

**MOLINO STEWART**  
ENVIRONMENT & NATURAL HAZARDS



**Australian Unity**

**266 Longueville Road, Lane Cove  
Ecological Impact Assessment**

*Final Report*







# **266 Longueville Road, Lane Cove Ecological Impact Assessment**

FINAL REPORT

for

Australian Unity

by

Molino Stewart Pty Ltd

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## DOCUMENT APPROVAL

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## 1 INTRODUCTION

### 1.1 INTRODUCTION

This ecological impact assessment is submitted to Lane Cove Council (Council) as supporting documentation for a development application (DA) for the seniors' housing development at 266 Longueville Road, Lane Cove.

The site comprises three parcels of land described as Lot 1 DP321353, Lot 1 DP1227921 and Lot 2 DP1227921.

This report builds on a previous assessment undertaken by Molino Stewart (2018) which ground-truthed a 'bushland line' for the subject site and an ecological impact assessment undertaken by Applied Ecology (2012) to support a planning proposal prepared by Council for the site.

### 1.2 LOCATION

The proposed development site is located on the eastern side of Longueville Road, between Richardson Street West and River Road West.

It covers an area of approximately 9,200 m<sup>2</sup> and is bounded by Longueville Road to the west, by adjacent private properties fronting Richardson Street West to the north, by a strata property to the south and by bushland owned by Council, the McMahons Road easement, Gore Creek and the Lane Cove Country Club to the east.

The subject property presently includes:

- a bitumen car parking area;
- two level areas, created by the placement of fill;
- two disused bowling greens;
- a small brick and weatherboard building in the south western corner of the site; and
- retained native vegetation at the front of the site and in the rear north-east corner.

The locality of the site is shown in Figure 1.

In 2013, a Planning Proposal was submitted by Council to rezone the subject site from RE1 Public Recreation to R4 High Density Residential. The adjacent to bushland to the east is zoned E2 Environmental Conservation (Figure 2).

### 1.3 THE PROPOSAL

The proposal is for the construction of a new Seniors Housing Development comprising 70 residential aged care beds, 82 independent living units (self-contained dwellings), associated facilities, new landscape works, car parking for 122 vehicles and site embellishments.

The proposal will comprise three interconnected buildings that are separated by landscaped communal open space and will be located above two levels of basement car parking. When viewed from Longueville Road, the proposal will present as a two storey building.

However, as the site falls substantially from the street to the rear boundary the buildings will vary in height from four to seven storeys (GSA 2017).

### 1.4 LEGISLATIVE CONTEXT

The *Biodiversity Conservation (BC) Act 2016* and *Regulation 2017* were enacted on 25 August 2017. The BC legislation replaces the *Threatened Species Conservation Act 1995* (TSC Act).

As the DA was lodged with Council on 10<sup>th</sup> August, 2017, this report assesses the threatened species impacts of the development in accordance with the previous legislative regime, including Section 5A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This report also considers relevant sections of Lane Cove Development Control Plan (DCP) 2009, particularly Part H – Bushland Protection.

The State Environmental Planning Policy No 19 - Bushland in Urban Areas (SEPP 19) applies to land in the Lane Cove Local Government Area. The aim of the policy is to protect bushland within urban areas identified in the SEPP. Specific aims of the policy are: protection of habitats for rare or native flora and fauna, protection of wildlife corridors and vegetation links with other bushland as well as the recreational potential of bushland.



Figure 1 Location of subject property

The majority of the development site is not identified in colour in the Land Adjoining Bushland Map in the DCP. However, the north-eastern and south-eastern corners of the site are located within an area identified in colour as “SEPP 19 bushland”.

Clause 9 of the SEPP applies to land which adjoins bushland zoned or reserved for public open space purposes. This clause states that a public authority shall not carry out development or grant development consent unless it has taken into account the following:

- (c) the need to retain any bushland on the land,
- (d) the effect of the proposed development on bushland zoned or reserved for public open space purposes and, in particular, on the erosion of soils, the siltation of streams and waterways and the spread of weeds and exotic plants within the bushland, and
- (e) any other matters which, in the opinion of the approving or consent authority, are relevant to the protection and preservation of bushland zoned or reserved for public open space purposes.

- provide an assessment of the potential direct and indirect impacts of the development on flora and fauna and their habitats, including consideration of the adjacent land zoned E2, and threatened species, populations and endangered ecological communities; and
- based upon the ecological assessment, adjust the eastern boundary setback if required.

This report also demonstrates how the development might be designed to avoid, minimise and mitigate any adverse ecological impacts that may result from the development.

A selection of site photographs is included in Figure 3, which show key elements and the current status of the site.

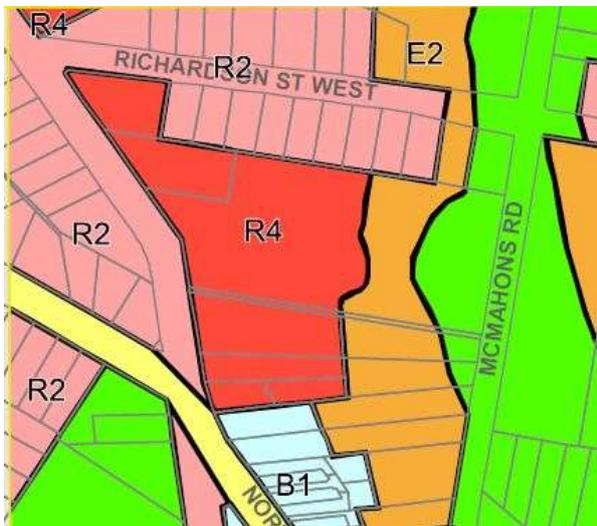


Figure 2 Land use zoning for the subject site and surrounds

## 1.5 PURPOSE OF THIS ASSESSMENT

Council has requested an assessment of the ecological impact to ensure that the development does not significantly impact flora and fauna on the site and on the adjacent land, zoned E2.

The purpose of this report is to:



*Figure 3 Photographs of the subject property showing vegetation and other relevant various features (see note below for details)*

Note: Area of batter at the eastern end of the old bowling green (top row left); transition to second level area (lower bowling green) in middle of site (top row middle and left); Remnant native vegetation and rock outcrops in the north-east (bottom row left); Weed infestation on filled area (bottom row middle) and Transition between placed fill in west of site and bushland area (bottom row right)



Figure 4 Footprint of proposed development

## 2 METHODOLOGY

This flora and fauna assessment was conducted in accordance with the following legislation:

- Part 4 of the NSW Environmental Planning & Assessment (EP&A) Act 1979;
- Threatened Species Conservation Act 1995; and
- Commonwealth Environmental Protection and Biodiversity Conservation (EPBC) Act 1999.

The Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities (DEC, 2004) facilitate informed decision making at the local scale for individual development activities with particular regard to: preliminary flora and fauna determination; and Assessment of Significance. The Guidelines were applied with the following objectives:

- Determining the threatened flora species recorded from the locality;
- Assessing the vascular flora species capable of being identified, searching for threatened flora species and to describe vegetation associations on site;
- Determining the threatened fauna species occurring or associated with the locality;
- Searching for threatened fauna species; and
- Assessing the habitat value of the site for threatened fauna species.

### 2.1 PERSONNEL

The flora and fauna and wildlife surveys and assessments were conducted by the following personnel, in accordance with the Office of Environment and Heritage (OEH) Scientific Licence and Department of Primary Industries (DPI) Animal Research Authority.

#### 2.1.1 Nimal Chandrasena

##### a) Qualifications

- B.Sc. (Hons.) Botany and Chemistry – University of Colombo, Sri Lanka;
- Ph.D. Plant Science – University of North Wales, Bangor, UK;

- Master of Science - Environmental Studies – University of New South Wales (UNSW).

##### b) Licences / Approvals

Scientific Licence Number SL100527 (issued under s132c, NPW Act, 1974).

##### c) Experience

More than 25 years of national and international experience in managing vegetation, weeds, catchments and waterways; Experience as Strategic Manager Natural Assets, Sydney Water (2000-2006) and 10 years as Principal Ecologist at Ecowise Australia, ALS Water Sciences and GHD (2007-2018). Contributions to major projects include assessing ecological impacts of developments on aquatic and terrestrial ecosystems; Environmental Impact Assessments of major projects (e.g. In the Sydney Basin; Rouse Hill Development; Northconnex, Badgerys Creek Airport, Northern Road Upgrade), and developing options for mitigation of impacts.

#### 2.1.2 Diane Campbell

##### a) Qualifications

- Bachelor of Science, University of Sydney;
- Biodiversity Assessment Method Accredited Assessor BAAS 17069, Biobanking Accredited Assessor No 240, Office of Environment and Heritage (OEH);
- Certificate IV in Contract Management.

##### b) Licences / Approvals

- Scientific Licence Number SL100527 (issued under s132c, NPW Act, 1974);
- Animal Research Authority and Animal Care and Ethics Committee approval (granted by the Director General and the Animal Care and Ethics Committee, Dept. Industry & Investment).

##### c) Experience

More than 25 years in state and local government natural resource management roles and 2.5 years in private environmental consultancy. Established and managed OEH Threatened Species Unit, Pittwater Council and Hornsby Councils' Natural Resources Branches.

## 2.2 BACKGROUND RESEARCH & DESKTOP SEARCHES

In completing the flora assessment, the following methods were applied:

- Review of previous studies completed for the site, in particular the *Flora, Fauna and Fungi Impact Assessment Ecology Report*, prepared for the subject site by Applied Ecology (2012) for Council;
- Review of the study report - *Arboricultural Impact Appraisal and Method Statement*, prepared by Naturally Trees (2017) for Australian Unity.
- Determination of threatened flora species, possibly located in the area by a desktop search of the BioNet Atlas (OEH, 2018);
- A search of records of species listed under the schedules of the Commonwealth EPBC Act, obtained using the protected matters search tool (<http://www.environment.gov.au/topics/about-us/legislation/environment-protection-and-biodiversity-conservation-act-1999/protected>); and
- Field-based, ground-truthing surveys of the subject land.

In completing the fauna assessment the following methods were applied:

- Review of previous studies of the area;
- Search of the BioNet Atlas for known occurrences of threatened fauna in the area;
- Observations of proxy evidence (scats, tracks, diggings); and
- Bat echo-locational survey.

On 9<sup>th</sup> August, 2018 Council provided Australian Unity with advice that Applied Ecology had revisited the subject site. The site visit determined that while there were some changes to the abundance and distribution of some flora species, particularly an increase in weed species' abundance. However, site conditions were essentially the same. As such, Molino Stewart concluded that the findings of the 2012 report are still valid (the Applied Ecology letter is attached in Appendix A).

As such, this ecological impact assessment relies on the *Flora, Fauna and Fungi Impact*

*Assessment Ecology Report* for the habitat assessment, in-depth field surveys to determine flora and fauna present, and the documentation of the existing environment, which has been supplemented by limited field work, undertaken by Molino Stewart, as documented below.

## 2.3 HABITAT ASSESSMENT

The habitat assessment focussed on recording the following features:

- The presence of mature trees with hollows, fissures and/or other suitable shelter, roosting/nesting places for arboreal fauna;
- Areas of dense vegetation;
- The presence of hollow logs/debris and areas of dense leaf litter;
- The presence of fruiting flora species;
- Vegetation connectivity and proximity to neighbouring areas of intact vegetation;
- The presence of man-made structures that may be suitable for bat roost sites; and
- The presence of bulky nests, which may belong to raptors.

Particular attention was paid to searching for scats, tracks or other signs of fauna activity.

## 2.4 FIELD SURVEYS

Field surveys were undertaken by Molino Stewart on the following dates:

- An initial site inspection was undertaken by Shireen Baguley, Principal and Diane Campbell, Senior Ecologist, on 15<sup>th</sup> of November, 2017 with the following objectives:
  - Examine the vegetation, topography and natural features of the subject and adjacent site; and
  - Ground truthing to establish the bushland demarcation line, in relation to these lots and the site's features.
- A second site inspection was undertaken by Senior Ecologists - Diane Campbell and Nimal Chandrasena on the 15<sup>th</sup> of August, 2018. The objectives of this were to:

- Examine and confirm the vegetation , topography and natural features of the subject and adjacent site; and
- Consider habitat features of the site and potential impacts from the proposed development.

The weather conditions were warm and sunny on both days.

#### 2.4.1 Flora Assessment

The property contains modified native and exotic vegetation in surrounding the existing dwelling and un-managed vegetation towards the eastern boundary. A random meander walk through survey was conducted, around the areas of retained vegetation, the perimeter of the footprint of the proposed development, and the immediately adjacent bushland remnant, likely to be affected by the development, to assess the likelihood of occurrence of any threatened flora and how adverse impacts might be avoided.

#### 2.4.2 Fauna Survey

The subject property adjoins areas of un-managed native and exotic vegetation within the E2 Zone to the east and may provide suitable habitat for a number native fauna.

Given the advice from Council regarding the Applied Ecology assessment, and the findings of the desktop searches, the following techniques were applied in the fauna survey.

##### a) Anabat Survey

An Anabat echo-locational detector was positioned within a potential flyway and remained operating for six nights to record micro-bat activity within the subject site (Figure 5). Data obtained was processed using the AnaLook W software. The method followed the draft recommended standards for assessing insectivorous bats using bat detectors (Australasian Bat Society, n.d.).

##### b) Trapping

Following the recommendations for Wildlife Surveys provided by the Animal Research Review Panel (ARRP, 2008), it was determined that trapping would not be warranted for the fauna survey.

## 2.5 LIMITATIONS

### 2.5.1 Limitations of the flora survey

The flora survey was completed over two half days, based on the advice from Council that the Applied Ecology assessment findings remained valid. As such, it was determined a full site assessment was not required.

Nevertheless, reasonable attempts were made to discern the vascular flora present during the two field visits. However, there is no assurance that other threatened species or communities are not present on the site.

### 2.5.2 Limitations of the fauna survey

The fauna survey was limited to the above, based on the advice from Council that the Applied Ecology assessment findings remained valid.

Additionally, as many faunal species are cryptic and/or nocturnal and/or wide-ranging and mobile, they are unlikely to be detected even during seasonal surveys. The fauna assessment is, accordingly, largely an assessment of the potential of the subject site as habitat for various fauna species.

With the exception of species that have been definitely recorded from the site, there is no certainty as to the presence or absence of the species discussed. Therefore, it is important to adopt the precautionary principle such that it is assumed that any threatened species is likely to occur at the site, if suitable habitat exists.



## 3 PREVIOUS STUDIES

### 3.1 FLORA, FAUNA AND FUNGI IMPACT ASSESSMENT (2012)

The Council had some years ago recognised a need for seniors housing in the local area and had identified the subject site as suitable for such a facility. To facilitate redevelopment on the site, Council submitted a Planning Proposal in 2013 to rezone the Council-owned land from RE1 Public Recreation to R4 High Density Residential.

As part of this Planning Proposal, a range of specialist studies were commissioned. This included the *Flora, Fauna and Fungi Impact Assessment Ecology Report* (Applied Ecology, 2012). The key outputs of the flora, fauna and fungi assessment included the following:

- A review of any existing literature and information available for the development site and the general locality to determine issues for consideration;
- A flora survey, identifying species and vegetation communities present at the development site and, on adjacent sites;
- A fauna survey, identifying species present at the subject site and, on the adjacent bushland remnant sites;
- A fungi survey, identifying species present on the subject site and, on the adjacent bushland remnant sites;
- An assessment of the conservation value of the species and communities recorded or identified with the potential to occur on the subject site; this included an assessment of the condition of vegetation communities and the value of the subject site as potential or actual fauna habitat;
- An analysis of the likely significance of the ecological impacts of a future residential development, in accordance with Commonwealth and State legislation requirements and local guidelines; and
- The identification of specific measures that may be incorporated into the design of any future development to ameliorate any likely adverse impacts upon the

native flora and fauna on in the immediate area.

#### 3.1.1 Summary of Findings of Habitat and Conservation Value

##### a) Flora and Vegetation Communities

The underlying geology of the survey site is Hawkesbury Sandstone. The sandstone produces sandy, stony soils, which dry out readily and tend to be associated with steeper slopes and rock outcrops. Additional influences are present include Wianamatta shales, which produce deeper and more fertile clay soils. The result is sandy loam soils, with varying fertility, some rock outcrops and a range of water holding capacities. This gives rise to a mosaic of microclimate conditions that supports a diverse array of plants, animals and fungi under normal, undisturbed conditions.

The vegetation in the bushland sections of the survey site was mapped as Coastal Enriched Sandstone Moist Forest (SMCMA & DECCW, 2009 in Applied Ecology 2012) (see Figure 6).

It was found that some parts of the Coastal Enriched Sandstone Moist Forest (CESMF) vegetation were in very good condition, while others were highly degraded. Taking into consideration site features, the site and the surrounding environment have been split into seven vegetation zones, as shown in Figure 7, for ease of description.

##### i) Zone 1 to Zone 3

Vegetation in Zones 1, 2 and 3 (Figure 7) comprise almost entirely of exotic species, dominated by lantana (*Lantana camara*), and several other environmental weeds. These invasive species have the capacity to invade bushlands and colonise disturbed areas.

This part of the property has a long history of degrading processes. Constructed as bowling greens, most of the area was reshaped; compacted; replanted; regularly fertilised; and species present were controlled or managed by mowing or pruning. The few native species present in the canopy and mid-storey layers have been retained for shading and screening purposes, or planted for aesthetic value, during the period of active management. More recently, the bowling green areas have fallen

into disuse, due to lack of mowing, which has led to colonisation by various invasive exotic species that have the potential to spread into the adjoining bushland areas.

Several large eucalypts (*Eucalyptus* spp.) exist towards the front edge of the property; these have ecological values, providing potential habitat for birds and arboreal marsupials, as well as their food sources. The individual trees, however, are disconnected from the main bushland areas, located at the lower end of the property, where there is more suitable feeding and roosting habitat present.

Apart from this, there is no ecological value in this front part of the site. Instead, it provides a constant source of invasive weed propagules in an area where the topography encourages dispersal from above, to the bushland remnant, Zone E2 below (see Figure 2).

The current policy of minimalist management – mowing grassed open space, leave the rest - does little to reduce these impacts.

#### **ii) Zone 4 and Zone 5**

Below the bowling greens, the land slopes away steeply to the east, towards the golf course. On the northern edge of the middle green, the slope is less steep, and the site is bordered by a fence line and adjacent, fully-detached residential properties. Several of the properties have rear access that leads to the bushland area, at the back.

Vegetation on this part of the site includes a significant number of mature eucalypts with extensive canopies. The mid-storey layer comprises a mixture of native and exotic species, with exotic flora (mainly, lantana) tending to dominate. Floral diversity in this layer is lowest in the northern bushland section (Zone 4), while bush regeneration activities and weed control in the eastern section (Zone 5) have reduced the dominance of many exotic species, helping to retain the native flora species richness.

The groundcover species are predominantly exotic throughout the site, attributed to the previous land uses and disturbances, although there is a greater diversity of native species in the eastern section.

Large and mature eucalypt canopy trees provide good feeding and roosting habitat for several bird species. The contiguous shrub layer of dense lantana scrub, provide a relatively safe feeding habitat for a plentiful population of ringtail possums, which in turn provide a preferred food source for the threatened Powerful Owl. This part of the site was concluded to be important feeding habitat for owls that breed and roost in nearby Lane Cove Bushland Reserve.

#### **iii) Zone 6 and Zone 7**

The bushland below adjoining properties, zoned as Coastal Enriched Sandstone Moist Forest (CESMF) (see Figure 6) has been targeted for weed control activities associated with bush regeneration. Although there are still abundant weeds, as a result of management activities, the native plant cover is higher in Zone 6, and native plant diversity is also greater in this zone than elsewhere on the site. In contrast, the road easement (Zone 7) is predominantly vegetated with environmental weeds.

Native flora species richness is highest in Zone 6, with a total of 61 species of native plants recorded in this zone. In contrast, the vegetation in the McMahons Road easement (Zone 7) is predominantly weeds, and has a low diversity of native plant species.

The bushland in Zone 6 consists of a diverse suite of native canopy, shrub and groundcover species, which are important resources for food, shelter and general habitat for a range of animals. A dense leaf litter layer, fallen logs and some rock outcrops increase the diversity of microhabitats available.

Key elements of the zones' habitat and conservation value are the diversity of habitat and the source of native plant propagules for recolonization of the adjoining bushland corridor areas. Effective management of more degraded bushland areas nearby, including the McMahons Road easement (Zone 7) have been reported as important for maintaining the quality of this bushland patch (Applied Ecology, 2012).



Figure 6 Vegetation mapping for the subject site

(Source: Applied Ecology, 2012)



Figure 7 Location of vegetation zones for survey site at 266 Longueville Rd, Lane Cove and adjoining properties

(Source: Applied Ecology, 2012)

## b) Fauna

A total of six bird species were recorded in fauna surveys. There was anecdotal evidence indicates that the threatened Powerful Owl (*Ninox strenua*) was nesting in nearby bushland at the Lane Cove Bushland Park and would potentially use the subject site for foraging. In addition, six species of lizard were recorded and three species of frogs.

Five species of mammals were recorded, with the Grey-headed Flying-fox being the only one of these listed under the TSC Act.

The Grey-headed Flying Foxes were observed feeding in the canopy of several trees on site. The favourite food of the Grey-headed Flying-fox is the nectar and pollen of eucalypts and other native trees, such as paperbarks and banksias, a number of which were recorded on the survey site.

A comparatively low number of bird species was recorded on site, with small birds notably absent. This may be due to the lower density of the shrub layer under the dominant canopy. Another impacting factor may be the proximity of the golf course, immediately adjoining the bushland patch. Numerous golf balls were found on site, and golf balls, as projectiles, may discourage smaller birds from using the area. Predation is not a major issue, as evidenced by the numbers and diversity of lizards recorded.

Several species of frogs were also recorded (by chorus attendance) responding to rain.

## c) Fungi

The nearby Lane Cove Bushland Park is the site of the only fungal community listed as an Endangered Ecological Community (EEC) in Australia (NSW Scientific committee, 2014). This community currently includes nine Hygrocybeae species, individually listed as threatened, and several other fungal species await proper description before they can be listed as threatened.

The majority of the fungal species occur in the warm temperate gallery rainforest centred on the banks of the north-eastern arm of Gore Creek and its tributaries.

Key aspects of the preferred habitat for the Hygrocybeae fungi of the Lane Cove Bushland

Park are absent from the site at 266 Longueville Road. While the timing of the fungal survey was not ideal for locating macrofungi fruiting bodies, the absence of suitable substrate conditions suggest that it is unlikely for members of the Hygrocybeae community to be found on this site.

Fungal surveys were conducted following several days of rain in the area, increasing the likelihood of production of fungal fruiting bodies. A total of 22 species were recorded from a range of fungal groups. Many of these produce fruiting bodies in the few days following rain, and would not have been recorded at other times.

### 3.1.2 Flora, Fauna and Fungi Impact Assessment Ecology Report Update (2018)

On 9<sup>th</sup> August, 2018 Council provided Australian Unity with advice that Applied Ecology had revisited the subject site. The site visit determined that while there were some changes to the abundance and distribution of a few flora species,

This was particularly true for the extent of the vast bushes of lantana (see Figure 3), and an increase in the abundance of other weed species. Apart from weed abundance, site conditions were essentially the same as had been previously documented.

A desktop review of threatened species also revealed no new records nearby that would impact on the findings of the original report.

However, there had been an increase in the number of Powerful Owl sightings in the general area of the site (Applied ecology, 2012). Despite this observation, our conclusion was that the finding of the 2012 report are still valid, provided the extent of the development proposal and associated works is confined to the highly modified areas of the site and mitigation measures recommended are implemented (letter attached in **Appendix A**).

## 3.2 GROUND-TRUTHING OF BUSHLAND LINE

Molino Stewart conducted an assessment of the 'bushland line' (see Figure 7) in November, 2017 and documented our findings in a letter

report (refer **Appendix B**). This assessment found that the topography and natural features within the E2 zone (see Figure 2) to the **east** of the 'bushland ground-truthing line' (see Figure 4) have not been significantly modified as part of the historical land uses. To the east of this line, there is little to no introduced fill soil and the area contains vegetation, which is a remainder of the natural vegetation of the land. Based on the floristics and structure, this natural vegetation is considered a remnant of the CESMF community, although it is in a relatively poor condition, due to historical disturbances.

The area within the E2 Zone (see Figure 2), to the **west** of the 'bushland ground-truthing line' contains vegetation that has established on the introduced fill. This vegetation is significantly different from the natural vegetation of the E2 Zone, and is not representative in terms of the structure and floristics of the natural vegetation. The ground cover and understory species in the filled areas are predominantly exotic and there are very few canopy species within this zone that are naturally occurring.

The topography also has been significantly modified as a result of the historical filling that has taken place. Historical clearing and land use appears to have caused the loss of remnant vegetation in this area. The presence of this introduced fill also makes it highly unlikely that this section would be a seed bank representative of the remnant vegetation within the E2 Zone (Molino Stewart, 2018).

## 4 ASSESSMENTS AND SURVEYS - UPDATE

### 4.1 THREATENED SPECIES ASSESSMENT

The background search of the BioNet Atlas of NSW Wildlife (NPWS, 2015) and the EPBC Act using the Protected Matters Search Tool indicated 47 records of threatened flora occurring within 10 km of the subject site (see **Appendix C** – Table 3).

The searches identified 82 fauna species within 10 km of the property. This was reduced, after consideration of the habitat on the property. The results of this preliminary assessment of the potential for the subject property to contain habitat for threatened flora and fauna is provided in **Appendix C**.

Targeted surveys were conducted for all species predicted to occur, based on available habitat. The previous detailed site survey (Applied Ecology, 2012) was used as a guide for the species presence and absence, together with ground-truthing of habitat and vegetation community and condition, undertaken through random meander during two site visits. Fauna were opportunistically assessed, based on existing information, and the Anabat Echolocation detector was deployed for seven nights in early August 2018.

### 4.2 SITE SURVEY

A total of 109 flora species were recorded during the random meander walk-through surveys of the subject site. Of these, 74 were exotic and/or introduced plants, and many are weeds (which are colonising plants, inhabiting disturbed sites). The lists of all species identified during the flora and fauna survey are included in **Appendix D**.

The majority of the plants in the eastern portion of the site are native species, while a large number of exotic species dominate the disturbed areas surrounding the existing dwelling and the disused bowling greens. The vegetation at the subject site was noted as providing a range of habitat, shelter and food

sources, supporting a variety of avifauna, reptiles and small mammals.

### 4.3 VEGETATION COMMUNITY DESCRIPTIONS

The vegetation communities present on the property or surrounding land were described with reference to the OEH Plant Community Type vegetation categories for the Sydney Metropolitan CMA as part of the OEH Vegetation Information System classification scheme Version 3.0 (NSW OEH, 2016, (<http://www.environment.nsw.gov.au/research/Visclassification.htm>)). This is based on the overstorey species present, characteristic shrub and small trees and the extent of native ground cover.

The vegetation community on the eastern part of the site was confirmed as Coastal Enriched Sandstone Moist Forest – Plant Community Type 1841 associated with Hawkesbury sandstone rock outcrops, being consistent with the profile for the community and the positive diagnostic species (OEH, 2016).

Tree canopy on the site is dominated by Blackbutt (*Eucalyptus pilularis*) with Smooth-barked Apple (*Angophora costata*) and Turpentine (*Syncarpia glomulifera*) present. Native understorey small tree and shrub species include Forest Oak (*Allocasuarina torulosa*) Sweet Pittosporum (*Pittosporum undulatum*), Mock Olive (*Notolaea longifolia*). Ground covers include Spiny Matrush (*Lomandra longifolia*) and Sword Sedge (*Lepidosperma laterale*).

The vegetation condition was heavily impacted on the upper slope edge by weed invasion associated with the fill slope. Within the bushland remnant, invasion by Large and Small – leaved Privet (*Ligustrum lucidum* and *L. sinense*) dominates the understorey.

#### 4.3.1 Threatened Ecological Communities

No threatened ecological communities were recorded on the site.

The Hygrocybeae Community of Land Cove Bushland Park, a Critically Endangered Ecological Community (CEEC), is known from a nearby gully system to the east of the subject site. However, this community was not located

during the recent site surveys by Molino Stewart Ecologists, or previously, by Applied Ecology (2012).

The previous survey, conducted by Applied Ecology (2012), discussed the potential presence of Blue Gum High Forest Critically Endangered Ecological Community (CEEC) on the subject site; however, there was no evidence of a dominant, contiguous canopy of the community, formed by *Eucalyptus saligna*, as the dominant species. It was noted that this canopy Eucalypt species commonly occurs also within the CESMF.

Although CEEC may be present south of the subject site, this aspect was not investigated further, as part of the current survey.

#### 4.4 NATIVE FAUNA

A total of five microbat species were identified on the site in the current survey:

- Two species were identified as definite - White-striped Free-tailed Bat (*Austronomus australis*) and Gould's Wattlebat (*Chalinolobus gouldii*) were identified as definite;
- Three species were identified as probable - *C. gouldii* / *Mormopterus* species, Eastern Bentwing Bat (*Miniopterus schreibersii* (= *orianae*) *oceanensis*) / Southern Forest Bat (*Vespadelus regulus*) and Eastern Forest Bat (*Vespadelus pumilus*) / Little Bentwing Bat (*Miniopterus australis*); and
- One unknown species was observed.

Decorticating bark and hollow bearing trees provide potential roosting sites for a number of the species. The site also contains foraging habitat.

Of the species recorded, two are listed as Vulnerable in NSW, including Eastern Bentwing Bat and Little Bentwing Bat. Seven part-tests have been prepared for these and as well a number of threatened microbat species with the potential to occur at the site.

The current survey recorded scratch marks of arboreal mammals, consistent with the findings of the previous survey.

Previous surveys recorded six species of native birds, including Australian Magpie, Grey Butcherbird, Kookaburra, Little Wattlebird, Noisy Miner and Rainbow Lorikeet; six species of reptiles, including Eastern Blue-tongue Lizard and skinks; three species of frogs, including Common Froglet, Brown Toadlet and Eastern Banjo Frog; four species of native mammals, including Common Brushtail Possum, Common Ringtail Possum, Grey-headed Flying-fox and Gould Wattlebat. Grey-headed Flying-fox is listed as a Vulnerable species in NSW.

#### 4.5 THREATENED SPECIES AND POPULATIONS

##### 4.5.1 Flora

No threatened species of flora were located in the site in any of the surveys.

##### 4.5.2 Fauna

###### a) Other threatened species

No other threatened fauna were recorded during the survey.

##### 4.5.3 Fungi

No threatened species of fungi were located in the site in any of the surveys.

#### 4.6 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Under the EPBC Act, a person must not, without an approval under the Act, take an action that has or will have, or is likely to have, a significant impact on a matter of National Environmental Significance (NES). These matters are listed as:

- The world heritage values of a declared World Heritage property;
- The ecological character of a declared Ramsar wetland;
- A threatened species or endangered community listed under the Act;
- A migratory species listed under the Act; or

- The environment in a Commonwealth marine area or on Commonwealth land.

The EPBC Act does not require Commonwealth approval for the redevelopment of the site property. It does, however, suggest that when considering a development proposal, planning authorities should consider whether to allow actions that could significantly affect NES matters or the environment of Commonwealth land.

Matters of NES in NSW are:

- Declared World Heritage Areas;
- Declared Ramsar Wetlands;
- Listed threatened species under the EPBC Act;
- Listed ecological communities under the EPBC Act; or
- Migratory species listed in the China Australia Migratory Bird Agreement (CAMBA), Japan Australia Migratory Bird Agreement (JAMBA) and Republic of Korea Australia Migratory Bird Agreement (ROKAMBA).

#### a) Site Assessment

Commonwealth assessment is required for proposed activities on the site if they affect any matter of NES. The subject site is not a Declared World Heritage Area; nor does it contain or is adjacent to any Declared Ramsar Wetlands.

The Grey-headed Flying-fox is listed as a Vulnerable species under the EPBC Act and an assessment of significance has been undertaken in accordance with EPBC criteria in **Appendix E**.

#### b) Migratory Birds

No CAMBA, JAMBA or ROKAMBA species are known to occur at the site. The development is removed from any waterbodies; hence, the proposed development is unlikely to have a significant impact on any CAMBA, JAMBA or ROKAMBA species should any migratory species arrive in the local area.

#### c) Koala Habitat Assessment

No records of sighting of koalas have been recorded within the immediate area and the surrounding properties do not provide any suitable habitat for this species.

There is limited koala habitat in the residential area with high value habitat present within the area, to the east of the subject site. No further assessment is required.

#### d) Summary

In light of the considerations discussed above, Commonwealth assessment is required for the Grey-headed Flying-fox as part of the proposed development of this property. The proposed development will not clear substantial habitat for this species with its footprint being largely within the previously disturbed and cleared area.

The assessment under the EPBC Act for the Grey-headed Flying-fox concludes that the impact of the proposed development will not be significant and consequently a referral under the EPBC Act is not required.

## 4.7 HABITAT CONNECTIVITY

Whilst in a highly urban setting, the land on the eastern side of the site has connectivity with remnant bushland to the immediate north and south of the property that extends the length of the adjoining Lane Cove Country Club, which also contains canopy trees along Gore Creek corridor. This contiguous vegetation forms a linkage with remnant bushland in Lane Cove Bushland Park to the east.

Table 1 Assessment of Habitat Features of Subject Site

Feature	Assessment
<i>The presence of mature trees with hollows, fissures and/or other suitable Roosting/nesting places</i>	Likely to be present in forest vegetation on the eastern part of the site; large hollow in the mature <i>Eucalyptus globoidea</i> on the west of the property near Longueville Road.
<i>The presence of Koala food trees</i>	One of the feed tree species <i>Eucalyptus haemastoma</i> listed in Schedule 2 of SEPP 44 – Koala Habitat Protection. This tree is to be retained. However, Lane Cove is not listed in the SEPP as being a local government area where the SEPP applies.
<i>The presence of caves or hollows suitable for Molossidæ species</i>	Absent on subject property, sandstone boulders are present in the eastern part of the site near the steep slope.
<i>The presence of Petauridæ feeding scars</i>	No evidence of feeding scars was observed.
<i>Areas of dense vegetation.</i>	Areas of dense vegetation occur to the east of the bowling greens and continue on adjoining lands to the north and south.
<i>Presence of hollow logs/debris and areas of dense leaf litter</i>	Hollow logs are not abundant, debris is present, however weed infestation obscures any fallen timber.
<i>Presence of fruiting flora species</i>	Mock Olive ( <i>Notolea longifolia</i> ), <i>Pittsoporum undulatum</i> and Blueberry Ash ( <i>Elaeocarpus reticulatus</i> ) provide food resources for fauna species
<i>Presence of blossoming flora species, particularly winter-flowering species</i>	Eucalypts and Angophoras present within the forest community along the vegetation on the east of the site provide blossom and winter-flowering resources.
<i>Vegetation connectivity and proximity to neighbouring areas of intact vegetation</i>	Good connectivity along the eastern part of the site towards the north and south of the site along the vegetation Gore Creek to the east and a public reserve to the southeast.
<i>Presence of caves and man-made structures that may be suitable for Microchiropteran bat roost sites</i>	Existing buildings were currently closed but not derelict. These are unlikely to provide habitat for micro-bat species. No other structures or caves are present on the development property.
<i>Presence of bulky nests which may belong to raptors</i>	Absent, no bulky nests were observed in the local area.

## 5 IMPACT ASSESSMENT

In preparing this impact assessment, Molino Stewart has considered the *Lane Cove Development Control Plan (DCP) Part H – Bushland Protection*, SEPP 19 and documentation related to the Longueville Road Seniors Living Village Project, particularly those relating to the bushland floristic assessments and ‘bushland delineation line’.

The Lane Cove DCP dictionary defines bushland to mean:

*“...land (private or public) on which there is vegetation which is either a remainder of the natural vegetation of the land or, if altered, is still representative in part of the structure and floristics of the natural vegetation and which contains topographic and natural features...”*

The *State Environmental Planning Policy No 19 - Bushland in Urban Areas* (SEPP 19) defines bushland to mean:

*“...land on which there is vegetation which is either a remainder of the natural vegetation of the land or, if altered, is still representative of the structure and floristics of the natural vegetation...”*

As evident in the building footprint for the proposed development, the project site is limited to the area that has been historically filled and occupied by the disused bowling greens. This area and its immediate surroundings, have extensive stands of lantana mixed with a vast array of weed species (see **Appendix C** - Table 5), which include scrambler vines, shrubs and groundcover forbs. In addition to weeds, the area also has several and perennial grasses that were once used in the bowling greens.

Consistent with the Council surveyed line and Molino Stewart’s findings (letter report May 2018 – see **Appendix B**), for the purposes of this development and its impact assessment, the ‘bushland delineation line’ is established as the western extent of the ‘bushland’ area.

This means that the ‘bushland’ commences at the Council-defined ground-truthing line, located within the E2 Zone, and extends east

down the sloped hill to the eastern boundary of the E2 zone (see Figure 2 and Figure 4).

According to the Lane Cove DCP, a buffer means:

*“...that part of the site which is a transition between the bushland and the building/s. (Bush)...”*

Based on Clause 3.5.2 of the Lane Cove DCP for residential buildings, the proposal on the subject site is to have a minimum setback of nine metres from the vegetation to the east, in order to reduce environmental impacts on the neighbouring vegetation. The buffer area is shown on the site plan (Figure 4) and in the cross-section below (Figure 8). A buffer area of between nine metres and approximately 25m is achieved on the site.

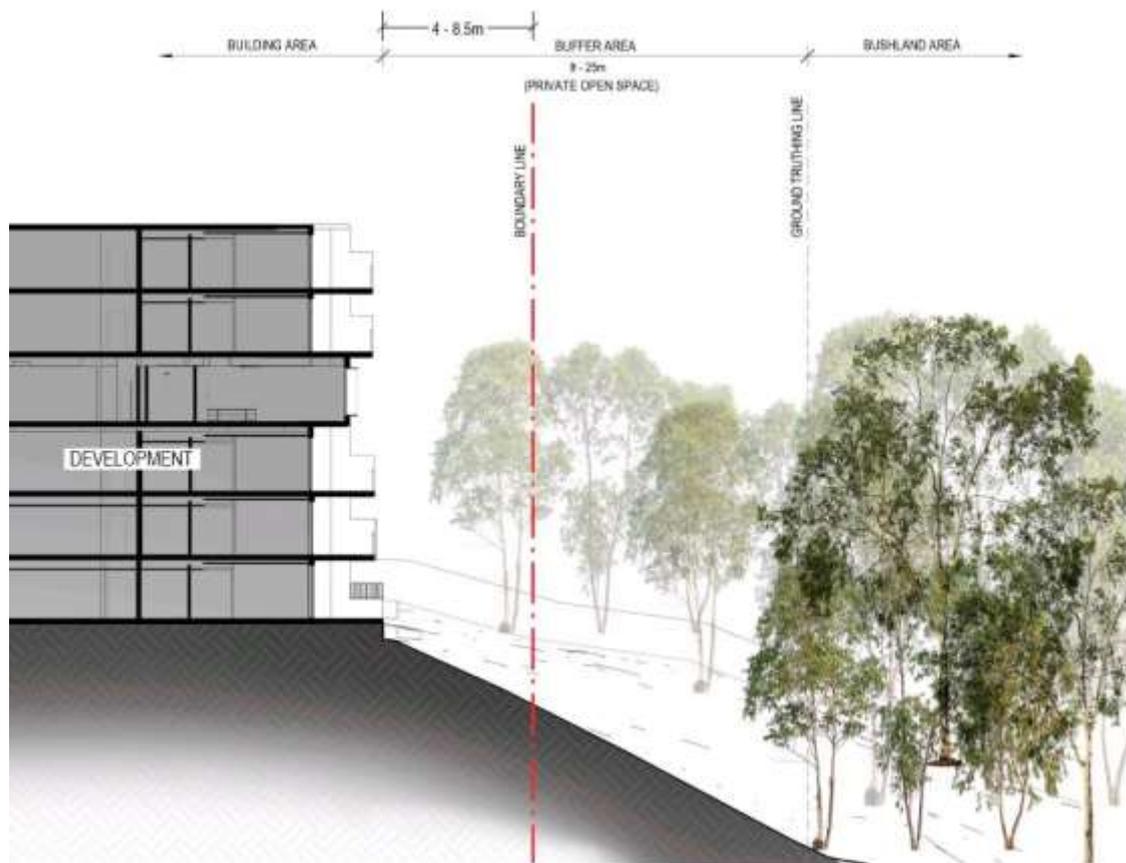


Figure 8 Section view of site area

## 5.1 DIRECT IMPACTS

A direct positive impact of the proposed development would be the removal of a significant source of weed propagules that are currently impacting the bushland on site.

Key threats for threatened species and endangered or other ecological communities include the following

- Reduction in food resources for Powerful Owls by affecting numbers of ringtail possums, or reducing feeding, roosting and breeding habitat for ringtail possums and increasing predation by domestic cats in the area. This has been identified as a key threat for this species.
- Reduction in food resources for Grey-headed Flying Foxes by reducing the quality and/or extent of bushland in the area. This has been identified as a key threatening process for this species.
- Reduction in floristic diversity in *Coastal Enriched Sandstone Moist Forest* (CESMF) in the area by clearing or changing conditions in surrounding areas.
- Reduction in extent of good quality vegetation in CESMF through invasion of weed species.
- Reduction in condition of CESMF through runoff from proposed development site.
- Reduction in condition of CESMF through water and soil erosion and sediment deposition during building on proposed development site.

Mitigation measures need to be considered for the above.

The following aspects have the potential to directly adversely affect the local biodiversity, as part of the development proposal:

- Loss of vegetation and associated habitat;
- Disruption to connectivity; and
- Injury and mortality to wildlife.

### 5.1.1 Loss of vegetation / habitat

Clearing for the proposal development will involve the removal of some native and exotic vegetation for the building footprint.

As given in the arborist report and associated maps (Naturally Trees, 2017), adopted by the landscape design planning (see T&B Tree Removal and Retention Plan Maps, 2018), only a few trees are to be removed from the site. These include a few native trees, dead trees and exotic species, as listed below:

- *Acacia parramattensis* (Tree No. 9)
- *Cotoneaster* sp. (Tree No. 10)
- *Eucalyptus globoidea* (Tree No. 11)
- *Euphorbia tirucalli* (Tree No. 12)
- *Chaemaecyparis* sp. (Tree No. 13)
- *Ligustrum* spp. (Tree Nos. 17,18 and 29)\*
- *Solanum mauritianum* (Tree No. 24)\*
- Unknown species (Tree No. 94)

\* Exotic, invasive species

The removal of the above native vegetation from the proposal site, particularly, the large *Eucalyptus globoidea* tree with hollows present which is located in the front section of the subject site, has the potential to reduce habitat for micro-bat species detected as part of the Anabat survey. This vegetation may also provide occasional food resources for avifauna, arboreal mammals and other species.

The vegetation around the back of the subject site (Figure 6 - Zones 4 and 5) will require management to protect the existing native vegetation. Minor clearing of exotic and native species is also required in this area. Within the rest of the subject site, stands of remnant trees are being retained.

The existing extent of the CESMF remnant vegetation will also be retained; as will the existing trees on the E2 Zone boundary and tree protection zones (refer to Map in Taylor-Brammer, 2018). Vegetation management in this E2 Zone area may have to be undertaken separately to protect and enhance the remnant's quality and condition in this area.

### 5.1.2 Connectivity

As detailed in Section 3 and Section 4, the E2 Zone to the rear and below the development site, which has been identified as CESMF vegetation community, has high value connectivity with areas of native vegetation within the remnant bushland corridor of the Gore Creek.

The proposed development will not impact significantly on the existing connectivity with areas of native vegetation. However, to improve connectivity, positive management should be a part of a biodiversity and vegetation management plan (BVMP) and the landscaping plan.

Measures should include removing the exotic species currently infesting the bushland remnant from propagules arising from the areas of vegetation on the subject site. These include lantana, Asparagus fern, several vines and scramblers, including Madeira vine and Turkey rhubarb, as well as several perennial grasses, such as kikuyu grass and buffalo grass, which are abundant on the development site.

A well-managed bushcare program, using bush regeneration techniques to enhance the quality of the remnant, and the use of indigenous, locally-abundant species in landscape plantings, is recommended.

This will not only improve the native vegetation connectivity, but also add considerable ecological and aesthetic values to the surrounding environment of the development.

### 5.1.3 Injury and mortality to wildlife

Given the vast stands of mature lantana and associated exotic vegetation, which has been on the site, undisturbed for a long period, there can be little doubt that the site will be home to many fauna, particularly reptiles, birds and small mammals.

This fauna could be adversely impacted by the development's construction activities, unless it is protected and allowed to re-locate to nearby, suitable habitat.

Prior to the commencement of any vegetation clearing, the areas should be assessed for potential fauna. As part of this pre-clearance assessment, a protocol should be established

for the capture and relocation of any fauna to avoid harm or injury to wildlife.

This protocol should be developed in consultation with an experienced fauna spotter and/or ecologists and may also involve obtaining input from wildlife service organisations.

### 5.1.4 Impact to Threatened species

The 7 part test for the Assessment of Significance (AoS) was completed for all threatened species that:

- have been recorded within the general area, or
- based on the field work in this and previous studies and a desktop assessment were predicted to use the existing habitat on the property.

The AoS are provided in **Appendix E** for:

- Grey-headed Flying Fox;
- Powerful Owl;
- Glossy Black-cockatoo;
- Micro-bats (Eastern Bentwing Bat, Little Bentwing-bat, Yellow-bellied Sheath-tail-bat, Eastern Freetail-bat, Southern Myotis, Greater Broad-nosed Bat);
- *Camarophylloopsis kearneyi* (a Basidiomycota fungus); and
- Hygrocybeae Fungal Community of the Lane Cove Bushland Park in the Sydney Basin Bioregion – a Critically Endangered Ecological Community.

No threatened species are likely to be significantly impacted by the proposed development and that suitable habitat is being retained or will be provided within the areas of the subject site that are identified for future revegetation measures.

Additionally, the removal of extensive weed infestations from the site and bush regeneration work within the adjacent E2 zone area will have a positive impact on habitat for the threatened species present or potentially present in the local area.

## 5.2 KEY THREATENING PROCESSES

A threat may be listed as a key threatening process (KTP) under the TSC Act if it: (a) adversely affects threatened species, populations of a species or ecological communities; (b) could cause species, populations of a species or ecological communities to become threatened.

Key threatening processes are managed under the Biodiversity Conservation Program or with threat abatement plans under the *Saving our Species* program.

The proposal is likely to trigger a number of KTPs. Those that are directly relevant to assessing the impacts of this proposal are described in Table 2 with comments.

In assessing the impact of potential KTPs, various site-specific factors must be considered in relation to the habitat of the threatened species, endangered population and the ecological community, identified as having the potential to occur (see Table 2 – **Appendix C**). Amelioration measures are required to offset the potential impacts for these, as well as the KTPs, as discussed in Table 2.

The proposed vegetation clearing will remove some shelter habitat for native fauna that occur within the previously-landscaped, now dis-used areas on the site.

Although much of the vegetation on the site will be cleared, the threatened species identified are not likely to be at any risk of extinction within the local area in the long term. Most species are likely to move throughout the adjoining properties, as part of a larger home range for foraging and breeding activities.

The CESMF vegetation on the eastern side of the subject site is currently poorly managed, as evident by weed invasions, erosion and other disturbances. However, this remnant has highly significant conservation values and habitat value, as part of the vegetation corridor, associated with the Gore Creek.

Although the subject land has been substantially modified by its historical land use, the proposal requires the clearing of several large native trees, along with the vast lantana scrub and exotic trees and shrubs.

Clearing of any area of native vegetation is likely to have an impact upon the biological diversity of a locality.

Clearing of the subject site has a high likelihood of causing further spread of weedy species, including lantana, privets, asparagus fern, and scramblers, such as Madeira Vine and Moth Vine.

The risk of spread is also high for perennial, exotic grasses, which have been used in the bowling greens, through fragmentation of rhizomes, stolons and runners.

Positive management of the existing tall-canopy and mid-stratum native trees, shrubs and other understorey and groundcover species should be part of a future Vegetation and Biodiversity Management Plan, with careful consideration for the issues identified in Table 2, to mitigate the impacts of Key Threatening Processes.

The Vegetation and Biodiversity Plan should take into account the tree protection and removal advice provided by the arborists report (Natural Trees, 2017).

The principles and approaches for re-vegetation planning, including compensatory plantings and tree protection, combined with biodiversity management, should complement the proposal's landscaping plan, (see Taylor-Brammer, 2018).

Table 2 Relevant Key Threatening Processes, Likely Impacts and Comments

Relevant Key Threatening Processes	Comments
<p><i>Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners, Manorina melanocephala</i></p>	<p>Residential developments attract Noisy Miner; however, if the landscaping and plantings are selected to exclude their preferred habitat, being 'lightly treed open areas' (CSIRO Publishing 2007).</p> <p>They consistently spend 25–30% of their foraging time feeding on Grevilleas, similar time foraging in Eucalypts or in flowering Callistemons and similar time foraging on open ground.</p> <p>Avoidance of this vegetation structure and composition within the landscaped area, and ensuring a high level of native canopy retention, regeneration and if required revegetation within the bushland area, can reduce or manage their abundance. However, it is noted that this is a suburb-wide issue.</p>
<p><i>Anthropogenic Climate Change</i></p>	<p>Climate Change adaptation and mitigation measures should be consciously undertaken to reduce impacts on the biodiversity.</p> <p>These include water saving gardens, drought-tolerant plants and devices, water treatment and reuse and BASIX design, such as low energy lighting etc. These principles have been incorporated into the design.</p>
<p><i>Bushrock removal .</i></p>	<p>Bushrock removal is not anticipated during construction, given the nature of the site</p>
<p><i>Clearing of native vegetation</i></p>	<p>Some clearing of native vegetation is inevitable in the development. This would include two native trees, dead trees and shrubs.</p> <p>However, most of the valuable, well-established trees are to be protected and bushland plantings and revegetation will be incorporated into the development (see Taylor Brammer 2018). A future BVMP should address the detail of mitigation measures and compensatory re-vegetation for those likely to be removed.</p>
<p><i>Competition and grazing by the feral European Rabbit, Oryctolagus cuniculus</i></p>	<p>The feral European Rabbit is likely to occur in the bushland remnant and vegetation corridor to the east, in Zone E2. The development itself will not have an impact on their occurrence or abundance.</p> <p>However, rabbit control is recommended for consideration as part of bush regeneration and vegetation management in the buffer area and E2 zone to mitigate the overall developmental impact.</p>
<p><i>Competition from feral honey bees, Apis mellifera</i></p>	<p>The introduced honey bee is abundant in Sydney and widespread. They occur in tree hollows and compete with the native and more desirable honey bees for tree hollows and nectar. There are several tree species currently associated with the site that have small or large tree hollows, which are suitable for occupation by any kind of honey bee. It is noted that a tree with large hollows is being removed.</p> <p>While the impacts of the development are largely neutral with regard to the occurrence of feral honey bees, the removal of some trees, existing scrub vegetation, etc. and their replacement with other mixes of garden plants could have an impact on local bee populations.</p> <p>Therefore, in re-vegetation planning, consideration be given to examining the existing trees and tree hollows for the occurrence of the feral species, and have them professionally removed and replaced by more desirable species.</p> <p>The approach would be in line with the application of the precautionary principle to reduce the environmental impact of the development, in the absence of data limitations.</p>

Relevant Key Threatening Processes	Comments
<p><i>Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners</i></p>	<p>Presently, there is no data and information on that can assess whether Eucalyptus die-back associated with excessive populations of psyllids and Bell Miners. No evidence of this was observed on site.</p> <p>The effect of the development on this KTP may be neutral. However, given the protection that must be afforded to the vegetation corridor on the eastern side, this aspect should be acknowledged in the future vegetation management planning, with the potential for this to occur monitored and appropriate mitigation action taken if required.</p>
<p><i>Infection of native plants by <i>Phytophthora cinnamomi</i></i></p>	<p>Presently, there is no evidence of Eucalyptus trees and other native plants in the bushland remnant immediately below the development being infected by the significant pathogen <i>Phytophthora cinnamomi</i> (fungi). There is potential for trucks entering the site to introduce the contaminant through poor hygiene practices.</p> <p>A hygiene protocol for fungal pathogens needs to be developed for the site as part of the Construction Environment Management Plan and BVMP and prepared prior to construction in order to minimise the risk of this KTP.</p> <p>Given the protection that must be afforded to the Eucalyptus-dominated vegetation corridor on the eastern side, this aspect should be monitored during construction and bushland regeneration works by the site manager and by professionally qualified ecologists.</p>
<p><i>Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae.</i></p>	<p>Presently, there is evidence of Myrtle Rust occurring in the Eucalyptus trees in the bushland remnant immediately below the development. The effect of the development on this KTP may be neutral. However, given the protection that must be afforded to the Eucalyptus-dominated vegetation corridor on the eastern side, this aspect should be examined further by professionally qualified ecologists in the future vegetation management planning and appropriate mitigation action taken.</p>
<p><i>Invasion and establishment of exotic vines and scramblers.</i></p>	<p>The infestations of exotic vines and scramblers on site are highly significant. These must be controlled as part of vegetation management on the development site, as well as the vegetation in Zone E2, which is to be protected from any future impacts. The aspect should be part of a future BVMP and bush regeneration works.</p>
<p><i>Invasion, establishment and spread of Lantana (<i>Lantana camara</i>)</i></p>	<p>The infestations of lantana on the development site are extensive and mature. Given that the stands are most likely quite old, these infestations are highly significant, and must be controlled as part of vegetation management on the development site.</p> <p>Spread of lantana, through seeds and other propagules, has already occurred in the vegetation in Zone E2, which is to be protected from any future impacts. Careful removal of the large lantana infestations with suitable methods should be part of both the pre-construction and post-construction works included a future BVMP and on-going bush regeneration works.</p>
<p><i>Invasion of native plant communities by African Olive (<i>Olea europaea</i> subsp. <i>Cuspidata</i>)</i></p>	<p>There are only a few Olive trees in the disturbed sections of the bushland remnant. Given that Olives can easily spread via seeds, they must be controlled as part of vegetation management in Zone E2, which is to be protected from any future impacts.</p> <p>This aspect should be part of a future BVMP and bush regeneration works.</p>

<b>Relevant Key Threatening Processes</b>	<b>Comments</b>
<i>Invasion of native plant communities by Bitou Bush (Chrysanthemoides monilifera)</i>	The vegetation surveys have not detected Bitou Bush in the surveyed zones; however, it does infest bushland sites in adjacent areas and is readily spread by birds. Vigilance is recommended, given the high levels of disturbances that are likely to occur during the construction of the development. Monitoring for Bitou Bush should be part of a future BVMP to protect the bushland in Zone E2.
<i>Invasion of native plant communities by exotic perennial grasses</i>	<p>The infestations of exotic perennial grasses on the development site are extensive; given that most of the site is a disused bowling green. Exotic perennial grass infestations are significant, and must be controlled as part of vegetation management on the development site.</p> <p>Spread of these grasses, through vegetative propagules (stolons and runners), has already occurred in the vegetation in Zone E2, which is to be protected from any future impacts. This aspect should be part of a future BVMP and bush regeneration works.</p>
<i>Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants</i>	A wide variety of exotic garden plants occur on the development site given the history of land use, dwellings and the disused bowling green. Some of these species have already spread into the bushland remnant on the east. Controlling garden plants that can become weedy and undesirable within a bushland remnant should be part of a future BVMP and bush regeneration works.
<i>Loss of hollow-bearing trees</i>	One hollow-bearing tree is likely to be removed during the development of the site. There are other hollow-bearing trees present within and adjacent to the site which are to be protected or unlikely to be affected by the proposal. Compensatory native plantings are recommended to mitigate long-term, future impacts of loss of hollows, as well as the preparation and implementation of a Nest Box Plan.
<i>Removal of dead wood and dead trees</i>	There will be some removal of dead wood and dead trees within the development site. However, in managing the remnant vegetation in the Zone E2, clearing of dead wood and dead trees should be minimised, because of ecological (habitat) values. In this zone, dead wood removal should be limited to trimming of standing trees for tree health and safety.

### 5.3 INDIRECT IMPACTS OF THE PROPOSAL

Indirect impacts of the proposed development can include:

- Loss of shade/shelter;
- Soil and water erosion;
- Weed invasion;
- Fauna and flora displacement;
- Increased edge effects from the construction and operational activities on the adjoining bushland remnant; and
- Increased lighting and noise due to the operation as a residential care facility.

Measures to mitigate many of these impacts should be incorporated into any Construction Environmental Management Plan (CEMP) of the development and ongoing operational management protocols.

The design and location of security lighting surrounding the development should seek to limit the amount of light projecting towards the areas of retained vegetation in the eastern part of the subject site to reduce the effects on fauna.

## 6 IMPACT ASSESSMENT AGAINST LEGISLATION

The development has been considered regarding its impacts on the land zoned E2 and the bushland buffer and has regard to the aims of SEPP 19 (see below) and the objectives of the Lane Cove DCP.

### 6.1.1 Assessment against the Lane Cove DCP and Impact Mitigation response

The following describe the responses to each objective:

**Objective:** To protect both public and private bushland from adjacent development which could result in any adverse change to the condition of bushland through altered moisture conditions, increased nutrient levels, soil movement, invasive or inappropriate plant species and proximity of development.

**Development response:** The impact on the adjoining bushland will be mitigated through bush regeneration and weed management works, carried out through an approved BVMP. Altered moisture conditions and nutrients will be addressed through water storage in the on-site detention (OSD) and water reuse tank, treatment through the bio-filtration system, and piping to an approved outlet, thereby, bypassing the bushland and not increasing impacts of nutrients or moisture.

**Objective:** - To retain and protect natural topographic features, bushland areas, plant species and communities and native fauna habitat; to maintain and regenerate areas of natural bushland which have been defined as an essential character of Lane Cove; and to acknowledge the importance of bushland to the character of the surrounding landscape and value of the locality and its importance to the region.

**Development response:** The bushland area to the east, the remnant trees to the north, the majority of the remnant trees to the west, and the rocky landform to the north east, will be fully protected during the development through the development and implementation of a Construction Environment Management Plan (CEMP) with appropriate sub-plans including

the Tree Protection Plan. Bushland restoration and enhancement will be undertaken post-construction through an approved BVMP.

**Objective:** To encourage innovation and attractive designs which acknowledge the importance of bushland areas through the control of building location, building form, soft and hard landscape elements and engineering controls.

**Development response:** The project development footprint has been located location to retain the maximum number of native trees possible on the site, adopt the Council's agreed bushland buffer line, to incorporate a minimum nine metre setback, to minimise the disturbance to the bushland. The design also incorporates energy and water saving devices through BASIX, stormwater management plan and native landscaping theme, as well as adopting best practice bushland restoration and regeneration techniques on the site.

**DCP requirement:** Site constraints are to be considered, especially the location of the boundary of the buffer between the site and the bushland area, the existing condition of the bushland on the site surrounding the site, as well as the potential of the bushland for regeneration.

**Development response:** The proposal has adopted the Council's bushland buffer line to ensure protection of the naturally vegetated part of the site. The condition of the bushland on the site is heavily weed impacted, due to previous disturbances including the historic fill and subsequent landscaping for the bowling green, and pollution associated with the fill, edge effects, weed invasion due to historic disturbance and the current high level of weed propagules upslope of the bushland.

The site adjoins a bushland corridor along Gore Creek and the condition of bushland is weed impacted; however, it does not have the impacts of the introduced fill directly upslope, and is in a better condition. The site has potential for carefully staged regeneration which is proposed through a BVMP. This will involve hand treatment of weeds along the slope using 'cut and paint' and 'drill and frill' techniques, with the use of heavy duty jute matting in steep or unstable areas, pegged

and overlapped to specifications in an approved BVMP. The slopes are to be stabilised through planting of local provenance indigenous plants appropriate to the vegetation community. The BVMP will be implemented over a three year period and Council is to certify the works are completed to its satisfaction.

**DCP requirement:** Where part of the site is designated as Environmental Protection, Clause 6.4 of Council's LEP must be considered. This states that development consent must not be granted for development on this land unless the consent authority is satisfied that the vegetation, topography or distinctive features of that land are unlikely to be adversely affected.

**Development response:** The proposal seeks to retain all native trees, except a few native trees, including one *E. globiodes* and *Acacia parramattensis* to the west of the site. The entire area of remnant trees to the north and bushland area to the east, within Zone E2, are to be retained, protected and restored during the construction and for three years beyond the initial works, with the aim of protection in perpetuity through annual site monitoring.

**DCP requirement:** Each site will be divided into three areas - bushland area, buffer area and building area. The owner, or an agent acting on the owner's behalf, may request Council to provide a general indication of the bushland/buffer/building areas on their land. Applicants can arrange for a pre DA meeting with a town planner and Council's Bushland Manager prior to submitting a development application. The extent of each area should be established prior to any application being prepared.

**Development response:** Molino Stewart's letter report (2018) adopted the Council's agreed bushland line for the site. The bushland contains native vegetation as described in this report, and although it is currently in a degraded condition is continuous with bushland on adjoining properties and is capable of restoration. Piping of the stormwater will need to be carefully managed, as described to minimise impacts on the bushland. The buffer area is shown on the site plan (Figure 4) and in the cross-section below (Figure 8). A buffer area of between nine

metres and approximately 25m is achieved on the site.

**DCP requirement:** the buffer is to provide a transition area between the building and bushland area so as to reduce the impacts of development upon bushland.

**Development response:** the buffer area contains the bio-filtration system and landscaping to meet the DCP requirements. It does not contain any structures and is permeable.

**DCP requirement:** The location and design of development must aim to maximise the retention and protection of (I) local indigenous plants, particularly if rare or uncommon in Lane Cove, (II) native fauna habitat, and (III) the natural features of the site such as rock outcrops, cliffs and escarpments,

**Development response:** The proposal for the development has maximised the retention of locally indigenous plants, with removal of only a few specimens, predominantly those near Longueville Road, and has retained all the bushland and remnant tree area to the west and north, associated fauna habitat and rock outcrops.

**DCP requirement:** The Landscape Plan should indicate the proposed methods to be used during the construction and demolition period to protect those trees, bushland and other natural features required to be or conditioned to be retained. Retention of bushland elements in the buffer area is encouraged. The use of local indigenous plants is required and selected plant species should be of a type which is suited to the immediate landform and vegetation character of the surrounding bushland. The Landscape Plan should include details of local indigenous plants to be planted in the buffer area. Vegetation belts of local indigenous plants should be planted in the buffer area immediately down slope of any stormwater dispersal trench or absorption pit. These belts need to be at least the width of the stormwater device and 2 m deep. All noxious weeds must be removed.

**Development response:** the Arborist Report includes a Tree Protection Plan, and this report proposes that the bushland area be fenced with protective barrier fencing prior to commencement of works. The Landscape

Plan includes areas of bushland plantings and revegetation and is to use locally indigenous plant species within the buffer area, especially downslope of the bio-filtration system. All priority (formerly noxious) and environmental weeds are to be removed from the site.

**DCP requirement:** A Bushland Rehabilitation and Maintenance Plan prepared by a suitably qualified and experienced environmental consultant specialising in bushland management must be submitted.

**Development response:** A BVMP will be prepared by an appropriately qualified and experienced bushland management consultant, addressing the issues related to vegetation, bushland rehabilitation and maintenance, as outlined in this report. This will include best practice bush regeneration techniques, giving special regard to the steep slope, the historic fill, and the potential for the threatened community of basidiomycetes fungi to occur in the adjoining bushland.

**DCP requirement:** A stormwater plan is to be prepared with appropriate measures must be taken to restrict the volume and rate of runoff to levels as near as possible to those which occur naturally prior to development. The discharging of stormwater directly into bushland without the use of an approved dispersal system will not be permitted. Council will not permit the construction of a discharge pipe through the bushland except where there is no alternative

**Development response:** Water and drainage from the site is to be managed in accordance with the measures outlined in the Civil Stormwater Management Report (Calibre Consulting, 2017). A stormwater plan and report has been prepared that includes calculations to demonstrate pre and post development water quantities. It includes retention of water through rainwater tanks for reuse and an OSD scheme. It includes water quality treatment including the trapping of gross pollutants and a biofiltration system to address metals and nutrients. The pipe located at the southern boundary crosses the bushland and appears as the most suitable alternative to a headwall or release of the water directly into the bushland. Any trenching for the pipe is to be done by low impact

techniques including hand digging, directional bore with root mapping where necessary.

Due to the steep slope the use of heavy-duty jute mesh will be required to stabilise the soil in the vicinity of any digging together with pinning of the mesh and planting of locally indigenous ground covers.

**DCP requirement:** Sediment controls must be wholly situated within the buffer and building areas. An Erosion and Sediment Control Plan (ESCP) prepared by a suitably qualified consultant, in accordance with this DCP - Part P *Stormwater Management*, is to be submitted with the DA

**Development response:** an ESCP has been prepared by a qualified consultant and submitted with the DA.

### 6.1.2 SEPP 19 Aims, Objectives and Responses

(1) The general aim of SEPP 19 Policy is to protect and preserve bushland within the urban areas referred to in Schedule 1 because of:

- (a) its value to the community as part of the natural heritage,
- (b) its aesthetic value, and
- (c) its value as a recreational, educational and scientific resource.

(2) The specific aims of this policy are:

- (a) to protect the remnants of plant communities which were once characteristic of land now within an urban area,
- (b) to retain bushland in parcels of a size and configuration which will enable the existing plant and animal communities to survive in the long term,
- (c) to protect rare and endangered flora and fauna species,
- (d) to protect habitats for native flora and fauna,
- (e) to protect wildlife corridors and vegetation links with other nearby bushland,
- (f) to protect bushland as a natural stabiliser of the soil surface,

(g) to protect bushland for its scenic values, and to retain the unique visual identity of the landscape,

(h) to protect significant geological features,

(i) to protect existing landforms, such as natural drainage lines, watercourses and foreshores,

(j) to protect archaeological relics,

(k) to protect the recreational potential of bushland,

(l) to protect the educational potential of bushland,

(m) to maintain bushland in locations which are readily accessible to the community, and

(n) to promote the management of bushland in a manner which protects and enhances the quality of the bushland and facilitates public enjoyment of the bushland compatible with its conservation.

**Development response:** The proposed development meets the aims and objectives of clauses 1 a and b, and 2 a-e through avoiding and maximising impacts on bushland, through the location design and siting of the development and the ongoing restoration of the site through removal of weeds from the development footprint that are currently delivering weed propagules to the bushland located downhill, and through carefully staged bush regeneration within the bushland remnant.

#### **Clause 9: Land adjoining land zoned or reserved for public open space**

(1) This clause applies to land which adjoins bushland zoned or reserved for public open space purposes.

(2) Where a public authority, (a) proposes to carry out development on land to which this clause applies, or (b) proposes to grant approval or development consent in relation to development on land to which this clause applies, the public authority shall not carry out that development or grant the approval or development consent, unless it has taken into account:

- the need to retain any bushland on the land,
- the effect of the proposed development on bushland zoned or reserved for public open space purposes and, in particular, on the erosion of soils, the siltation of streams and waterways and the spread of weeds and exotic plants within the bushland, and
- any other matters, which, in the opinion of the approving or consent authority, are relevant to the protection and preservation of bushland zoned or reserved for public open space purposes.

**Development response:** The proposal adjoins bushland zoned E2 and the Lane Cove Country Club, which is zoned RE1 and part of its land includes bushland. With the implication of mitigation measures designed to protect and enhance the adjoining bushland, the proposed development on the subject site would have a minimal impact on the bushland zoned E2 and RE1. This is achieved through the design of the development to protect, conserve and restore the bushland on the property and to minimise increased water, nutrients or soil entering the bushland. The piping of the stormwater will be carefully managed, as outlined above, and Council will be requested to certify these works are done to its satisfaction.

## 7 MITIGATION MEASURES AND RECOMMENDATIONS

Compensatory measures to improve the available habitat and to minimise impact of potential fauna should be considered for this development. The following strategies are proposed to compensate for the loss of vegetation and potential habitat.

A Biodiversity and Vegetation Management Plan (BVMP) should be prepared for the site and adjacent E2 zone by appropriately qualified specialists. The Plan should take into account the ecological advice provided within this report and the arborists report (Natural Trees, 2017).

It should also be in line with Council guidelines to improve the habitat value of the retained vegetation, particularly in the eastern part of the proposed development and the Gore Creek valley and vegetation corridor.

The principles and approaches for re-vegetation planning, including compensatory plantings and tree protection, combined with biodiversity management, complement the proposal's landscaping plan. The plan includes suitable, native plant species for landscaping the gardens, with preference for hardy, drought-tolerant mix of species that do not radically alter the vegetation of the general area, which perform ecological functions.

The impact of the proposed vegetation clearing can be minimised by incorporating appropriate species in the landscaping plan for the development. This may improve the connectivity with the eastern part of the subject site.

The following measures have been presented to align with the stages of the proposal.

### 7.1 PRIOR TO CLEARING, EARTHWORKS AND CONSTRUCTION

It is recommended that strategies are implemented during construction to limit any erosion towards the slopes on the eastern side (bushland remnant) during the proposed works for the development.

Given the proximity of the development boundary to the remnant vegetation on the eastern slopes, effective measures need to be fully considered to prevent soil, sediments, waste, construction debris and any waste water drainage from the site from impacting on the bushland.

The following mitigation safeguards are required to be implemented prior to commencement of vegetation clearing, earthworks or construction works:

- Prepare a Soil and Water Management Plan and Erosion and Sediment Control Plan in accordance with the 'Blue Book' (Landcom, 2004) and installation of all required controls prior to commencement of any clearing or earthworks. This is to include any silt booms required in the creek.
- Prepare a detailed BVMP to manage vegetation removal pre-construction and to address protection of native vegetation, weed control and rehabilitation of any disturbed areas post-construction. The BVMP should be for a minimum of three years and include both the buffer area and the bushland to the east of the site (E2 Zone). The BVMP shall consider the following (as a minimum):
  - A hygiene protocol for fungal pathogens.
  - Program of weed control and measures to remove and dispose of weeds without spreading propagules.
  - Management of soil stability on slopes below the bowling green area by staged weed removal, stabilisation and revegetation as required;
  - Staged removal of shrub layer weeds to retain habitat elements; this may require methods, such as killing the large bushes of lantana *in situ*, using the 'cut-and-paint' with an appropriate herbicide, prior to mechanical removal; the aim should be to kill, as much as possible the propagules (i.e. seeds and stems) *in situ*.
  - Managing other weeds and clearing of vegetation needs to be conducted in stages, so as to minimise disturbances and spreading of propagules into the adjacent bushland remnant.

- Primary, secondary and follow up works by qualified bush regenerators.
- The specification of native species endemic to the local area and suitable for the adjacent bushland. Preference is to be given to use of local provenance plants.
- Species that provide food resources for Grey-headed Flying Foxes and possums should be incorporated.
- Ongoing weed management which includes both bush regeneration and weed management within the E2 zone.
- A monitoring and compliance plan for vegetation and biodiversity, to ensure that the actions are achieving improvements in biodiversity. As well as criteria covering weed management and rehabilitation works, the monitoring and compliance should incorporate criteria to specifically consider the bushland areas in the associated with the walkway and stormwater infrastructure.
- Install No Go area signage and fencing for all vegetation outside the work footprint. Environmental protection areas are to be clearly labelled on the fencing and all plans as “No-Go” areas.
- Install Tree Protection in accordance with the arborist’s recommendations for trees to be retained near the work area, including those located near any access areas or site compounds.
- Prior to the commencement of any vegetation clearing, the areas should be assessed for potential fauna. As part of this pre-clearance assessment, a protocol should be established for the capture and relocation of any fauna to avoid harm or injury to wildlife. This protocol should be developed in consultation with an experienced fauna spotter and/or ecologists and may also involve obtaining input from wildlife service organisations.
- An Ecologist is to undertake pre-clearance surveys in accessible areas for animals, burrows and nests. Any fauna are to be moved to adjacent bushland.

## **7.2 DURING CLEARING, EARTHWORKS AND CONSTRUCTION**

The following mitigation safeguards are required to be implemented during vegetation clearing, earthworks or construction works:

- Monitor and maintain erosion and sediment controls in accordance with specifications in the Erosion and Sediment Control Plan.
- Maintain tree protection and “No Go Area” fencing. There is to be no clearing, earthworks or storage of materials in these areas.
- Induct staff into the importance preventing disturbance to tree protection zones and No Go areas.
- No material shall be stored, soil stockpiled or vehicles parked within the drip line of retained trees.
- Any stockpiles are to be kept away from the drainage lines and contained using sediment controls.
- Weeds are to be removed and disposed of in a manner that does not spread propagules.
- Weed infested soils should not be reused on site, but instead disposed to landfill.
- No excavation should be undertaken within drip line of mature trees that are being retained without advice from a qualified (AQF 5) Arborist. If major roots of native trees are uncovered during earthworks, the Arborist must supervise any root pruning required.
- Any fuel, oil or chemical containers are to be stored in a bunded area. There are to be emergency procedures implemented for any spills and appropriate spill kits are to be kept on site and/or with vehicles.
- Refuelling of plant and equipment is only to be carried out in a bunded area at least 30 metres distant from the E2 zone area and all appropriate control measures and emergency spill kits in place.
- All work areas are to be kept clean and tidy, with all rubbish or litter collected and disposed.

### 7.3 AFTER COMPLETION OF CONSTRUCTION

The following mitigation measures and safeguards are required to be implemented post-construction:

- Stabilise any disturbed soils.
- Remove any temporary construction and No Go area fencing.
- Management of recreational pedestrian access through the site and adjoining bushland remnant by developing formal walking path(s).
- Given the potential suitability of the habitat for *Hygrocybe* fungi, the access track route should be clearly delineated, but should remain a “natural” bush track.
- Conduct a supplementary fungi survey in autumn to confirm presence/absence of threatened fungal species.
- A bush regeneration contractor is to undertake weed control, revegetation and rehabilitation works outlined in the BVMP.
- At the completion of the BVMP, there should be ongoing maintenance of the buffer area and the E2 Zone adjacent thereto by bush regeneration contractors for the life of the lease.

### 7.4 NEST BOX PLAN

A nest box plan should be prepared that provides nest boxes to compensate for the loss of the hollow bearing tree and considers providing supplementary nesting sites for possums to support ongoing food supplies for the Powerful Owls.

### 7.5 LIGHTING

Careful design and positioning of the lighting for the development would be required, seeking to reduce the amount of light projecting towards the east, where lighting may affect ground-dwelling mammals, such as the Common Brushtail Possum, Ringtail Possum and some micro-bats.

## 8 CONCLUSIONS

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Molino Stewart has completed a flora and fauna assessment for the proposed development, taking into consideration the previous biodiversity assessments and planning that has occurred on environmental protection measures for the proposed development.

The assessment was conducted in accordance with Section 5A of the EP&A Act (1979), and followed the Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities (DEC, 2004) and current best practice methods. It included a desktop assessment followed by field survey by qualified ecologists.

No threatened flora was observed during the surveys on the development site. However, potential habitat exists for one endangered fungal species, and one critically-endangered fungal community, associated with the bushland remnant and corridor, at the back of the development site. Potential habitat exists for several fauna species as well.

In preparing this review, Molino Stewart has also considered the Lane Cove Development Control Plan (DCP) Part H – Bushland Protection, SEPP 19 and documentation issued by the Lane Cove Council for the Longueville Road Seniors Living Village Project bid, particularly those relating to the ‘bushland delineation line’.

The proposal is confined to the highly modified areas of the site, which are significantly degraded through past use of the site as bowling greens. This use involved extensive fill being placed across the site and landscaping with exotic species

The vegetation community to the east of the site, beyond the ‘bushland line’, was confirmed as Coastal Enriched Sandstone Moist Forest – Plant Community Type 1841 associated with Hawkesbury sandstone rock outcrops. The tree canopy is dominated by Blackbutt (*Eucalyptus pilularis*) with Smooth-barked Apple (*Angophora costata*) and Turpentine (*Syncarpia glomiuifera*). The mid-canopy and understorey small tree and shrub layer include Forest Oak (*Allocasuarina torulosa*), Sweet Pittosporum (*Pittosporum undulatum*), Mock

Olive (*Notolaea longifolia*) and other species, which are typical of the CESMF community. Ground covers include *Lomandra longifolia* and *Lepidosperma laterale*.

As part of remaining, historical vegetation in Sydney, this remnant bushland, associated with the Gore Creek, is considered of high conservation value. Although, the condition of the remnant may be considered poor in some sections, providing protection to the remaining vegetation is paramount.

As discussed in sections 4 and 5, habitat for a number of threatened fauna species was also present in the eastern part of the subject site. Any clearing of existing vegetation will result in loss of potential shelter and food resources for some of this fauna, making them further vulnerable.

Our assessment has found there would be some loss of habitat, shelter and food for native fauna within the proposed development. However a positive impact will be the removal of the extensive weed infestation present within the footprint of the proposed development.

Mitigation measures have been recommended, as avoiding any adverse impacts and providing appropriate mitigation of potential impacts should be a key performance criterion for the proposed development. The majority of these measures are focussed on the management of the buffer area and by extension, the adjacent bushland, to ensure the condition of both areas are improved with the development and the integrity of the buffer is maintained over the life of the development. With such measures in place there is no imperative to adjust the eastern boundary setback.

We conclude that the development could proceed with adherence to plans that would minimise environmental impacts, both during construction and operation phases. For this to occur, the recommended impact mitigation planning needs to be undertaken, and measures implemented.

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## **APPENDIX A– APPLIED ECOLOGY LETTER**

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August 9, 2018

**Geoffrey Douglas**  
**LANE COVE COUNCIL**  
48 Longueville Road  
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**RE: FLORA, FAUNA & FUNGI IMPACT ASSESSMENT FOR A PROPOSED  
DEVELOPMENT SITE AT 266 LONGUEVILLE ROAD, LANE COVE**

In December 2011 Applied Ecology undertook a series of site assessments of 266 Longueville Road, Lane Cove to identify ecological constraints that may influence the suitability of the block for development. At that time the proposed development was confined to the disused bowling greens and immediate surroundings and we found, in summary, that the proposed development would not have an adverse impact on ecological values on the site. Several mitigation measures were recommended.

Dr Meredith Brainwood of Applied Ecology visited the site on the 6<sup>th</sup> of August 2018 to ascertain if conditions on the site had changed to such a degree that the findings of the original report were no longer applicable. This site visit determined that while there were some changes to the abundance and distribution of some flora species, particularly an increase in weed species' abundance, site conditions were "essentially the same". A desktop review of threatened species also revealed no new records nearby that would impact on the findings of the original report. Of note is an increase in the number of Powerful Owl sightings in the general area of the site, however, this does impact our conclusion that the finding of the 2012 report are still valid provided the extent of any proposal is confined to the highly modified areas on the site (see attached maps) and mitigation measures recommended are implemented.

**YOURS SINCERELY,**

**ANNE CAREY**



- SURVEY ZONES**  
 266 Longueville Road & surrounds
-  266 Longueville Road roadside zone
  -  Eastern bushland zone
  -  Eastern bushland zone (268-270)
  -  McMahons Road easement
  -  Middle green and surrounds
  -  Northern bushland zone
  -  Top green and surrounds



Project: 266 Longueville Road Flora, Fungi & Fauna Survey
Date: 28th December 2011
Scale: 1:2,000

Figure 1 Ecological zones on site

Bushland zones were preserved under the original proposal (Northern Bushland, Eastern Bushland 1, Eastern Bushland 2 @268-270 and the McMahons Rd easement) with development/disturbance confined to the Roadside zone, top green and surrounds and Middle green and surrounds. Note that in this instance “surrounds” refers to planted vegetation forming borders to the greens and pathways.



Figure 2 Zones 1,2 and 3 form the highly modified portions of the site.

## **APPENDIX B – BUSHLAND LINE GROUND TRUTHING ASSESSMENT**

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22 May, 2018

Ms Claudia Leung  
Design Manager  
Independent & Assisted Living  
Australian Unity Limited  
114 Albert Road,  
South Melbourne VIC 3205

Dear Claudia

**Re: 266 Longueville Road, Lane Cove: bushland definition**

Australian Unity has engaged Molino Stewart to provide a peer review of documentation relating to vegetation management for a development application for the Longueville Road Seniors Living Village Project.

This report provides an opinion of a ‘ground truthing line’ as the bushland line boundary in defining the bushland area for the site, a buffer area to this bushland area and the building area for the site.

A site inspection of the subject site (Lot 1 DP1227921) and the adjacent site (Lot 3 DP1227921) (refer Attachment A) was undertaken by Shireen Baguley, Principal and Diane Campbell, Senior Ecologist on the 15<sup>th</sup> November, 2017. The objectives of this were to:

- Examine the vegetation, topography and natural features of the subject and adjacent site; and
- Consider the ‘ground truthing line’ in relation to these lots and the site’s features.

**Background Documentation**

The above lots have been the subject of a number of investigations. These have been prepared and issued by Lane Cove Council (LCC) as part of a rezoning process and by the design team engaged by Australian Unity as part of the development application process. In preparing this report, Molino Stewart has also undertaken a review of the following documentation presented in Attachment B.

**Project Advice and Definitions**

In preparing this review, Molino Stewart has also considered the Lane Cove Development Control Plan (DCP) Part H – Bushland Protection, SEPP 19 and documentation issued by LCC for the Longueville Road Seniors Living Village Project bid, particularly that relating to the ‘ground truthing line’. Further details are presented in Attachment C.

**Site Assessment Findings**

1. Topography

The natural topography of the site involves considerable fall from west to east. Parts of the site were also filled with imported material, some of this contaminated, and “benched” to provide level bowling greens. It is evident that between the rear bowling green and the ‘ground truthing line’ that this area has been subject to extensive historical filling as part of the previous land use.

## 2. Vegetation

### a) Canopy species

The Arborist's report has identified the canopy species on the sites. An extract of the area of interest in Attachment D. Overlaid on this is the location of LCC's 'ground truthing line'. The trees between this line and the E2 boundary area are listed and colour coded in the table overlain on Figure C1. Those in green are native, the orange is native but can be considered invasive, those in red are exotic and invasive woody weeds. This coding has also been used to differentiate the trees in the layout in Attachment D. It can be seen there are very few native canopy species present between the E2 boundary and LCC's 'ground truthing line'.

### b) Understorey species

The shrub and ground layers between the edge of the former bowling green and the 'ground truthing line' consist of a predominance of weeds. This area includes part of the R4 zone and part of the E2 zone.

Woody weeds occur on the fill bank including Lantana, a Weed of National Significance (WoNS) and a Weed of State Significance (WoSS) in the Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022. Other woody weeds on the fill bank and invading the bushland below include Small and Large-leaved Privets, Camphor Laurel, Ochna, (all are Other Weeds of Regional Concern – OWoRC) and African Olive, a Regional Priority Weed (RPW).

Invasive vines such as Madeira Vine (WoNS and WoSS), Turkey Rhubarb and Coastal Morning Glory (both are OWoRC) are also a significant threat to bushland on the site.

Bushland weeds occur on the edges of the former bowling green and the fill bank, including herbaceous and grass weeds such as Kikuyu (OWoRC), as well as Erharta, Catsear, Cudweed, Lambs Tongue, White Clover, Fleabane, Milk Thistle, Bromus and Cobblers Pegs, Asparagus Fern (a WoNS) and other garden escapes including Ginger Lily and, Montbretia (both OWoRC).

There were little to no native ground cover or shrub species present in this location with the high abundance of weeds being due to the introduced fill soils on the bank.

### **Definition of Bushland Area, Buffer and Building Area**

#### a) Bushland Area

The Lane Cove DCP dictionary defines bushland to mean:

*land (private or public) on which there is vegetation which is either a remainder of the natural vegetation of the land or, if altered, is still representative in part of the structure and floristics of the natural vegetation and which contains topographic and natural features.*

The State Environmental Planning Policy No 19 - Bushland in Urban Areas (SEPP 19) defines bushland to mean:

*land on which there is vegetation which is either a remainder of the natural vegetation of the land or, if altered, is still representative of the structure and floristics of the natural vegetation.*

The site assessment has found:

- The ‘ground truthing line’ generally follows the eastern extent of the historical filling that has occurred as part of the previous land use
- The topography and natural features within the area within the E2 zone to the east of the ‘ground truthing line’ have not been significantly modified as part of the historical land uses and it contains little to no introduced fill soil. It contains vegetation which is a remainder of the natural vegetation of the land and can be considered representative of the structure and floristics of the natural vegetation.
- The area within the E2 zone to the west of the ‘ground truthing line’ contains vegetation which is significantly altered from the natural vegetation of the land occurring on introduced fill soils. It is not representative in part of the structure and floristics of the natural vegetation, as the ground cover and understory species are predominantly exotic and there are very few canopy species within this zone that are naturally occurring. The topography through here has been significantly modified as a result of the historical filling that has taken place and it would appear this has been the cause of the loss of remnant vegetation in this area. The presence of this fill would also make it highly unlikely there would be a seed bank representative of the remnant vegetation within this area.

b) Buffer and Building Area

The Lane Cove DCP dictionary defines a buffer to mean:

*that part of the site which is a transition between the bushland and the building/s.*

## **Conclusion**

Based on the findings of our site investigation and consideration of background documentation, in Molino Stewart’s opinion is consistent with the advice provided by LCC as part of the Longueville Road Seniors Living Village Project bid, that is, the vegetation should be applied using the ‘ground truthing line’ as the western extent of the ‘bushland’ area. In conclusion, Molino Stewart agrees with LCC that the bushland commences at the Council-defined ground truthing line within the E2 zone and extends east down the hill to the eastern boundary of the E2 zone.

To illustrate the relationship between the proposed building, the ‘ground truthing line’ as the western extent of the ‘bushland’ area, and the buffer which forms the transitional area, a cross section of the area has been prepared on this of the findings of the analysis within this letter. This is included as Attachment E.

Yours faithfully

For Molino Stewart Pty Ltd



Shireen Baguley

Principal

Enclosures: 5

Y:\Jobs\2017\1004 266 Longueville Road, Lane Cove\Reports\Final\Stage 2a letter Bushland definition v1.docx

## **Attachments**

**Attachment A: Lot layout, aerial and zoning**



Figure A1

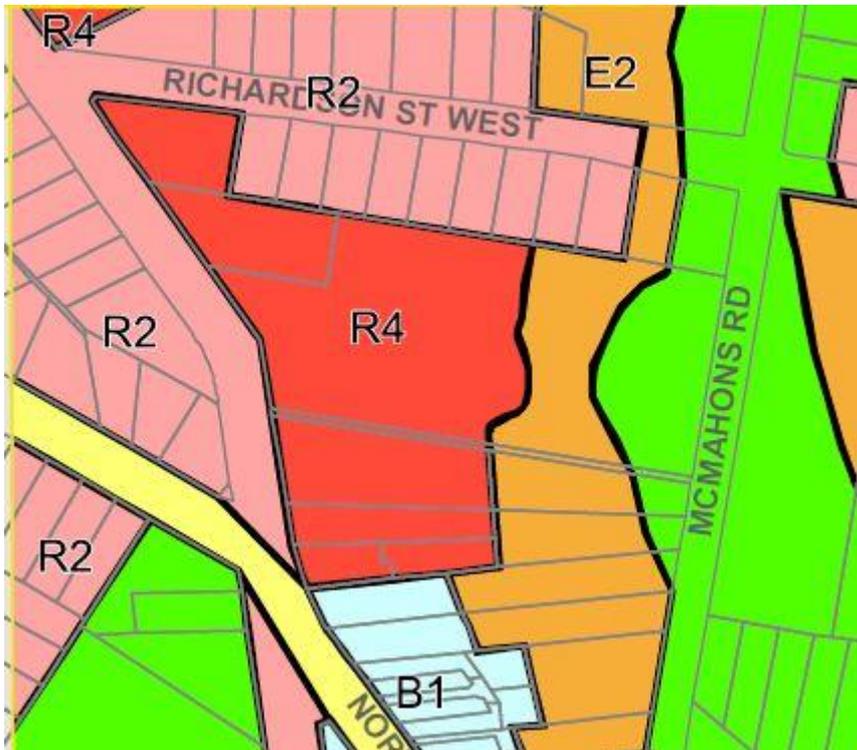


Figure A2

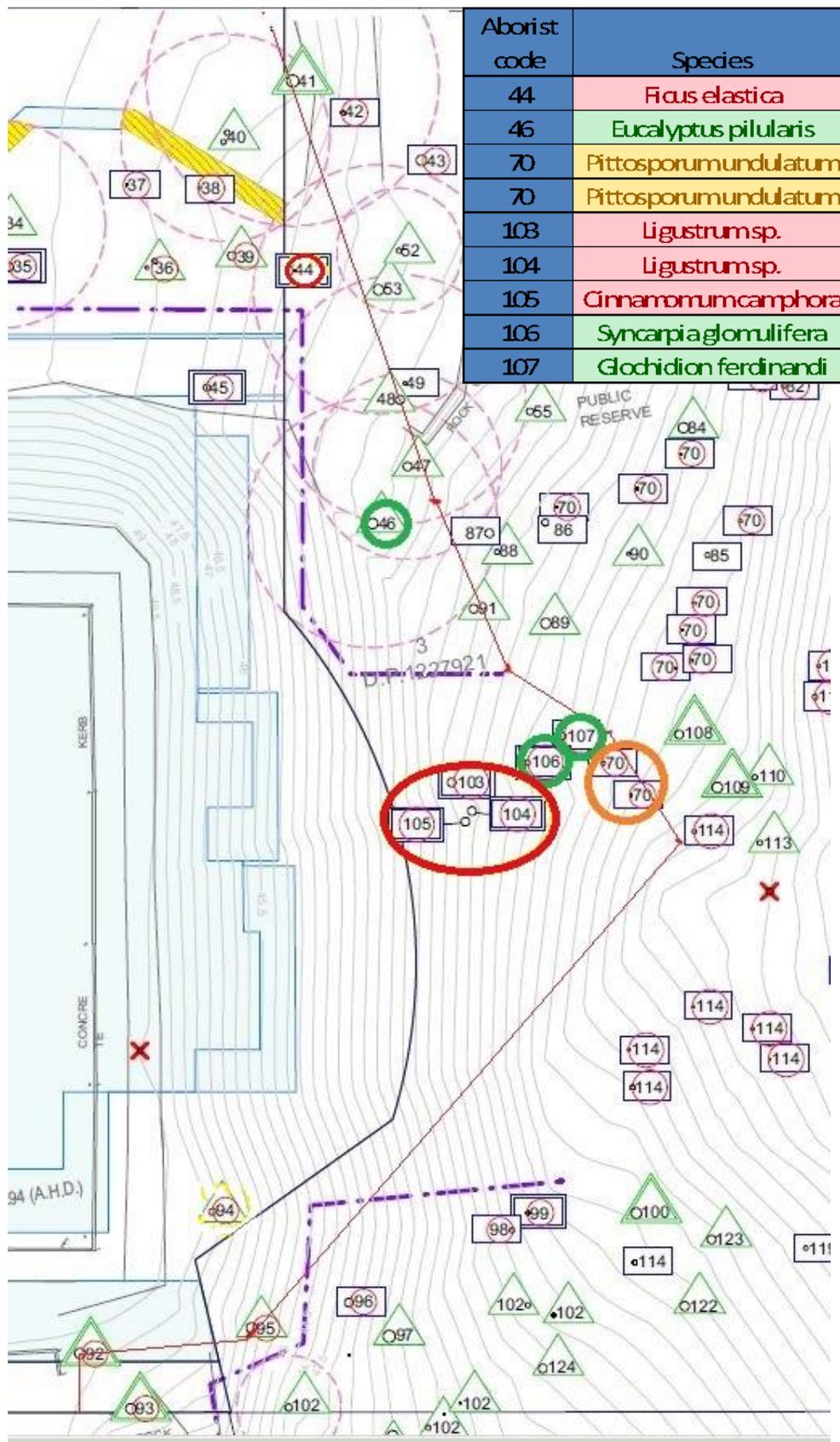
## Attachment B: Background documentation

Documentation for 266 Longueville Road, Lane Cove	
Details	Dated
Lane Cove Development Control Plan - Part H - Bushland Protection	9/12/2011
Request for EOI_Addendum 3	23/10/2015
EOI_Addendum 4, Flora Fauna assessment & Geotechnical and Environmental Investigation	23/10/2015
Flora, Fauna and Fungi Impact Assessment Ecology Report(prepared by Council as part of the bid stage of the project)	9/01/2012
Request for Bid for The long term lease of Council land at 266 Longueville Road, Lane Cove for the purpose of designing, building and operating a Seniors Living Village Project <i>Agreement no: MP 2016/4</i>	20/06/2016
Detail survey over No. 266 Longueville Road, Lane Cove Prepared by Craig & Rhodes for LCC: Shows bush land line defined by Council 'ground truthing' as of 12/07/2016	dated 2012 but must have been issued post 12/07/2016
Architectural Drawings (Merged.Pdf)	17/10/2017
SEE prepared by GSA Planning (16229 - See - Final.Pdf)	18/09/2017
Arborist Report (Draft Au_Arborist Report.Pdf)	18/07/2017
Prelim Enviromental Site Assessment (contamination) (Environmental R_17_06_28_27380_Lanecove_Pesa.Pdf)	18/07/2017
Heritage 266 Longueville Road Lane Cove_Shi_Da-Issue.Pdf	17/07/2017
Survey with R4 Zone and Bushland Line (003)	20/12/2012
Longueville Rd 2011 Smec Geotech And Contamination Report - Previous Report.Pdf	18/07/2017
16-162s Lane Cove Retirement Village Master Plan LA17 - LA18 P2 (Landscape Drawing)	8/11/2017
Australian Unity_Tree Constraints Sketch (002)	30/6/2017 (pdf date)
Council Planning documents regarding the E2 Zone (Definition, map)	undated

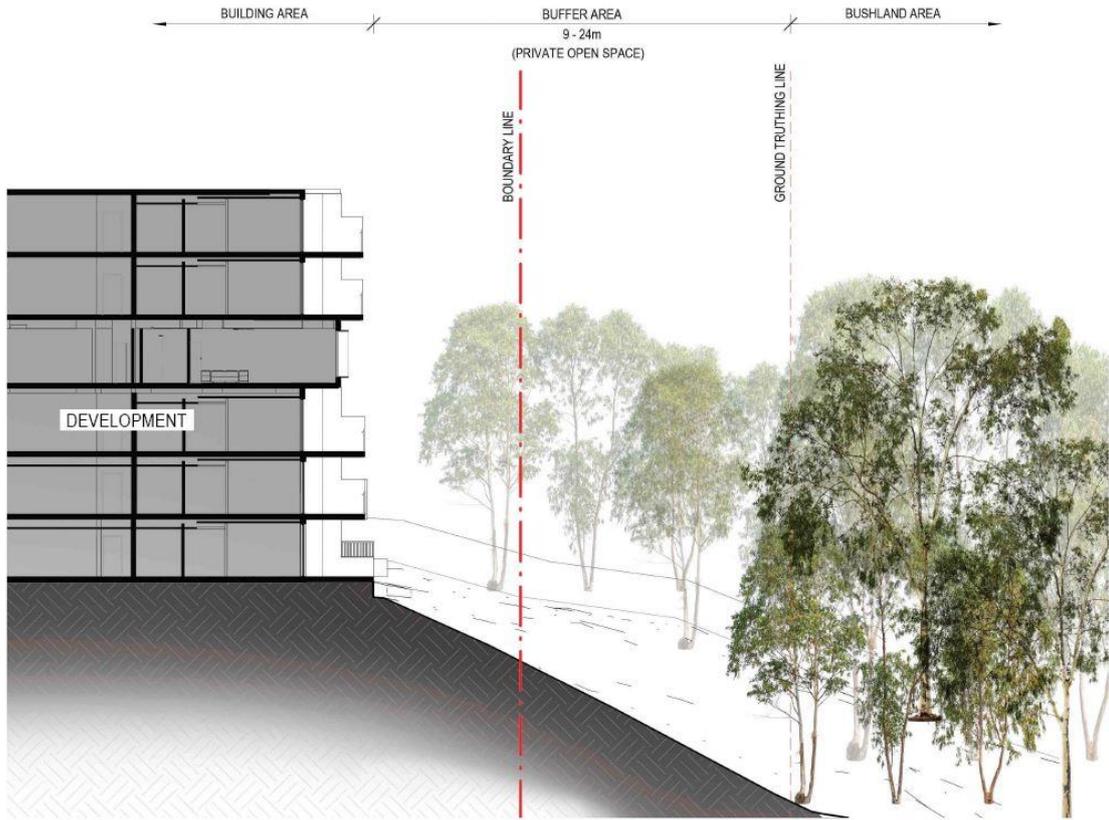
**Attachment C: Relevant advice and definitions**

<b>Source</b>	<b>Instruction</b>
SEPP 19	<i>bushland means land on which there is vegetation which is either a remainder of the natural vegetation of the land or, if altered, is still representative of the structure and floristics of the natural vegetation.</i>
Lane Cove Development Control Plan (DCP) Part H – Bushland Protection	Each site will be divided into three areas - bushland area, buffer area and building area. The owner, or an agent acting on the owner’s behalf, may request Council to provide a general indication of the bushland / buffer / building areas on their land.
Lane Cove <u>DCP Dictionary</u>	<i>Buffer means that part of the site which is a transition between the bushland and the building/s. (Bush)</i>  <i>Bushland means land (private or public) on which there is vegetation which is either a remainder of the natural vegetation of the land or, if altered, is still representative in part of the structure and floristics of the natural vegetation and which contains topographic and natural features. (Bush)</i>
Request for Bid for The long term lease of Council land at 266 Longueville Road, Lane Cove for the purpose of designing, building and operating a Seniors Living Village Project Agreement no: MP 2016/4	A setback of 9m from the vegetation to the east has been adopted based on C1 3.5.2 of the Lane Cove DCP for Residential Flat Buildings.
Detail survey over No. 266 Longueville Road, Lane Cove Prepared by Craig & Rhodes for LCC	Shows bushland line defined by Council 'ground truthing' as of 12/07/2016

### Attachment D: Analysis of canopy species



# Attachment E: Section view of Site Area



## **APPENDIX C – LIKELIHOOD OF OCCURRENCE ASSESSMENT TABLE**

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Table 3 Threatened flora recorded within 10 km of subject property and included in either the BC Act or EPBC Act

Note: Species likely to occur are highlighted green in the Table.

Family	Species	Common Name	Habitat	Likelihood at Subject Site
Apocynaceae	<i>Cynanchum elegans</i>	White-flowered Wax Plant	Usually occurs on the edge of dry rainforest vegetation. Associated with a range of vegetation types including littoral rainforest, Forest Red Gum, Coastal Banksia and Spotted Gum.	Unlikely, as no suitable habitat present
Casuarinaceae	<i>Allocasuarina glareicola</i>		Grows in Castlereagh woodland on lateritic soil.	Unlikely, as out of range and no suitable habitat present
Convolvulaceae	<i>Wilsonia backhousei</i>	Narrow-leafed Wilsonia	Occurs in margins of salt marshes and lakes.	Unlikely, as no suitable habitat present
Dilleniaceae	<i>Hibbertia puberula</i>		Occurs on sandy soil often associated with sandstone, or on clay. Habitats are typically dry sclerophyll woodland communities, although heaths are also occupied.	Unlikely – not found
Dilleniaceae	<i>Hibbertia spanantha</i>	Julian's Hibbertia	Forest with canopy species including <i>Eucalyptus pilularis</i> , <i>E. resinifera</i> , <i>Corymbia gummifera</i> and <i>Angophora costata</i> . The understorey is open with species of Poaceae, Orchidaceae, Fabaceae and Liliaceae.	Unlikely as understorey is densely vegetated with privet and other weeds
Elaeocarpaceae	<i>Tetratheca glandulosa</i>		Associated with shale-sandstone transition environments with shallow stony soils.	Unlikely, as no suitable habitat present
Elaeocarpaceae	<i>Tetratheca juncea</i>	Black-eyed Susan	Low open forest/woodland with a mixed shrub understorey and grassy groundcover. Also recorded in heathland and moist forest.	Unlikely, as no suitable habitat present
Ericaceae	<i>Epacris purpurascens</i> var. <i>purpurascens</i>		Found in a range of vegetation communities growing in areas with strong shale soil influence.	Unlikely, not located on the site
Fabaceae (Faboideae)	<i>Dillwynia tenuifolia</i>		Scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition.	Unlikely, as no suitable habitat present
Fabaceae (Mimosoideae)	<i>Acacia bynoeana</i>	Bynoe's Wattle	Occurs in heath or dry sclerophyll forest on sandy soils, often slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches.	Unlikely, as no suitable habitat present
Fabaceae (Mimosoideae)	<i>Acacia pubescens</i>	Downy Wattle	Open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.	Unlikely, as no suitable habitat present
Fabaceae (Mimosoideae)	<i>Acacia terminalis</i> subsp. <i>Terminalis</i>	Sunshine Wattle	Coastal scrub and dry sclerophyll woodland on sandy soils in generally sparse and scattered vegetation.	Unlikely, no suitable habitat present

Table 2 (continued) Threatened flora recorded within 10 km of subject property and included in either the BC Act or EPBC Act

Family	Species	Common Name	Habitat	Likelihood at Subject Site
Geraniaceae	<i>Pelargonium sp.</i>	Omeo Stork's-bill	Has a narrow habitat range, occurs above high-water level of ephemeral lakes, in the transition zone between surrounding grasslands or pasture and the wetland or aquatic communities.	Unlikely, as no suitable habitat present
Haloragaceae	<i>Haloragodendron lucasii</i>		Dry sclerophyll forest.	Unlikely, no suitable habitat present
Hygrophoraceae	<i>Camorophyllopsis kearneyi</i>		Appears to be limited to the Lane Cove Bushland Park.	Potential – however not located after detailed targeted surveys
Hygrophoraceae	<i>Hygrocybe anomala var. ianthinomarginata</i>		Warm temperate forests dominated by Lilly Pilly ( <i>Acmena smithii</i> ), Grey Myrtle ( <i>Backhousia myrtifolia</i> ), Cheese Tree ( <i>Glochidion ferdinandi</i> ) and Sweet Pittosporum ( <i>Pittosporum undulatum</i> ).	Unlikely, as no suitable habitat present
Hygrophoraceae	<i>Hygrocybe aurantipes</i>		Warm temperate forests dominated by Lilly Pilly ( <i>Acmena smithii</i> ), Grey Myrtle ( <i>Backhousia myrtifolia</i> ), Cheese Tree ( <i>Glochidion ferdinandi</i> ) and Sweet Pittosporum ( <i>Pittosporum undulatum</i> ).	Unlikely, as no suitable habitat present
Hygrophoraceae	<i>Hygrocybe austropratensis</i>		Warm temperate forests dominated by Lilly Pilly ( <i>Acmena smithii</i> ), Grey Myrtle ( <i>Backhousia myrtifolia</i> ), Cheese Tree ( <i>Glochidion ferdinandi</i> ) and Sweet Pittosporum ( <i>Pittosporum undulatum</i> ).	Unlikely, as no suitable habitat present
Hygrophoraceae	<i>Hygrocybe collucera</i>		Warm temperate forests dominated by Lilly Pilly ( <i>Acmena smithii</i> ), Grey Myrtle ( <i>Backhousia myrtifolia</i> ), Cheese Tree ( <i>Glochidion ferdinandi</i> ) and Sweet Pittosporum ( <i>Pittosporum undulatum</i> ).	Unlikely, as no suitable habitat present
Hygrophoraceae	<i>Hygrocybe griseoramosa</i>		Warm temperate forests dominated by Lilly Pilly ( <i>Acmena smithii</i> ), Grey Myrtle ( <i>Backhousia myrtifolia</i> ), Cheese Tree ( <i>Glochidion ferdinandi</i> ) and Sweet Pittosporum ( <i>Pittosporum undulatum</i> ).	Unlikely, as no suitable habitat present
Hygrophoraceae	<i>Hygrocybe lanecovensii</i>		Warm temperate forests dominated by Lilly Pilly ( <i>Acmena smithii</i> ), Grey Myrtle ( <i>Backhousia myrtifolia</i> ), Cheese Tree ( <i>Glochidion ferdinandi</i> ) and Sweet Pittosporum ( <i>Pittosporum undulatum</i> ).	Unlikely, as no suitable habitat present
Hygrophoraceae	<i>Hygrocybe reesia</i>		Warm temperate forests dominated by Lilly Pilly ( <i>Acmena smithii</i> ), Grey Myrtle ( <i>Backhousia myrtifolia</i> ), Cheese Tree ( <i>Glochidion ferdinandi</i> ) and Sweet Pittosporum ( <i>Pittosporum undulatum</i> ).	Unlikely, as no suitable habitat present
Hygrophoraceae	<i>Hygrocybe rubronivea</i>		Warm temperate forests dominated by Lilly Pilly ( <i>Acmena smithii</i> ), Grey Myrtle ( <i>Backhousia myrtifolia</i> ), Cheese Tree ( <i>Glochidion ferdinandi</i> ) and Sweet Pittosporum ( <i>Pittosporum undulatum</i> ).	Unlikely, as no suitable habitat present

Table 2 (continued) Threatened flora recorded within 10 km of subject property and included in either the BC Act or EPBC Act

Family	Species	Common Name	Habitat	Likelihood at Subject Site
Laminaceae	<i>Prostanthera marifolia</i>	Seaforth Mintbush	Only known from the northern Sydney suburb of Seaforth and has a very highly restricted distribution. within the Sydney Basin Bioregion.	Unlikely, as outside range
Lobeliaceae	<i>Isotoma fluviatilis</i> subsp. <i>Fluviatilis</i>		Occurs in damp places, including freshwater wetland, grassland/alluvial woodland and an alluvial woodland/shale plains woodland (Cumberland Plain Woodland) ecotone.	Unlikely, as no suitable habitat present
Myrtaceae	<i>Callistemon linearifolius</i>	Netted Bottle Brush	Dry sclerophyll forest on the coast, known from the Hornsby Plateau and within Ku-ring Gai N.P.	Unlikely, as no suitable habitat present
Myrtaceae	<i>Darwinia biflora</i>		Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone.	Unlikely, as no suitable habitat present
Myrtaceae	<i>Eucalyptus camfieldii</i>	Camfield's Stringybark	Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges.	Unlikely, as no suitable habitat present
Myrtaceae	<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	New England Tablelands in grassy woodlands on infertile soils derived from granite or meta-sedimentary bedrock.	Unlikely, as no suitable habitat present
Myrtaceae	<i>Leptospermum deanei</i>		Woodland on lower hill slopes or near creeks on sandy alluvial soil or sand over sandstone.	Unlikely, as no suitable habitat present
Myrtaceae	<i>Melaleuca deanei</i>	Deane's Paperbark	Ridgetop woodland on sandstone in two distinct areas at Berowra and Wedderburn.	Unlikely, as no suitable habitat present
Myrtaceae	<i>Melaleuca biconvexa</i>	Biconvex Paperbark	Grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	Unlikely, as no suitable habitat present
Myrtaceae	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	Littoral rainforest and coastal scrub.	Unlikely, as no suitable habitat present
Myrtaceae	<i>Triplarina imbricata</i>	Creek Triplarina	Occurs along watercourses in low open forest with Water Gum ( <i>Tristaniopsis laurina</i> ) or in montane bogs.	Unlikely, as no suitable habitat present
Orchidaceae	<i>Caladenia tessellata</i>	Thick-lipped Spider Orchid	Generally found in grassy sclerophyll woodland on clay loam or sandy soils.	Unlikely, as no suitable habitat present
Orchidaceae	<i>Cryptostyllis hunteriana</i>	Leafless Tongue-orchid	Known from a range of communities, including swamp-heath and woodland dominated by <i>Eucalyptus sclerophylla</i> , <i>E. sieberi</i> , <i>Corymbia gummifera</i> and <i>Allocasuarina littoralis</i> .	Unlikely, as no suitable habitat present
Orchidaceae	<i>Genoplesium baueri</i>	Bauer's Midge Orchid	Grows in dry sclerophyll forest and moss gardens over sandstone.	Unlikely, as no suitable habitat present

Table 2 (continued) Threatened flora recorded within 10 km of subject property and included in either the BC Act or EPBC Act

Family	Species	Common Name	Habitat	Likelihood at Subject Site
Orchidaceae	<i>Microtis angusii</i>	Angus's Onion Orchid	Currently known from only one site at Ingleside, north of Sydney. Habitat not clearly defined.	Unlikely, as no suitable habitat present
Orchidaceae	<i>Pterostylis saxicola</i>	Sydney Plains Greenhood	Grow in sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	Unlikely, as no suitable habitat present
Poaceae	<i>Deyuexia appressa</i>		Known only from two pre-1942 records in the Sydney area from wet boggy open communities in Hornsby area.	Unlikely, as no suitable habitat present
Proteaceae	<i>Grevillea caleyi</i>	Caley's Grevillea	Known sites are ridgetops at elevations of 170 to 240 m ASL in Belrose, Ingleside and Terry Hills in laterite soils and open forest vegetation community.	Unlikely as outside range and no suitable habitat present
Proteaceae	<i>Grevillea parviflora</i> subsp. <i>Parviflora</i>	Small-flower Grevillea	Sandy or light clay soils usually over thin shales. Occurs in a range of vegetation types from heath and shrubby woodland to open forest.	Unlikely, as no suitable habitat present
Proteaceae	<i>Persoonia hirsute</i>	Hairy Geebung	Sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	Unlikely, as no suitable habitat present
Proteaceae	<i>Persoonia mollis</i> subsp. <i>Maxima</i>		Occurs in relatively moist, tall forest vegetation communities, often with warm temperate rainforest influences.	Unlikely, as no suitable habitat present
Rutaceae	<i>Asterolasia elegans</i>		Small shrub found in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest.	Unlikely, as no suitable habitat present
Santalaceae	<i>Thesium australe</i>	Austral Toadflax	Grassland on coastal headlands or grassy woodland away from the coast. Often in association with Kangaroo Grass ( <i>Themeda australis</i> ).	Unlikely, as no suitable habitat present
Thymelaeaceae	<i>Pimelea curviflora</i> var. <i>curviflora</i>		Occurs on shale/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands.	Unlikely, as no suitable habitat present
Thymelaeaceae	<i>Pimelea spicata</i>	Spiked Rice-flower	Occurs on clay soils and associated with derived grasslands, Forest Red Gum and Grey Box in the Sydney Basin Bioregion.	Unlikely, as outside range and no suitable habitat present

Source: NPWS Wildlife Atlas as at 8<sup>th</sup> August, 2018, Protected Matters Search Tool, 8<sup>th</sup> August, 2018.

Table 4 Habitat of threatened fauna species and their likelihood of occurrence

Note: Species likely to occur are highlighted green in the Table.

Family	Scientific Name	Common Name	Habitat	Likelihood of Occurrence on Site
<b>Amphibia</b>				
<i>Hylidae</i>	<i>Litoria aurea</i>	Green and Golden Bell Frog	Permanent unshaded dams and lakes, often in fringing vegetation; has been observed in degraded and polluted environments.	Unlikely, dams and ponded water is not present
<i>Myobatrachidae</i>	<i>Heleioporus australicus</i>	Giant Burrowing Frog	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	Unlikely, unsuitable habitat
<i>Myobatrachidae</i>	<i>Mixophyes balbus</i>	Stuttering Frog	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range.	Unlikely, as no suitable habitat present
<i>Myobatrachidae</i>	<i>Pseudophryne australis</i>	Red-crowned Toadlet	Inhabits periodically wet drainage lines below sandstone Shelters under rocks and dense vegetation or thick piles of leaf litter.	Unlikely as no suitable habitat present
<b>Aves (Birds)</b>				
<i>Accipitridae</i>	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Occurs near the sea or sea-shore, bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; or in the vicinity of freshwater swamps, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heath and, woodlands.	Unlikely as no suitable habitat present
<i>Accipitridae</i>	<i>Hieraaetus morphnoides</i>	Little Eagle	Open Eucalypt forest and woodland throughout most of NSW.	Unlikely
<i>Accipitridae</i>	<i>Lophoictinia isura</i>	Square-tailed Kite	Open forests, woodlands, breeds in tall riparian vegetation.	Unlikely
<i>Accipitridae</i>	<i>Pandion cristatus</i>	Eastern Osprey	Coastal areas, especially the mouths of large rivers, lagoons and lakes.	Unlikely, as no suitable habitat present
<i>Ardeidae</i>	<i>Botaurus poiciloptilus</i>	Australasian Bittern	Permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes ( <i>Typha</i> spp.) and spikerushes ( <i>Eleocharis</i> spp.).	Unlikely as no suitable habitat present
<i>Ardeidae</i>	<i>Ixobrychus flavicollis</i>	Black Bittern	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation.	Unlikely as no suitable habitat present
<i>Artamidae</i>	<i>Artamus cyanopterus</i> subsp. <i>cyanopterus</i>	Dusky Woodswallow	Inhabits dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, Acacia and other shrubs, and ground-cover of grasses or sedges and fallen woody debris.	Unlikely

Table 3 (continued) Habitat of threatened fauna species and their likelihood of occurrence

Family	Scientific Name	Common Name	Habitat	Likelihood of Occurrence on Site
<i>Burhinidae</i>	<i>Burhinus grallarius</i>	Bush Stone-curlew	Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber.	Unlikely
<i>Cacatuidae</i>	<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	Dependent on large hollow-bearing eucalypts for nest sites with a preference of She-oak vegetation.	Possible, assessment of significance provided
<i>Charadriidae</i>	<i>Charadrius leschenaultii</i>	Great Sand Plover	Occurs mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks.	Unlikely as no suitable habitat present
<i>Charadriidae</i>	<i>Charadrius mongolus</i>	Lesser Sand Plover	Occurs on beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms.	Unlikely as no suitable habitat present
<i>Columbidae</i>	<i>Ptilinopus superbus</i>	Superb Fruit-Dove	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees	Unlikely as no suitable habitat present
<i>Haematopodidae</i>	<i>Haematopus longirostris</i>	Pied Oystercatcher	Found commonly on intertidal flats of inlets and bays, open beaches and sandbanks.	Unlikely as no suitable habitat present
<i>Hydrobatidae</i>	<i>Fregetta grallaria</i> subsp. <i>grallaria</i>	White-bellied Storm-Petrel	Vagrant birds occur in coastal NSW waters, particularly after storm events.	Unlikely as no suitable habitat present
<i>Laridae</i>	<i>Sternula albifrons</i>	Little Tern	Almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records).	Unlikely as no suitable habitat present
<i>Laridae</i>	<i>Sternula nereis</i> subsp. <i>nereis</i>	Australian Fairy Tern	The subspecies has been found in embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline.	Unlikely as no suitable habitat present
<i>Meliphagidae</i>	<i>Anthochaera phrygia</i>	Regent Honeyeater	Dry Open Forest and Woodland and riverine sheoak woodlands on the coast.	Unlikely as outside known locations
<i>Meliphagidae</i>	<i>Grantiella picta</i>	Painted Honeyeater	Inhabits Boree/ Weeping Myall ( <i>Acacia pendula</i> ), Brigalow ( <i>A. harpophylla</i> ) and Box-Gum Woodlands and Box-Ironbark Forests.	Unlikely as out of range

Table 3 (continued) Habitat of threatened fauna species and their likelihood of occurrence

Family	Scientific Name	Common Name	Habitat	Likelihood of Occurrence on Site
<i>Neosittidae</i>	<i>Daphoenositta chrysoptera</i>	Varied Sittella	Open Eucalypt forest and woodland.	Unlikely
<i>Pardalotidae</i>	<i>Dasyornis brachypterus</i>	Eastern Bristlebird	Occurs in dense, low vegetation including heath and open woodland with a heathy understorey. In northern NSW the habitat occurs in open forest with dense tussocky grass understorey and sparse mid-storey near rainforest ecotone.	Unlikely as no suitable habitat present
<i>Psittacidae</i>	<i>Glossopsitta pusilla</i>	Little Lorikeet	Tall open forest, woodland, Melaleuca swamp, riparian and open forest.	Unlikely as no suitable habitat present
<i>Psittacidae</i>	<i>Lathamus discolor</i>	Swift Parrot	Open Forest and Woodland, particularly Grey Box – Ironbark communities.	Unlikely as no suitable habitat present
<i>Rostratulidae</i>	<i>Rostratula australis</i>	Australian Painted Snipe	Occurs in fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	Unlikely as no suitable habitat present
<i>Strigidae</i>	<i>Ninox connivens</i>	Barking Owl	Eucalypt Woodlands, Open Forest, Swamp Woodlands and timber along watercourses.	Unlikely
<i>Strigidae</i>	<i>Ninox strenua</i>	Powerful Owl	Woodland to Tall moist forest and rainforest.	Probable, assessment of significance provided
<i>Tytonidae</i>	<i>Tyto novaehollandiae</i>	Masked Owl	Lives in dry eucalypt forests and woodlands from sea level to 1100 m.	Unlikely
<i>Tytonidae</i>	<i>Tyto tenebricosa</i>	Sooty Owl	Dry Sclerophyll Forests and woodlands but requires large tree hollows or caves for nesting.	Unlikely
<b>Mammalia (Mammals)</b>				
<i>Burramyidae</i>	<i>Cercartetus nanus</i>	Eastern Pygmy-possum	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred.	Unlikely as no suitable habitat present (low abundance of Banksia heath)
<i>Dasyuridae</i>	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	Occurs in dry sclerophyll forest, scrub, heathland and cultivated land.	Unlikely
<i>Emballonuridae</i>	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	Found in tree hollows and buildings; in treeless areas, known to utilise mammal burrows. Forages in most habitats across a very wide range, with and without trees; appears to defend an aerial territory.	Possible, assessment of significance provided

Table 3 (continued) Habitat of threatened fauna species and their likelihood of occurrence

Family	Scientific Name	Common Name	Habitat	Likelihood of Occurrence on Site
Molossidae	<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.	Possible, assessment of significance provided
Muridae	<i>Pseudomys novaehollandiae</i>	New Holland Mouse	Dry coastal heath or heathy sclerophyll forest with open understorey from recent disturbances.	Unlikely, as no suitable habitat present
Peramelidae	<i>Perameles nasuta</i>	Long-nosed Bandicoot	Occupies a variety of habitats in North Head. Shelters during the day in a well-concealed nest based on a shallow hole lined with leaves and grass, sometimes under debris, sometimes hidden with soil and with the entrance closed for greater concealment.	Unlikely- not recorded in the vicinity
Peramelidae	<i>Isoodon obesulus</i> subsp. <i>obesulus</i>	Southern Brown Bandicoot	Dry sclerophyll forest, woodland and heath with sandy soils.	Unlikely, as no suitable habitat present
Petauridae	<i>Petaurus australis</i>	Yellow-bellied Glider	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils.	Unlikely, as no suitable habitat present
Petauridae	<i>Petauroides volans</i>	Greater Glider	Wide range of habitats including tall open woodland, eucalypt forests and low woodlands.	Unlikely, as no suitable habitat present
Pteropodidae	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Rainforest, tall sclerophyll forests and woodland.	Possible foraging habitat , assessment of significance provided
Phascolarctidae	<i>Phascolarctos cinereus</i>	Koala	Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species; but in any one area will select preferred species.	Unlikely,, not known from northern Sydney
Vespertilionidae	<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	Prefers moist habitats, trees taller than 20 m. Roosts in eucalypt hollows, but also found under loose bark on trees or in buildings.	Unlikely
Vespertilionidae	<i>Miniopterus australis</i>	Little Bentwing-bat	Coastal heath, woodland and forest vegetation , particularly associated with Melaleuca sp.	Possible, assessment of significance provided
Vespertilionidae	<i>Miniopterus schreibersii</i> (= <i>oraniae</i> ) subsp. <i>oceanensis</i>	Eastern Bentwing-bat	Caves old growth forest with tree hollows, known to utilise man-made stormwater infrastructures and disused buildings for roosting.	Located (Anabat)
Vespertilionidae	<i>Myotis macropus</i>	Southern Myotis	Feeds over large water bodies, roosts in open forest, woodland with tree hollows.	Possible, assessment of significance provided

Table 3 (continued) Habitat of threatened fauna species and their likelihood of occurrence

Family	Scientific Name	Common Name	Habitat	Likelihood of Occurrence on Site
Vespertilionidae	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Tall wet forests and drier gullies, roosts in tree hollows and feeds along forest edges or streams.	Possible, assessment of significance provided
Vespertilionidae	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Prefers caves and rock overhangs near water for roosting sites.	Unlikely
<b>Reptile (Reptiles)</b>				
Elapidae	<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring.	Unlikely –outside known range
Varanidae	<i>Varanus rosenbergi</i>	Rosenberg's Goanna	Occurs in heath, open forest and woodland. Associated with termites, the mounds of which are a critical habitat component. Feeds on carrion, birds, eggs, reptiles and small mammals.	Unlikely

Source: NPWS Wildlife Atlas as at 8<sup>th</sup> August, 2018, Protected Matters Search Tool, 8<sup>th</sup> August, 2018.

## **APPENDIX D – SPECIES RECORDED**

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Table 5 Flora recorded on subject property (based on Applied Ecology report (2012) and Molino Stewart assessments)

<b>Family</b>	<b>Botanical name</b>	<b>Common Name</b>	<b>Observed (Random Walk)</b>
Amaranthaceae	<i>Amaranthus retroflexus</i> *	Redroot Amaranth	Yes
Apiaceae	<i>Actinolus minor</i>	Lesser Flanner Flower	Yes
Apocyanaceae	<i>Nerium oleander</i> *	Oleander	Yes
Araceae	<i>Monstera deliciosa</i> *	Monstera	Yes
Araliaceae	<i>Hedera helix</i> *	English Ivy	Yes
Araucariaceae	<i>Araucaria heterophyll</i>	Norfolk Pine	Yes
Asclepiadaceae	<i>Araujia serifera</i> *	Moth vine	Yes
Asparagaceae	<i>Asparagus aethiopicus</i> *	Asparagus Fern	Yes
Asteraceae	<i>Ageratina adenophora</i> *	Crofton weed	Yes
Asteraceae	<i>Bidens pilosa</i> *	Cobblers Pegs	Yes
Asteraceae	<i>Carduus nutans</i> *	Nodding Thistle	Yes
Asteraceae	<i>Conyza bonariensis</i> *	Fleabane	Yes
Asteraceae	<i>Hypochoeris radicata</i> *	Cats Ear	Yes
Asteraceae	<i>Onopordium acanthium</i> *	Scotch Thistle	Yes
Asteraceae	<i>Senecio madagascariensis</i> *	Fireweed	Yes
Asteraceae	<i>Sonchus oleraceus</i>	Sowthistle	Yes
Asteraceae	<i>Taraxacum officinale</i> *	Dandelion	Yes
Basellaceae	<i>Anredera cordifolia</i>	Madeira vine	Yes
Bignoniaceae	<i>Jacaranda mimosifolia</i>	Jacaranda	Yes
Cannaceae	<i>Canna indica</i>	Canna	Yes
Caprifoliaceae	<i>Abelia grandiflora</i>	Abelia	
Casuarinaceae	<i>Allocasuarina torulosa</i>	Forest-Oak	Yes
Caprifoliaceae	<i>Lonicera japonica</i> *	Japanese Honeysuckle	Yes
Commelinaceae	<i>Commelina cyanea</i>	Scurry weed	Yes
Commelinaceae	<i>Tradescantia albiflora</i> *	Wandering Jew	Yes
Convolvulaceae	<i>Dichondra repens</i>	Kidney weed	Yes
Convolvulaceae	<i>Ipomoea indica</i> *	Purple morning-glory	Yes
Convolvulaceae	<i>Ipomoea purpurea</i> *	Common morning-glory	Yes
Cyperaceae	<i>Cyperus spp.</i>	Sedge	Yes
Cyperaceae	<i>Lepidosperma laterale</i>	Sedge	Yes
Davaliaceae	<i>Nephrolepis cordifolia</i>	Fishbone Fern	Yes
Dennstaedtiaceae	<i>Pteridium esculentum</i> *	Bracken Fern	Yes

Table 5 (continued) Flora recorded on subject property (based on Applied Ecology report (2012) and Molino Stewart assessments)

Family	Botanical name	Common Name	Observed (Random Walk)
Euphorbiaceae	<i>Chamaesyce prostrata</i> *	Red Caustic Creeper	Yes
Euphorbiaceae	<i>Euphorbia pepulus</i> *	Petty Spurge	Yes
Euphorbiaceae	<i>Euphorbia tirucalli</i> *	Pencil Tree	Yes
Fabaceae	<i>Acacia longifolia</i>	Sydney Golden Wattle	Yes
Fabaceae	<i>Acacia parramattensis</i>	Parramatta Green Wattle	Yes
Fabaceae	<i>Gledistia triacanthos</i> *	Honey Locust	Yes
Fabaceae	<i>Medicago sativa</i> *	Medic	Yes
Fabaceae	<i>Senna pendula</i> *	Senna	Yes
Fabaceae	<i>Trifolium repens</i> *	White Clover	Yes
Juncaceae	<i>Juncus usitatus</i>	Juncus	Yes
Lamiaceae	<i>Mentha spicata</i> *		Yes
Lauraceae	<i>Cinnamomum camphora</i> *	Camphor laurel	Yes
Liliaceae	<i>Agapanthus spp.</i> *		Yes
Liliaceae	<i>Alstromeria psittacina</i> *	Parrot Lily	Yes
Liliaceae	<i>Dianella careulea</i>	Flax Lilly	Yes
Liliaceae	<i>Northoscordum borbonicum</i> *	Onion Weed	Yes
Lomandraceae	<i>Lomandra longifolia</i>	Mat Rush	Yes
Myrtaceae	<i>Angophora costata</i>	Smooth-barked Apple	Yes
Myrtaceae	<i>Baekkea diosmifolia</i>	Fringed Baeckea	Yes
Myrtaceae	<i>Callistemon citrinus</i>	Crimson Bottlebrush	Yes
Myrtaceae	<i>Callistemon viminalis</i>	Dwarf Bottlebrush	Yes
Myrtaceae	<i>Corymbia gummifera</i>	Red Bloodwood	Yes
Myrtaceae	<i>Eucalyptus pilularis</i>		Yes
Myrtaceae	<i>Eucalyptus haemastoma</i>	Scribbly Gum	Yes
Myrtaceae	<i>Eucalyptus sieberi</i>	Silvertop Ash	Yes
Myrtaceae	<i>Leptospermum polygalifolium</i>	Tantoon	Yes
Myrtaceae	<i>Syncarpia glomulifera</i>	Turpentine	Yes
Myrtaceae	<i>Syzygium smithii</i>	Lilly Pilly	Yes
Malvaceae	<i>Cotoneaster glaucophyllus</i>	Cotoneaster	Yes
Malvaceae	<i>Hibiscus spp.</i> *	Hibiscus	Yes
Malvaceae	<i>Malva nicaeensis</i> *	Mallow of Nice	Yes
Malvaceae	<i>Modiola caroliniana</i> *	Redflower Mallow	Yes
Malvaceae	<i>Sida rhombifolia</i> *	Paddys Lucerne	Yes

Table 5 (continued) Flora recorded on subject property (based on Applied Ecology report (2012) and Molino Stewart assessments)

<b>Family</b>	<b>Botanical name</b>	<b>Common Name</b>	<b>Observed (Random Walk)</b>
Ochnaceae	<i>Ochna serrulata</i>	Mickey Mouse Plant	Yes
Oleaceae	<i>Jasminum polyanthum</i> *	Climbing Jasmine	Yes
Oleaceae	<i>Ligustrum lucidum</i> *	Large-leave Privet	Yes
Oleaceae	<i>Ligustrum sinense</i> *	Small-leave Privet	Yes
Oleaceae	<i>Notolea longifolia</i>	Mock Olive	Yes
Oleaceae	<i>Olea europea</i> *	European Olive	Yes
Oxalidaceae	<i>Oxalis corniculata</i> *	Yellow Wood Sorrel	Yes
Oxalidaceae	<i>Oxalis pes-caprae</i> *	Soursob	Yes
Phytolaccaceae	<i>Phytolacca octandra</i> *	Ink weed	Yes
Plantaginaceae	<i>Plantago lanceolate</i> *	Plantain	Yes
Poaceae	<i>Andropogon virginicus</i> *	Whiskey Grass	Yes
Poaceae	<i>Arrhenatherum elatius</i>	Bulbous Oat Grass	Yes
Poaceae	<i>Chloris Guyana</i> *	Rhodes Grass	Yes
Poaceae	<i>Cynodon dactylon</i> *	Couch	Yes
Poaceae	<i>Ehrharta erecta</i>		Yes
Poaceae	<i>Imperata cylindica</i>	Blady Grass	Yes
Poaceae	<i>Microlaena stipoides</i>	Weeping Meadow Grass	Yes
Poaceae	<i>Ophiopogon japonicas</i> *	Mondo Grass	Yes
Poaceae	<i>Papalum dilatatum</i> *	Paspalum	Yes
Poaceae	<i>Pennisetum clandestinum</i> *	Kikuyu	Yes
Poaceae	<i>Setaria glauca</i>	Pigeon Grass	Yes
Poaceae	<i>Stenotaphrum secundatum</i>	Buffalo Grass	Yes
Polygonaceae	<i>Acetosa sagittata</i> *	Turkey Rhubarb	Yes
Polygonaceae	<i>Rumex obtusifolia</i> *	Large-leaved Docks	Yes
Pittosporaceae	<i>Pittosporum undulatum</i> *	Sweet Pittosporum	Yes
Proteaceae	<i>Banksia ericifolia</i>	Heath-leaved Banksia	Yes
Proteaceae	<i>Banksia oblongifolia</i>	Banksia	Yes
Proteaceae	<i>Banksia serrata</i>	Old Man Banksia	Yes
Proteaceae	<i>Banksia spinulosa</i>	Hair-pin Banksia	Yes
Ranunculaceae	<i>Ranunculus repens</i>	Creeping Buttercup	Yes
Rosaceae	<i>Prunus persica</i> *	Peach	Yes
Rosaceae	<i>Rubus fruticosus</i> *	Blackberry	Yes

Table 5 (continued) Flora recorded on subject property (based on Applied Ecology report (2012) and Molino Stewart assessments)

<b>Family</b>	<b>Botanical name</b>	<b>Common Name</b>	<b>Observed (Random Walk)</b>
Rubiaceae	<i>Coprosma repens</i> *	Mirror bush	Yes
Sapindaceae	<i>Cardiospermum grandiflorum</i> *	Baloon vine	Yes
Smilacaceae	<i>Smilax glyciophylla</i>	Sweet Sarsparilla	Yes
Solanaceae	<i>Cestrum parqui</i> *	Cestrum	
Solanaceae	<i>Solanum mauritianum</i> *	Wild Tobacco Bush	Yes
Solanaceae	<i>Solanum nigrum</i> *	Blackberry Nightshade	Yes
Theaceae	<i>Camellia spp.</i> *	Camellia	Yes
Tropaeolaceae	<i>Tropaeolum majus</i>	Nasturtium	Yes
Verbenaceae	<i>Lantana camara</i> *	Lantana	Yes
Verbenaceae	<i>Verbena bonariensis</i> *	Purpletop	Yes
Xanthoraceae	<i>Xanthorrhoea arborea</i>	Broad leaf grass tree	Yes

\* Introduced species, many of which are weeds and others, horticultural species, which have the potential to invade natural habitat.

Table 6 Fauna List (based on Applied Ecology report (2012) and Molino Stewart assessments)

Scientific Name	Common Name	Detection
<b>Amphibians (Frogs)</b>		
<i>Crinia signifera</i>	Common Eastern Froglet	Heard
<i>Pseudo Phryne bibronii</i>	Brown Toadlet	Heard
<i>Lymnodynastes dumerilli</i>	Eastern Banjo Frog	Heard
<b>Reptilia (Reptiles)</b>		
<i>Lampropholus delicata</i>	Garden Skink	Observed
<i>Lampropholus guichenoti</i>	Common Garden Skink	Observed
<i>Eulamprus quoyii</i>	Easter Water Skink	Observed
<i>Ctenotus robustus</i>	Eastern Striped Skink	Observed
<i>Cryptoblepharus virgatus</i>	Wall Skink	Observed
<i>Tiliqua scincoides</i>	Eastern Blue-tongue Lizard	Observed
<b>Aves (Birds)</b>		
<i>Rhipidura leuophrys</i>	Willie Wagtail	Observed
<i>Manorina melanocephala</i>	Noisy Minor	Observed
<i>Cracticus torquatus</i>	Grey Butcherbird	Observed
<i>Anthachaera chrysoptera</i>	Little Wattlebird	Observed
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	Observed
<i>Gymnorhina tibicen</i>	Australian Magpie	Heard
<i>Passer domesticus</i>	House Sparrow	Observed
<i>Dacelo novaeguineae</i>	Australian Kookaburra	Heard
<b>Mammalia (Mammals)</b>		
<i>Austronomus australis</i>	White-striped Free-tailed Bat	Anabat (definite)
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	Anabat (definite)
<i>Mormopterus</i> sp.	Southern Free-tailed Bat	Anabat (probable)
<i>Miniopterus schreibersii</i> (=oriana) <i>oceanensis</i> */ <i>Vespadelus regulus</i>	Eastern Bentwing-bat/ Southern Forest Bat	Anabat (probable)
<i>Vespadelus pumilus</i> / <i>Miniopterus australis</i> *	Eastern Forest bat/ Little Bent-wing bat	Anabat (probable)
<i>Pteropus poliocephalus</i> * **	Grey-headed Flying fox	Observed
<i>Trichosurus vulpecula</i>	Common Brushtail possum	Observed/hair
<i>Pseudocheirus peregrinus</i>	Ringtail Possum	Observed
<i>Vulpes vulpes</i>	Red Fox	Scats

\* Species listed as threatened in schedule of BC Act

## **APPENDIX E – ASSESSMENTS OF SIGNIFICANCE**

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### **Assessments of Significance under the Threatened Species Conservation Act 1995**

The subject site occurs within an area of high urban biodiversity adjacent to Gore Creek and in close proximity to Lane Cove Bushland Park, which is the only known record of the Hygrocybaceae Endangered Ecological Community (EEC).

The extent of the building footprint and the bushfire protection measures for the retirement village will not impact on mature native vegetation on the lower part of the site in the east on Zone E2 (see Figure 2. Suitable habitat was identified for the following species, which had been previously recorded within 10 km of the proposed development and an assessment of significance of for each species provided in this Appendix.

- Grey-headed Flying Fox;
- Powerful Owl;
- Glossy Black-cockatoo;
- Micro-bats (Eastern Bentwing Bat, Little Bentwing-bat, Yellow-bellied Sheath-tail-bat, Eastern Freetail-bat, Southern Myotis, Greater Broad-nosed Bat)
- *Camarophyllopsis kearneyi* (a Basidiomycota fungus); and
- Hygrocybeae Fungal Community of the Lane Cove Bushland Park in the Sydney Basin Bioregion – a Critically Endangered Ecological Community.

Assessments that share common life cycle and habitat requirements have been combined for some species.

## Grey-headed Flying-fox

The Grey-headed Flying-fox is the largest Australian bat, with a head and body length of 23 - 29 cm. It has dark grey fur on the body, lighter grey fur on the head and a russet collar encircling the neck. The wing membranes are black and the wingspan can be up to 1 m. It can be distinguished from other flying-foxes by the leg fur, which extends to the ankle.

Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations.

This species occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. This species feeds on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops.

The Grey-headed Flying-fox is listed as Vulnerable under the TSC Act and EPBC Act.

There are records of this species within 10 kilometres of the site.

There are known flying fox camps at Gladesville, Royal Botanic Gardens, Centennial Parkland at Lachlan Swamp, Ku-ring-gai Flying Fox Reserve at Gordon and the Warriewood Camp at Warriewood wetlands within a 20 km distance.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Mature canopy trees are only present in the Blackbutt – Angophora forest in the elevated part of the site on Longueville Road near the car parking area for the old bowling club facility. The vegetation does provide foraging resource for this species but is limited by the external noise and light influences. The majority of the native trees in this area will be retained as part of the landscaping for the facility. The clearing will involve a small number of mainly exotic trees on the west and north of the site, plus the weedy vegetation surrounding the former bowling greens. All the remnant trees to the north and the native vegetation to the east will be retained. The clearing is unlikely to have an adverse effect on the life cycle of this species such that it is placed at risk of extinction.

The bushland to the east of the development will be restored through carefully staged bush regeneration works and retain linkages to the north and south and will provide habitat for this species post development.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction

This section is not applicable to the Grey-headed Flying-fox.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

*(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*

This section is not applicable to the Grey-headed Flying-fox.

*(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction*

This section is not applicable to the Grey-headed Flying-fox.

*(d) in relation to the habitat of a threatened species, population or ecological community:*

*(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and*

Foraging habitat for the Grey-headed Flying Fox is present on the property. The existing canopy trees next to Longueville Road are impacted by noise and lighting effects, however the majority of these will be retained, as will the trees to the north of the site. Foraging habitat includes tall, closely-spaced canopy trees to the east that will not be impacted by the development.

*(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*

The existing road and residential dwellings along the ridge have already significantly fragmented the potential habitat. The development will not fragment or isolate the habitat to the east of the site.

*(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,*

The area to be cleared includes two native trees, several exotic trees, weedy embankments and two former bowling greens, providing little habitat value. It is considered that the habitat to be removed and modified is not important to the long-term survival of the species in the local area.

*(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*

Critical habitat has not been declared for this species.

*(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

To date, a recovery plan for this species has not been declared. A National Draft Recovery Plan has been prepared in 2017 and a NSW Government endorsed draft National Recovery Plan prepared in 2009.

The relevant objectives from the NSW endorsed plan that are relevant to this site include enhancing of winter and spring foraging habitat for Grey-headed Flying-foxes. This will be undertaken through the bush-regeneration and restoration of the eastern Zone E2 bushland area that contains winter flowering species, such as *Angophora costata*.

*(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

Key Threatening Processes that are relevant for this species and project are outlined:

Clearing of native vegetation – the removal of two native trees may remove potential habitat for this species. Important fauna corridor and connectivity with adjoining areas of native vegetation will be retained and positive management strategies adopted to enhance the habitat value of the bushland vegetation in the eastern part of the subject site.

Removal of dead wood and dead trees – cleared vegetation shall be retained on site to increase the availability of fallen timber and dead trees for ground-dwelling animals.

### **Conclusion:**

Based on consideration of this Assessment of Significance and the implementation of mitigation measures listed in the ecological assessment the proposed development is considered unlikely to result in a significant impact on the Grey-headed Flying-fox.

### Assessment of Significance (EPBC Act)

*1. Are there any matters of national environmental significance located in the area of the proposed action*

Grey-headed Flying-fox is a Matter Of National Environmental Significance, with the species being listed as a Vulnerable Species under the EPBC Act.

2. *Considering the proposed action at its broadest scope (that is, considering all stages and components of the action, and all related activities and infrastructure), is there potential for impacts, including indirect impacts, on matters of national environmental significance?*

Direct impacts include loss of foraging habitat through removal of a small number of trees. Potential indirect impacts are damage to trees through physical impact or compaction of soils.

3. *Are there any proposed measures to avoid or reduce impacts on matters of national environmental significance (and if so, is the effectiveness of these measures certain enough to reduce the level of impact below the 'significant impact' threshold)?*

Retention of the majority of trees will result in a reduction of impacts on the habitat value of the site for the species.

Disturbance from construction activity would be minimised through observing the tree protection measures.

The potential increase in paving could damage tree roots. This will be minimised through placing pavers at or above ground level.

4. *Are any impacts of the proposed action on matters of national environmental significance likely to be significant impacts (important, notable, or of consequence, having regard to their context or intensity)?*

Is the action is likely to have a significant impact on a vulnerable species	
Will it lead to a long-term decrease in the size of an important population of a species	No
Will it reduce the area of occupancy of an important population	No
Will it fragment an existing important population into two or more populations	No
Will it adversely affect habitat critical to the survival of a species	No
Will it disrupt the breeding cycle of an important population	No
Will it modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No
Will it result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	No
Will it introduce disease that may cause the species to decline, or	No
Will it interfere substantially with the recovery of the species.	No

Any occurrence of Grey-headed Flying-fox on the site is considered to occur as part of a broader foraging activity throughout the area and the impact of loss of habitat is considered to be minor when compared to other available feeding habitat in the local area.

## **Conclusion**

Based on consideration of this Assessment of Significance, the proposal is considered unlikely to result in a significant impact on the Grey Headed Flying-Fox and referral for a decision by the Australian Government Environment Minister on whether assessment and approval is not required.

## Powerful Owl

The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda*, Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species.

The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider. There may be marked regional differences in the prey taken by Powerful Owls. Ringtail Possum, Flying foxes and birds are important prey in some areas. As most prey species require hollows and a shrub layer, these are important habitat components for the owl.

Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. While the female and young are in the nest hollow the male Powerful Owl roosts nearby (10-200 m) guarding them, often choosing a dense 'grove' of trees that provide concealment from other birds that harass him.

The site provides potential roosting sites for the species and habitat for prey species.

### Assessment

*(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction*

Only very limited areas of potential roosting habitat will be adversely affected by removal of trees for the proposed development. There are no large hollow bearing trees occurring on the site. The retention of canopy trees at the north and east of the site would be maintained as well as overall connectivity of canopy vegetation in the local area.

*(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction*

This section is not applicable to the Powerful Owl.

*(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

*(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*

This section is not applicable to the Powerful Owl.

*(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction*

This section is not applicable to the Powerful Owl.

*(d) in relation to the habitat of a threatened species, population or ecological community:*

*(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed*

The Southern Brown Bandicoot forages in sandy soil and shelters in dense heath vegetation. Both of these features shall be available post development.

Minor potential roosting habitat for the Powerful Owls would be reduced on the site by the removal of several trees for construction of the new facility. However, suitable habitat is retained through mature trees along the western and northern edge of the property and in the bushland on the eastern part of the site and in the adjoining bushland to the north and south along Gore Creek and its tributaries.

*(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action*

The area of retained vegetation in the eastern portion of the subject site will provide connectivity with the surrounding bushland. Provided movement through to the subject site is not prevented by exclusion fencing, the available habitat for this species will not be fragmented by the proposed development.

*(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,*

The area to be cleared is weed infested and includes two former bowling greens. It provides low value habitat. The vegetation to the north and the east provides high value habitat and will be retained post development.

*(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*

Critical habitat has not been declared for this species.

*(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

A recovery plan for this species has been prepared for this species as part of the Large Forest Owls Recovery Plan.

The relevant objectives and actions for the management of the vegetation in the northern and eastern part of the property are consistent with the objectives of the recovery plan for the Powerful Owl.

This includes management and protection habitat off reserves. This will occur on the site by retaining and restoring the majority of the native vegetation.

*(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

Key Threatening Processes that are relevant for this species and project is outlined:

Clearing of native vegetation for the building footprint may remove minor potential habitat for this species. Important fauna corridor and connectivity with adjoining areas of native vegetation will be retained and positive management strategies adopted to enhance the habitat value of the heath vegetation in the eastern part of the subject site.

## **Conclusion**

Based on consideration of this Assessment of Significance and the implementation of mitigation measures listed in the ecological assessment the proposed development is considered unlikely to result in a significant impact on potential habitat for the Powerful Owl.

## Glossy Black Cockatoo

The Glossy Black Cockatoo is around 46-50 cm long and is generally smaller than other black-cockatoos. It is a brownish black colour and has a small crest.

There are some distinct differences in appearance between male and female birds. The male can be identified by the browner colour on the head and underparts and by bright red panels in the black tail. The female has a wider tail which is red to reddish-yellow, barred with black. The female may also have yellow markings around the head.

The glossy black-cockatoo lives in coastal woodlands and drier forest areas, open inland woodlands or timbered watercourses where casuarinas (or sheoaks), its main food trees, are common. Brigalow scrub or hilly rocky country containing casuarina species tend to be their preferred habitat in inland NSW. The glossy black-cockatoo generally prefers to feed from the seeds of mature *Allocasuarina* trees. The birds' presence is often indicated by a layer of cracked cones and fragments that have accumulated under favoured casuarina trees.

The glossy black-cockatoo prefers to nest in the hollows of large, old eucalypt trees, alive or dead. The typical nest site will be around 3-30 m above the ground, and the nest hollow is generally lined with decayed debris. The birds tend to nest in the same areas as other nesting pairs, sometimes even sharing the same nest tree.

In NSW, breeding takes place from March to August. One egg, white in colour, is produced.

### Assessment

*(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction*

The Glossy Black Cockatoo occupies a range of habitats that include moist forest identified on the subject land. However, only one hollow-bearing tree was identified and no evidence of chewed *Allocasuarina* cones was observed that could indicate recent activity by this species.

Given the weed infested condition of vegetation surrounding the bowling greens, the proximity to surrounding developments and the present of suitable gully forest to the east and in nearby creekline reserves, the proposal is unlikely to have an adverse effect on the life cycle of this species such that it is placed at risk of extinction.

*(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,*

The Glossy black Cockatoo is not an endangered population.

*(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

*(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*

*(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction*

The Glossy Black Cockatoo is not an endangered ecological community.

*(d) in relation to the habitat of a threatened species, population or ecological community:*

*(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed*

The proposed works will require clearing of weedy vegetation surrounding the existing bowling greens, several exotic tree species to the north and west of the site, and two native trees to the west. The extent of this clearing is restricted to that necessary for the development footprint with the majority of the northern treed area and eastern bushland part of the property retained post development.

*(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action*

The proposed works will not isolate any areas of potential habitat for this species. The current areas of native vegetation will be retained within the reserve to the east of the subject site.

*(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,*

The removal of vegetation for the development will result in a minor loss of potential habitat for this species. The vegetation provides only limited habitat value due to the influence of surrounding land uses such that the habitat to be removed/modified is not important to the long-term survival of the species in the local area.

*(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*

Critical habitat has not been declared for this species.

*(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

To date, a recovery plan for this species has not been declared. A number of activities have been recommended to assist the recovery of the species. The following is relevant to the proposed works:

Retain and protect areas of native forest and woodland containing she-oaks, particularly the bushland setback vegetation in and manage the bioretention system to minimise risk of bushland impacts from runoff.

*(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

Key Threatening Processes that are relevant for this species and project include:

Clearing of native vegetation for the building footprint may remove one tree with a hollow that offers potential habitat for this species. Important fauna habitat will be retained in the bushland adjoining the site corridor, connectivity with adjoining areas of native vegetation will be retained and positive management strategies adopted to enhance the habitat value of the bushland vegetation in the eastern part of the subject site.

## **Conclusion**

Based on consideration of this Assessment of Significance and the implementation of mitigation measures listed in the ecological assessment the proposed development is considered unlikely to result in a significant impact on the Glossy Black Cockatoo.

## **Micro-bats (Eastern Bentwing Bat, Little Bentwing-bat, Yellow-bellied Sheathtail-bat, Eastern Freetail-bat, Southern Myotis, Greater Broad-nosed Bat)**

Two species of threatened microbats were located as probable records on the site, including Eastern Bentwing-bat (*Miniopterus schreibersii* (=oriana) *oceanensis*) and Little Bentwing-bat (*Miniopterus australis*). Other species of microbats included in the assessment of significance are likely to occur on the site but were not detected during the winter survey period.

Eastern Bentwing-bat (*Miniopterus schreibersii* (=oriana) *oceanensis*) is listed as Vulnerable in NSW. It has chocolate to reddish-brown fur on its back and slightly lighter coloured fur on its belly. It has a short snout and a high 'domed' head with short round ears. The wing membranes attach to the ankle, not to the base of the toe. The last bone of the third finger is much longer than the other finger-bones giving the "bent wing" appearance. It weighs up to 20 grams, has a head and body length of about 6 cm and a wingspan of 30 - 35 cm.

Eastern Bentwing-bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but they also use derelict mines, storm-water tunnels, buildings and other man-made structures. They form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. They hunt in forested areas, catching moths and other flying insects above the tree tops.

Little Bentwing-bat (*Miniopterus australis*) is listed as Vulnerable in NSW. They are small dark chocolate brown insectivorous bats with a body length of about 45 mm. The tip of the wing is formed by a particularly long joint of the third finger, folded back and bent under the wing while the bat is at rest. The fur is long and thick, especially over the crown and around the neck, and is slightly lighter in colour on the belly. They have distinctly short muzzles, and short, rounded roughly triangular shaped ears. They are distinguished from the Common Bentwing-bat by its smaller size.

Little Bentwing-bat occurs along the east coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. Their habitat includes moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. They are generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters.

In NSW the largest maternity colony is in close association with a large maternity colony of Eastern Bentwing-bats (*Miniopterus schreibersii*) and appears to depend on the large colony to provide the high temperatures needed to rear its young. Maternity colonies form in spring and birthing occurs in early summer. Males and juveniles disperse in summer. Only five nursery sites /maternity colonies are known in Australia.

Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) is listed as Vulnerable in NSW. It is a very distinctive, large, insectivorous bat up to 87 mm long. It has long, narrow wings, a glossy, jet-black back, and a white to yellow belly extending to the shoulders and just behind the ear. Characteristically, it has a flattened head and a sharply-pointed muzzle. The tail is covered with an extremely elastic sheath that allows variation in the tail-membrane area. Males have a prominent throat pouch; females have a patch of bare skin in the same place.

The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. It roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, it flies high and fast over the forest canopy, but lower in more open country. It forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to

mid-March, when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.

Eastern Freetail-bat (*Mormopterus norfolkensis*) is listed as Vulnerable in NSW. It has dark brown to reddish brown fur on the back and is slightly paler below. Like other freetail-bats it has a long (3 - 4 cm) bare tail protruding from the tail membrane. Freetail-bats are also known as mastiff-bats, having hairless faces with wrinkled lips and triangular ears. They weigh up to 10 grams.

The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. It occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. It roosts mainly in tree hollows but will also roost under bark or in man-made structures. It is usually solitary but is also recorded roosting communally, and is probably insectivorous.

Southern Myotis (*Myotis mcaropus*) is listed as Vulnerable in NSW. It was previously called the Large-footed Myotis (*M. adversus*). It has disproportionately large feet; more than 8 mm long, with widely-spaced toes which are distinctly hairy and with long, curved claws. It has dark-grey to reddish brown fur above and is paler below. It weighs up to 15 grams and has a wingspan of about 28 cm.

The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. It generally roosts in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. It forages over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December.

Greater Broad-nosed Bat (*Scoteanax rueppellii*) is listed as Vulnerable in NSW. It is a large powerful bat, up to 95 mm long, with a broad head and a short square muzzle. It is dark reddish-brown to mid-brown above and slightly paler below. It is distinguished from other broad-nosed bats by its greater size. While similar to the Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), it differs by having only two (not four) upper incisors.

The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. It utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. It forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young.

### Assessment

*(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction*

Areas of potential habitat will not be adversely affected by the proposed development. Existing flyways occur surrounding the residential dwelling and will maintain connectivity with adjoining areas of tall open woodland. It is unlikely that the clearing of weedy vegetation for the development will impact on the long term survival of these species such that they are placed at risk of extinction.

*(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,*

This section is not applicable to the listed Micro-bats.

*(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

*(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*

This section is not applicable to the listed Micro-bats.

*(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction*

This section is not applicable to the listed Micro-bats.

*(d) in relation to the habitat of a threatened species, population or ecological community:*

*(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed*

Microbat habitat would be modified for the construction of the retirement village through the loss of one eucalypt at the western side of the property. The majority of the suitable habitat is retained through mature trees along the western and northern boundary and within the eastern part of the site and continues within the Oxford Falls Regional Crown Reserve to the east.

*(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*

The proposed works will not isolate areas of potential habitat for these species.

*(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,*

Minor potential habitat would be adversely modified by the proposed works. Much of the habitat would still be viable habitat once the construction phase is completed. Important habitat features would be retained on site. It is considered that the habitat to be removed/modified is not important to the long-term survival of the species.

*(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*

Critical habitat has not been declared for these species.

*(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

To date, a recovery plan for these species has not been declared. A number of activities have been recommended to assist the recovery of the species. The following are relevant to the proposed works:

Retain and protect habitat and buffers around habitat, particularly the hollow bearing trees and sandstone boulders.

Protect water quality entering the retained bushland.

*(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

Key Threatening Processes that are relevant for this species and project include the clearing of native vegetation. The clearing of vegetation for the retirement village will remove one tree that will be a minor impact on the species.

## **Conclusion**

Based on consideration of this Assessment of Significance and the implementation of mitigation measures listed in the ecological assessment the proposed development is considered unlikely to result in a significant impact on the listed Micro-bats.

### ***Camarophylloopsis kearneyi***

*Camarophylloopsis kearneyi* is a small, pale, gilled agaric fungus (Kingdom: Fungi; Division: Basidiomycota; Class: Agaricomycetes; Order: Agaricales). Mushroom cap 5 - 11 mm, at first often nearly round then becoming dome shaped or deeply convex; smooth but covered with fine glistening particles (seen when viewed under a magnifying lens); dry; pallid brown with darker centre; margins scalloped forming rounded teeth and paler to near white. Its flesh is very thin and of same colour with cap surface. Gills are fused or an extending downwards tooth or curved like a bow; distant; white to greyish white; margins of the same colour and even. Stem is 15 - 27 mm x 1.5 - 2.5 mm; pale brown; dry; and its surface has scattered brownish fine silky fibres, cylindrical, solid.

It is known only from its type locality in Lane Cove Bushland Park in the Lane Cove local government area in the Sydney metropolitan region.

Its occurrence appears to be limited to the Lane Cove Bushland Park. Surveys in potentially suitable habitats elsewhere in the Sydney Basin Bioregion have failed to find *Camarophylloopsis kearneyi*. It does not produce basidiomes (above-ground fruiting structures) all year, but may be present only as non-reproductive hyphal structures below ground.

#### Assessment

*(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction*

This species was not detected during the surveys. Although suitable habitat is present, the original survey was undertaken during warmer months when fruiting bodies are not evident. The later survey was undertaken during winter months however following a dry period. The level of weed dominance on the site may affect the fruiting of the species.

The proposed development is unlikely to affect the life cycle of this species and place a local population at risk of extinction. Weeding of the site may increase its ability to germinate if the species is present, however inappropriate bush regeneration measures may disturb the forest canopy and native understorey plant hence it is critical that bush regeneration be undertaken with extreme sensitivity, staging the process so that only small areas are treated so as not to create increased opportunity for foot traffic. The species is also likely to be threatened by water-borne pollutants, including industrial pollutants and domestic contaminants. It is therefore critical that the water treatment be of the highest standard and that the retirement village be managed to limit the potential for pollutants from drainage to affect the species.

*(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,*

There is no endangered population listing of the species.

*(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

*(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*

*(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.*

This species is not an endangered ecological community or critically endangered ecological community.

*(d) in relation to the habitat of a threatened species, population or ecological community:*

*(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed.*

The area of vegetation clearing is predominantly weed infested and will also involve the removal of several exotic trees to the north and west of the site and two remnant trees to the west of the site near the road. This will cause a minimal impact on habitat for the species.

*(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*

The proposed works will not fragment existing vegetation communities or habitat for the species as it will conserve the bushland to the east of the site and the remnant canopy trees to the north of the site.

*(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,*

*Camarophyllopsis kearneyi* was not recorded on the site but viable hyphae may exist below ground. Regardless, suitable habitat will not be impacted by the proposed development such that these species may establish in the eastern or northern part of the subject site post development.

*(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*

Critical habitat has not been declared for this species.

*(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

A recovery plan has not been prepared for this species.

*(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

Key threatening processes (KTPs) that are relevant to the proposed development that may impact on potential habitat for this species are outlined:

Clearing of native vegetation is unlikely to affect remove potential habitat for this species as it only involves the removal of one tree from the site.

Invasion and establishment of exotic vines and scramblers, invasion, establishment and spread of lantana and the loss and degradation of native plant and animal habitat by invasion of escaped garden plants, are key threatening processes that may affect the species, as the listing specifically states that it is likely to be at risk from encroachment by exotic weeds, and inappropriate bush regeneration measures that disturb the forest canopy and native understorey plant. The removal of weeds through carefully staged bush regeneration techniques and monitoring of potential occurrence through winter and autumn surveys for the species, will mitigate any risk.

### **Conclusion:**

Based on consideration of this Assessment of Significance and the implementation of mitigation measures listed in the ecological assessment the proposed development is considered unlikely to result in a significant impact on local populations of *Camarophyllopsis kearneyi*.

## **Hygrocybeae Community of the Lane Cove Bushland Park in the Sydney Basin Bioregion Critically Endangered Ecological Community**

Hygrocybeae Community of the Lane Cove Bushland Park in the Sydney Basin Bioregion, a Critically Endangered Ecological Community, is an assemblage of more than 20 species of fungi in the family Hygrophoraceae (Kingdom: Fungi; Division: Basidiomycota; Class: Agaricomycetes; Order: Agaricales; Family: Hygrophoraceae).

The fungal community includes the following genera and species: *Camarophylloopsis kearneyi*, *Hygrocybe anomala* var. *ianthinomarginata*, *H. astatogala*, *H. aurantiopallens*, *H. aurantipes*, *H. austropratensis*, *H. cantharellus*, *H. cheelii*, *H. chromolimonea*, *H. erythrocala*, *H. graminicolor*, *H. helicoides*, *H. involutus*, *H. irrigata*, *H. kula*, *H. lanecovensensis*, *H. lewellinae*, *H. mavis*, *H. miniata*, *H. reesiaae*, *H. sanguinocrenulata*, *H. stevensoniae*, *H. taekeri*, and *H. virginea*.

The community is only known from the Lane Cove Bushland Park, in the Lane Cove Local Government Area, within the Sydney Basin Bioregion.

The community 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*). The fungal community is found in gullies that have a dense tree canopy with little light penetration (Kearney and Kearney 2000). Overstorey trees in the core zone include Grey Ironbark (*Eucalyptus paniculata*), Blackbutt (*E. pilularis*), Sydney Blue Gum (*E. saligna*) and Smooth-barked Applebox (*Angophora costata*), deeper in the gully are small to medium-sized Lillypilly (*Syzygium smithii*) and Sweet Pittosporum (*Pittosporum undulatum*), and higher up the slopes are Turpentine (*Syncarpia glomulifera*) and Grey Myrtle (*Backhousia myrtifolia*) (Martyn 2010).

Wet sclerophyll forest on gully walls act as a protective barrier and help to maintain a high humidity environment (Young 1999). The combination of vegetation structure and environmental conditions has been suggested to be critical for formation of the unique Hygrocybeae community found in Lane Cove Bushland Park (Young 1999). Sandy soils in the area are derived from Hawkesbury Sandstone (Kearney and Kearney 2000), but valley slopes are fertile due to shale soil downwash (Martyn 2010).

Species of *Camarophylloopsis*, *Humidicutis* and *Hygrocybe* are mostly saprophytic and live in soil or humus (Young 2005). It is not yet known if any of the species in the Hygrocybeae assemblage form mycorrhizal associations (Young 2005), but the associated plant community contributes to formation of humus and development of soil fertility from which the fungi derive some or all of their nutrition and energy

It is associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. It occurs as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss. It does not produce above ground fruiting bodies (fungus) all year round. Fruiting bodies begin appearing mid May to mid July sometimes to August.

### Assessment

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Hygrocybeae Community is not a threatened species.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Hygrocybeae community is not an endangered population.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Despite extensive searching in the area, Hygrocybeae fungal communities have not been identified on the site. However, potential habitat does exist, to the east of the development footprint, and will not be directly affected as none of this area zoned E2 will be cleared.

If the fungal community was present at the east of the site, it may be susceptible to pollution from sewage over-flow, garden fertiliser, animal wastes and petroleum-derived residues washed from nearby road surfaces. However, the development will not increase the potential for this as the site has previously been managed as a bowling green that would have used fertilizer and herbicides.

The proposed future use of the site as a retirement village will be subject to management of the facility that can strictly control the use of pollutants, such as fertilizer and herbicides. The impacts of additional nutrients will also be managed through the bio-filtration system located above the bushland.

There is potential for additional trampling through inappropriate weed removal, hence bush regeneration must be carefully staged. Hence, the careful site management and controls during construction, retention of bushland, treatment of nutrient runoff, carefully-staged bush regeneration works and surveys for the presence of the community in cool wetter months, means that the development will be unlikely to place the local occurrence of the Hygrocybeae community at risk of extinction or long term survival.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

The proposed clearing of weeds vegetation surrounding the existing bowling greens is unlikely to significantly impact the potential habitat for the Hygrocybeae community. Management of the potential threats of water pollution and inappropriate weed removal is unlikely to place the local occurrence at risk of extinction.

*(d) in relation to the habitat of a threatened species, population or ecological community:*

*(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed.*

The area of the potential habitat for the Hygrocybeae community is outside the development footprint. This habitat will be retained and enhanced through positive management strategies. The management of surrounding vegetation by minimising of nutrients and bushland weed control through careful staging, will not have a significant impact on the risk of extinction on the habitat for this community.

*(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*

The proposed works will not fragment existing habitat in the eastern portion of the subject site.

*(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,*

The potential habitat for the Hygrocybeae community will be retained. Management of the surrounding vegetation of surrounding vegetation by minimising of nutrients and bushland weed control through careful staging will not affect the long-term survival of this community if it is present.

*(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*

Critical habitat has not been declared for the Hygrocybeae community.

*(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan*

No recovery plan has been prepared for this community.

*(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

Key threatening processes (KTPs) that are relevant to the proposed development that may impact on potential habitat for this community are outlined:

Clearing of native vegetation is unlikely to affect remove potential habitat for this community as it only involves the removal of one tree from the site.

Invasion and establishment of exotic vines and scramblers, invasion, establishment and spread of lantana and the loss and degradation of native plant and animal habitat by invasion of escaped garden plants, are key threatening processes that may affect the community, as the listing states that it is likely to be at risk from encroachment by exotic weeds.

The removal of weeds through carefully-staged bush regeneration techniques and monitoring of potential occurrence through winter and autumn surveys for the species, will mitigate these key threatening processes.

**Conclusion:**

Based on consideration of this Assessment of Significance and the implementation of mitigation measures listed in the ecological assessment the proposed development is considered unlikely to result in a significant impact on the Hygrocybeae community.