ACS Environmental Pty Ltd

FLORA AND FAUNA SURVEYS AND

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT (BDAR)

FOR

PROPOSED STATE SIGNIFICANT DEVELOPMENT (SSD)

APPLICATION

FOR THE REDEVELOPMENT OF LOURDES RETIREMENT

VILLAGE, 95 STANHOPE STREET, KILLARA, NSW

PREPARED FOR:

Lourdes Retirement Village
95 Stanhope Road,
Killara
For Levande Pty Ltd
C/O Natalie Vaughan
Project Director
Essence Project Management Pty. Ltd.

30th NOVEMBER 2022

ACS Environmental Pty Ltd

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The principal of 'ACS Environmental P/L has worked in the area of floristic and faunal impact assessment services for a period of greater than 20 years. He also has over 30 years of experience in scientific research (ecological) and teaching in biological science.

Declarations

Certification under clause 6.15 *Biodiversity Conservation Act 2016*

I certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the *Biodiversity Conservation Act 2016* (BC Act).

The relevant application is for a planning approval for the development of Stage 1A of the Telopea Concept Plan Area (CPA)

Signature: 

Date: 30/11/2022

BAM Assessor Accreditation no: BAAS 18125

This BDAR has been prepared to meet the requirements of BAM 2020. Appendix A provides an assessment of compliance with the minimum information requirements outlined in BAM Appendix K.

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Glossary and Acronyms

APZ	asset protection zone
BAM	Biodiversity Assessment Method (2020) – supports the BC Act (2016)
BAM-C	Biodiversity Assessment Method Calculator
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offsets Scheme
CEEC	critically endangered ecological community
DCCEEW	Commonwealth Department of Climate Change, Environment, Energy and Water
DAWE	Commonwealth Department of Agriculture, Water and Environment
DBH	Diameter at breast height over bark
DPI	Department of Primary Industries
DPE	Department of Planning and Environment
EC	ecological community listed under the EPBC Act
E (threatened species status)	Endangered species
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth). Enacted to protect and manage nationally and internationally (migratory) flora, fauna and ecological communities, defined in the Act as matters of national environmental significance (NES)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EEC	endangered ecological community
Habitat	areas occupied, either territorially, periodically or occasionally, by a species, population or ecological community
HTW	high threat weed
IBRA	Interim Biogeographic Regionalisation for Australia
KTP	Key threatening process, a process that threatens the survival, life cycle, abundance or potential evolutionary development of native species, populations or ecological communities (Dept of Environment and Conservation 2004). KTP's are listed under the BC Act and the EPBC Act.
LLS Act	*Local Land Services Act 2013* (NSW)
IPA	Inner Protection Zone
Migratory species	listed under the EPBC Act and relating to international agreements to which Australia is a signatory. Includes the Japan-Australia Migratory Bird Agreement (JAMBA), Chine-Australia Migratory Bird Agreement (CAMBA) Republic of Korea Migratory Bird Agreement (ROKAMBA)

MNES	matters of national environmental significance
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
OEH	Office of Environment and Heritage
OPA	Outer protection zone
PCT	plant community type as such using the Bionet Vegetation Classification system (OEH 2018)
RoTAP	Rare or Threatened Australian Plants
SAII	serious and irreversible impact
SEARs	Secretary's Environmental Assessment Requirements
TBDC	Threatened Biodiversity Data Collection
TEC	threatened ecological community
Threatened species, populations or ecological communities	- Entities listed by the BC Act and EPBC Act as 'Vulnerable to decreasing population growth in time', Endangered as population growth decreasing rapidly leading to eventual extinction' or 'Critically Endangered, a more extreme rate of population decrease than the former'.
TPZ	Tree protection zone
V (threatened species status)	Vulnerable
VEC	vulnerable ecological community
Vegetation SEPP	*State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017* (NSW)

1. Introduction

1.1. Proposed development

This report has been prepared by ACS Environmental Pty Ltd for Essence Project Management Pty Ltd on behalf of *Levande Pty Ltd* and accompanies a State Significant Development application (SSDA) submitted to the NSW Department of Planning and Environment (DPE).

The proposed development is to demolish a number of single and two storey residential buildings and replace these with a number of multi-storey residential buildings and a single storey chapel. The proposal also involves the re-aligning of some of the internal roadways and associated services.

1.2. Purpose of report

The purpose of this report is to provide *Levande Pty Ltd* with detailed flora and fauna surveys on the subject land and to prepare a biodiversity development assessment report (BDAR) to accompany the SSDA.

The report investigates the impact of the proposed development on the biodiversity values of the existing natural or derived biota occurring on the land and provides the following guidelines for appropriate conservation of existing biodiversity and recommended mitigation measures in relation to the proposed impacts:

- describe the ecological value of the existing populations of remnant trees and landscaped trees that have been planted to provide amenity amongst building structures;
- to evaluate the potential for the current populations of trees to represent threatened ecological communities and/or to provide habitat for threatened species of flora and/or fauna, and to assess the requirement to provide biodiversity offsets for potential impacts in relation to the BC Act (2016). This evaluation will provide guidance on appropriate management and protective measures in support of the planning submission of the concept proposal;
- to ensure all necessary safeguards are described and complied with in relation to the to the proposal as required by Ku-ring-gai LEP 2015 and Ku-ring-gai DCP 2022; and

- to prepare a comprehensive report addressing current legislation, qualifying potential impacts and describing mitigation measures in relation to the above assessments.

1.3. Background

The current Lourdes Retirement Village development dates back to 1983 and lacks amenities such as lifts and is in "need of significant renewal to provide modern seniors housing" (Levande Pty Ltd 2022).

The development proposes a partial redevelopment to bring the facility into the modern era as the existing dwellings and infrastructure are already experiencing a decline in their useful life.

The proposal aims to redevelop the current facility into a major retirement and aged care complex to meet the growing demand for seniors' accommodation (Levande Pty Ltd 2022).

1.4. Site description

The location of the Lourdes Retirement Village is at the eastern end of Stanhope Road, Killara, adjacent to an area of Garigal National Park.

The subject site has been extensively modified in relation to natural vegetation structure and floristics. The site currently contains existing independent living units and other retirement and nursing home facilities in an area of managed curtilage with formal garden beds and landscaped areas of planted and established trees. However, some individuals and patches of remnant tree and shrub species have also been retained within the landscape.

Landscaped trees have been planted mainly along the surrounding boundaries of internal roadways and grassy garden areas and include locally-occurring and non-locally occurring indigenous species as well as exotic ornamental species, the tree assemblages and locations comprehensively documented in an updated arboricultural report by Scales (2021).

1.5. History of subject area

Figure 1 is an image of aerial photography taken in 1943 that indicates that the hillcrest at the subject site had been extensively cleared at that time. The hillslopes facing to the south, south-east and east contained an open structured woodland vegetation occurring on sandstone-derived soils.

Unformed tracks are also evident around the hillslope, some of which have eventually been upgraded to form present day internal roads at the Lourdes Village including landscaped planting of trees among remnant individuals affording visual amenity to the facility.

Some built structures were present at the north-west corner of the study area in 1943 (Figure 1) where the current office and recreational facilities now occur.

1.6. Arboricultural assessment of subject area

Scales (2015; revised 2021) has completed Arboricultural Impact Assessment and Method Statements for the subject area and documented a total of 379 individual trees that occur within the subject area.

As such, the tree numbers and species referred to in this report are as for those documented in the current report by Naturally Trees Arboricultural Consulting by Scales (2015; revised 2021).

1.7. Location and site plans of subject area

Figure 2 is a diagram indicating the location of the subject site in the Sydney region.

Figure 3 is a locality aerial image of the subject site at Killara (blue marker), and surrounds in relation to landscapes and current residential development (Nearmap 2022).

Figure 4 is a locality aerial image of Lourdes Retirement Village showing approximate property boundaries in relation to the subject site at 95 Stanhope Road, Killara (blue marker) (Nearmap 2022).

Figure 5 is a schematic plan of the proposed Masterplan of the development at the proposed Lourdes Retirement and Aged Care Facility (RACF) (Plus Architecture 2022) .

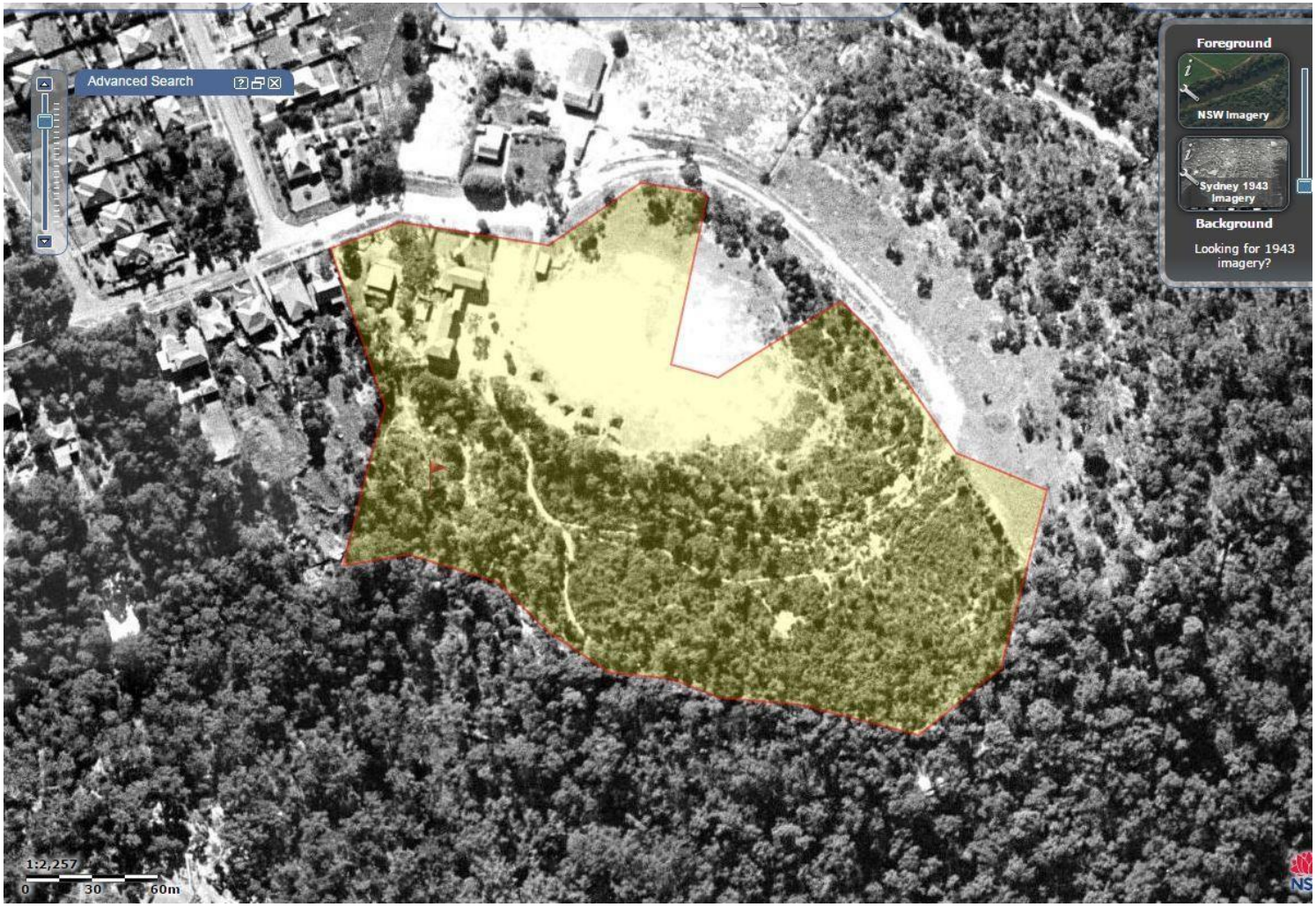

Figure 1 - Indicates an aerial image of the area of study at the Lourdes Retirement Village and Nursing Home at 95 Stanhope Street, Killara, taken in 1943 (outlined in red font) (from SIX maps 2022) showing extensive clearing at the crest section of the landform at that time. Much natural vegetation is retained along the lower southern slopes of the land at that time.

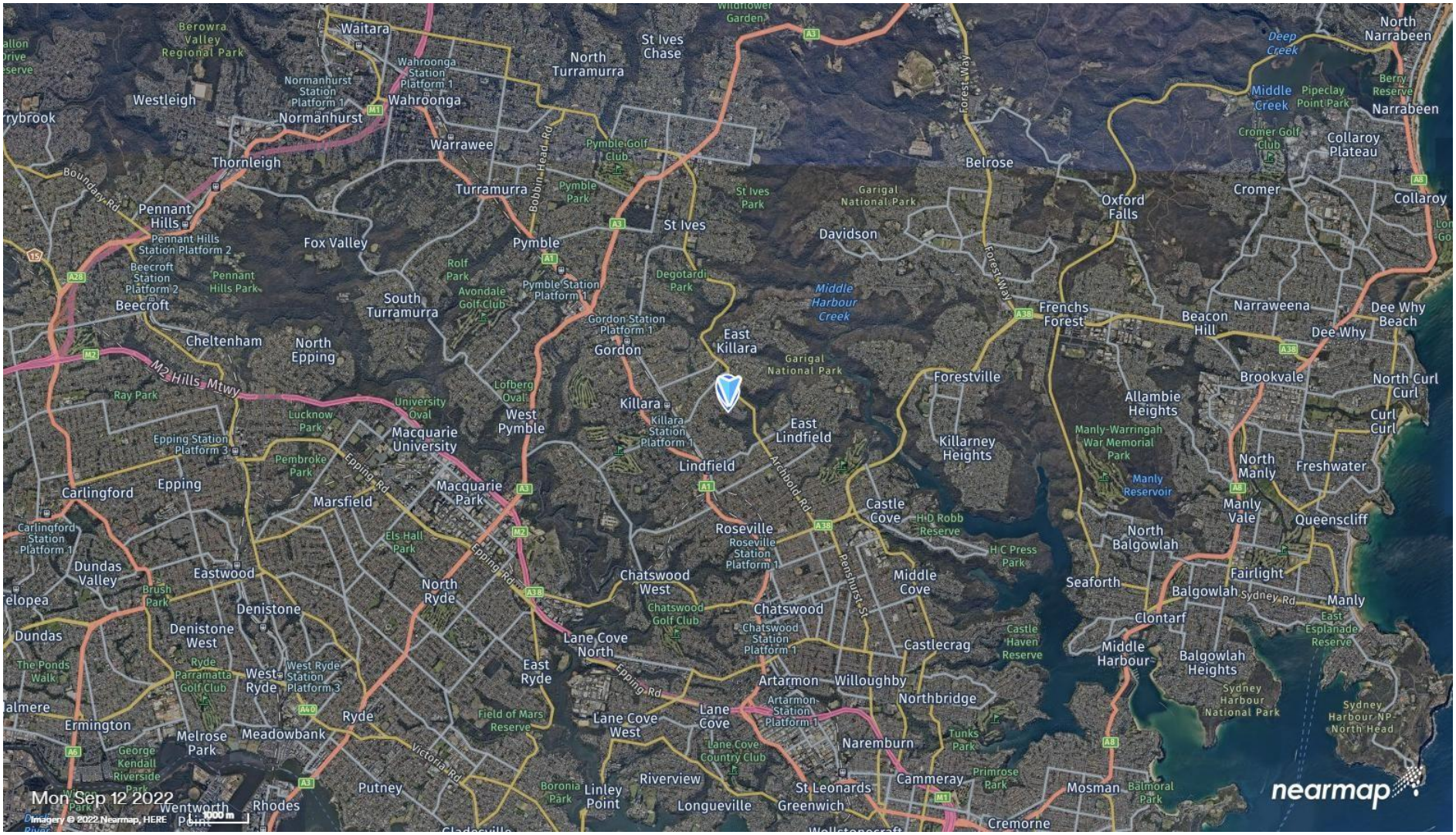

Figure 2 – Location of the Lourdes Retirement Village development area at Killara within the Sydney region (blue marker) (imagery from Nearmap, 2022)

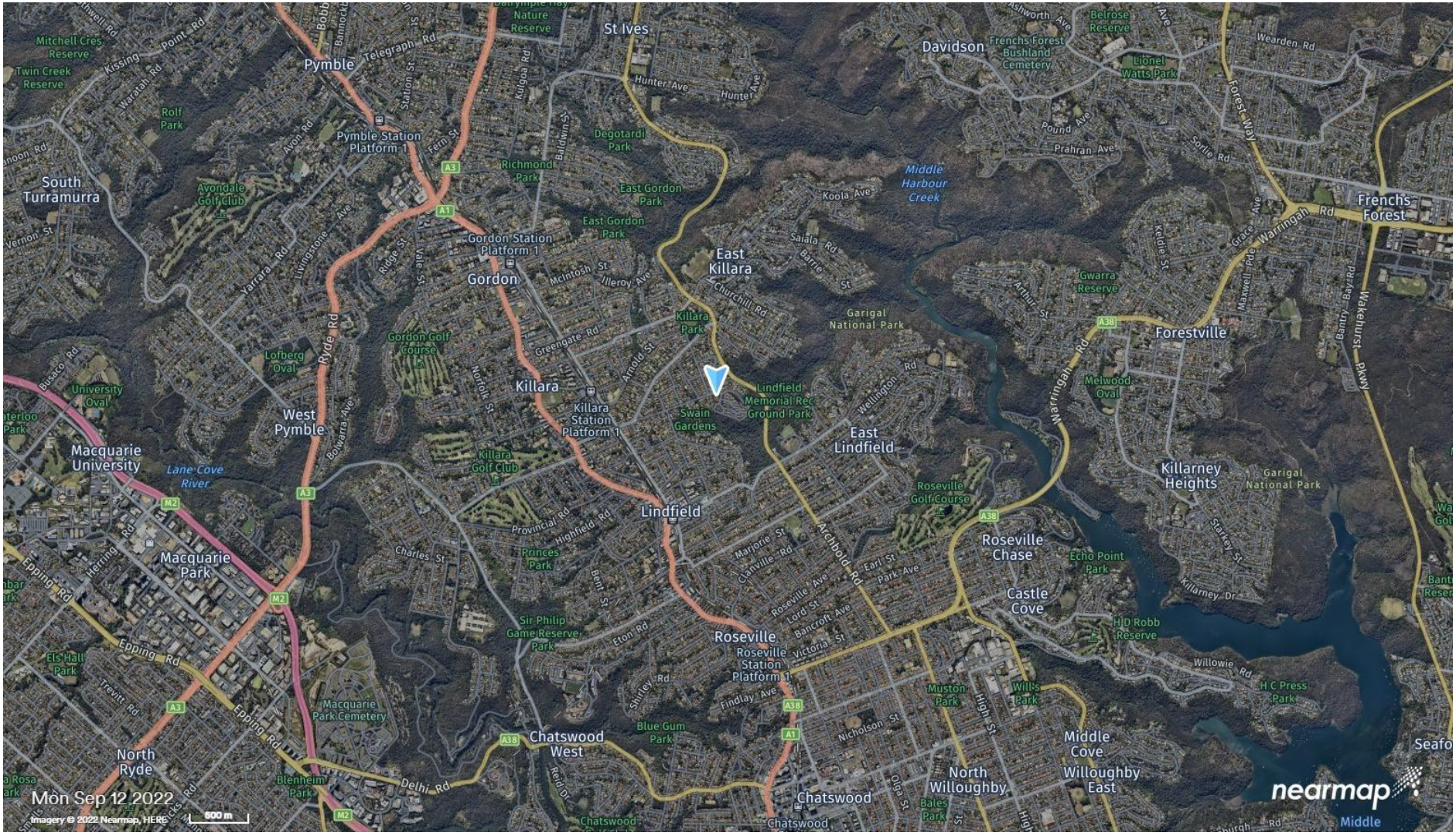

Figure 3 – Locality image of development area at Killara (blue marker), and surrounds in relation to surrounding landscape and residential development (Nearmap, 2022)

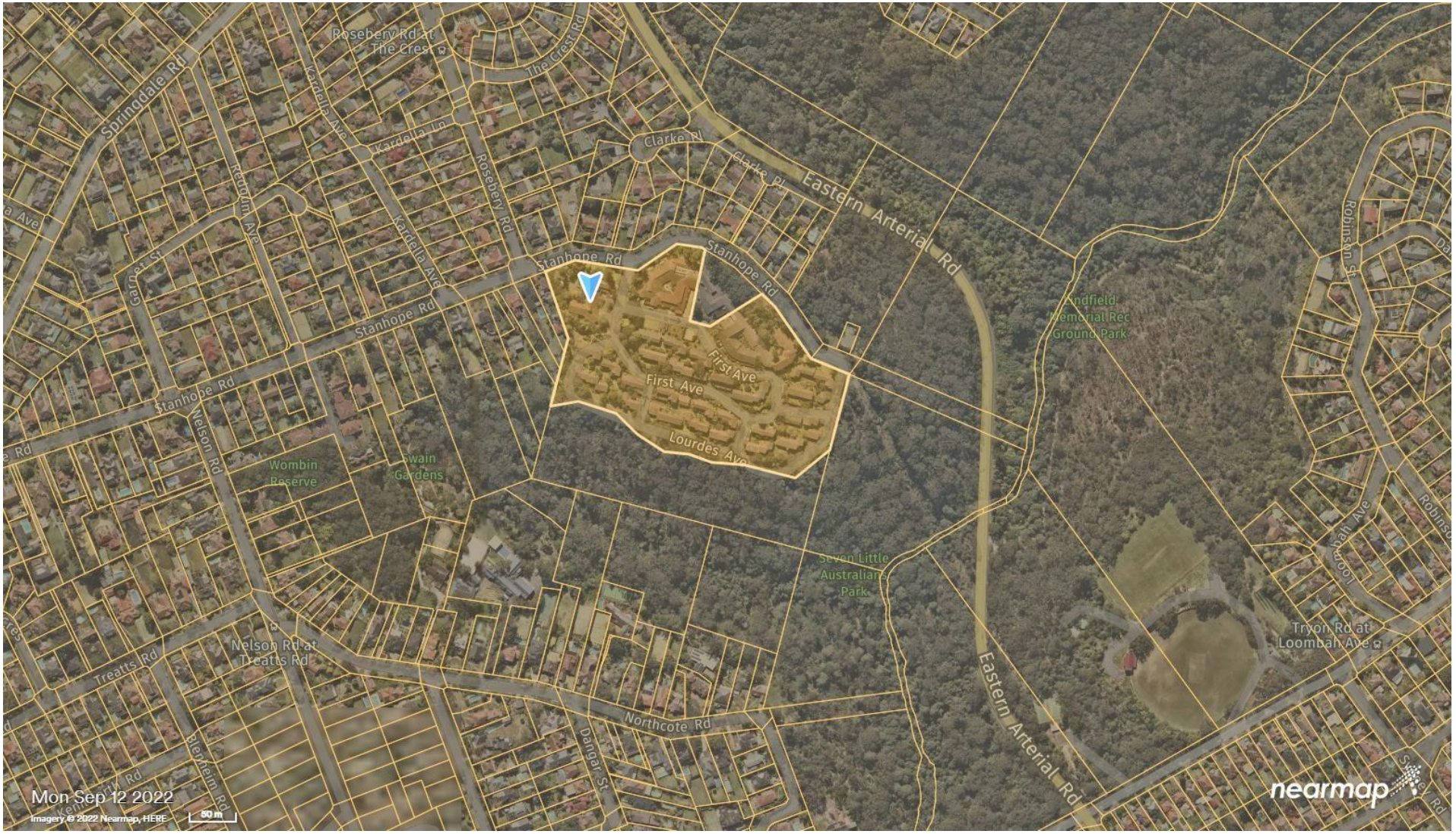

Figure 4 – Locality aerial image of part of Killara showing property boundaries within the yellow shaded area in relation to the proposed development area of the Lourdes Retirement Village, an area of 4.914ha (Nearmap, 2022)

Figure 5 - Schematic representation of the updated Masterplan proposal at Lourdes Retirement Village (prepared by Plus Architecture 2022)

1.8. Sampling vegetation attributes

Strategy for sampling planted vegetation

The definition of native vegetation means that all plants that are native to NSW must be assessed in accordance with the Biodiversity Assessment Method (BAM), even if they are not indigenous to the local area. This includes planted native vegetation, such as windbreaks, street trees and planted native gardens.

BAM 2020 Appendix D: 'Streamlined assessment module - Planted native vegetation' provides a framework for the assessment of planted native vegetation using the BAM.

The planted native vegetation, where possible, is allocated to a best-fit PCT in the same IBRA subregion as the proposal. Appendix D: asks 'Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?' If the answer is yes, the BAM is then applied. Some planted native vegetation may meet the definition of a TEC.

If the planted native vegetation occurs in an isolated patch and/or cannot be reasonably assigned to a PCT known to naturally occur in the IBRA subregion, the assessor must include justification for this in the BAR and then apply Q2 of the Module (BAM 2020).

Planted native vegetation meeting specific requirements in the decision-making key only need to assess the planted native vegetation area for threatened species habitat (i.e. the use of Chapters 4 and 5 of the BAM are not required to be applied). Evidence demonstrating the application of the decision-making key to the areas of planted native vegetation must be provided in the BDAR.

Strategy for sampling vegetation with elements of natural ecological communities

The total area of the Lourdes re-development plan as depicted in Figure 4 equates to about 4.91ha.

This area, however, based on potential geological variation and mapped ecological communities for the site (DPE 2022) can be discretionally separated into 3 zones based on likely former plant community types that occurred at the subject area before development.

The zones are loosely based on predictions of which Plant Community Type (PCT) may have occurred across the site before clearing and historical development (from DPE mapping 2022).

Table 1 indicates which PCT and position along the slope most likely corresponds to which zone.

ZONE	EQUIVALENT PCT (from mapping by DPE 2022)	LOCATION ON SITE (Figure 6)	ESTIMATED AREA OF PART OF SUBJECT SITE (ha) (Figure 6)	ESTIMATED AREA OF PCT TO BE REMOVED (ha)
1	1281	Upper northern and north-west sections	1.76	0.225 (from a total of 0.517ha)
2	1776	Lower southern sections	2.04	0.186 (from a total of 0.229ha)
3	1250	Central mid and eastern sections	1.43	0.103 (from a total of 0.123ha)

Table 1 - Parameters characterising each of 3 zones determined for the subject site at 95 Stanhope Road, Killara

Figure 6 indicates the likely zones equivalent to variation in plant community types across the subject site.

As such, one BAM plot is required to sample the vegetation attributes at each zone within the proposed development site (BAM 2020). Accordingly, three plots were sampled, one in each of the zones (Figure 6), although location of suitable areas of vegetation in each zone was problematic as internal roads, carparks and buildings are also always included in sampled areas. Only locally-occurring native species which are representative of a PCT in the locality were included in the floristic, structural and functional attributes that were recorded to use in the BAM calculator.

The extent of naturally-occurring PCT's was determined by adding crown areas of representative native species located in each of the zones, and likewise, the extent of likely area of PCT to be removed was estimated from those trees proposed for removal (Table 1) (Scales 2021).

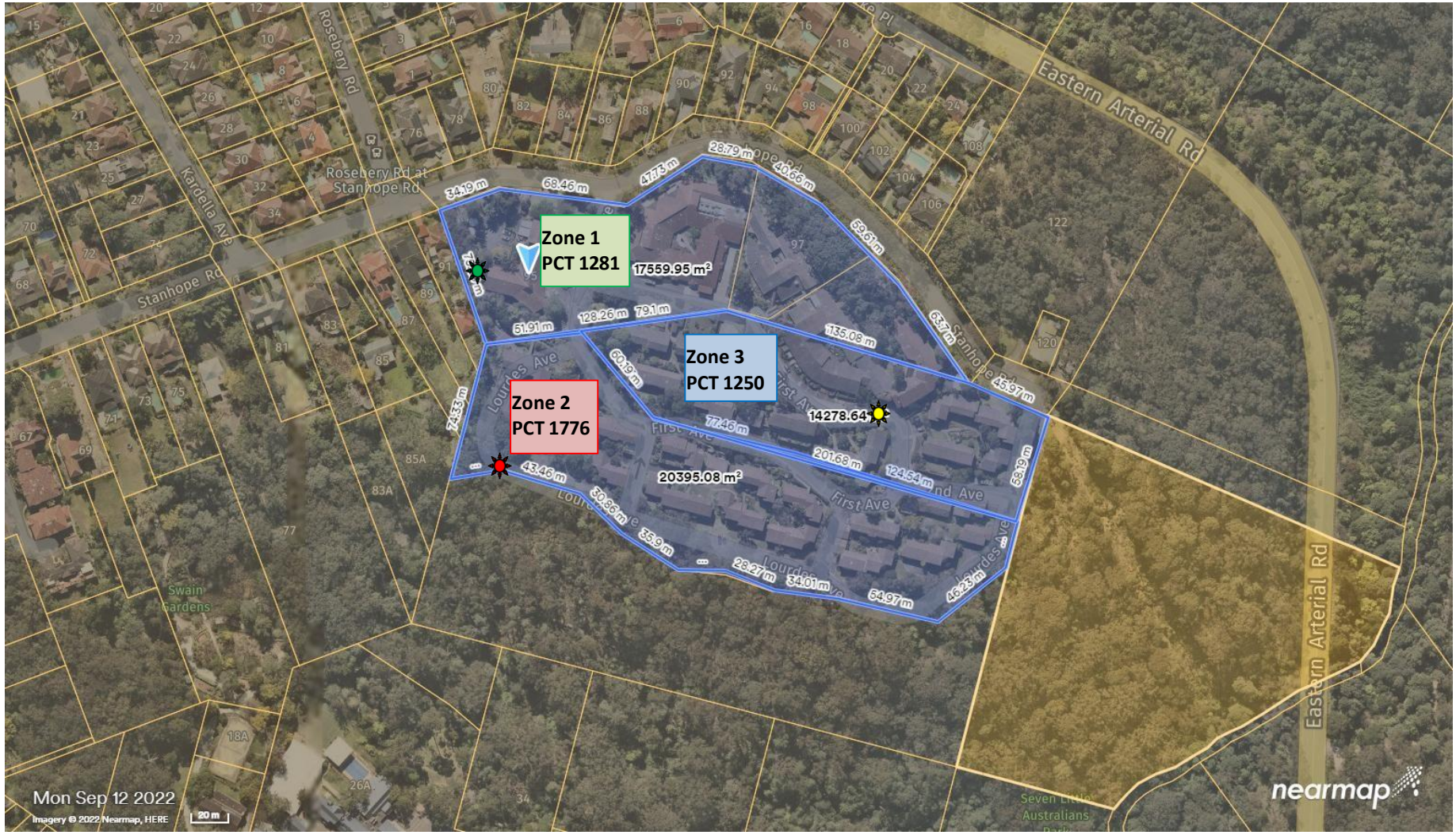

Figure 6 - Three zones based on likely former PCT and position along slope, one quadrat was sampled in each of these zones as indicated (star symbols) (Nearmap 2022)

The three most likely areas containing likely representative tree species of the PCT's listed in Table 1 within the proposed construction footprints were sampled for vegetation composition attributes in quadrat sizes of 20m x 20m to derive species composition and structural attributes (Table 2). The 400m^2 areas and adjacent areas extending for another 600m^2 adjacent to the sampled 400m^{2}quadrats, were further sampled for functional attributes.

Where an area of 20m x 20m could not be located, areas comprising 400m^2 with variable length and breadth dimensions were sampled accordingly (as in Zone 1).

The compositional, structural and functional attributes of the sampled vegetation were calculated by the BAM algorithm process to derive Vegetation Integrity Scores (VIS) for each zone (PCT).

The BAM attributes for floristic composition, structural variation and functional attributes were sampled on the 27th of October 2022.

Figures 7A, 7B and 7C indicate the location of the sampling areas at the various zones within the subject site. For Plot 3 in Zone 3 (Figure 7C), a more suitable area for sampling could not be accessed due to its being fenced off due to safety concerns (Figure 8).

These plots provided the biotic attributes that were used to derive any potential offsets (Table 2).

Figure 7A - Location of Quadrat 1 in Zone 1 (Figure 6); 10 x 40m plot (400m^2) and adjacent 30 x 20m plot for stem sizes in 1000m^2 quadrat, location within area of likely former STIF (PCT 1281), in managed curtilage at north-western section of subject area (Nearmap Sept 2022).

Figure 7B - Location of Quadrat 2 in Zone 2 (Figure 6); 20 x 20m plot (400m^2) and adjacent 60 x 10m plot for stem sizes in 1000m^2 quadrat, location within area of likely former Coastal Enriched Sandstone Dry Forest (PCT 1776), in managed curtilage at south-western section of subject area (Nearmap Sept 2022).

Figure 7C - Location of Quadrat 3 in Zone 3 (Figure 6); 27 x 15m plot (400m^2) and adjacent 40 x 15m plot for stem sizes in 1000m^2 quadrat, location within area of likely former Coastal Sandstone Gully Forest (PCT 1250), in managed curtilage in central-east section of subject area (Nearmap Sept 2022).

Figure 8 - Entire area in north-eastern section of subject site fenced off due to safety concerns of buildings within this area, access not available for sampling vegetation

Table 2 summarises biotic attributes recorded in the floristic plot(s) (PLOT 1 - Zone 1), (PLOT 2 - Zone 2) & (PLOT 3 - Zone 3) (Figure 6).

QUADRAT NUMBER	**Q1**	**Q2**	**Q3**
ZONE	**1**	**2**	**3**
	(POTENTIAL STIF - PCT 1281)	**(POTENTIAL PCT 1776)**	**(POTENTIAL PCT 1250)**
DESCRIPTION	**SOME PLANTED AND SOME REMNANT TREES**	**SOME PLANTED AND SOME REMNANT TREES**	**SOME PLANTED AND SOME REMNANT TREES**
Plot coordinates	-33.766133, 151.172986	-33.7967007, 151.173245	-33.766838, 151.17532
Location of Coordinate	(SW corner of quadrat)	(SE corner of quadrat)	(SW corner of quadrat)
Bearing	10° N	25^0 N	295^0 W

QUADRAT NUMBER	Q1	Q2	Q3
ZONE	1	2	3
	(POTENTIAL STIF - PCT 1281)	(POTENTIAL PCT 1776)	(POTENTIAL PCT 1250)
DESCRIPTION	SOME PLANTED AND SOME REMNANT TREES	SOME PLANTED AND SOME REMNANT TREES	SOME PLANTED AND SOME REMNANT TREES
Approx. canopy tree cover	~ 50%	~ 58%	~ 15%
Total number potentially locally occurring native spp.	9	9	9
Locally occurring native canopy spp. occurring in 20 x 50m plot	*Eucalyptus robusta;* *Syncarpia glomulifera;* *Pittosporum undulatum;* *Allocasuarina littoralis* *Acacia longifolia;* *Centella asiatica;* *Geranium homeanum;* *Dichondra repens;* *Commelina cyanea;*	*Eucalyptus pilularis;* *Syncarpia glomulifera;* *Banksia integrifolia;* *Angophora costata;* *Corymbia maculata;* *Lomandra longifolia;* *Centella asiatica;* *Geranium homeanum;* *Dichondra repens;*	*Angophora floribunda;* *Elaeocarpus reticulatus;* *Angophora costata;* *Banksia serrata;* *Banksia spinulosa;* *Lomandra longifolia;* *Dianella caerulea;* *Callistemon citrinus;* *Calochalena dubia*

Table 2 - Summarises biotic attributes recorded at sampled plots across the subject land

1.9. Extent of land proposed to be impacted by development

Table 1 indicates the nominal area within the subject site, that before any clearing had occurred, may have supported various ecological communities, including potential STIF habitat (PCT 1281), Coastal Enriched Sandstone Dry Forest (PCT 1776) and Coastal Sandstone Gully Forest (PCT 1250). Figures 9A, 9B and 9C indicate DPE mapping (2022) of these communities surrounding the facility.

However, since clearing, but with the retention of representative species of these various ecological communities and with subsequent landscaping, the extent of loss of these various ecological communities can be estimated as a result of the construction proposal.

It appears that about 0.225ha of existing STIF (PCT 1281) would be removed; about 0.186ha of existing Coastal Enriched Sandstone Dry Forest (PCT 1776) would be removed; and about 0.103ha of Coastal Sandstone Gully Forest (PCT 1250) would be removed as a consequence of the proposed redevelopment (Table 1.)

The area of total native vegetation cover that is to be removed equates to 0.514ha, the various components of this area included in offset evaluation by the BAM calculator. As the area of this land exceeds 0.5ha, the threshold for which the BAM and offsets scheme applies for an area size of 5ha (<40ha), the Biodiversity Offsets Scheme is triggered (BAM 2020).

The mapping of Biodiversity Value indicates that there is some Biodiversity Value associated with a patch of STIF identified at the north-western corner of the subject property (Figure 10). Also a small area of Coastal Enriched Sandstone Dry Forest (PCT 1776) indicates Biodiversity Value at the far south-western corner of the subject property (Figure 10), though as PCT 1776 is not a listed threatened ecological community, it is not sure why this area is given a high biodiversity status (Figure 10).

PCT 1281 (STIF), however, is listed as a threatened ecological community (TEC) on registers of the BC Act (2016) and as a Critically Endangered Ecological Community on registers of the EPBC Act (1999)(OEH 2016).

This report will determine the number of Biodiversity Credits that may be required to offset the potential loss of 0.225 hectares of potential STIF habitat (PCT 1281) in highly modified condition, as well as 0.186ha of potential Coastal Enriched Sandstone Dry Forest (PCT 1776) in modified condition and 0.103ha of Coastal Sandstone Gully Forest in highly modified condition, the offset to be paid under the NSW Biodiversity Offsets Agreement Management Scheme (BOAMS).

Figure 9A – Vegetation mapping by DPE (2022) showing small patch of STIF (PCT 1281) (light green shading with aqua borders) occurring in far north-west section of subject site

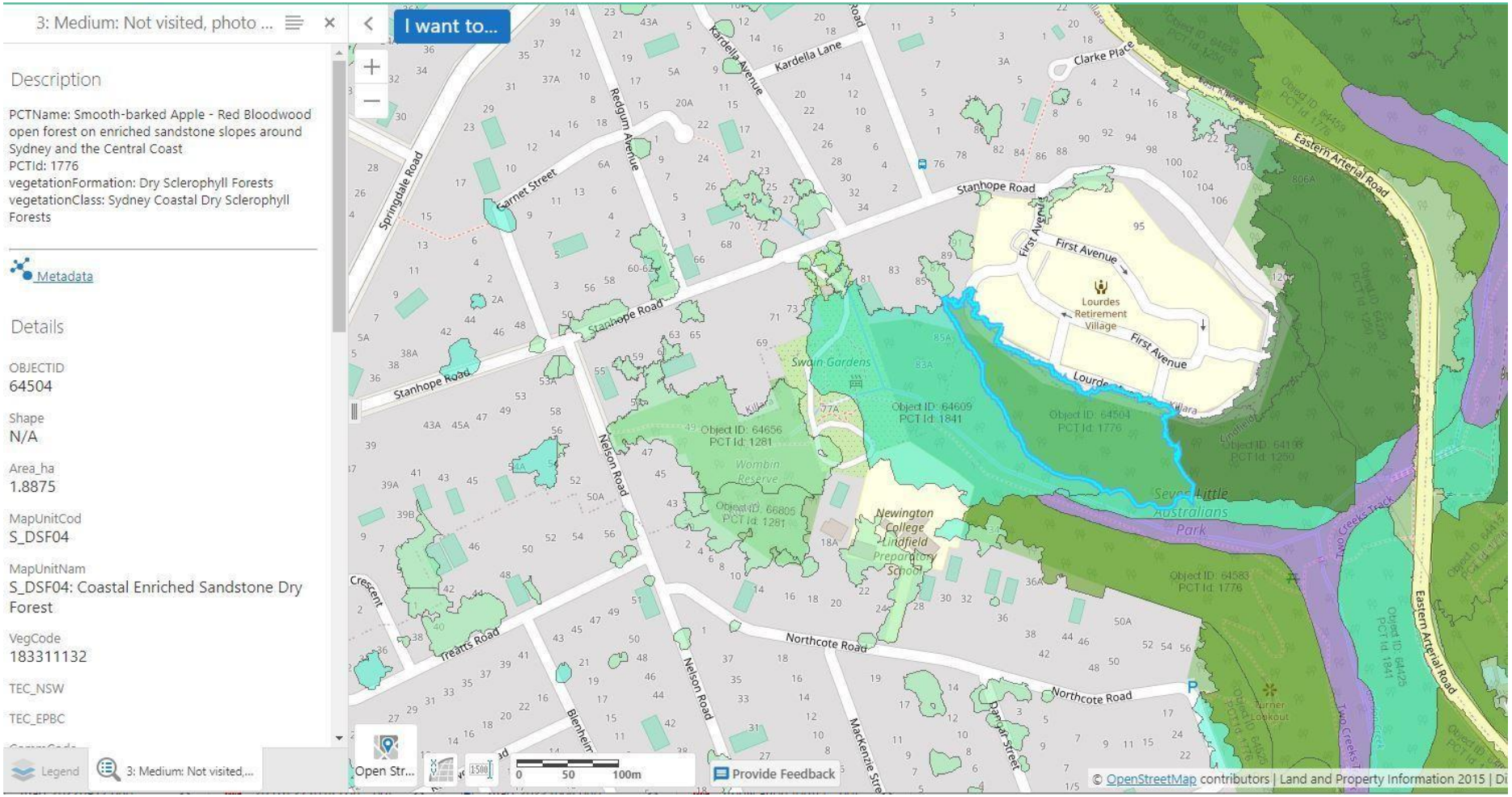

Figure 9B – Vegetation mapping by DPE (2022) showing area of Coastal Enriched Sandstone Dry Forest (PCT 1776) (green shading with aqua borders) occurring in lower south-west section of subject site

Figure 9C – Vegetation mapping by DPE (2022) showing area of Coastal Sandstone Gully Forest (PCT 1250) (dark green shading with aqua borders) occurring in eastern section of subject site

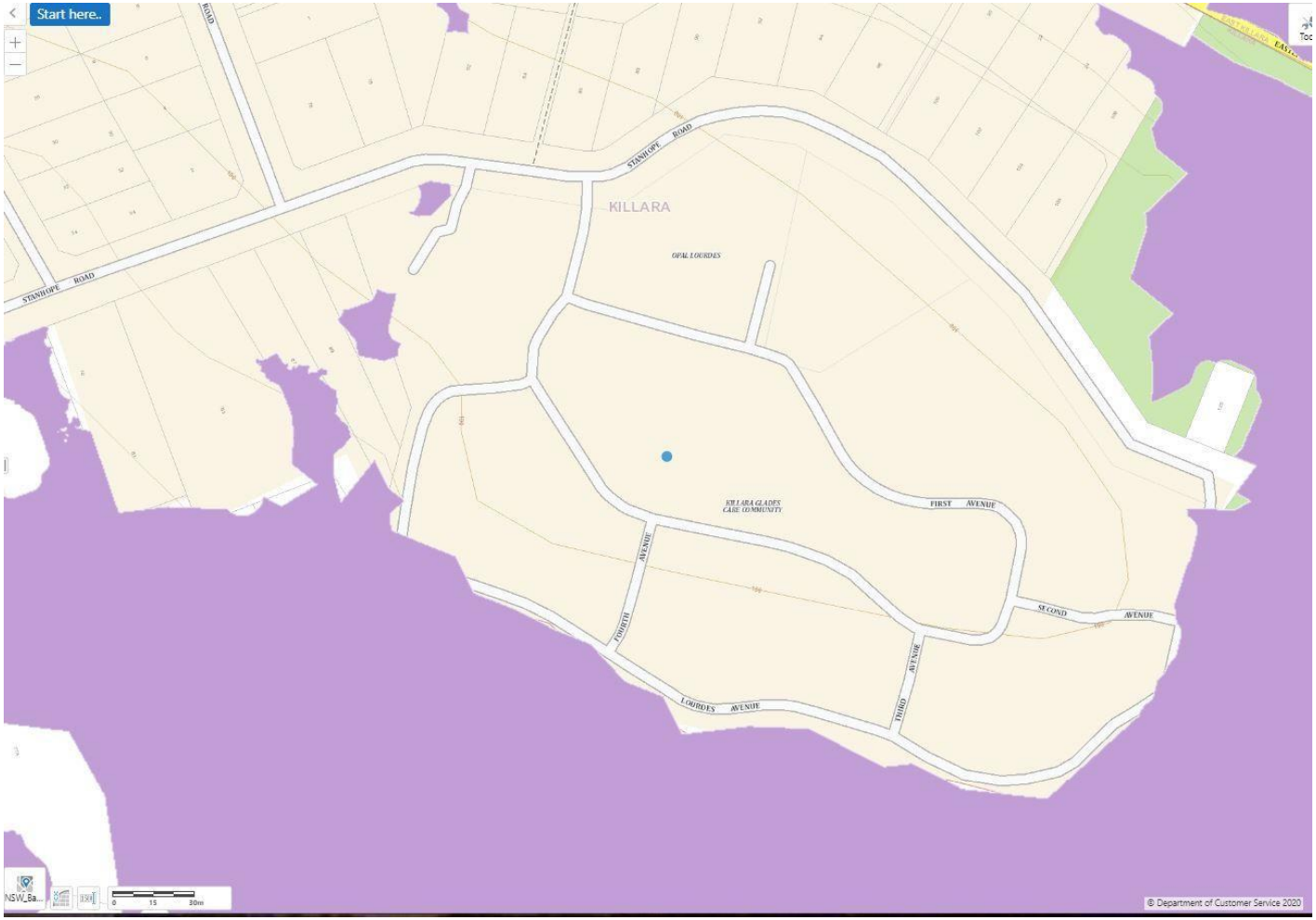

Figure 10 – Biodiversity Values map showing subject area of Lourdes Retirement Village at 95 Stanhope Road, Killara (relative location indicated by blue dot) which includes small patches of biodiversity value represented by STIF (PCT 1281) at upper north-western section of site (see Figure 9A) (shaded purple in relation to retained elements of STIF bushland) and small area of PCT 1776 at lower south-western section of subject area which generates biodiversity value at this part of the property.

1.10. Topography, geology and soils

The topography of the subject land slopes from a hillcrest gently to the south-east over gradients of from 2 - 5^0.

The local underlying geology of the subject area occurs across the boundaries of the Ashfield Shale Series of the Wianamatta Group of Shales (Herbert 1983) and Hawkesbury Sandstone (Herbert 1983).

The Soil Landscape type in the north-western section of the site is the 'residual 'Lucas Heights' Soil landscape Series that that is characterised by gently undulating crests and ridges on plateau surfaces of the Mittagong Formation where rock outcropping is usually absent. (Chapman & Murphy 1989). The lower and eastern sections of the site appear to be more associated with Hawkesbury Sandstone sediments where the colluvial 'Hawkesbury' Soil Landscape Series is characterised by rolling hills on Hawkesbury Sandstone including rock outcropping with rocky benches, broken scarps and boulders (Chapman & Murphy 1989).

1.11. Current database and mapping searches

Existing information on 'Threatened Flora of the Locality', defined as an area of 5km radius around the site, was accessed from the DPE Bionet Atlas of NSW Wildlife (online BioNet 2022), Review of Commonwealth DCCEEW Environmental Protected Matters Search Tool for MNES records within an area of 5km radius around the site (November 2022) and RoTAP (Briggs and Leigh 1996) databases.

Other literature detailing regionally and locally threatened and significant flora and fauna, as well as plant communities of the study area, included NSW Scientific Committee Final Determinations (1996-2022), Benson and Howell (1994) and 'The Native Vegetation of the Sydney Metropolitan Catchment Management Authority Area' (OEH 2016).

1.12. Literature Review

Information sources reviewed included the following:

- Aerial Photograph Interpretation (API)
- Relevant guidelines, including:

- DPE Biodiversity Assessment Method (BAM) (2020);
- NSW Guide to Surveying Threatened Plants (OEH 2016);
- 'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method (OEH 2018);
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Department of Environment and Conservation 2004);
- DPE Threatened Species, Populations and Ecological Communities website (2022);
- Commonwealth DCCEEW Species, Profile and Threats Database (2022);
- Threatened species survey and assessment guidelines: field survey methods for fauna: Amphibians (DEC 2009);
- NSW Guideline to Surveying Threatened Plants (OEH 2016b);
- Survey guidelines for Australia's threatened birds. Guidelines for detecting birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia 2010a);
- Survey guidelines for Australia's threatened frogs. Guidelines for detecting frogs listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia 2010c);
- Survey guidelines for Australia's threatened mammals. Guidelines for detecting mammals listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia 2011);
- Survey guidelines for Australia's threatened orchids (2017);
- Guidelines for detecting bats listed as 'threatened' under the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia 2013).

2. Landscape Features

2.1. IBRA Regions and Subregions

The subject site occurs within the Sydney Basin IBRA region and the Pittwater IBRA Subregion.

2.2. Mitchell Landscapes (NSW Landscape Regions)

The landscape features of the greater section of subject site is included in the Pennant Hills Ridges Mitchell Landscape in the Pittwater IBRA subregion of the Sydney Basin IBRA Region (Figure 11).

The Pennant Hills Ridges landscape is characterised by rolling to moderately steep hills on horizontal Triassic shales and siltstones. General elevation 10 to 90m, local relief 60m.

Deep red texture-contrast soils on narrow hillcrests, red and brown to yellow texture-contrast soils on slopes becoming slightly harsher in drainage lines. Supports a tall open forest of Sydney Blue Gum *(Eucalyptus saligna),* Turpentine *(Syncarpia glomulifera),* Blackbutt *(Eucalyptus pilularis),* White Stringybark *(Eucalyptus globoidea),* Grey Ironbark *(Eucalyptus paniculata),* Forest Oak *(Allocasuarina torulosa) and* Rough-barked apple *(Angophora floribunda).*

Rainforest elements in protected moist gully heads with Sweet Pittosporum *(Pittosporum undulatum),* Cheese tree *(Glochidion ferdinandi),* Sandpaper Fig *(Ficus coronata)* and Black Wattle *(Callicoma serratifolia*).

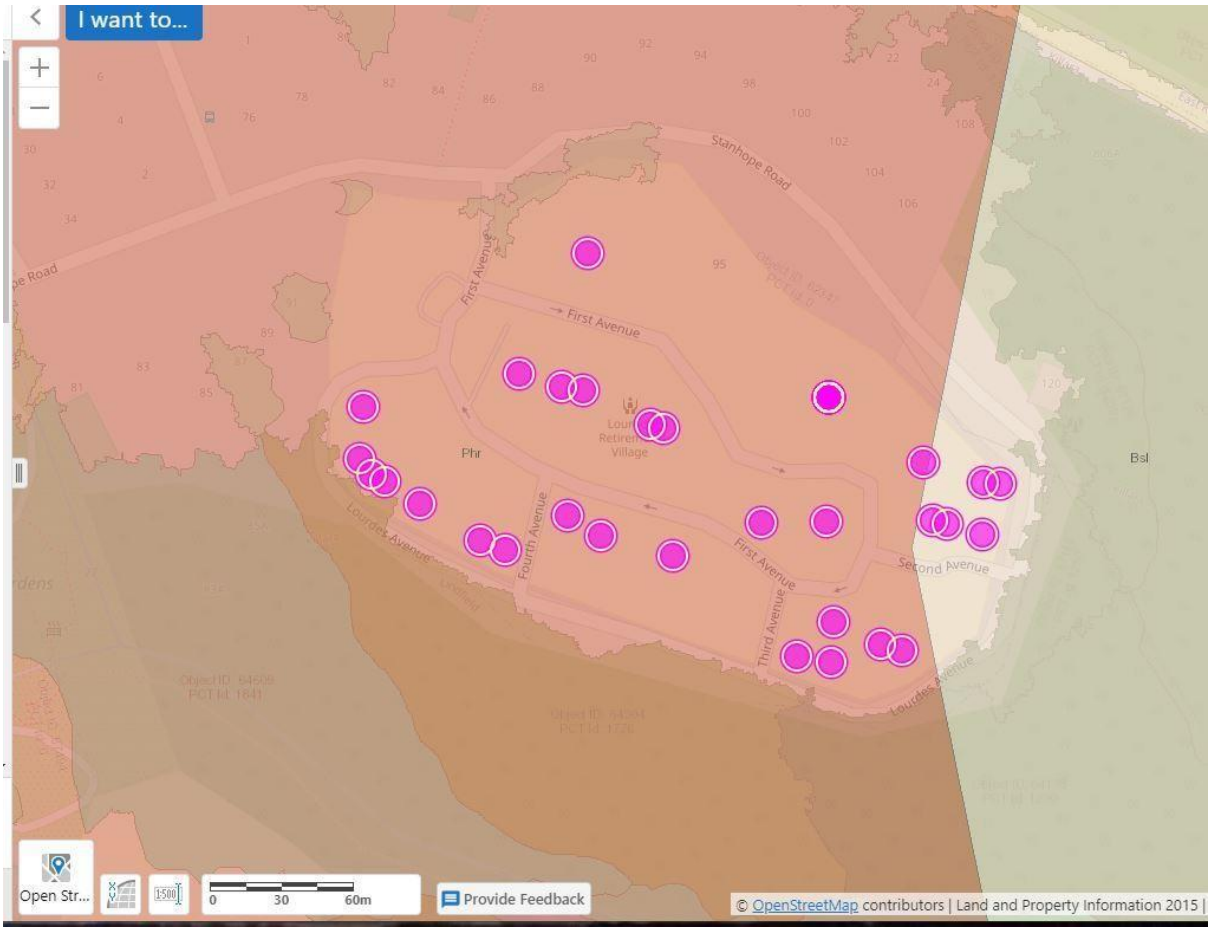

Figure 11 – Map of Mitchell landscapes surrounding the subject area. Orange shaded area indicates the more elevated Pennant Hills Ridges Mitchell Landscape. The Subject area is indicated by the series of pink dots (Land and Property Information 2015).

2.3. Extent of native vegetation

The area of native vegetation cover within a 1,500 m buffer area surrounding the site is shown in Figure 12. It is estimated that the native vegetation cover within the 1500m buffer area to the subject site is about 24% and this was used in the BAM Offsets calculations.

2.4. Wetlands, Rivers, Streams and Estuaries

No significant wetlands, rivers, streams and estuaries are present within the developmental section of the subject land or that would affect the assessment.

2.5. Connectivity

Landscapes that retain connections between patches of otherwise isolated areas of vegetation are more likely to maintain more numerous and more diverse populations of plant and animal species (Lindenmayer and Fischer 2006).

The proposed development will remove some of the cover of canopy trees in the subject locality although many individuals of locally-occurring native tree species are proposed to be retained (Scales 2021).

Landscape planning will eventually restore the canopy connectivity maintaining a fragmented cover throughout the subject site with adjacent bushland areas to the south, south-east, east and north-eastern of the site (Figure 2).

2.6. Areas of Geological significance and soil hazard features

These features are not present on the subject land. The managed curtilage on the slopes of the subject land are currently stabilised by vegetative cover including managed exotic grassland and no soil creep or landslip features are apparent.

2.7. Areas of Outstanding Biodiversity Value (AOBV)

AOBV are special areas that contain irreplaceable biodiversity values that are considered important to NSW, Australia or globally. No listed AOBV occur within the site or within a 1,500m area buffer around the subject site.

2.8. Site Context

2.8.1. Native Vegetation Cover

Native vegetation cover is calculated as a percentage cover occurring on the subject land and within the surrounding 1,500m buffer area.

Cover estimates are based on the cover of native woody and non-woody vegetation relative to the approximate benchmarks for the PCT considering the extent and condition of the vegetation.

The native vegetation cover within the 1500m buffer area is estimated at 24% (Figures 2 and 12) (L. Edgeworth GIS 2022).

2.8.2. Patch Size

Patch size is used to describe areas that include native vegetation with a gap of less than 100m from adjacent or surrounding areas of native vegetation that occur in moderate to good condition within the 1500m buffer area (Figure 12). The patch size for the vegetation onsite is assessed as 166ha (Figure 12).

Figure 12 - Image of landscape features within a 1500m radius centred around the subject site at Lourdes Retirement Village (blue circular outline) showing extent of vegetated areas along creek lines and associated reserves within the buffer zone (Nearmap September 2022; GIS 2022) (Blue marker indicates location of subject site).

3. Native Vegetation

3.1. Native vegetation extent within the site

The subject land is comprised of a managed landscape curtilage with some remnant native canopy species, and many landscaped locally-occurring, non-locally occurring and exotic ornamental trees established within low residential building complexes, small trees and shrubs in garden areas and areas of maintained exotic grassy lawns including mostly exotic herbaceous ground cover species.

For the subject site, Scales (2021) documents a total of 379 individuals of various tree species, including some likely remnant individuals of Blackbutt, Turpentine, Coast Banksia, Sydney Red Gum, Sweet Pittosporum, Red Bloodwood, Old Man Banksia, Swamp Mahogany, Spotted Gum etc., which may represent former natural species assemblages, and many of which currently include non-locally occurring planted native species such as River Sheoak, Magenta Lilly Pilly, Broad-leaved Paperbark, Weeping Bottlebrush etc,. together with some exotic ornamental species (Scales 2021).

Figure 1 indicates that much of the natural vegetation at the upper, northern sections of the subject site, which may have included Sydney Turpentine Ironbark Forest and Coastal Shale-Sandstone Forest (DPE 2022), had been almost totally cleared before 1943.

The total area of locally-occurring remnant and planted native vegetation cover within the subject site is estimated at about 27% of the total planted vegetated cover (from cover values of native tree species in Scales 2021).

Locally-occurring remnant and planted native tree and shrub species such as Sydney Blue Gum, Blackbutt, Sydney Red Gum, Red Bloodwood, Sweet Pittosporum, Old Man Banksia etc are scattered among non-locally occurring planted native species such as Broad-leaved Paperbark, River Sheoak, Weeping Bottlebrush etc.

As such, a total of 0.225 hectares of potential STIF habitat (PCT 1281) in highly modified condition, as well as 0.186ha of potential Coastal Enriched Sandstone Dry Forest (PCT 1776) in modified condition, and another 0.103ha of Coastal Sandstone Gully Forest in highly modified condition, was entered as native vegetation to be impacted, in the BAM Calculator.

3.2. Plant Community Types (PCTs)

3.2.1. Plant Community Type mapped and PCT assessed as potentially occurring at the site

Table 1 indicates the nominal areas within the subject site, that before any clearing had occurred, may have supported various ecological communities, including:

- About 1.76ha of potential STIF habitat (PCT 1281),
- About 2.04ha of potential Coastal Enriched Sandstone Dry Forest habitat (PCT 1776), and;
- About 1.43ha of potential Coastal Sandstone Gully Forest (PCT 1250) habitat. (Figures 9A, 9B and 9C indicate DPE mapping (2022) of these communities surrounding the facility).

Table 1 also indicates how much of these communities currently occur in modified form amongst established residential development and landscaped gardens as follows (Scales 2021):

- About 0.517ha of estimated STIF assemblages (of which 0.225ha will be lost);
- About 0.229ha of estimated Coastal Enriched Sandstone Dry Forest assemblages (of which 0.186ha will be lost); and
- About 0.123ha of estimated Coastal Sandstone Gully Forest assemblages (of which 0.103ha will be lost) (Scales 2021).

Figure 13 indicates a highly modified example of STIF habitat;

Figure 14 indicates a modified stand of a Coastal Enriched Sandstone Dry Forest assemblage; and

Figure 15 indicates landscaped areas along First Avenue that contain native species that may be representative of a highly modified Coastal Sandstone Gully Forest assemblage that includes Old Man Banksia, Hairpin Banksia, Blueberry Ash, Sydney Red Gum and Rough-barked Apple, among others (Scales 2021)

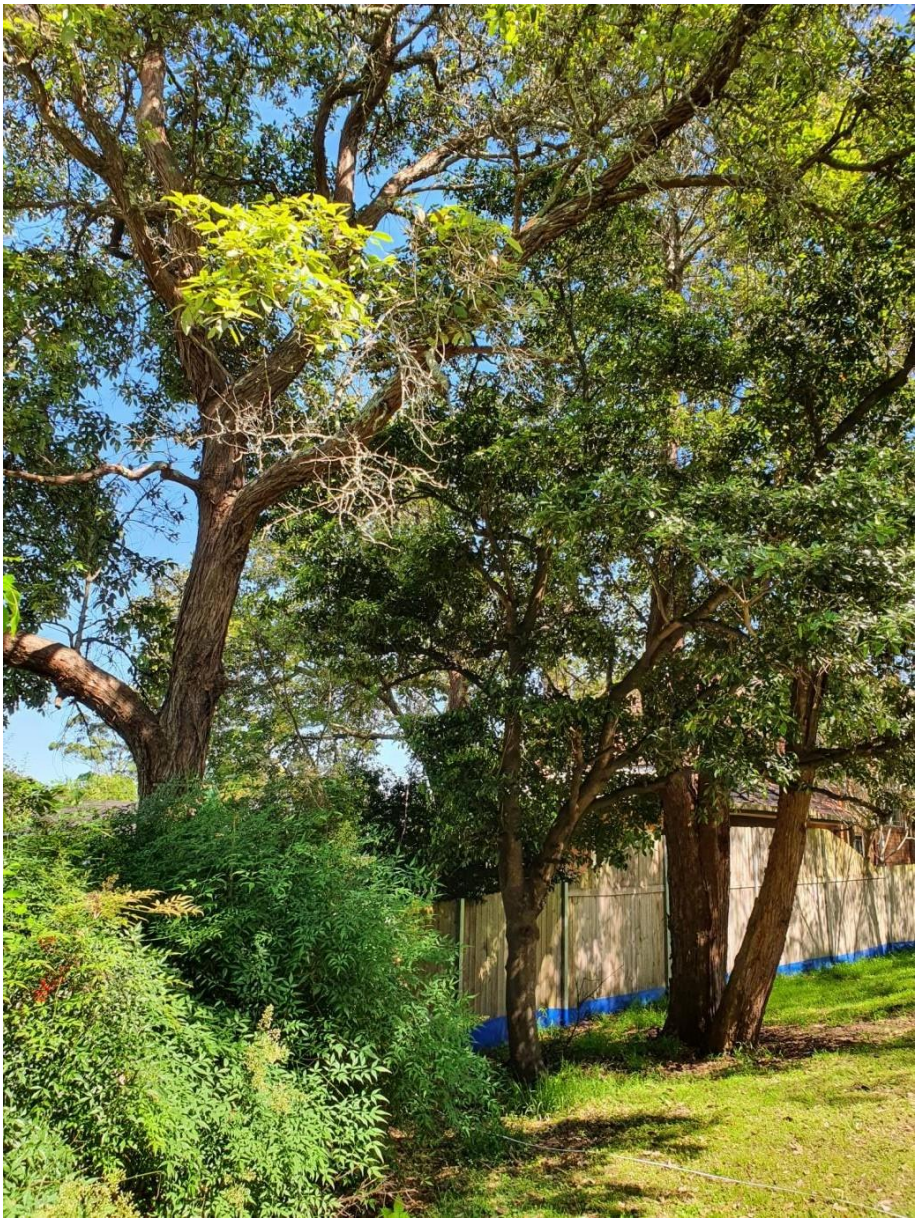

Figure 13 - Lower section of Quadrat 1 in Zone 1 (see Figure 6) indicating remnant individuals of Turpentine and Sweet Pittosporum with Swamp Mahogany, Sydney Golden Wattle, and Black Sheoak also present in the surveyed area

Figure 14 –Section of Quadrat 2 in Zone 2 (see Figure 6) in the south-western corner of the Lourdes redevelopment proposal indicating remnant individuals of Blackbutt (*Eucalyptus pilularis*) occurring in relatively good condition in a landscaped area with individuals of Spotted Gum and Turpentine with planted individuals of Broad-leaved Paperbark and River Sheoak etc

Figure 15 - Lower section of Quadrat 3 in Zone 3 (see Figure 6) in the Central Eastern section of the Lourdes redevelopment proposal indicating mature remnant individuals of Old Man Banksia retained within landscaped street verges and gardens along First Avenue, Lourdes Retirement Village

Description of Sydney Turpentine Ironbark Forest in the Sydney Basin Bioregion (from DPE 2022)

BioNet Vegetation Classification – Community Profile Report (DPE 2022)

Plant Community Type ID (PCT ID): 1281

PCT Name: Sydney Turpentine - Ironbark forest

Classification Confidence Level: 2-High

Vegetation Description: Sydney Turpentine-Ironbark Forest (Benson and Howell 1990) is a tall open forest found on shale and shale-enriched sandstone soils on the coast and hinterland of Sydney. It has been extensively cleared but was once widely distributed between Sutherland and the Hornsby plateau with outlying examples found on shale-rich deposits at Campbelltown, Menai, Kurrajong and Heathcote. The primary distribution of this forest is in areas receiving between 900 and 1250 millimetres of mean annual rainfall at elevations between 10 and 180 metres above sea level. The forest is characterised by open midstrata of mesic and sclerophyllous shrubs and small trees with a grassy ground cover.

The composition of the canopy is variable depending on location and substrate. Typically it is recognised by a canopy dominated by Turpentine (*Syncarpia glomulifera*), Red Mahogany (*Eucalyptus resinifera*) and various ironbarks of which *Eucalyptus paniculata* is most often recorded.

On the north shore these forests are found on shale-enriched sheltered sandstone slopes where ironbarks are less common and Blackbutt (*Eucalyptus pilularis*) is prevalent.

In the western suburbs drier forms of this forest are found at Concord, Bankstown and Auburn although remnants are small and highly disturbed. This map unit is referrable to a community of the same name in Tozer et al. 2010 and includes some sites previously identified as Sydney Turpentine Ironbark Margin Forest in NPWS (2002b) and Tozer (2003).

Vegetation Formation: Wet Sclerophyll Forests (Grassy sub-formation);

Vegetation Class: Northern Hinterland Wet Sclerophyll Forests;

IBRA Bioregion(s): Sydney Basin;

IBRA Sub-region(s): Wollemi; Yengo; Pittwater; Cumberland; Burragorang; Sydney Cataract;

LGA: SUTHERLAND; BANKSTOWN; FAIRFIELD; RYDE; KU-RING-GAI; HORNSBY; HAWKESBURY; BLUE MOUNTAINS; WOLLONDILLY; LITHGOW;

Emergent species: None

Upper Stratum Species: *Syncarpia glomulifera; Eucalyptus punctata; Eucalyptus pilularis; Eucalyptus paniculata subsp. paniculata; Angophora costata;*

Mid Stratum Species: *Pittosporum undulatum; Polyscias sambucifolia subsp. A; Acacia parramattensis; Breynia oblongifolia; Ozothamnus diosmifolius; Pittosporum revolutum; Allocasuarina torulosa; Leucopogon juniperinus; Notelaea longifolia;*

Ground Stratum Species: *Dianella caerulea; Lomandra longifolia; Microlaena stipoides var. stipoides; Pratia purpurascens; Entolasia marginata; Dichondra repens; Entolasia stricta; Pseuderanthemum variabile; Imperata cylindrica* var. *major; Oplismenus imbecillis;*

TEC Assessed: Has associated TEC

TEC List: Listed BC Act, E: Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion (Part); Listed BC Act, CE: Shale Sandstone Transition Forest in the Sydney Basin Bioregion (Part); Listed BC Act, CE: Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion (Equivalent); Listed EPBC Act, CE: Shale Sandstone Transition Forest of the Sydney Basin Bioregion (Part); Listed EPBC Act, CE: Turpentine-Ironbark Forest of the Sydney Basin Bioregion (Part);

Associated TEC Comments: PCT Percent Cleared: 90.00

PCT Definition Status: Decommissioned

Description of Coastal Enriched Sandstone Dry Forest (from DPE 2022)

BioNet Vegetation Classification – Community Profile Report (DPE 2022)

Plant Community Type ID (PCT ID): 1776

PCT Name: Coastal enriched sandstone dry forest

Classification Confidence Level: 2-High

Vegetation Description: Coastal Enriched Sandstone Dry Forest is commonly encountered on the upper slopes and dry gullies of Sydney urban areas. It is a tall open eucalypt forest with an understorey of dry sclerophyll shrubs with ferns and forbs amongst the ground cover. The commonly recorded eucalypts are smooth-barked apple (*Angophora costata*), red bloodwood (*Corymbia gummifera*) and Sydney peppermint (*Eucalyptus piperita*). Blackbutt (*Eucalyptus pilularis*) is common on gully slopes of the north shore and Hacking River valley while broad-leaved white mahogany (*Eucalyptus umbra*) replaces this species along the Warringah and Pittwater escarpments.

A sparse layer of small trees such as *Allocasuarina littoralis* and old-man banksia (*Banksia serrata)* is common above a variety of wattles, tea-trees, gee bungs and grass trees. In long unburnt areas sweet pittosporum (*Pittosporum undulatum*) may be prevalent.

It is widespread on the Hornsby plateau in areas that receive greater than 1000 millimetres of mean annual rainfall and are at elevations less than 200 metres above sea level. It extends north of the Sydney area into the hinterland of the Central Coast.

One of the distinguishing features of the community is that it appears to persist in areas that have subtle clay enrichment to the sandstone soils. Typically sites are located downslope from large residual shale caps or on exposed Narrabeen sandstone or thin clay bands on coastal sandstone ridgetops. The clay influence is not immediately discernible at sites but does appear expressed in the plant assemblage, resulting in more prominent mesic and grass species and less abundant heath plants than occur in the sheltered forests found on rockier and more siliceous sandstones.

Vegetation Formation: Dry Sclerophyll Forests (Shrubby sub-formation);

Vegetation Class: Sydney Coastal Dry Sclerophyll Forests;

IBRA Bioregion(s): Sydney Basin; IBRA Sub-region(s): Wyong; Pittwater; Cumberland; Sydney Cataract;

LGA: PITTWATER; WARRINGAH; KU-RING-GAI; HORNSBY; RYDE; HILLS; KOGARAH; HURSTVILLE; BANKSTOWN; LIVERPOOL; SUTHERLAND;

Emergent species: None

Upper Stratum Species: *Angophora costata; Corymbia gummifera; Eucalyptus piperita; Eucalyptus pilularis; Eucalyptus umbra; Syncarpia glomulifera;*

Mid Stratum Species: *Allocasuarina littoralis; Banksia serrata; Elaeocarpus reticulatus; Pittosporum undulatum; Ceratopetalum gummiferum; Acacia ulicifolia; Leptospermum trinervium; Persoonia levis; Acacia suaveolens; Acacia terminalis; Lomatia silaifolia; Dodonaea triquetra; Banksia spinulosa;*

Ground Stratum Species: *Dianella caerulea; Entolasia stricta; Lomandra longifolia; Pteridium esculentum; Xanthosia pilosa;*

TEC Assessed: No associated TEC

Associated TEC Comments: 20170316: There are currently no TECs associated with this PCT. May occur on slopes below Duffy's Forest Ecological Community.

PCT Percent Cleared: 64.00

PCT Definition Status: Decommissioned

Description of Coastal Sandstone Gully Forest (from DPE 2022)

BioNet Vegetation Classification – Community Profile Report (DPE 2022)

Plant Community Type ID (PCT ID): 1250

PCT Name: Coastal sandstone gully forest

Classification Confidence Level: 2 - High

Vegetation Description: Coastal Sandstone Gully Forest is widely distributed along the eastern extent of the Sydney sandstone plateaus. It occupies sheltered aspects on infertile Hawkesbury sandstone in areas that receive more than 1000 millimetres of mean annual rainfall. Sydney peppermint (*Eucalyptus piperita*) and smooth-barked apple (*Angophora costata*) form a moderately tall open forest. These are rocky environments and the understorey is a diverse mix of heath and shrub species such as banksias, tea-trees and wattles. The taller NSW Christmas bush (*Ceratopetalum gummiferum*) is also commonly encountered and is conspicuous in early summer when it flowers profusely. South of Sydney the spectacular large red flower and luxuriant green leaves of the Gymea lily (*Doryanthes excelsa)* immediately catches the eye. They are found scattered across the forest floor amongst patches of ferns, grasses, sedges and rock outcrops. The Gymea lily however is uncommonly recorded in northern Sydney though it becomes more frequent again in this community north of the Hawkesbury River. The community is found at elevations up to 500 metres above sea level.

Vegetation Formation: Dry Sclerophyll Forests (Shrubby sub-formation);

Vegetation Class: Sydney Coastal Dry Sclerophyll Forests;

IBRA Bioregion(s): Sydney Basin;

IBRA Sub-region(s): Pittwater; Cumberland; Sydney Cataract;

LGA: PITTWATER; SUTHERLAND;

Emergent species: None

Upper Stratum Species: *Banksia serrata; Eucalyptus piperita; Angophora costata; Corymbia gummifera; Ceratopetalum gummiferum;*

Mid Stratum Species: *Persoonia levis; Leptospermum polygalifolium; Lomatia silaifolia; Persoonia pinifolia; Banksia ericifolia; Acacia terminalis; Leptospermum trinervium; Platysace linearifolia; Banksia spinulosa; Acacia suaveolens;*

Ground Stratum Species: *Lomandra longifolia; Pteridium esculentum; Gonocarpus teucrioides; Entolasia stricta; Caustis flexuosa; Dianella caerulea; Doryanthes excelsa; Lepidosperma laterale;*

TEC Assessed: No associated TEC

Associated TEC Comments: 20170315: There are currently no TECs associated with this PCT.

PCT Percent Cleared: 30.00

PCT Definition Status: Decommissioned

3.2.2. Plot data used in BAM Calculator

The area containing Plots 1, 2 and 3 in Zones 1, 2 and 3 respectively (Figure 6) was subject to BAM analysis for Vegetation Integrity Scores that may require biodiversity offsets.

The data for Plots 1, 2 & 3 is presented in Table 4.

The native species occurring in the plots are indicated in Table 2.

3.2.3. Flora species occurring in the plot

The flora species complement and respective cover values are listed in Tables 2 and 4.

3.2.4. Fauna species and potential fauna habitat

The area subject to offsets (Figure 4) is largely landscaped though some small areas of remnant locally-occurring native tree and shrub species occur throughout the subject area, but also consisting of exotic managed grassland verges and parkland areas and non-locally occurring native and exotic tree and shrub species (Table 1). There is currently a low potential habitat for ground-dwelling fauna.

The locally-occurring and non-locally occurring tree and shrub canopy cover is relatively continuous along the internal road system and within parkland areas and garden areas, where the habitat may be deemed suitable for common arboreal species such as possums and common species of nectiferous and insect-eating avifauna.

The habitats of the subject land include:

1. Cleared, managed lawns and garden areas with extensive patches of exotic grassland and garden areas with dense shrub canopies (Figure 16), and
2. Large tall mature canopy trees occurring in rows along internal roads or within managed patches of woodland (Figures 13, 14 & 15).

The areas of managed exotic grassland provides poor sheltering habitat but may provide some food resources for common seed foraging avifauna such as the Magpie and Magpie Lark.

Figure 16 - Areas of formal gardens are established among building complexes and along internal roads with grassy maintained verges

Canopy trees may provide sheltering and seasonal food resources for avifauna, arboreal species and occasionally, the Grey-headed Flying Fox. No hollows were recorded for any tree observed within the Lourdes residential Retirement Village.

The developed managed curtilage areas have no habitat features such as hollow logs, dense leaf litter, rock shelves and crevices etc that may provide safe foraging and potential shelter for small terrestrial fauna species such as skinks or small mammals (Figures 13, 14, 15 & 16).

Microchiropteran survey

A dedicated mirochiropteran survey (4 evening sampling surveys) was undertaken from 21/11/2022 - 24/11/2022 to record the presence of microbats across the subject area.

Methodology: Two SongMeter Minibat ultrasonic recorders were set at 95 Stanhope Rd, Killara for four consecutive nights during fair, warm temperature conditions.

Afternoon temperatures varied from 25.9^0 - 26.3^0, with wind speeds varying from 17kmh (South on Wednesday 23rd) to 33kmh (West on Monday 21st).

The detectors were placed at the North-east and South-west corners of the subject site within areas of open vegetation as indicated in Figure 17.

Detector 1 was placed at the intersection of Stanhope Rd and Lourdes Avenue in the NE corner of the site (Coordin: -33.76677 151.17621) and Detector 2 was placed on the southern edge of the site along Lourdes Avenue (Coordin: -33.76717 151.17357).

Figure 17 - Location of two digital bat detectors at the Lourdes Retirement Village at 95 Stanhope Road, Killara from 21/11/2022 - 24/11/2022

Limitations of surveys:

It was not possible to survey year-round for microbats, there is a chance some microbat species may use the study area even if not detected during the current survey period.

Results and Discussion:

Results of the bat surveys over the four days at the two locations are tabulated in Table 3.

Species	Common Name	Identification Confidence (No of passes of individuals)	
		Detector 1	Detector 2
Austronomus australis	**White-striped Freetailed Bat**	D (7)	D (6)
Chalinolobus gouldii	**Gould's Wattle Bat**	Pr (2)	D (9); Pr (9)

Species	Common Name	Identification Confidence (No of passes of individuals)	
		Detector 1	Detector 2
Miniopterus orianae oceanensis	**Large Bent-winged Bat**	D (1)	D (1) Pr (1)
Miniopterus australis	**Little Bent-winged Bat**	-	D (2)

Legend: D - definite identification; Pr - Probable identification (high likelihood)

Table 3 - Results of bat surveys over four days at two locations (A Rowles 2022)

Results indicate that over the survey period, microbat activity was very low, recording only four species of microchiropterans despite suitable weather conditions.

Two threatened species were recorded:

The Large-Bentwinged Bat (*Miniopterus orianae oceanensis*) and The Little Bent-winged Bat (*Miniopterus australis*), however only a few passes of each were recorded over the four days and were therefore likely individuals passing through the site and not foraging at the two locations at the subject site (Rowles 2022).

The other two common species, White-striped Freetailed Bat and Gould's Wattle Bat appear to be foraging at both sites with several passes at each location (Table 3). Exterior building lighting recorded over the site could increase insect activity to offer some species of bats with potential foraging opportunities (Newport, et al., 2014).

Artificial lighting and prevalence of flowering trees (such as eucalypt ocurrences) in the study area may offer improved foraging conditions for microbats (Lumsden, 2004; Newport, et al., 2014). For some species, such as the Gould's Wattled Bat, it has been shown they will travel several kilometres from roost sites to reach preferred foraging habitat (Lumsden, 2004).

These species forage over wide areas and the potential loss of a few individuals of mostly locally indigenous and non-locally indigenous tree species is not considered to significantly affect their foraging behaviours in the locality.

3.3. Vegetation Integrity Assessment

3.3.1. Vegetation zones

A vegetation zone is defined as an area of vegetation having the same PCT and occurring in a similar condition state.

In a highly modified landscape such as occurs at Lourdes Retirement Village, few areas of vegetation appear structurally or floristically similar.

The presence of species such as Turpentine (*Syncarpia glomulifera*), Sweet Pittosporum *Pittosporum undulatum*), Black Sheoak (*Allocasuarina littoralis*) (Table 2), together with DPE mapping (2022) (Figure 9A) for the patch of trees occurring at the upper north-west section of the site (Zone 1, Figure 6), as well as geology mapping of the locality (Herbert 1983), indicate that the patches of remnant and landscaped vegetation may represent elements of Sydney Turpentine Ironbark Forest in the Sydney Basin Bioregion (Figure 14) (DPE 2022).

Similarly, the presence of such species as Blackbutt (*Eucalyptus pilularis)*, Spotted Gum (*Corymbia maculata*), Sydney Red Gum (*Angophora costata*), Coast Banksia *(Banksia integrifolia)* (Table 2), together with DPE mapping (2022) (Figure 9B) for the patch of trees occurring at the lower south-west section of the site (Zone 2, Figure 6), as well as geology mapping of the locality (Herbert 1983), indicate that the patches of remnant and landscaped vegetation may represent elements of Coastal Enriched Sandstone Dry Forest (Figure 15) (DPE 2022).

Likewise, the presence Old Man Banksia (*Banksia serrata*), Hairpin Banksia (*Banksia spinulosa*), Blueberry Ash (*Elaeocarpus reticulatus*) and Sydney Red Gum (*Angophora costata*) (Table 2), together with DPE mapping (2022) (Figure 9C) for the patch of trees occurring at the central eastern section of the site (Zone 3, Figure 6), as well as geology mapping of the locality (Herbert 1983), indicate that the patches of landscaped vegetation may represent elements of Coastal Sandstone Gully Forest (Figure 16) (DPE 2022).

A total of 9 potentially locally-occurring native species were recorded in all Plots (Table 2, Figures 14, 15 & 16).

The general condition of the vegetation in regard to BAM analysis was regarded as 'managed' since much of the natural vegetation has been cleared, species poor, landscaped and maintained as managed curtilage (Figures 14, 15, 16 & 17).

3.3.2. Patch size

The patch size for relatively continuous patches of native vegetation within the buffer area (within 100m of any adjacent patch) and aligned with the vegetation of the subject land is estimated at 166ha. This area was used for patch size in the BAM calculation.

3.3.3. Vegetation Integrity Score

Quantitative measures for species composition, structure and function attributes were derived from the intact landscaped vegetation within the plots as listed in Table 2 of BAM (2020) as indicated in Table 4.

The 20m x 20m plots (or variants of this equating to an area of 400m^2) were mostly located within landscaped exotic grassland vegetation with remnant and planted locally-native occurring tree and shrub species, as well as some non-locally occurring native and exotic tree and shrub species (Figures 6, 7A, 7B & 7C) and scores derived from the 20m x 50m plots were used for functional attributes.

Condition attributes use to assess composition of vegetation	Condition attributes use to assess structure within vegetation	Condition attributes use to assess functionality within vegetation
Tree richness	Tree cover	Number large trees
Shrub richness	Shrub cover	Tree regeneration potential
Grass and grass-like richness	Grass and grass-like cover	Tree stem size classes
		Tree hollows
Forb richness	Forb cover	Total length of fallen logs
Fern richness	Fern cover	Litter cover
Other richness (Twiners, Palms etc)	Other cover (Twiners etc)	High Threat Weed cover

Table 4 - Condition attributes for composition, structure and function at plots (Table 2; Figure 6) which were sampled for BAM analysis (from Table 2 in BAM 2020).

Table 5 tabulates the plot scores for the attributes listed in Table 4 for the plots.

PLOT 1 - Zone 1 (Figures 6 & 14)

Life-form	Tree	Shrub	Grass & Grass-like	Forb	Fern	Other
Counts for composition	3	2	0	4	0	0
Counts for cover (%)	50	10	0	6	0	0

Number large trees (>80cm DBH)	Tree regeneration	Tree stem size classes (cm)					Length fallen logs	litter cover (%)	Tree Hollows	HTW (%)
		5-9	10-19	20-29	30-49	50-79				
0	absent	0	2	4	2	0	none	15	0	0

PLOT 2- Zone 2 (Figures 6 & 15)

Life-form	Tree	Shrub	Grass & Grass-like	Forb	Fern	Other
Counts for composition	3	0	1	3	0	0
Counts for cover (%)	58	0	15	7	0	0

Number large trees (>80cm DBH)	Tree regeneration	Tree stem size classes (cm)					Length fallen logs	litter cover (%)	Tree Hollows	HTW (%)
		5-9	10-19	20-29	30-49	50-79				
0	absent	2	0	1	3	3	none	58	0	2

PLOT 3 - Zone 3 (Figures 6 & 16)

Life-form	Tree	Shrub	Grass & Grass-like	Forb	Fern	Other
Counts for composition	3	3	1	1	1	0
Counts for cover (%)	15	15	10	2	2	0

Number large trees (>80cm DBH)	Tree regeneration	Tree stem size classes (cm)					Length fallen logs	litter cover (%)	Tree Hollows	HTW (%)
		5-9	10-19	20-29	30-49	50-79				
0	absent	1	0	4	0	1	none	5	0	0

Table 5 - Condition attributes for composition, structure and function in Plots 1, 2 & 3 (Figure 6)

Table 6 summarises the condition attributes for composition, structure and functionality of the biota in the plots which were sampled for BAM analysis, with the resultant Vegetation Integrity Scores (VIS) based on the potential PCT areas impacted (Table 1).

The VIS is used to calculate the offset credits required and the costs incurred for clearing native vegetation at the subject land.

PLOTS 1, 2 & 3 in Zones 1, 2 & 3 (Figures 6, 14, 15 & 16)

ZONE	COMPOSITION SCORE	STRUCTURE SCORE	FUNCTION SCORE	VEGETATION INTEGRITY SCORE (VIS)
1 (PCT 1281)	**13.3**	**49.1**	**13.4**	**20.6**
2 (PCT 1776)	**10.5**	**41.2**	**63.7**	**30.2**
3 (PCT 1250)	**9**	**18.5**	**18.7**	**14.6**

Table 6 - Condition scores for composition, structure, function and VIS at Plots (Zones) 1, 2 & 3 for PCT's 1281; 1776 & 1250 respectively.

4 Threatened Species

4.1 Ecosystem Credit Species

These species are those where the likelihood of occurrence of the species potential elements of the species habitat can reasonably be predicted by vegetation surrogates and features of the landscape, or for which targeted species surveys have a low probability of detection.

The Threatened Biodiversity Data Collection (TBDC) has identified 29 potential ecosystem credit species as predicted by vegetation surrogates and landscape features (even though the site is managed curtilage with mostly landscaped tree and garden plantings in a relatively busy and long established residential setting!). These are listed and addressed in the following Table 7.

4.2 Species Credit Species (Candidate Species)

These species are those where the likelihood of occurrence of the species, or potential suitable elements of the species habitat, cannot be reliably predicted by vegetation surrogates and landscape features and can more reliably be detected by species surveys.

The TBDC has identified a total of 62 potential candidate species that cannot be reliably predicted to occur at the long-established residential precinct, and these are listed and addressed in the following Table 7.

In accordance with Section 5.3 of BAM (2020) a targeted species survey must be undertaken for a threatened candidate species that is likely to occur at the site based on the application of Steps 1 - 3 in Sub-sections 5.2.1 - 5.2.3 (BAM 2020).

The habitat features for breeding (such as caves, rocky overhangs and escarpments) are not present in the managed curtilage of the residential areas of the subject land that is proposed to be impacted.

The landscaped assemblages are mostly highly modified and lack any natural ground cover, mostly lacks any understorey structure and are maintained as managed curtilage (Figures 13, 14, 15 and 16).

Most, if not all, of these species would not be expected to occur at the subject site where habitat is otherwise highly modified and unsuitable. It is considered that targeted surveys in this case would not achieve any purpose, except possibly for threatened microbat species

that may have sought shelter and roost sites after occupants had vacated some buildings in the unsafe upper northern sections of the facility (Figure 8) and these species have been targeted in current relevant microchiropteran surveys.

Table 7 lists all Ecosystem Credit and Species Credit Species (Candidate Species) listed in the TBDC and addresses their suitability to the habitat and likelihood of occurrence.

Table 7 - Ecosystem species and Candidate species assessment table for PCT's 1281; 1776 and 1250 occurring within the redevelopment proposal at Lourdes Retirement Village, 95 Stanhope Road, Killara

SPECIES & COMMON NAME	DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)	HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES	HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)	ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT
PLANTS				
Acacia bynoeana **Bynoe's Wattle**	Decumbent shrub to 0.5m tall. Dry sclerophyll woodland/forest on sandy clay soils, often containing ironstone gravels in Castlereagh Woodlands. Also occurs in heath and woodland on sandy soils in the central and upper Blue Mountains	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover	No records within locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Acacia prominens **Gosford Wattle**	An erect or spreading tree, 4 - 18 m high. Grows in open situations on clayey or sandy soils	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover	No records within locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Acacia pubescens **Downy Wattle**	Spreading shrub to 5m tall. Dry sclerophyll woodland/forest on clay soils, from Bilpin to the Georges River.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover	No records within locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required

SPECIES & COMMON NAME	DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)	HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES	HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)	ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT
PLANTS				
Caladenia tesselata **Thick-lip Spider Orchid**	Terrestrial herb. Clay or sandy soils in moist forests or scrubs on coastal ridgetops. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. The single leaf regrows each year. Flowers appear between September and November (but apparently generally late September or early October in extant southern populations).	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover	No records within locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Rhodamnia rubescens **Scrub Turpentine**	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover	Record about 3.6km in Garigal Nat Park to the North at Barra Brui. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required

SPECIES & COMMON NAME	DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)	HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES	HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)	ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT
PLANTS				
Persoonia hirsuta **subsp *hirsuta*** **Hairy Geebung**	Spreading to decumbent shrub found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover	No records within locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Epacris purpurascens **var. *purpurascens***	Erect shrub to 150cm tall, in dry sclerophyll forest. Occurs on damp soils in woodland and forest on sandstone, shale or rocky sites, confined to coastal plateaus in the Sydney region from Gosford to Sydney district.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover. No natural shrub canopy onsite.	Records about 2.2km to the East at Gooseberry Flat. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Grevillea parviflora **var. *parviflora*** **Small-flower Grevillea**	Erect shrub to 150cm tall. Occurs in light clayey soils over shale on ridges or rocky sandstone slopes in dry shrubby sclerophyll forest, from Gosford to Sydney district. Known to occur or have occurred from Prospect to Camden and Appin.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover. No natural shrub canopy onsite.	No records within locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required

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PLANTS				
Grevillea parviflora* var. *supplicans **Grevillea parviflora var. supplicans**	Semi-prostrate shrub to 1m tall. Occurs in heathy woodlands on skeletal soils over massive sandstones. Associated with clay-capped ridges of the Lucas Heights & Faulconbridge soil landscapes, preference for yellow clays and periodically impeded drainage	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover. No natural shrub canopy onsite.	No records within locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Gyrostemon thesioides **Gyrostemon thesioides**	Within NSW, has only ever been recorded at three sites, to the west of Sydney, near the Colo, Georges and Nepean Rivers. The most recent sighting was of a single male plant near the Colo River within Wollemi National Park. The species has not been recorded from the Nepean and Georges Rivers for 90 and 30 years respectively, despite searches. Also occurs in Western Australia, South Australia, Victoria and Tasmania. Grows on hillsides and riverbanks and may be restricted to fine sandy soils	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover. No natural shrub canopy onsite.	No records within locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required

SPECIES & COMMON NAME	DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)	HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES	HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)	ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT
PLANTS				
Hibbertia purebula **Hibbertia purebula**	Sparsely branched shrublet to 30cm tall with weak stems. Occurs in sandy soils or clay in woodland and shrubland from Wollemi National Park to south coast near Nowra.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover. No natural shrub canopy onsite.	No records within locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Hibbertia superans **Hibbertia superans**	Low spreading shrub to 30cm tall with weak stems. Occurs insandy soils in woodland and shrubland in north-west Sydney from Annangrove, Kellyville and Maroota.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover. No natural shrub canopy onsite.	No records within locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Pimelea curviflora* var. *curviflora **Pimelea curviflora var. curviflora**	Much-branched subshrub or shrub 20 to 100cm. Occurs in woodlands of the northern area of Sydney on shale-sandstone transition areas and laterite soils.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover. No natural shrub canopy onsite.	No records within locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required

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PLANTS				
Pomaderris prunifolia **Pomaderris prunifolia**	Shrub to 3m tall. At Rydalmere it occurs along a road reserve near a creek, among grass species on sandstone. At Rookwood Cemetery it occurs in a small gully of degraded Cooks River / Castlereagh Ironbark Forest on shale soils.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover. No natural shrub canopy onsite.	No records within locality This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Syzygium paniculatum **Magenta Lilly Pilly**	Shrub or small tree to 8m tall, occurs in or near rainforest from littoral sands to sheltered gullies, especially near watercourses on sandy soils	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover. Some individuals have established from landscaped plantings in garden areas within the subject site.	Records of landscaped individuals purchased from nurseries. Three (3) individuals will be removed as a result of the proposal, but these individuals are landscaped plantings and not occurring in natural littoral rainforest habitats	**A candidate species credit species but habitat is managed curtilage and these individuals are established in landscaped garden settings not in natural littoral habitats** No further surveys required
Wahlenbergia multicaulis **Tadgells Bluebell**	A perennial, tufted herb, typically few-stemmed, 10 - 75 cm high. In Western Sydney most sites are closely aligned with the Villawood Soil Series, which is a poorly drained, yellow podsolic extensively permeated with fine, concretionary ironstone (laterite).	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	No records for this species in the locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required

SPECIES & COMMON NAME	DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)	HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES	HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)	ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT
PLANTS				
Callistemon linearifolius **Netted Bottlebrush**	Erect shrub to 2.5m tall. Occurs in damp situations in woodland or scrub on sandstone substrates	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	Records for this species occur some 3km to the NW at Pymble This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Darwinia peduncularis **Darwinia peduncularis**	Erect to spreading shrub to 1.5m. Occurs in rocky locations in open forest and woodland in sandy soils. Occurs between Hornsby and Brooklyn.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	No records for this species in the locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Deyeuxia appressa **Deyeuxia appressa**	Erect, perennial grass to 1m tall, occurs in damp, poorly drained habitat on sandstone substrates in the Hornsby area.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	No records for this species in the locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required

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PLANTS				
Eucalyptus camfieldii **Camfields Stringybark**	Mallee or small tree 1 – 4m tall. Occurs on shallow sandstone soils bordering coastal heath in association with other mallee eucalypts.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	Nearest records for this species about 3.6km to the north in Garigal Nat Park. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Grammitis stenophylla **Grammitis stenophylla**	Small erect fern with fronds <5cm long. Occurs on rocks in rainforest and in wet sclerophyll forest	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	No records for this species in the locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Haloragadendron lucasii **Haloragadendron lucasii**	Erect shrub to 1.5m tall, occurs in moist sandy loam soil in sheltered aspects and on gentle slopes below cliff lines near creeks in low open woodland.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	Nearest records for this species about 2.5km to the north in Garigal Nat Park. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required

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PLANTS				
Hibbertia spanantha **Hibbertia spanantha**	Grows in forest with canopy species including *Eucalyptus pilularis, E. resinifera, Corymbia gummifera and Angophora costata.* The understorey is open with species of Poaceae, Orchidaceae, Fabaceae and Liliaceae. Flowering in October and November, but with an odd flower throughout the year. The soil is identified as a light clay occurring on a shale sandstone soil transition.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover. Patch of forest in PCT 1776 containing Blackbutt, but ground stratum is landscaped	No records for this species in the locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Leucopogon exolasius **Leucopogon exolasius**	Erect prickly shrub to 1m tall occurring in woodlands on sandstone substrates, often along rocky river banks.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	No records for this species in the locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Melaleuca deanei **Deanes Paperbark**	Shrub to 3m, occurring in isolated clumps on dry ridges with sandy soils or on ironstone gravels in shrubby woodland	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	Nearest records for this species about 5.2km to the SW at East Ryde. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required

SPECIES & COMMON NAME	DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)	HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES	HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)	ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT
PLANTS				
Persoonia bargoensis **Basrgo Geebung**	Is an erect, bushy shrub, the height of which varies between 60 cm and 2.5 m. The Bargo Geebung is restricted to a small area south-west of Sydney on the western edge of the Woronora Plateau and the northern edge of the Southern Highlands. The historical limits are Picton and Douglas Park (northern), Yanderra (southern), Cataract River (eastern) and Thirlmere (western). The Bargo Geebung occurs in woodland or dry sclerophyll forest on sandstone and on heavier, well drained, loamy, gravelly soils of the Wianamatta Shale and .Hawkesbury Sandstone. It favours interface soil landscapes such as between the Blacktown Soil Landscape and the complex Mittagong Formation soils (Lucas Heights Soil Landscape) with the underlying sandstone (Hawkesbury Soil Landscape and Gymea Soil Landscape). Some of the vegetation the species occurs within would be recognised as the Shale/Sandstone Transition Forest, a listed community. Plants are likely to be killed by fire and recruitment is solely from seed. Longevity expected to be about 20 years.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	No records for this species in the locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required

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PLANTS				
Persoonia mollis **Persoonia mollis**	A tall, branching, spreading shrub which grows 2 - 6 m high. Highly restricted, known from the Hornsby Heights-Mt Colah area north of Sydney in the Sydney Basin Bioregion. Occurs in three populations (described on a catchment basis) located over an approximate north-south range of 5.75 km and east-west distance of 7.5 km. Occurs in sheltered aspects of deep gullies or on the steep upper hillsides of narrow gullies on Hawkesbury Sandstone. These habitats support relatively moist, tall forest vegetation communities, often with warm temperate rainforest influences. Associated species: Smooth Barked Apple *Angophora costata*, Sydney Peppermint *Eucalyptus piperita*, Red Bloodwood *Corymbia gummifera*, Turpentine *Syncarpia glomulifera*, Coachwood *Ceratopetalum apetalum* and Black Wattle *Callicoma serratifolia*. Flowers late December – March.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover. Patch of forest in PCT 1776 containing Blackbutt and Sydney Red Gum, but ground stratum is landscaped with no natural vegetation in shrub or ground layers..	No records for this species in the locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required

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PLANTS				
Pomaderris brunnea **Pomaderris brunnea**	Shrub to 3m tall occurring on clay or alluvial soils overlying shale, generally in open woodland	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native shrub or ground cover.	No records for this species in the locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Pterostylis saxicola **Pterostylis saxicola**	Ground orchid with reddish brown and green translucent flowers on a slender stem to 35cm tall. Most commonly occurs in small pockets of shallow soil in depressions on sandstone rock shelves above cliff-lines in association with sclerophyllous forest or woodland on shale/andstone transition soils.	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	No records for this species in the locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Tetratheca glanulosa **Tetratheca glandulosa**	A perennial, tufted herb, typically few-stemmed, 10 - 75 cm high. In Western Sydney most sites are closely aligned with the Villawood Soil Series, which is a poorly drained, yellow podsolic extensively permeated with fine, concretionary ironstone (laterite).	Potential habitat onsite does not occur, site is managed curtilage, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	Nearest record about 3.9km to the north-east in Garigaal Nat Park for this species in the locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required

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FUNGI				
Hygrocybe aurantipes **Hygrocybe aurantipes**	A small brightly coloured gilled fungus that occurs in warm temperate gallery forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*)	Potential habitat onsite does not occur. No creeks, swamps or waterbodies within 50m of site. Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	Nearest records within locality about 3.2km to the south in Lane Cove Nat Park. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Hygrocybe anomola* var. *ianthinomarginata **Hygrocybe anomola var. ianthinomarginata**	A small brightly coloured gilled fungus. Cap 8 - 18 mm variable, convex to expanded convex to convex with a hollow at the centre; orange brown to buff with a darkish reddish centre dot that occurs in warm temperate gallery forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*)	Potential habitat onsite does not occur. No creeks, swamps or waterbodies occur within 500m of site. Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	Nearest records within locality about 3.2km to the south in Lane Cove Nat Park. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Hygrocybe austropratensis	A small brightly coloured fungus. Cap 14 - 30 mm orange to light orange brown, convex or irregularly convex expanding to convex on one side and	Potential habitat onsite does not occur. No creeks, swamps or waterbodies occur within 500m of site.	Nearest records within locality about 3.2km to the south in Lane Cove Nat Park.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not**

Hygrocybe austropratensis	flat on the other to irregular that occurs in warm temperate gallery forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*)	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**locate individuals of this species.** No further surveys required
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FUNGI				
Hygrocybe collucera **Hygrocybe collucera**	A small brightly coloured red gilled fungus. Cap 8 - 20 mm scarlet red, cone shaped to broadly convex that occurs in warm temperate gallery forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*)	Potential habitat onsite does not occur. No creeks, swamps or waterbodies occur within 500m of site. Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	No records within locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Hygrocybe griseoramosa **Hygrocybe griseoramosa**	A small buff to brown gilled fungus. Cap 20 -30 mm, sepia brown to chocolate brown at the centre but becoming light pinkish buff that occurs in warm temperate forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion*	Potential habitat onsite does not occur. No creeks, swamps or waterbodies occur within 500m of site. Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges	No records within locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required

	ferdinandi) and Sweet Pittosporum (*Pittosporum undulatum*)	and gardens, no native ground cover.		
SPECIES & COMMON NAME	**DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)**	**HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES**	**HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)**	**ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT**
FUNGI				
Hygrocybe lanecovensis **Hygrocybe lanecovensis**	A small brightly coloured gilled fungus. Cap 10 - 23 mm, brilliant scarlet, convex, very sticky but soon becoming almost dry and only faintly sticky at maturity that occurs in warm temperate gallery forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*)	Potential habitat onsite does not occur. No creeks, swamps or waterbodies occur within 500m of site. Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	Nearest records within locality about 3.2km to the south in Lane Cove Nat Park. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Hygrocybe reesiae **Hygrocybe reesiae**	A small, lilac coloured gilled fungus that occurs in warm temperate gallery forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*)	Potential habitat onsite does not occur. No creeks, swamps or waterbodies occur within 500m of site. Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, no native ground cover.	Nearest records within locality about 5.7km to the south at Northbridge This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required

SPECIES & COMMON NAME	DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)	HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES	HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)	ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT
FUNGI				
Hygrocybe rubronivea **Hygrocybe rubronivea**	Small, brightly-coloured gilled fungus. Cap 7 - 30 mm, convex then becoming rather flattened and occasionally centrally depressed, dry, smooth or sometimes mealy, brilliant crimson that occurs in warm temperate gallery forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*)	Potential habitat onsite does not occur. No creeks, swamps or waterbodies occur within 500m of site. Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, no native ground cover	No records within locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required
Camarophyllopsis kearneyi **Camarophyllopsis kearneyi**	A small, pale, gilled agaric fungus. Cap 5 - 11 mm, at first often nearly round then becoming dome shaped or deeply convex; smooth but covered with fine glistening particles. Known only from its type locality in Lane Cove Bushland Park in the Lane Cove local government area in the Sydney metropolitan region.	Potential habitat onsite does not occur. No creeks, swamps or waterbodies occur within 500m of site. Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, no native ground cover	No records within locality. This species was not observed during targeted searches within the managed curtilage of the subject site and can be deemed to not occur and not impacted.	**A candidate species credit species but habitat is managed curtilage and targeted searches did not locate individuals of this species.** No further surveys required

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ANIMALS				
Burhinus grallarius **Bush Stone-curlew**	The Bush Stone Curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch.	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, no native ground cover. No fallen or standing dead timber including logs	No recent sightings at site.	**Candidate species credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further surveys or assessment required**
Anthochaera phyrgia **Regent Honeyeater**	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover.	No recent sightings at site.	**Dual Ecosystem and Candidate species credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further surveys or assessment required**

	forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast. The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. Flowering of associated species such as Thin-leaved Stringybark *Eucalyptus eugenioides* and other Stringybark species, and Broad-leaved Ironbark *E. fibrosa* can also contribute important nectar flows at times. Nectar and fruit from the mistletoes *Amyema miquelii, A. pendula* and *A. cambagei* are also utilised. When nectar is scarce lerp and honeydew can comprise a large proportion of the diet. Insects make up about 15% of the total diet and are important components of the diet of nestlings.			
Chthonicola sagittata **Speckled Warbler**	The Speckled Warbler lives in a wide range of *Eucalyptus* dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The diet consists of seeds and insects, with most foraging taking place on the	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover.	No recent sightings at site.	**Ecosystem species credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further surveys or assessment required**

	ground around tussocks and under bushes and trees.			
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ANIMALS				
Eastern Pygmy Possum *Cercartetus nanus*	In most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover.	Nearest records about 1.9km to the north-east near Forestville Bend. No suitable habitat in managed curtilage of subject site	**Candidate species credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further surveys or assessment required**
Chalinolobus dwyeri **Large-eared Pied Bat**	A small to medium-sized bat with long, prominent ears and glossy black fur. It is generally rare with a very patchy distribution in NSW. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. Found in well-timbered areas containing gullies.	Managed curtilage. No roosting or breeding habitat at site. No sandstone cliffs or rocky cave habitat features.	Nearest record some 4km to the north at St Ives, Garigal Nat Park. Managed curtilage at subject site does not provide any suitable habitat.	**Candidate species credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. No roosting or breeding habitat occurs at subject site, no caves, rocky areas or cliff structures at subject site. **No further surveys or assessment required**

SPECIES & COMMON NAME	DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)	HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES	HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)	ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT
ANIMALS				
Lathamus discolor **Swift Parrot (foraging)**	The Swift Parrot is small parrot about 25 cm long distinguishable by its long thin dark red tail. Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Forest Red Gum *E. tereticornis*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens.* Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum *Eucalyptus globulus*.	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover.	Swift Parrot sightings in the locality are marked as sightings on a 1km grid pattern, sightings being of birds on the wing or bird calls in the locality. Most 'sightings' to the NE of the subject site. Managed curtilage at subject site does not provide any suitable habitat.	**Dual Ecosystem Credit Species and Candidate Species Credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**
Miniopterus australis **Little Bent-winged Bat**	Small, dark chocolate brown insectivorous bats with a body length of about 45 mm. Lives in moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca	No suitable habitat. No roosting or breeding habitat at site. No sandstone cliffs or rocky cave habitat	Records of these bats foraging in bushland surrounding the subject site to the east, south-east and south. Current anabat	**Dual ecosystem credit species and candidate species credit species.** No roosting or breeding

	swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. 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.	features. Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover.	surveys detected two passes over 4 evenings at the south-western section of the subject site, indicating individuals passing through the area, not numerous passes, apparently not foraging at site.	habitat occurs at subject site, no caves, rocky areas or cliff structures at subject site. Heavily vegetated habitat suitable for foraging not present at site. No further surveys required.
Miniopterus orianae oceanensis **Large Bentwing Bat** **(Foraging and Breeding)**	This sub species of Bentwing Bat occurs from Cape York to central Vic. Occurs in wet and dry sclerophyll forests and rainforests. Roost within man-made structures. Known roost sites include caves, disused mines, storm-water drains, culverts and buildings. However maternity roosts occur in sandstone or limestone cave systems. Will form scattered smaller colonies, mostly within 300km of the larger maternity cave (Churchill 1998). Active all year round, foraging mostly on moths above the tree canopy. Feeds over large areas of land and has been reported to travel up to 70 km in one night (Dwyer 1995). No breeding habitat onsite.	No suitable foraging, breeding habitat onsite, no caves, tunnels, few tree hollows or other roosting or breeding habitat features. Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover.	A total of 137 records across the landscape including in forest occurring to the south of the subject site. Bats may forage in area but will not be breeding or roosting in the subject site. Current anabat surveys detected one pass over 4 evenings at the north-eastern section of the site and 2 passes at the south-western section of the subject site, indicating individuals passing through the area, not numerous passes, apparently not foraging at site.	**Dual ecosystem credit species and candidate species credit species.** No roosting or breeding habitat occurs at subject site, no caves, rocky areas or cliff structures at subject site. Habitat may be suitable for foraging above trees occurring at the site. No further surveys required.
Artamus cyanopterus cyanopterus **Dusky woodswallow**	The Dusky Woodswallow is found in open forests and woodlands, and may be seen along roadsides and on golf courses. The Dusky Woodswallow nests colonially in 'neighbourhoods'. The nest is a loose bowl of twigs, grass and roots, lined with fine grass, and is placed in a tree fork, behind bark, in a stump hollow or in a fence post, about 1 m - 10	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover.	One record occurs in East Lindfield in previous 20 years.	**Ecosystem Credit Species** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment**

	m above the ground.			**required**
SPECIES & COMMON NAME	**DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)**	**HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES**	**HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)**	**ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT**
ANIMALS				
Grantiella picta **Painted Honeyeater**	Inhabits Boree/ Weeping Myall (*Acacia pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema*.	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover. Habitat unsuitable No mistletoes at site.	No records in locality.	**Ecosystem Credit Species** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**
Green and Golden Bellfrog *Litoria aurea*	Occurs along the coast and eastern slopes of the Great Dividing Range south from Wollemi National Park. Breeds in ephemeral to intermittent streams with persistent pools. Only infrequently moves to breeding sites, most commonly found on ridges away from creeks, several hundred metres from water.	No waterbodies (ponds/swamps/creeklines) at site. Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover. Habitat unsuitable	No records in locality.	**Candidate Credit Species** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**
Cumberland Plain Land Snail ***Meridolum corneovirens***	This large native land snail occurs over a very restricted area within Cumberland Plain vegetation between Prospect and Liverpool to the east and the Hawkesbury-Nepean River to the west. To the south it extends as far as Picton and to the north to the Windsor-Richmond area. Its habitat has been largely destroyed by urbanisation and it	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover. Habitat unsuitable	No records in locality.	**Candidate Credit Species** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. Ground searches below leaf

	now is reported as surviving only as isolated populations in some remnant areas of bushland. Large Land Snails (*Meridolum corneovirens*) burrow into the soft soil around the base of trees and during dry period can appear to be lost from an area. However following prolonged wet periods they will re-emerge into the litter to feed on decaying wood and fungi. No suitable habitat.			litter was undertaken beneath representative trees at the site, but no snails were located. **No further assessment required**
Melithreptis gularis gularis **Black-chinned Honeyeater (Eastern subspecies)**	In NSW it is widespread, with records from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. It is rarely recorded east of the Great Dividing Range, although regularly observed from the Richmond and Clarence River areas. It has also been recorded at a few scattered sites in the Hunter, Central Coast and Illawarra regions, though it is very rare in the latter. Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*E. albens*), Inland Grey Box (*E. microcarpa*), Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*) and Forest Red Gum (*E. tereticornis*). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees. A gregarious species usually seen in	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover.	No recors in locality	**Ecosystem Credit Species** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**

	pairs and small groups of up to 12 birds. Feeding territories are large making the species locally nomadic. Recent studies have found that the Black-chinned Honeyeater tends to occur in the largest woodland patches in the landscape as birds forage over large home ranges of at least 5 hectares. Moves quickly from tree to tree, foraging rapidly along outer twigs, underside of branches and trunks, probing for insects. Nectar is taken from flowers, and honeydew is gleaned from foliage.			
Myotis macrocarpus **Southern Myotis**	Prefers permanent and/or flowing water. The Southern Myotis is commonly a cave dwelling microchiropteran, but will utilise tree hollows, mines, stormwater drains, bridges and dense vegetation (Churchill 1998). Roosting sites can be located within a wide variety of habitats, usually located in close proximity to permanent, slow flowing water. Breeding occurs between November and December, with young being weaned after three to four weeks (Churchill 1998). The Southern Myotis commonly forages over water bodies for insects and small fish (Churchill 1998).	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover. No hollow bearing trees. No waterbodies on site or nearby. Targeted surveys did not locate this species onsite.	Records occur along Lane Cove River and tributaries.	**Candidate Credit Species** Subject site is highly managed curtilage and unlikely to provide suitable habitat. No waterbodies onsite. Development proposal is not likely to impact on this species. **No further assessment required**
Neophema pulchella **Turquoise Parrot**	The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native	No records in locality.	**Ecosystem Credit Species** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not

	Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Usually seen in pairs or small, possibly family, groups and have also been reported in flocks of up to thirty individuals. Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants, or browsing on vegetable matter. Forages quietly and may be quite tolerant of disturbance. However, if flushed it will fly to a nearby tree and then return to the ground to browse as soon as the danger has passed. Nests in tree hollows, logs or posts, from August to December	ground cover. Lawn grass is mostly Couch or Kikuyu, not suitable for foraging.		likely to impact on this species. **No further assessment required**
Callocephalon fimbriatum **Gang-gang Cockatoo**	Has a preference for wetter forests and woodlands from sea level to > 2,000m on the Great Dividing Range, timbered foothills and valleys, timbered watercourses, coastal scrubs, farmlands and suburban gardens. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9m above the ground in eucalypts.	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover. No tree hollows.	Single record about 3.6km to the east at Forestville	**Dual Ecosystem species and Candidate credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**
Calyptorhynchus lathami **Glossy Black Cockatoo (foraging and breeding)**	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak (*Allocasuarina littoralis*), Forest She-oak (*A. torulosa*) or Drooping She-oak (*A.*	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native	Nearest record about 4.4km to south-east at Willoughby	**Dual Ecosystem species and Candidate credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat.

	verticillata) occur. Forest She-oak is the preferred foraging resource. Roosts in the canopy of tall trees, occasionally in tree hollows. Nests in deep hollows in eucalypts.	ground cover. Only sparse frequency of Black Sheoak at site, No tree hollows.		Development proposal is not likely to impact on this species. **No further assessment required**
SPECIES & COMMON NAME	**DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)**	**HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES**	**HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)**	**ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT**
ANIMALS				
Daphoenositta chrysoptera **Varied Sittella**	Inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy.	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover.	Nearest record about 5km to the south at Artarmon	**Ecosystem Credit Species** Subject site is highly managed curtilage and unlikely to provide suitable habitat. No individuals observed during targeted searches of trees onsite. Development proposal is not likely to impact on this species. **No further assessment required**
Dasyrus maculata **Spotted-tail Quoll**	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites (Edgar & Belcher 1995).	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover. No den features (rocks, caves, fallen logs etc)	More likely to occur in nearby Garigal Nat Park.	**Ecosystem Credit Species** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment**

				required
SPECIES & COMMON NAME	**DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)**	**HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES**	**HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)**	**ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT**
ANIMALS				
Petaurus norfolcensis **Squirrel Glider**	The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Live in family groups of a single adult male one or more adult females and offspring. Require abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of *Acacia* gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.	Site is managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover. No tree hollows	No records in locality	**Candidate Credit Species** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**
Phascolarctus cinereus **Koala**	Occurs in natural eucalypt forests and woodlands. Koala feed trees listed under Schedule 2 of SEPP 44 legislation include: Forest red gum *Eucalyptus tereticornis;* Tallowwood, *Eucalyptus microcorys*; Grey Gum, *Eucalyptus*	Site is occupied, managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover.	Record about 5km to east near Garigal Nat Park at Forestville	**Candidate species credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat.

	punctata; Manna Gum, *Eucalyptus viminalis*; River Red Gum, *Eucalyptus camaldulensis*; Broad leaved scribbly gum, *Eucalyptus haemastoma*; Scribbly gum and Swamp mahogany, *Eucalyptus robusta.*			Development proposal is not likely to impact on this species. **No further assessment required**
SPECIES & COMMON NAME	**DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)**	**HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES**	**HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)**	**ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT**
ANIMALS				
Glossopsitta pusilla **Little Lorikeet**	Little Lorikeets mostly occur in dry, open eucalypt forests and woodlands. They have been recorded from both old-growth and logged forests in the eastern part of their range, and in remnant woodland patches and roadside vegetation on the western slopes. Little lorikeets are considered to be nomadic, likely in a response to food availability. These lorikeets usually forage in small flocks, feeding mainly on nectar and pollen, but also fruit of eucalypts, melaleucas and mistletoes. The little lorikeet breeds from May to September, nesting in tree hollows, with small diameter entrance holes. Most breeding records are located on the western slopes.	Site is occupied, managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover. Habitat unsuitable No tree hollows.	Nearest record some 4.6km to the south-east at Willoughby	**Ecosystem Credit Species** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**
Hieraaetus morphnoides **Little Eagle** **(Foraging and breeding)**	The Little Eagle is seen over woodland and forested lands and open country, extending into the arid zone. It tends to avoid rainforest and heavy forest. The Little Eagle searches for prey on the wing or from a high exposed perch,	Site is occupied, managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover.	Record about 2.4km to east at Gooseberry Flat, near Middle Harbour Creek.	**Dual Ecosystem species and Candidate credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat for breeding. Development

	taking prey from the ground, the shrub layer or the canopy. Prey includes rabbits, other live mammals and insects.	Habitat unsuitable No nests observed in any tall trees onsite		proposal is not likely to impact on this species. **No further assessment required**
SPECIES & COMMON NAME	**DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)**	**HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES**	**HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)**	**ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT**
ANIMALS				
Hirundapus caudacutus **White-throated Needletail**	Summer migrant to coastal and sub-coastal eastern Australia. Occurs over a range of habitats in summer months where it forages in the airspace over forests, woodlands, urban areas, grasslands and water. May occasionally roost in trees	May forage over subject land but development not expected to impact on this species as extensive areas of surrounding foraging habitat occur in the locality. Sub-optimal habitat as it is highly managed	Scattered sightings throughout locality	**Ecosystem species credit species.** May overfly area. Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**
Lophoictinia isura **Square-tailed Kite**	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage. Appears to occupy large hunting ranges of more than 100 square km.	Site is occupied, managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover. No timbered watercourses onsite. Habitat unsuitable No nest trees observed at site	Scattered sightings throughout locality	**Dual Ecosystem species and Candidate credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**

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ANIMALS				
Melanodryas cucullata cucullata **Hooded Robin**	The Hooded Robin is a large Australian robin reaching 17 cm in length. Rarely found on the coast. The south-eastern form (subspecies *cucullata*) is found from Brisbane to Adelaide and throughout much of inland NSW, with the exception of the extreme north-west, where it is replaced by subspecies *picata*. Two other subspecies occur outside NSW. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	Site is occupied, managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover.	No records in locality	**Ecosystem species credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**
Ninox connivens **Barking Owl** **(Breeding an foraging)**	Occurs in a wide but sparse distribution in NSW. Core populations exist on the western slopes and plains and in some northeast coastal and escarpment forests. Many populations crashed as woodland on fertile soils was cleared over the past century, leaving linear riparian strips of remnant trees as the last inhabitable areas. Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use,	Site is occupied, managed curtilage, no structural integrity, mostly planted trees and shrubs along road verges and gardens, sparse native ground cover. No dense canopies for roosting. No hollow bearing trees.	Scattered Barking Owl sightings in the locality are marked as sightings on a 1km grid pattern, sightings being of birds on the wing or bird calls in the locality. Most 'sightings' to the south of the subject site near waterways such as the Middle Harbour Creek. Managed curtilage at subject site does not	**Dual Ecosystem species and Candidate credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**

	and hunting can extend in to closed forest and more open areas. Roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as *Acacia* and *Casuarina* species.		provide any suitable habitat.	
SPECIES & COMMON NAME	**DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)**	**HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES**	**HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)**	**ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT**
ANIMALS				
Ninox strenua **Powerful Owl (foraging and breeding)**	Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. 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 other eucalypt species.	Habitat unsuitable for breeding as no large hollows for breeding for this owl. The Powerful Owl may occasionally forage within the area if prey species are in abundance. However during the survey, prey for this large owl did not appear sufficient in number to attract it to the area.	Powerful Owl sightings in the locality are marked as sightings on a 1km grid pattern, sightings being of birds on the wing or bird calls in the locality.	**Dual Ecosystem species and Candidate credit species.** Subject site is occupied, highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**
Petroica boodang **Scarlet Robin**	In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in	Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. Habitat unsuitable for this species as land has been highly modified as occupied, managed curtilage with	No records in locality	**Ecosystem credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment**

	mallee or wet forest communities, or in wetlands and tea-tree swamps. The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding.	mostly planted trees and shrubs along roadside verges and in gardens. No structural integrity.		**required**.
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ANIMALS				
Petroica phoenecia **Flame Robin**	In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense. Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgelands at high altitudes. In winter, birds migrate to drier more open habitats in the lowlands (i.e. valleys below the ranges, and to the western slopes and plains). Often occurs in recently burnt areas; however, habitat becomes unsuitable as vegetation closes up following regeneration.	Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. Habitat unsuitable for this species as land has been highly modified as occupied, managed curtilage with mostly planted trees and shrubs along roadside verges and in gardens. No structural integrity.	No records in locality	**Ecosystem credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**.

SPECIES & COMMON NAME	DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)	HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES	HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)	ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT
ANIMALS				
Pseudomys novaehollandiae **New Holland Mouse**	Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes. It is a social animal, living predominantly in burrows shared with other individuals	Habitat unsuitable for this species as land has been highly modified as occupied, managed curtilage with mostly planted trees and shrubs along roadside verges and in gardens. No structural integrity.	Nearest record about 4.4km to the north-east in Garigal National Park	**Ecosystem credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**.
Pteropus poliocephalus **Grey-headed Flying-fox** **(Breeding and foraging)**	Occurs 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. Feed on the nectar and pollen of native trees, in particular *Eucalyptus, Melaleuca* and *Banksia*, and fruits of rainforest trees and vines.	Some suitable foraging trees located on subject site. Potential seasonal foraging at the site. May be attracted to flowering Eucalyptus and paperbark trees on occasion during the warmer months No evidence of roosting camps found at subject site.	Total of 598 records in locality over previous 20 years.	**Dual Ecosystem species and Candidate credit species.** It is considered that due to the greater extent of foraging area in the region, this species will not be compromised by the proposed development for the subject site which will remove some potential foraging trees. However, large expanses of bushland occur in surrounding reserves. **No further assessment required**

SPECIES & COMMON NAME	**DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)**	**HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES**	**HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)**	**ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT**
ANIMALS				
Masked Owl ***Tyto novaehollandiae*** **(breeding and foraging)**	Extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats.	Habitat unsuitable for breeding as no large hollows for breeding for this owl. Habitat unsuitable for this species as land has been highly modified as occupied, managed curtilage with mostly planted trees and shrubs along roadside verges and in gardens. No structural integrity.	Single record. Prefers natural bushland habitat such as occurs in Garigal Nat Park.	**Dual Ecosystem species and Candidate credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**
Rosenberg's Goanna ***Varanus rosenbergi***	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	Habitat unsuitable for this species as land has been highly modified as occupied, managed curtilage with mostly planted trees and shrubs along roadside verges and in gardens. No structural integrity.	All records to north-east of subject site in heathland/scrub habitat.	**Ecosystem credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**.
Saccolaimus flaviventris **Yellow-bellied Sheathtail-bat**	A very distinctive, large, insectivorous bat up to 87 mm long. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	Habitat unsuitable for this species as land has been highly modified as occupied, managed curtilage with mostly planted trees and shrubs along		**Ecosystem credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact

	Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	roadside verges and in gardens. No structural integrity.		on this species. **No further assessment required.**
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ANIMALS				
Haliaeetus leucogaster **White-bellied Sea Eagle**	Occurs in wooded areas near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest. May overfly site on occasion.	Habitat unsuitable for this species as land has been highly modified as occupied, managed curtilage with mostly planted trees and shrubs along roadside verges and in gardens. No structural integrity. No breeding habitat onsite	All records to along waterways such as Middle Harbour Creek	**Ecosystem credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**.
Ixobrychus flavicollis **Black Bittern**	Black Bitterns roost and nest in trees, and are found in tree-lined wetlands and in mangroves. They forage in both daylight and darkness, mainly from shady trees over water, but may be seen during the day in open areas of short marshy vegetation and along creeks.	Habitat unsuitable for this species as land has been highly modified as occupied, managed curtilage with mostly planted trees and shrubs along roadside verges and in gardens. No structural integrity.	All records along waterways to South-west of subject site.	**Ecosystem credit species** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**
Micronomus norfolkensis **Eastern Coastal Freetail Bat**	Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Insectivorous.	Habitat unsuitable for this species as land has been highly modified as occupied, managed curtilage with mostly planted trees and	Nearest record about 1.4km to the north-west and scattered records throughout locality	**Ecosystem credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not

		shrubs along roadside verges and in gardens. No structural integrity. No tree hollows.		likely to impact on this species. **No further assessment required**.
SPECIES & COMMON NAME	**DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)**	**HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES**	**HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)**	**ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT**
ANIMALS				
Pommerhelix duralensis **Dural Land Snail**	*Pommerhelix duralensis* (the Dural Land Snail), also commonly known as the Dural Woodland Snail, is a medium sized snail with a dark brown to black semi-translucent, subglobose (almost spherical shaped) shell. The species is a shale-influenced-habitat specialist, which occurs in low densities along the western and northwest fringes of the Cumberland IBRA subregion on shale-sandstone transitional landscapes. There is currently a degree of uncertainty about the distribution and identity of the snails in this and related species. *Pommerhelix duralensis* in the strict sense is found in an area of north-western Sydney between Rouse Hill - Cattai and Wiseman's Ferry, west from Berowra Creek.	Habitat unsuitable for this species as land has been highly modified as occupied, managed curtilage with mostly planted trees and shrubs along roadside verges and in gardens. No structural integrity.	No records in locality	**Ecosystem credit species** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Searches beneath leaf litter beneath eucalypts did not locate any individuals of this species Development proposal is not likely to impact on this species. **No further assessment required**
Pandion cristatus **Eastern Osprey**	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually	Habitat unsuitable for this species as land has been highly modified as occupied, managed curtilage with mostly planted trees and shrubs along roadside	Nearest record about 8.4km to the north-west at the Lane Cove River	**Candidate credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not

	within one kilometre of the sea.	verges and in gardens. No structural integrity. No nests observed.		likely to impact on this species. **No further assessment required**.
SPECIES & COMMON NAME	**DESCRIPTION/HABITAT REQUIREMENTS AND PREFERENCES (CONSTRAINTS) (from species profiles DPE 2022)**	**HABITAT SUITABILITY FROM DPE PROFILES; TDBC AND CALCULATOR TICK BOXES**	**HISTORICAL RECORDS (TO 20 YEARS PREVIOUS)**	**ECOSYSTEM SPECIES/CANDIDATE SPECIES ASSESSMENT**
ANIMALS				
Pseudophryne australis **Red-crown Toadlet**	Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones at the sandstone-shale interface. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter.	Habitat sub-optimal for this species as land has been highly modified as occupied, managed curtilage with mostly planted trees and shrubs along roadside verges and in gardens. No structural integrity.Habitat unsuitable. No wet drainage lines below sandstone ridges with shale lenses.	Nearest record about 830m to the east in Garigal Nat Park.	**Candidate credit species.** Subject site is highly managed curtilage and unlikely to provide suitable habitat. Development proposal is not likely to impact on this species. **No further assessment required**.

4.3. Description of Impacts

4.3.1. Direct impacts to the subject site

The proposed development is to demolish a number of single and two storey residential buildings and replace these with a number of multi-storey residential buildings and a single storey chapel. The proposal also involves the re-aligning of some of the internal roadways and associated services. Figures 5A and 5B indicate the planned layout of the proposed development.

A total of 233 individual trees will be removed from a total of 394 trees occurring at the subject site (59%) as a result of the proposal, however, a total of 69 of these individuals are exempt from Ku-ring-gai Council's Tree Preservation Order (Scales 2021).

A total of 58 individuals of locally-occurring native trees are proposed to be removed from a total of 105 such native trees occurring within the subject site (or 55%) (Scales 2021).

A total of 27 individual locally-occurring native trees and shrubs are proposed to be removed from the 63 individuals occurring within the nominal mapped PCT 1281 (STIF) area of the subject site (43%) (Figure 6 - Zone 1) (Scales 2021). Many of these individuals to be removed are small trees with canopy spreads of from 2 - 5m (heights to 14m) (Scales 2021).

A total of 17 individual locally-occurring native trees and shrubs are proposed to be removed from the 26 individuals occurring within the nominal mapped PCT 1776 (Coastal Enriched Sandstone Dry Forest) area of the subject site (65%) (Figure 6 - Zone 2) (Scales 2021). Many of these individuals to be removed are small trees with canopy spreads of from 2.5 - 5m (heights to 14m) (Scales 2021).

A total of 14 individual locally-occurring native trees and shrubs are proposed to be removed from the 16 individuals occurring within the nominal mapped PCT 1250 (Coastal Sandstone Gully Forest) area of the subject site (88%) (Figure 6 - Zone 3) (Scales 2021). Many of these individuals to be removed are small trees with canopy spreads of from 1.5 - 7m (heights to 14m) (Scales 2021).

4.3.2. Potential for runoff, erosion and sedimentation during construction

Sediment fences or hay bales installed along downslope contours from construction activities would serve to reduce potential erosion of land surfaces and decrease any sediment wash downslope.

An approved Construction Environment Management Plan (CEMP) must be prepared for the proposal and be provided with the relevant application prior to issue of the Construction Certificate to address these potential issues.

It is recommended that a hydrological drainage report is prepared to assess drainage flows resulting from excavation activities and run-off from increased hard surfaces to downslope gully environments resulting from the proposal, and whether any water flow mitigation measures are required.

4.3.3. Biodiversity credits for PCT's occurring at the subject site

4.3.3.1. Biodiversity credits for PCT 1281

The vegetation community that may have occurred in Zone 1 of the subject site (Figure 6) before historical clearing and subsequent landscaping is assessed as having potentially represented Sydney Turpentine Ironbark Forest (STIF) in the Sydney Basin Bioregion, an ecological community that is listed as Endangered by the NSW Biodiversity Conservation Act (2016) and as Critically Endangered by the EPBC Act (1999).

This ecological community may be considered to be represented by small patches of remnant individuals of such species as Turpentine, Black Sheoak, Sydney Golden Wattle, Sweet Pittosporum and possibly (though unlikely) Swamp Mahogany, within the construction envelope at Zone 1 (Figure 6) of the subject site (Figures 6, 9A & 13).

This assessment (prepared using the BAM-C Offsets Calculator) has determined that there are 3 ecosystem credits required to offset the impact for the clearing of 0.225ha of patches of vegetation representing elements of STIF in a highly floristically, structurally and functionally modified condition.

The floristic, structural and functional components of the BAM in relation to impacts to PCT 1281 result in a vegetation integrity score of 20.4 which is greater than the threshold score of 15, the lowest score for an EEC to generate any offsets (BAM 2020).

According to section 9.2 of the BAM (2020) the vegetation integrity score is greater than the vegetation integrity threshold required to generate an offset requirement and 3 credits have been generated for this proposed impact (Table 6).

4.3.3.2. Biodiversity credits for PCT 1776

The vegetation community that may have occurred in Zone 2 of the subject site (Figure 6) before clearing and subsequent landscaping is assessed as having represented Coastal Enriched Sandstone Dry Forest (PCT 1776) (Figure 9B), an ecological community that is not listed on registers of the NSW Biodiversity Conservation Act (2016) or the EPBC Act (1999).

This ecological community may be considered to be represented by patches of remnant individuals of such species as Turpentine, Blackbutt, Sydney Red Gum, Coast Banksia and possibly (though unlikely) Spotted Gum, within the construction envelope at Zone 2 (Figure 6) of the subject site (Figures 6, 9B & 14).

This assessment (prepared using the BAM-C Offsets Calculator) has determined that there are 3 ecosystem credits required to offset the impact for the clearing of 0.186ha of patches of vegetation representing elements of Coastal Enriched Sandstone Dry Forest in a highly floristically, structurally and functionally modified condition.

The floristic, structural and functional components of the BAM in relation to impacts to PCT 1776 result in a vegetation integrity score of 30.2 which is greater than the threshold score of 20, the lowest score for any unlisted ecological plant community which does not represent threatened species habitat, to generate any offsets (BAM 2020).

According to section 9.2 of the BAM (2020) the vegetation integrity score is greater than the vegetation integrity threshold required to generate an offset requirement and 3 credits have been generated for this proposed impact (Table 6).

4.3.3.3. Biodiversity credits for PCT 1250

The vegetation community that may have occurred in Zone 3 of the subject site (Figure 6) before clearing and subsequent landscaping is assessed as having represented Coastal Sandstone Gully Forest (PCT 1250) (Figure 9C), an ecological community that is not listed on registers of the NSW Biodiversity Conservation Act (2016) or the EPBC Act (1999).

This ecological community may be considered to be represented by patches of remnant individuals of such species as Old Man Banksia, Blueberry Ash, Sydney Red Gum and possibly

(though unlikely) Rough-barked Apple, within the construction envelope at Zone 3 (Figure 6) of the subject site (Figures 6, 9C & 15).

This assessment (prepared using the BAM-C Offsets Calculator) has determined that there are no ecosystem credits required to offset the impact for the clearing of 0.103ha of patches of vegetation representing elements of Coastal Sandstone Gully Forest in a highly floristically, structurally and functionally modified condition.

The floristic, structural and functional components of the BAM in relation to impacts to PCT 1250 result in a vegetation integrity score of 15.9 which is less than the threshold score of 20, the lowest score for any unlisted ecological plant community which does not represent threatened species habitat, to generate any offsets (BAM 2020).

According to section 9.2 of the BAM (2020) the vegetation integrity score is less than the vegetation integrity threshold required to generate an offset requirement and no credits have been generated for the proposed impact to PCT 1250 (Table 6).

4.3.4. Serious and Irreversible Impacts (SAII)

Species and ecological communities with a 'very high' biodiversity risk weighting are considered to be a potential serious and irreversible impact (SAII). These 'potential SAII entities' are identified by the BAM calculator (BAM 2020).

The determination of serious and irreversible impacts on biodiversity values is to be made by the consent authority in accordance with the principles set out in the BC Regulation. To assist the consent authority, the guidance document 'Guidance to Assist a Decision Maker to determine a serious and irreversible impact' includes criteria that enable the application of the four principles set out in clause 6.7 of the BC Regulation. These criteria provide a guide to identify the species and ecological communities that are likely to be the subject of serious and irreversible impacts.

These four principles include the following (BC Regulation 2018):

An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because:

a) it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or

b) it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size, or

c) it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution, or

d) the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable.

For the purpose of this clause, a decline of a species or ecological community is a continuing or projected decline in:

a) an index of abundance appropriate to the taxon, or

b) the geographic distribution and habitat quality of the species or ecological community.

As the subject land proposed for development occurs in a highly floristically, structurally and functionally modified condition with little opportunity for natural recovery, it is considered that 3 credits for the biodiversity offset are required to compensate for the clearing of 0.225ha of a highly modified area of representative elements of PCT 1281 on the subject site, and there are no serious and irreversible impacts associated with the clearing of a small area of this subject land.

4.3.5. Potential Direct Impacts

4.3.5.1 Removal of vegetation and potential habitat

The impact would include the removal of 0.225ha of highly modified areas of representative elements of PCT 1281; removal of 0.186ha of highly modified areas of representative elements of PCT 1776 on the subject site, and 0.103ha of highly modified areas of representative elements of PCT 1250 that occur as remnant vegetation among largely landscaped street plantings and amenity for garden areas (Figures 13, 14, 15 & 16).

No habitat to be removed is considered suitable habitat for any threatened species as the potential habitat to be removed is largely managed curtilage lacking natural floristic, structure and functional elements and occurs as ornamental landscaping containing some remnant individuals of locally-occurring native species (Figures 13, 14, 15 & 16)

4.3.5.2 Potential for runoff, sedimentation and erosion during construction

Due to the contoured surface of the subject land, construction activities could potentially lead to soil erosion and some increase in sediment load downslope.

The potential for accidental leaks/spills of oil, fuel, cement or other substances could potentially pollute ground water and downslope drainage lines.

The installation of sediment fences or hay bales installed along downslope contours from construction activities would serve to reduce potential erosion of land surfaces and decrease the sediment wash downslope.

An approved Construction Environment Management Plan (CEMP) must be prepared for the proposal and be provided with the approved application prior to issue of the Construction Certificate to address these potential issues.

4.3.5.3. Potential temporary noise, dust, excessive lighting and vibration disturbance during construction

The potential effects of temporary but excessive noise, dust, bright lighting and vibration disturbance during construction activities upon potential fauna are difficult to predict.

Potential impacts may include negative effects on predator-prey interactions and changes to roosting and breeding behaviours in the short term.

An approved Construction Environment Management Plan (CEMP) must be prepared for the proposal and be provided with the approved application prior to issue of the Construction Certificate to address these potential issues.

4.3.6. Indirect Impacts

Indirect impacts occur when the proposal or activities relating to the construction or operation of the proposal may affect adjacent or proximal areas of native vegetation, threatened ecological communities or threatened species habitat beyond the subject site.

Potential indirect impacts to flora and fauna would include hydrological changes to the surface water-runoff flow. Additional hard surface areas created as a result of the proposed construction would be expected to potentially result in some changes to the current hydrological regime, however, it is proposed that all water run-off would be directed to the current urban stormwater management system. A separate hydrological study may be required to assess significant changes to water flow regimes that may result from the proposal.

4.3.7. Prescribed and uncertain impacts

Prescribed impacts on biodiversity values includes any potential impacts that are not a result of direct vegetation clearing or construction development that have been prescribed by the Biodiversity Conservation Regulation (2017), these listed in Table 8 as follows:

Attributes or features of the habitat	Potential impacts	Actions to alleviate or ameliorate potential impacts
Species using caves, cliffs, karsts or crevices. Includes potential roosting sites for cave-dwelling microchiropterans	None, as these natural features do not occur at or in the vicinity of the subject site	Not applicable
Habitat of threatened species associated with rocks	Not applicable	Not applicable
Habitat of threatened species associated with man-made structures such as drainage pipes	Not applicable	Not applicable
Habitat of threatened species associated with non-native vegetation	Not applicable	Not applicable
Connectivity of habitats within and between allotments facilitating movement of species across their range	The removal of some canopy trees is not expected to reduce habitat connectivity for any threatened species.	Connectivity is retained via a total of 161 remaining trees located within the development, particularly associated with the northern section of forest that occurs adjacent to bushland on the opposite side of Stanhope Road (Figure 4), though threatened species are highly unlikely to occur

		anywhere within the Lourdes Retirement Village precinct
Movement of threatened species required to maintain life cycles	Highly unlikely that any threatened species would occur within the developed and highly modified areas at the Lourdes Retirement Village site	Connectivity is retained via 161 remaining trees located within the development, particularly associated with the northern section of forest that occurs adjacent to bushland on the opposite side of Stanhope Road (Figure 4), though threatened species are highly unlikely to occur anywhere within the Lourdes Retirement Village precinct
Hydrological regimes required to sustain threatened species	Not applicable	Not applicable

Table 8 - List of potential prescribed impacts which may occur as a result of proposed development

4.3.8. Avoidance/minimisation of impacts

Minimisation of impacts can be achieved through the potential retention of a high number of mature individuals (>10m in height) of locally-occurring native species such as 11 individuals of Sydney Blue Gum (*Eucalyptus saligna),* 3 individuals of Bangalay (*Eucalyptus botryoides*), 1 large individual of Spotted Gum (*Corymbia maculata*), 1 large individual of Blackbutt (*Eucalyptus pilularis*), 2 individuals of Turpentine (*Syncarpia glomulifera*), 7 individuals of Sydney Red Gum (*Angophora costata*), 6 individuals of Red Bloodwood (*Corymbia gummifera*), 3 individuals of Swamp Mahogany (*Eucalyptus robusta*), 2 individuals of Grey Ironbark (*Eucalyptus paniculata*), and a single mature individual of Coast Banksia (*Banksia integrifolia)* (Scales 2021).

5. Impact Summary

5.1 Serious and Irreversible Impacts (SAII)

OEH (2017) 'Guidance to Assist a Decision-maker to Determine a Serious and Irreversible Impact' lists the ecological communities and species that are 'potential serious and irreversible impact (SAII) entities'.

Criteria to identify which ecological communities and threatened species are at the greatest risk of serious and irreversible impacts allowing the identification of ecological communities and threatened species that:

- are in a rapid rate of decline
- have a very small population size
- are severely degraded or disrupted
- have a very limited geographic distribution
- are unlikely to respond to measures to improve habitat

PCT 1281 in the Sydney Basin Bioregion is **currently listed as an endangered or threatened entity on the BC Act** (NSW Bionet Vegetation Classification 2022, OEH 2016) but the scattered and often isolated, highly modified floristically, structurally and in functionality, landscaped elements of such community are such that impacts over the assessed area of Zone 1 (STIF - PCT 1281) derive a relatively low VIS Score of 20, indicating that these elements are unlikely to be regarded as viable components of this PCT.

As such, the community at the subject development site has been historically cleared and the elements of the PCT highly modified with a relatively low VI Score of 20 (Table 6), a qualification critical to its assessment as to whether the removal of a small area of mostly cleared and landscaped vegetation would constitute a SAII. The clearing of about 0.225ha of this area of highly modified floristically, structurally and functionally landscaped elements of such community is not considered to constitute a serious and irreversible impact (SAII).

5.2 Impacts that require an offset

Table 9 summarises the impact to areas of PCT 1281 and PCT 1776 that require an offset.

Vegetation Zone (Description)	PCT	Extent of area impacted	Current Vegetation Integrity Score (VIS)	Future Vegetation Integrity Score	Number of Ecosystem credits required
Elements of highly modified, landscaped areas of PCT 1281 (Figure 14)	**1281**	**0.225ha**	**20.1**	**0**	**3**
Elements of highly modified, landscaped areas of PCT 1776 (Figure 15)	**1776**	**0.186ha**	**30.2**	**0**	**3**
Elements of highly modified, landscaped areas of PCT 1250 (Figure 16)	**1250**	**0.103ha**	**15.9**	**0**	**0**
TOTAL CREDITS					**6**

6. Biodiversity Credit Report (Like for Like)

For the proposed development of the Lourdes Retirement Village at 95 Stanhope Road, Killara (Figures 4, 5A, 5B and 6), 6 credits are assessed as having been generated with the loss of a potential area of 0.225ha of elements of highly modified floristically, structurally and functionally landscaped areas of Sydney Turpentine Ironbark Forest in the Sydney Basin Bioregion (Figure 14), and 0.186ha of highly modified floristically, structurally and functionally landscaped areas of Coastal Enriched Sandstone Dry Forest occurring as partial remnant trees within garden amenity plantings (Figure 15).

Section 9.2 of the BAM (2020) qualifies that scores for vegetation integrity for an EEC that are higher than 15 generate the requirement for biodiversity offset costs. Similarly, scores for vegetation integrity higher than 20 for a non-EEC plant community also generate credit scores.

As the vegetation integrity score for the subject area of potential STIF (PCT 1281) at Killara is 20.6, and that for Coastal Enriched Sandstone Dry Forest (PCT 1776) is 30.2, both PCT's yield Vegetation Integrity scores higher than the thresholds, and as such, may be associated with habitat for threatened species.

In general, the vegetation is assessed as having a relatively low floristic, structural and functional integrity in the canopy tree, shrub and ground strata. There is low composition of natural species in the assemblages, a low spread of tree DBH sizes with limited regeneration occurring and limited functional aspects to the vegetation to provide foraging, sheltering or breeding habitat opportunity for any threatened fauna.

The Biodiversity Credit Report for the proposal is as follows:

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00036553/BAAS18125/22/00036729	REDEVELOPMENT PROPOSAL FOR LOURDES RETIREMENT VILLAGE AT 95 STANHOPE ROAD KILLARA	14/10/2022
Assessor Name	Assessor Number	BAM Data version *
PETER STRICKER	BAAS18125	55
Proponent Names	Report Created	BAM Case Status
Nathan Donn	30/11/2022	Finalised
Assessment Revision	Assessment Type	Date Finalised
0	Major Projects	30/11/2022

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

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion	Critically Endangered Ecological Community	1281-Sydney Turpentine - Ironbark forest

Species
Nil

Additional Information for Approval

BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
1281-Sydney Turpentine - Ironbark forest	Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion	0.2	0	3	3
1776-Coastal enriched sandstone dry forest	Not a TEC	0.2	0	3	3
1250-Coastal sandstone gully forest	Not a TEC	0.1	0	0	0

1250-Coastal sandstone gully forest	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	1250_MANAGED	No	0	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1281-Sydney Turpentine - Ironbark forest	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion This includes PCT's: 1183, 1281, 1284	-	1281_MANAGED	No	3	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1776-Coastal enriched sandstone dry forest	**Like-for-like credit retirement options**					

BAM Biodiversity Credit Report (Like for like)

Class	Trading group	Zone	HBT	Credits	IBRA region
Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1138, 1253, 1625, 1636, 1638, 1776, 1778, 1782, 1786	Sydney Coastal Dry Sclerophyll Forests >=50% and <70%	1776_MANAGED	No	3	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

7. References and Literature Reviewed

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Appendix 1 – BAAS Profile for P Stricker

NSW GOVERNMENT | Planning, Industry & Environment

CERTIFICATE OF ACCREDITATION AS A BIODIVERSITY ASSESSMENT METHOD ASSESSOR under the *Biodiversity Conservation Act 2016* (NSW)

BAM Assessor		
Peter Stricker		
Accreditation number	**Accreditation date (Date of issue)**	**Expiry Date of**
BAAS18125	17 July 2021	17 July 2024

The person named above is accredited under section 6.10 of the *Biodiversity Conservation Act 2016* (NSW) (**BC Act**) as a Biodiversity Assessment Method Assessor to apply the Biodiversity Assessment Method in connection with the preparation of biodiversity stewardship site assessment reports, biodiversity development assessment reports and biodiversity certification assessment reports pursuant to Part 6 of the BC Act.

The accreditation is in force until and including the Expiry Date. The accreditation is subject to the conditions set out in the *Accreditation Scheme for the Application of the Biodiversity Assessment Method*, under the BC Act, and the conditions specified on the reverse of this certificate.

LUCIAN MCELWAIN

Manager Ecosytem Programs
Department of Planning, Industry & Environment

NOTES

- DPIE maintains a register of Accredited Biodiversity Assessment Method (BAM) Assessors accessible from the DPIE website.
- The BAM Assessor's accreditation expires on the Expiry Date unless renewed in accordance with the *Accreditation Scheme for the Application of the Biodiversity Assessment Method*. It is the BAM Assessor's responsibility to monitor the Expiry Date of their accreditation, and apply for any renewal with sufficient time for the application to be processed prior to the Expiry Date.
- Words and expressions used in this accreditation instrument and which are also used in the Act have the same meaning.

Appendix 2 – BAM Summary Reports

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00036553/BAAS18125/22/00036729	REDEVELOPMENT PROPOSAL FOR LOURDES RETIREMENT VILLAGE AT 95 STANHOPE ROAD KILLARA	14/10/2022
Assessor Name	**Report Created**	**BAM Data version ***
PETER STRICKER	30/11/2022	55
Assessor Number	**BAM Case Status**	**Date Finalised**
BAAS18125	Finalised	30/11/2022
Assessment Revision	**Assessment Type**	
0	Major Projects	

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

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Coastal enriched sandstone dry forest												
2	1776_MANAGED	Not a TEC	30.2	30.2	0.19	PCT Cleared - 64%	High Sensitivity to Gain			1.75		3
											Subtotal	**3**
Coastal sandstone gully forest												
3	1250_MANAGED	Not a TEC	14.6	14.6	0.1	PCT Cleared - 30%	High Sensitivity to Gain			1.50		0
											Subtotal	**0**
Sydney Turpentine - Ironbark forest												
1	1281_MANAGED	Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion	20.6	20.6	0.23	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	3
											Subtotal	**3**
											Total	**6**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00036553/BAAS18125/22/00036729	REDEVELOPMENT PROPOSAL FOR LOURDES RETIREMENT VILLAGE AT 95 STANHOPE ROAD KILLARA	14/10/2022
Assessor Name	Assessor Number	BAM Data version *
PETER STRICKER	BAAS18125	55
Proponent Name(s)	Report Created	BAM Case Status
Nathan Donn	30/11/2022	Finalised
Assessment Revision	Assessment Type	Date Finalised
0	Major Projects	30/11/2022

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Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion	Critically Endangered Ecological Community	1281-Sydney Turpentine - Ironbark forest

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

BAM Biodiversity Credit Report (Variations)

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
1281-Sydney Turpentine - Ironbark forest	Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion	0.2	0	3	3.00
1776-Coastal enriched sandstone dry forest	Not a TEC	0.2	0	3	3.00
1250-Coastal sandstone gully forest	Not a TEC	0.1	0	0	0.00

1250-Coastal sandstone gully forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region

	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	1250_MANAGED	No	0	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 4 or higher threat status	1250_MANAGED	No	0	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1281-Sydney Turpentine - Ironbark forest	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion This includes PCT's: 1183, 1281, 1284	-	1281_MANAGED	No	3	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1776-Coastal enriched sandstone dry forest	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1138, 1253, 1625, 1636, 1638, 1776, 1778, 1782, 1786	Sydney Coastal Dry Sclerophyll Forests >=50% and <70%	1776_MANAGED	No	3	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	1776_MANAGED	No	3	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like options

BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00036553/BAAS18125/22/00036729	REDEVELOPMENT PROPOSAL FOR LOURDES RETIREMENT VILLAGE AT 95 STANHOPE ROAD KILLARA	14/10/2022
Assessor Name	**Report Created**	**BAM Data version ***
PETER STRICKER	30/11/2022	55
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS18125	Major Projects	Finalised
Assessment Revision	**Date Finalised**	
0	30/11/2022	

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List of Species Requiring Survey

Name	Presence	Survey Months

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Bargo Geebung	Persoonia bargoensis	Habitat degraded
Barking Owl	Ninox connivens	Habitat degraded
Brown Pomaderris	Pomaderris brunnea	Habitat degraded
Bush Stone-curlew	Burhinus grallarius	Habitat degraded Habitat constraints
Bynoe's Wattle	Acacia bynoeana	Habitat degraded
Camarophyllopsis kearneyi	Camarophyllopsis kearneyi	Habitat degraded
Camfield's Stringybark	Eucalyptus camfieldii	Habitat degraded
Cumberland Plain Land Snail	Meridolum corneovirens	Habitat degraded

Darwinia peduncularis	Darwinia peduncularis	Habitat degraded
Deane's Paperbark	Melaleuca deanei	Habitat degraded
Deyeuxia appressa	Deyeuxia appressa	Habitat degraded
Downy Wattle	Acacia pubescens	Habitat degraded
Dural Land Snail	Pommerhelix duralensis	Habitat degraded
Eastern Osprey	Pandion cristatus	Habitat degraded
Eastern Pygmy-possum	Cercartetus nanus	Habitat degraded
Epacris purpurascens var. purpurascens	Epacris purpurascens var. purpurascens	Habitat degraded
Gang-gang Cockatoo	Callocephalon fimbriatum	Habitat constraints
Glossy Black-Cockatoo	Calyptorhynchus lathami	Habitat constraints
Gosford Wattle, Hurstville and Kogarah Local Government Areas	Acacia prominens - endangered population	Habitat degraded Geographic limitations
Green and Golden Bell Frog	Litoria aurea	Habitat degraded
Grevillea parviflora subsp. supplicans	Grevillea parviflora subsp. supplicans	Habitat degraded Geographic limitations
Grey-headed Flying-fox	Pteropus poliocephalus	Habitat degraded
Gyrostemon thesioides	Gyrostemon thesioides	Habitat degraded
Hairy Geebung	Persoonia hirsuta	Habitat degraded
Haloragodendron lucasii	Haloragodendron lucasii	Habitat degraded Geographic limitations
Hibbertia puberula	Hibbertia puberula	Habitat degraded
Hibbertia superans	Hibbertia superans	Habitat degraded
Hygrocybe anomala var. ianthinomarginata	Hygrocybe anomala var. ianthinomarginata	Habitat degraded
Hygrocybe aurantipes	Hygrocybe aurantipes	Habitat degraded
Hygrocybe austropratensis	Hygrocybe austropratensis	Habitat degraded
Hygrocybe collucera	Hygrocybe collucera	Habitat degraded
Hygrocybe griseoramosa	Hygrocybe griseoramosa	Habitat degraded
Hygrocybe lanecovensis	Hygrocybe lanecovensis	Habitat degraded
Hygrocybe reesiae	Hygrocybe reesiae	Habitat degraded

Hygrocybe rubronivea	Hygrocybe rubronivea	Habitat degraded
Julian's Hibbertia	Hibbertia spanantha	Habitat degraded
Koala	Phascolarctos cinereus	Habitat degraded
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat degraded Habitat constraints
Large-eared Pied Bat	Chalinolobus dwyeri	Habitat degraded
Little Bent-winged Bat	Miniopterus australis	Habitat degraded Habitat constraints
Little Eagle	Hieraaetus morphnoides	Habitat degraded
Magenta Lilly Pilly	Syzygium paniculatum	Habitat degraded
Masked Owl	Tyto novaehollandiae	Habitat degraded
Narrow-leaf Finger Fern	Grammitis stenophylla	Habitat degraded
Netted Bottle Brush	Callistemon linearifolius	Habitat degraded
P. prunifolia in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas	Pomaderris prunifolia - endangered population	Habitat degraded Geographic limitations
Persoonia mollis subsp. maxima	Persoonia mollis subsp. maxima	Habitat degraded
Pimelea curviflora var. curviflora	Pimelea curviflora var. curviflora	Habitat degraded
Powerful Owl	Ninox strenua	Habitat degraded
Red-crowned Toadlet	Pseudophryne australis	Habitat degraded
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Scrub Turpentine	Rhodamnia rubescens	Habitat degraded
Small-flower Grevillea	Grevillea parviflora subsp. parviflora	Habitat degraded
Southern Myotis	Myotis macropus	Habitat degraded
Square-tailed Kite	Lophoictinia isura	Habitat degraded
Squirrel Glider	Petaurus norfolcensis	Habitat degraded
Swift Parrot	Lathamus discolor	Habitat degraded
Sydney Plains Greenhood	Pterostylis saxicola	Habitat degraded

Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	Wahlenbergia multicaulis - endangered population	Habitat degraded Geographic limitations
Tetratheca glandulosa	Tetratheca glandulosa	Habitat degraded
Thick Lip Spider Orchid	Caladenia tessellata	Habitat degraded
White-bellied Sea-Eagle	Haliaeetus leucogaster	Habitat degraded
Woronora Beard-heath	Leucopogon exolasius	Habitat degraded

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00036553/BAAS18125/22/00036729	REDEVELOPMENT PROPOSAL FOR LOURDES RETIREMENT VILLAGE AT 95 STANHOPE ROAD KILLARA	14/10/2022
Assessor Name	**Report Created**	**BAM Data version ***
PETER STRICKER	30/11/2022	55
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS18125	Major Projects	Finalised
Assessment Revision		**Date Finalised**
0		30/11/2022

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

Common Name	Scientific Name	Vegetation Types(s)
Barking Owl	Ninox connivens	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Black Bittern	Ixobrychus flavicollis	1250-Coastal sandstone gully forest
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
Dusky Woodswallow	Artamus cyanopterus cyanopterus	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Eastern Osprey	Pandion cristatus	1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Flame Robin	Petroica phoenicea	1281-Sydney Turpentine - Ironbark forest
		1250-Coastal sandstone gully forest

Gang-gang Cockatoo	Callocephalon fimbriatum	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Glossy Black-Cockatoo	Calyptorhynchus lathami	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Grey-headed Flying-fox	Pteropus poliocephalus	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	1281-Sydney Turpentine - Ironbark forest
Large Bent-winged Bat	Miniopterus orianae oceanensis	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Little Bent-winged Bat	Miniopterus australis	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Little Eagle	Hieraaetus morphnoides	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Little Lorikeet	Glossopsitta pusilla	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Masked Owl	Tyto novaehollandiae	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
New Holland Mouse	Pseudomys novaehollandiae	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Painted Honeyeater	Grantiella picta	1281-Sydney Turpentine - Ironbark forest
Powerful Owl	Ninox strenua	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Regent Honeyeater	Anthochaera phrygia	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest

Regent Honeyeater	Anthochaera phrygia	1250-Coastal sandstone gully forest
Rosenberg's Goanna	Varanus rosenbergi	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Scarlet Robin	Petroica boodang	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Speckled Warbler	Chthonicola sagittata	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
Spotted-tailed Quoll	Dasyurus maculatus	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Square-tailed Kite	Lophoictinia isura	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Swift Parrot	Lathamus discolor	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Turquoise Parrot	Neophema pulchella	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Varied Sittella	Daphoenositta chrysoptera	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
White-bellied Sea-Eagle	Haliaeetus leucogaster	1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
White-throated Needletail	Hirundapus caudacutus	1281-Sydney Turpentine - Ironbark forest
		1776-Coastal enriched sandstone dry forest
		1250-Coastal sandstone gully forest
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	1281-Sydney Turpentine - Ironbark forest
		1250-Coastal sandstone gully forest

Threatened species Manually Added

None added

BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00036553/BAAS18125/22/00036729	REDEVELOPMENT PROPOSAL FOR LOURDES RETIREMENT VILLAGE AT 95 STANHOPE ROAD KILLARA	14/10/2022
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PETER STRICKER	30/11/2022	55
Assessor Number	Assessment Type	BAM Case Status
BAAS18125	Major Projects	Finalised
Assessment Revision	Date Finalised	
0	30/11/2022	

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Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	1281_MANAGED	1281-Sydney Turpentine - Ironbark forest	MANAGED	0.23	1	

2	1776_MANAGED	1776-Coastal enriched sandstone dry forest	MANAGED	0.19	1	
3	1250_MANAGED	1250-Coastal sandstone gully forest	MANAGED	0.1	1	