



Flora and Fauna Assessment Report

461-473 Pacific Highway, Asquith NSW 2077

Report prepared by Narla Environmental for Calder Flower Architects c/- Chinese Australian Services Society

July 2020



NARLA

environmental

Report:	Flora and Fauna Assessment Report – 461-473 Pacific Highway, Asquith
Prepared for:	Calder Flower Architects c/- Chinese Australian Services Society
Prepared by:	Narla Environmental Pty Ltd
Project no:	Cafl1 var1
Date:	July 2020
Version:	Final v2.0

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Document Control

Revision	Document Name	Issue Date	Internal Document Review
Draft V1.0	Flora and Fauna Assessment Report – 461-473 Pacific Highway, Asquith	30.10.2018	Kurtis Lindsay
Final V1.0	Flora and Fauna Assessment Report – 461-473 Pacific Highway, Asquith	11.11.2018	Kurtis Lindsay
Draft V2.0	Flora and Fauna Assessment Report – 461-473 Pacific Highway, Asquith	21.07.2020	Chris Moore Alexander Graham
Final V2.0	Flora and Fauna Assessment Report – 461-473 Pacific Highway, Asquith	31.07.2020	Chris Moore

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Glossary

Acronym/ Term	Definition
ASL	Above Sea Level
BAM	Biodiversity Assessment Methodology
BC Act	New South Wales Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
CEEC	Critically Endangered Ecological Community
DA	Development Application
DAWE	Department of Agriculture, Water and the Environment
Development Footprint	- Proposed aged care centre and associated driveway; and - Proposed stormwater drainage easement.
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment
EP&A Act	Environmental Planning & Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
FFA	Flora and Fauna Assessment
ha	Hectares
HDCP	Hornsby Development Control Plan 2013
HLEP	Hornsby Local Environmental Plan 2013
km	Kilometre
LGA	Local Government Area
Locality	The area within a 10km radius of the Subject Site
m	metres
mm	millimetres
NSW	New South Wales
OEH	Office of Environment and Heritage (now known as the DPIE)
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
SRZ	Structural Root Zone
STIF	Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion
Subject Site	461 Pacific Highway, Asquith, 2077 (Lot 15/-/DP14476); 463 Pacific Highway, Asquith, 2077 (Lot 16/-/DP1003192); 465 Pacific Highway, Asquith, 2077 (Lot 17/-/DP1003192);

	▪ 467 Pacific Highway, Asquith, 2077 (Lot 18/-/DP1003192); ▪ 469 Pacific Highway, Asquith, 2077 (Lot 19/-/DP1003912); ▪ 471 Pacific Highway, Asquith, 2077 (Lot 1/-/DP1003107); and ▪ 473 Pacific Highway, Asquith, 2077 (Lot 1/-/DP120748).
Threatened species, populations and ecological communities	Species, populations and ecological communities specified in Schedules 1 and 2 of the BC Act 2016
TPZ	Tree Protection Zone

1. Introduction

1.1 Project Background

Narla Environmental Pty Ltd (Narla) was engaged by Calder Flower Architects c/- Chinese Australian Services Society (the proponent) to undertake a Flora and Fauna Assessment (FFA) in association with the Development Application (DA) for the proposed development across the following properties:

- 461 Pacific Highway, Asquith, 2077 (Lot 15/-/DP14476);
- 463 Pacific Highway, Asquith, 2077 (Lot 16/-/DP1003192);
- 465 Pacific Highway, Asquith, 2077 (Lot 17/-/DP1003192);
- 467 Pacific Highway, Asquith, 2077 (Lot 18/-/DP1003192);
- 469 Pacific Highway, Asquith, 2077 (Lot 19/-/DP1003912);
- 471 Pacific Highway, Asquith, 2077 (Lot 1/-/DP1003107); and
- 473 Pacific Highway, Asquith, 2077 (Lot 1/-/DP120748).

For the purpose of this FFA, the properties were assessed collectively (hereafter referred to as 'the Subject Site') (**Figure 1**). The 'Development Footprint' is comprised of the following:

- Proposed aged care centre and associated driveway; and
- Proposed stormwater drainage easement.

Narla have produced this report in order to assess any potential impacts associated with the proposed activity on biodiversity, particularly threatened species, populations, and ecological communities listed under the Biodiversity Conservation Act 2016 (BC Act) and the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). The report also recommends appropriate measures to mitigate any potential impacts in line with all relevant State Environmental Planning Policies (SEPP) and local government plans, namely the Hornsby Local Environmental Plan 2013 (HLEP) and the Hornsby Development Control Plan 2013 (HDCP).

1.2 Site Description and Location

The Subject Site is situated on the Pacific Highway within the suburb of Asquith in the Hornsby Shire Local Government Area (LGA). The property boundary has been defined by cadastral boundaries provided on the NSW Government Land & Property Information Spatial Information Exchange map viewer (SIX Maps 2020) and the site plans (Calder Flower Architects 2020) (**Figure 2**).

The Subject Site is currently occupied by seven (7) detached dwellings and associated landscaping. Existing landscaping is comprised of a mixed, urban native/exotic tree, shrub, and groundcover assemblages typical of urban Sydney. Remnant, native canopy species were found within the Subject Site along with a mixture of historically planted native and exotic tree species.

1.3 Topography, Geology and Soil

The Subject Site covers an area of approximately 4,941 m² with elevation varying from 176-180 m above sea level (ASL). The slope declines a maximum of 4 m from Pacific Highway to the southern edge of the Subject Site.

The majority of the Subject Site is situated on the 'Glenorie' soil landscape as described in the Soil Landscapes of the Sydney 1:100,000 sheet (Chapman et al. 2009). This soil landscape is underlain by Wianamatta Group Ashfield Shale and Bringelly Shale formations. The Ashfield Shale is comprised of laminite and dark grey shale. Bringelly Shale consists of shale, calcareous claystone, laminite, and fine to medium grained lithic-quartz sandstone.

1.4 Hydrology

There are no mapped or unmapped watercourses or dams located within the Subject Site.

1.5 Scope of Assessment

The objectives of this FFA were to:

- Establish the likelihood of occurrence of migratory species, threatened species, endangered populations, and threatened ecological communities as listed under the New South Wales BC Act and/or the Commonwealth EPBC Act;
- Assess any potential impacts to species and/or communities listed under the BC Act and EPBC Act;
- Identify and map the distribution of vegetation communities within the Subject Site;
- Record presence and the extent of any known or potential fauna habitat features such as nests, dreys, caves, crevices, culverts, pools, soaks, flowering trees, fruiting trees, and hollow-bearing trees and provide recommendations for on-going management of these habitat features and any fauna present;
- Record presence and the extent of any priority weeds or weed infestations and provide recommendations for on-going management; and
- Recommend any controls or additional actions to be taken to protect or improve environmental outcomes of the proposed activity.



Figure 1. Components of the proposed development.

1.6 Relevant Legislation and Policy

The legislation and policy that are addressed in this report are listed in **Table 1**.

Table 1. Relevant legislation and policy addressed

Legislation/ Policy	Relevant Ecological Feature on Site	Triggered	Action Required
Environmental Planning and Assessment Act 1979 (EP&A Act)	All threatened species, populations and ecological communities and their habitat that occur or are likely to occur on the Subject Site during a part of their lifecycle.	Yes	This Flora and Fauna Assessment and all subsequent recommendations relevant to the planning process under 'Part 4 Development assessment and consent'.
Biodiversity Conservation Act (BC Act) (New South Wales)	Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion, which is listed under BC Act (NSW) as a Critically Endangered Ecological Community, is present on the Subject Site. No threatened flora or fauna listed under the BC Act were observed on the Subject Site at the time of the site assessment. Suitable habitat for a suite of threatened fauna species listed under the BC Act is present within the Subject Site.	Yes	A test of significance of impact from the proposed DA on BC Act-listed threatened species and ecological communities (Assessment of Significance [5-part Test]) (Appendix C).
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Commonwealth)	The vegetation identified within the Subject Site did not meet the EPBC Act listing criteria for the Critically Endangered Turpentine-Ironbark Forest of the Sydney Basin Bioregion, therefore no EPBC Act Referral to the Commonwealth is required. Suitable habitat for three (3) threatened fauna species listed under the EPBC Act is present within the Subject Site: ▪ <i>Anthochaera phrygia</i>; ▪ <i>Lathamus discolour</i>; and ▪ <i>Pteropus poliocephalus</i>.	Yes	An Assessment of Significant Impact Criteria from the proposed DA on EPBC Act-listed threatened species (Appendix D).
Biosecurity Act 2015 (Bio Act)	Three (3) priority weeds for the Greater Sydney region were identified on the Subject Site: ▪ <i>Asparagus aethiopicus</i>; ▪ <i>Cortaderia selloana</i>; and ▪ <i>Senecio madagascariensis</i>.	Yes	Listed priority weeds must be managed in accordance with the Biosecurity Act 2015.
State Environmental Planning Policy (Coastal Management) 2018	The Subject Site does not contain areas mapped as 'Coastal Wetlands', 'Littoral Rainforest', or proximity to either, therefore, the Coastal Management SEPP (2018) does not apply.	No	None.
State Environmental Planning Policy (Koala	Koala Habitat Protection SEPP (2019) applies to land within the Hornsby Shire	No	None.

Legislation/ Policy	Relevant Ecological Feature on Site	Triggered	Action Required
Habitat Protection) 2019	LGA, but the Subject Site does not encompass an area larger than 1 ha, therefore, the Koala Habitat Protection SEPP (2019) does not apply.		
SEPP (Vegetation in Non-Rural Areas) 2017	The Vegetation in Non-Rural Areas SEPP (2017) regulates clearing of native vegetation on urban land and land zoned for environmental conservation or management that does not require development consent. Since the proposal is associated with a Development Application, this SEPP does not apply.	No	None.
State Environmental Planning Policy No 19— Bushland in Urban Areas	The Subject Site does not contain nor is adjoining any land zoned or reserved for public open spaces, therefore, SEPP 19 does not apply.	No	None.
Water Management Act 2000	The Subject Site does not occur on waterfront land, therefore, the Water Management Act 2000 does not apply.	No	None.

1.7 Biodiversity Assessment Pathway

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

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

The HLEP does not provide a minimum lot size for the Subject Site. The smallest lot size associated with the Subject Site is approximately 645 m². To avoid triggering the Biodiversity Offset Scheme, the proponent must avoid the clearing/management of native vegetation in excess of 0.25 ha. The proposed development will involve the clearing of approximately 0.04 ha.

Table 2. Biodiversity offset scheme entry thresholds. Bold indicates the threshold relevant to this report.

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

The Subject Site does not contain land mapped as 'biodiversity values' within the Biodiversity Values Map (DPIE 2020a), and the threshold for clearing is greater than the area of native vegetation proposed for clearing, therefore:

- The BOS is not triggered;
- The Biodiversity Assessment Method (BAM) does not apply;
- An Accredited Assessor is not required to prepare a Biodiversity Development Assessment Report (BDAR); and
- No offset credit calculations are required.

As such, a standard Flora and Fauna Impact Assessment Report (this report) has been produced to assess the impact of the proposed DA.

1.8 Hornsby Local Environmental Plan 2013 (HLEP)

1.8.1 Zoning

The Subject Site is zoned 'R3 – Medium Density Residential'.

The HLEP requires that development satisfies the following zone objectives:

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

1.9 Hornsby Development Control Plan 2013 (HDCP)

1.9.1 Landscaping (Part 1C.2.9)

The following desired outcomes pertaining to Landscaping apply:

- Landscaping that integrates the built form with the locality and enhances the tree canopy; and
- Landscaping that improves the environmental performance of the development.

The following prescriptive measures apply:

- Landscaping on site should be incorporated into the site planning of a development to (where appropriate):
 - Reinforce the desired future character of the locality;
 - Maintain significant landscape features;
 - Provide planting within setback zones (setbacks identified within the relevant applicable parts of the DCP);
 - Soften the visual impact of buildings, carparks and roads;
 - Cater for outdoor recreation areas;
 - Separate conflicting uses;
 - Screen undesirable elements; and
 - Improve the aesthetic quality of the development.
- Landscape planting should achieve a mature height in scale with the structures on the site;
- Where canopy trees, shrubs and groundcovers are required, preference should be given to incorporating locally indigenous plants;
- Street tree planting within public land should comply with Council's Tree Management Plan;

- Topsoil and mulch should be included in landscape areas and should contain organic matter to support plant growth; and
- Where landscaping is provided in a structured environment such as a raised planter box or 'on slab' they should include waterproofing, drainage and automatic irrigation.

The proposed development meets the objectives of this control as the implementation of the corresponding landscape plan and relevant revegetation recommendations within this report will satisfy both the desired outcomes and prescriptive measures outlined within Part 1C.2.9 of the HDCP.

1.9.2 Tree and Vegetation Preservation (Part 1B.6)

1.9.2.1 Tree Preservation (Part 1B.6.1)

The prescribed trees that are protected by the Vegetation SEPP and/or Clause 5.10 of the HLEP and this Section of the DCP includes:

- Trees except exempt tree species in Hornsby Shire, as listed in **Table 3** or subject to the Biodiversity Offset Scheme,
 - All trees on land within a heritage conservation area described within the HLEP;
 - And all trees on land comprising heritage items listed within the HLEP.
- To damage or remove any tree protected under this DCP is prohibited without the written consent of Council, except in accordance with the exemptions prescribed in this part (under the heading 'Exempt Tree Work');
- For the purposes of this section:
 - **Arborist (Project and Consulting)** must have obtained through training and completed Australian Qualification Framework (AQF) Level 5, Diploma of Arboriculture;
 - **A tree** is defined as a long lived woody perennial plant with one or relatively few main stems with the potential to grow to a height greater than 3 metres;
 - **Native vegetation** has the same meaning as in Part 5A of the Local Land Services Act 2013, with the exclusion of 60B(4) for the purposes of including marine vegetation in the definition of native vegetation. Damage means to impair the value or usefulness, or weaken the health or the normal function of a tree or vegetation;
 - **Remove** means to cut down, knock down, kill, lop or destroy;
 - **Prune** means to selectively remove branches; and
 - **Tree Protection Zone** means the area above or below ground at a given distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree.

Table 3. Exempt trees as listed in the HDCP. Tree works are permitted on any of these species without written consent from Council

Botanical Name	Common Name
<i>Acacia baileyana</i>	Cootamundra Wattle
<i>Acacia saligna</i>	Golden Wreath Wattle
<i>Acer negundo</i>	Box Elder
<i>Ailanthus altissima</i>	Tree of Heaven
<i>Alnus jorullensis</i>	Evergreen Alder
<i>Arecastrum romanzoffianum</i>	Cocos Palm
<i>Celtis sinensis</i>	Hackberry
<i>Cinnamomum camphora</i>	Camphor Laurel

Botanical Name	Common Name
All edible fruit and nut trees except native species such as <i>Acmena</i> spp. (Lilli Pilli), <i>Syzygium</i> spp. (Lilli Pilli) <i>Elaeocarpus</i> spp. (Blueberry Ash) or <i>Macadamia</i> spp. (Macadamia Tree) Fruit and Nut trees	
<i>Cotoneaster</i> spp.	Cotoneaster
<i>Eriobotrya japonica</i>	Loquat
<i>Erythrina</i> spp.	Coral tree
<i>Ficus elastica</i>	Rubber tree
<i>Gleditsia triacanthos</i>	Honey Locust
<i>Lagunaria patersonii</i>	Norfolk Island Hibiscus
<i>Ligustrum</i> spp.	Privet
<i>Populus</i> spp.	Poplar
<i>Pyracantha augustifolia</i>	Firethorn
<i>Robinia pseudoscacia</i>	Golden Robinia
<i>Salix</i> spp.	Willow
<i>Schefflera actinophylla</i>	Umbrella Tree
<i>Schinus</i> spp.	Peppercorn Tree
<i>Toxicodendron</i> spp.	Rhus

1.9.2.2 Natural Environment and Biodiversity (HDCP Part 1C.1 and Part 1C.1.1)

The following desired outcomes pertaining to Natural Environment and Biodiversity apply:

- Development that provides for the conservation of biodiversity including threatened species and populations, endangered ecological communities, remnant indigenous trees, regionally and locally significant terrestrial and aquatic vegetation; and
- Development that maintains habitat for native wildlife and wildlife corridors to provide for the movement of fauna species.

The following prescriptive measures apply:

- Development should seek to:
 - Avoid potential adverse impact on biodiversity;
 - If that impact cannot be avoided, minimise that impact; or
 - If the impact cannot be minimised, to mitigate the impact.
- A flora and fauna assessment is required for development that may impact on:
 - Land mapped as Biodiversity on the HLEP Terrestrial Biodiversity Map; or
 - Native vegetation which is habitat for species listed in Schedule 1, 1A or 2 of the Threatened Species Conservation Act 1995.
- Development should avoid the fragmentation of existing native vegetation;
- Development should seek to retain unique environmental features of the site including:
 - Rock outcrops;
 - Groups of significant trees and vegetation; and
 - Mature hollow trees and other fauna habitat features on the site.

- Development should incorporate and maintain a buffer zone to significant flora and fauna. Development should not include buildings, structures and earthworks within the required buffer zone prescribed in Table 4.

Table 4. Buffer zones to vegetation types as listed in HDCP

Significant Vegetation Type	Minimum Buffer Zone
Endangered ecological communities and regionally significant bushland (as mapped in the HLEP Terrestrial Biodiversity Map)	20 m
Populations of threatened flora species, habitat for threatened species, locally significant bushland, groups of remnant indigenous trees	10 m

- Notwithstanding the buffers presented in Table 4 above, certain native vegetation that is habitat for species listed in the Threatened Species Conservation Act may require larger buffer zones in order to avoid potential adverse impacts on biodiversity;
- Development within or adjoining land zoned or reserved for public open space should address means to protect and minimise bushland disturbance; and
- Development should provide buffers for bushfire protection on private land, not on public land.

The proposed development meets the objectives of this control as the implementation of both the prescribed landscape plan and the compensatory revegetation recommendations outlined within this report will satisfy both of the primary desired outcomes of this clause. The proposed development will result in a net gain in both the prevalence of Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion within the Subject Site, as well as habitat for native species within the vicinity of the Subject Site.

1.10 Study Limitations

This study was not intended to provide a complete inventory of all flora and fauna species with potential to occur on the Subject Site. Rather this study was undertaken in order to:

- Provide an assessment into the likelihood of occurrence of any significant terrestrial and aquatic ecological features, particularly vertebrate fauna and vascular plants or ecological communities listed under state and/or commonwealth legislation (e.g. migratory species, threatened species, threatened ecological communities and endangered populations);
- Assess the potential for impacts from the proposed works on any of those ecological features; and
- Identify the presence of any habitat features that provide foraging or shelter for threatened or protected fauna.

The species list provided for the Subject Site in this report was restricted to what was observed during the site assessment by the Narla Ecologists. The timing of the survey may not have coincided with emergence times of some species of flora and fauna, such as seasonally flowering herbs, seasonal migratory fauna, or nocturnal fauna. To account for those species that could not be identified during the field survey, detailed habitat assessments were combined with desktop research and local ecological knowledge to establish an accurate prediction of the potential for such species to occur on or adjacent the Subject Site.

2. Methodology

2.1 Desktop Assessment and Literature Review

A thorough literature review of local information relevant to the Hornsby Shire Council area was undertaken. Searches using NSW Wildlife Atlas (BioNet) (DPIE 2020b) and the Commonwealth Protected Matters Search Tool (DAWE 2020) were conducted to identify all current threatened flora and fauna, as well as migratory fauna records within a 10 km x 10 km cell search area centred on the Subject Site. These data were used to assist in establishing the presence or likelihood of any ecological values as occurring on or adjacent to the Subject Site and helped inform our Ecologists on what to look for during the site assessment.

Soil landscape and geological mapping was examined to gain an understanding of the environment on the Subject Site and assist in determining whether any threatened flora or ecological communities may occur there (Chapman et al. 2009).

2.2 Ecological Site Assessment

2.2.1 General Survey

A preliminary site assessment was undertaken by a Narla Ecologist on Tuesday the 28th of August 2018, with an additional site assessment undertaken by Narla Ecologist Polina Zadorojnaya on Wednesday the 8th of July 2020. During the site assessments, the following activities were undertaken:

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

2.2.2 Weather Conditions

Weather conditions recorded at the nearest weather station (Terrey Hills, NSW) prior to and during the general site assessments are provided in **Table 5** (BOM 2020). The data reveal minimal rainfall leading up to the site assessments. These weather conditions may not be conducive to the emergence of annual herbs.

Table 5. Weather conditions recorded at Terrey Hills (station 066059) preceding and during the site assessments (site assessment date in bold)

Survey date	Day	Minimum Temp. (°C)	Maximum Temp. (°C)	Rainfall (mm)
21/08/2018	Tuesday	7.0	17.0	0
22/08/2018	Wednesday	9.1	16.0	0
23/08/2018	Thursday	9.0	17.2	0.6
24/08/2018	Friday	11.5	17.1	2.2
25/08/2018	Saturday	12.1	20.0	1.2
26/08/2018	Sunday	12.0	16.7	0.2
27/08/2018	Monday	12.1	13.9	0.9
28/08/2018	Tuesday	9.6	15.1	0
1/07/2020	Wednesday	10.2	19.7	0.2
2/07/2020	Thursday	11.2	21.8	0
3/07/2020	Friday	9.6	16.3	0.8
4/07/2020	Saturday	6.0	14.2	1.6
5/07/2020	Sunday	6.5	16.4	0.2
6/07/2020	Monday	5.8	16.5	0
7/07/2020	Tuesday	8.5	15.1	0
8/07/2020	Wednesday	9.3	13.7	4.8

2.2.3 Mapping and Analysis of Vegetation Communities

Narla examined local satellite imagery, geological mapping, soil landscape mapping, and topographic mapping, in addition to existing vegetation mapping (Southeast NSW Native Vegetation Classification and Mapping [OEH 2010]) in order to stratify the Subject Site and guide the site assessment survey efforts. The following documents were also consulted during the assessment to assist with the identification of vegetation communities present within the Subject Site:

- Chapman GA, Murphy CL, Tille PJ, Atkinson G and Morse RJ (2009) Soil Landscapes of the Sydney 1:100,000 Sheet map, Department of Environment, Climate Change and Water, Fourth Edition
- Department of Planning, Industry and Environment (DPIE) (2020d) eSPADE v2.0 <https://www.environment.nsw.gov.au/eSpade2Webapp#>
- Tozer, M.G., Turner, K., Simpson, C., Keith, D.A., Beukers, P., MacKenzie, B., Tindall, D. & Pennay, C., (2010) Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. Version 1.0

3. Native Vegetation

3.1 Vegetation Community

3.1.1 Historically Mapped Vegetation Communities

Southeast NSW Native Vegetation Classification and Mapping (OEH 2010) indicated the presence of one vegetation community present within the southern corner of the Subject Site (**Figure 3**):

- S_WSF09: Sydney Turpentine Ironbark Forest.

3.1.2 Field-validated Vegetation Communities

Site assessments conducted by Narla Ecologists identified one (1) plant community type (PCT) within the Subject Site (**Figure 4**):

- PCT 1281: Turpentine - Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion.

The determination of this PCT was based on soil profile, topography, and the number of 'positive diagnostic' species identified throughout the Subject Site. PCT 1281 made up small, fragmented portions of the Subject Site, with the majority of the Subject Site being comprised of Urban Native/Exotic Vegetation amongst the existing dwellings and areas of hardstand. The vegetation communities found with the Subject Site are detailed in **Table 6** and **Table 7**, and are displayed in **Figure 4**.

Table 6. Description of PCT 1281 identified within the Subject Site

PCT 1281: Turpentine - Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion	
	
Vegetation formation / Keith Class	Wet Sclerophyll Forests (Grassy Sub-formation) / Northern Hinterland Wet Sclerophyll Forests
Extent within Subject Site (approximate)	1,032 m ²
Description of the Vegetation within the Subject Site Small patches within the Subject Site were comprised of poor quality PCT 1281 dominated by <i>Angophora costata</i> (Sydney Red Gum), <i>Eucalyptus paniculata</i> (Grey Ironbark), <i>Eucalyptus resinifera</i> (Red Mahogany), and <i>Syncarpia glomulifera</i> (Turpentine). There was a complete lack of native mid and ground cover species characteristic of this PCT, instead large number of exotic planted garden ornamentals and weed species were present, hence the occurrence of PCT 1281 within the Subject Site is deemed to be highly disturbed.	

PCT 1281: Turpentine - Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion**Description (DPIE 2020c)**

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 ASL.

The forest is characterised by an 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 *Syncarpia glomulifera* (Turpentine), *Eucalyptus resinifera* (Red Mahogany) 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 *Eucalyptus pilularis* (Blackbutt) 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.

Justification of Vegetation Assignment	Characteristic Flora Species	Geology and Geography
	The vegetation within this area contained four (4) canopy species that are characteristic of PCT 1281: <i>Angophora costata</i> , <i>Eucalyptus paniculata</i> , <i>Eucalyptus resinifera</i> , and <i>Syncarpia glomulifera</i> .	PCT 1281 occurs on shale and shale-enriched sandstone soils between 10-180 m ASL. The Subject Site is situated on the 'Glenorie' soil landscape as described in the Soil Landscapes of the Sydney 1:100,000 sheet (Chapman et al. 2009). This soil landscape is underlain by Wianamatta Group Ashfield Shale and Bringelly Shale formations. The Ashfield Shale is comprised of laminite and dark grey shale. Bringelly Shale consists of shale, calcareous claystone, laminite, fine to medium grained lithic-quartz sandstone. The Subject Site has an elevation of approximately 176-180 m ASL. The Subject Site is also found in the Pittwater IBRA sub-bioregion, a known IBRA sub-bioregion for PCT 1281.
BC Act 2016 Status	PCT 1281 is associated with the BC Act-listed Critically Endangered Ecological Community (CEEC), Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion (STIF).	
EPBC Act 1999 Status	PCT 1281 within the Subject Site did not meet the EPBC Act listing criteria for the Critically Endangered Turpentine-Ironbark Forest of the Sydney Basin Bioregion (Table 8).	
References	Chapman GA, Murphy CL, Tille PJ, Atkinson G and Morse RJ (2009) Soil Landscapes of the Sydney 1:100,000 Sheet map, Department of Environment, Climate Change and Water, Fourth Edition Department of Planning, Industry and Environment (DPIE) (2020c) BioNet Vegetation Classification. https://www.environment.nsw.gov.au/research/Visclassification.htm	

Table 7. Description of Urban Native/Exotic Vegetation identified within the Subject Site

Urban Native/Exotic Vegetation	
	
Extent within Subject Site (approximate)	2,154 m ²
Description of the Vegetation within the Subject Site	
The majority of the Subject Site was comprised of urban garden areas dominated by exotic shrubs such as <i>Camellia</i> spp. and ornamental native species such as <i>Banksia integrifolia</i> (Coast Banksia) and <i>Callistemon viminalis</i> (Weeping Bottlebrush). There were large areas of exotic weed species, namely <i>Ehrharta erecta</i> (Panic Veldtgrass), <i>Ligustrum sinense</i> (Small-leaved Privet), and <i>Paspalum dilatatum</i> (Paspalum). There was also the presence of the priority weeds <i>Asparagus asparagoides</i> (Bridal Creeper), <i>Cortaderia selloana</i> (Pampas Grass), and <i>Senecio madagascariensis</i> (Fireweed).	

Urban Native/Exotic Vegetation	
Justification of Vegetation Assignment	The vegetation within this area consisted of common urban native and exotic species. As the vegetation in this area did not contain native species characteristic of the remnant vegetation found in the locality and has been extensively disturbed, it has been classified as Urban Native/Exotic.
BC Act 2016 Status	Not Listed.
EPBC Act 1999 Status	Not Listed.
References	Department of Planning, Industry and Environment (DPIE) (2020b) BioNet. The website of the Atlas of NSW Wildlife http://www.bionet.nsw.gov.au/

3.2 Environmental Protection and Biodiversity Conservation Act (EPBC Act) Listing

3.2.1 Turpentine-Ironbark Forest of the Sydney Basin Bioregion

PCT 1281 is a component of the EPBC Act-listed CEEC, Turpentine-Ironbark Forest of the Sydney Basin Bioregion. PCT 1281 within the Subject Site did not meet the EPBC Act listing criteria as indicated by the minimum requirements in **Table 8**.

Table 8. Turpentine-Ironbark Forest of the Sydney Basin Bioregion minimum requirements to meet EPBC Act listing criteria

Thresholds	Status
Good condition is generally determined as:	
The vegetation has some characteristic components from all structural layers (tree canopy, small tree/shrub mid-storey, and understorey); and	No – Extensively modified mid-story and groundcover
The tree canopy cover is greater than 10%; and	Yes
The patch size is greater than one hectare.	No
However, patches with a tree canopy cover of less than 10% are also included in the ecological community, if:	
The patch of the ecological community is greater than one hectare in size; and	No
It is part of a remnant of native vegetation that is 5 hectares or more in area.	No



Figure 3. Historically mapped vegetation within the Subject Site (OEH 2010).



Figure 4. Narla field-validated vegetation within the Subject Site.

4. Threatened Species

4.1 Threatened Flora

Desktop analysis revealed a range of threatened flora as occurring or having the potential to occur on or within a 10 km x 10 km cell centred on the Subject Site. Thorough targeted surveys were undertaken throughout the Subject Site for potentially occurring threatened flora. No naturally occurring threatened flora were identified at the time of the site assessment.

Two commonly propagated, planted species that are regarded as threatened in their natural populations were identified within the Subject Site:

- *Eucalyptus scoparia* (Wallangarra White Gum) – listed as ‘Endangered’ under the BC Act, and ‘Vulnerable’ under the EPBC Act; and
- *Macadamia tetraphylla* (Rough-shelled Bush Nut) – listed as ‘Vulnerable’ under the BC Act and EPBC Act.

The specimens within the Subject Site consisted of historically planted, nursery stock of unknown origin and hold little to no conservational significance as they are out of their natural distribution.

A comprehensive list of flora species identified during the site assessment is presented in **Appendix A**.

The following locally occurring species were assessed for their potential to occur within the Subject Site (**Table 9**). It was deemed that the proposed activity will have no significant impact on these species. Therefore, no further assessment of impacts pursuant the BC Act (e.g. Assessment of Significance or Biodiversity Development Assessment Report [BDAR]) and/or EPBC Act Referral to Commonwealth will be required.

Table 9. Assessment of Likely Occurrence of Threatened Flora Species within the Subject Site.

Species	BC Act	EPBC Act	Likelihood of occurrence within the Subject Site	Further Impact Assessment Required?
<i>Acacia bynoeana</i> (Bynoe’s Wattle)	Endangered	Vulnerable	Low. Occurs in heath or dry sclerophyll forest on sandy soils. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple. No such soil exists within the Subject Site. The Subject Site is heavily disturbed and is largely comprised of planted species. A targeted survey was undertaken however no individuals were identified.	No

Species	BC Act	EPBC Act	Likelihood of occurrence within the Subject Site	Further Impact Assessment Required?
<i>Acacia pubescens</i> (Downy Wattle)	Vulnerable	Vulnerable	Low. Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravelly soils, often with ironstone. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Although appropriate soil exists within the Subject Site, it is heavily disturbed and is largely comprised of planted species. A targeted survey was undertaken however no individuals were identified.	No
<i>Callistemon linearifolius</i> (Netted Bottle Brush)	Vulnerable	-	Low. Few proximal records (DPIE 2020b). The species was more widespread in the past. There are currently only 5-6 populations remaining from the 22 populations historically recorded in the Sydney area. Three of the remaining populations are reserved in Ku-ring-gai Chase National Park, Lion Island Nature Reserve and Spectacle Island Nature Reserve. Grows in dry sclerophyll forest on the coast and adjacent ranges. The Subject Site is heavily disturbed and is largely comprised of planted species. A targeted survey was undertaken however no individuals were identified.	No
<i>Darwinia biflora</i>	Vulnerable	Vulnerable	Low. This species occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. Associated overstorey species include <i>Eucalyptus haemastoma</i> , <i>Corymbia gummifera</i> and/or <i>E. squamosa</i> . The vegetation structure is usually woodland, open forest or scrub-heath. The Subject Site does not contain the associated overstorey species. The site is heavily disturbed and is largely comprised of planted species. A targeted survey was undertaken however no individuals were identified.	No
<i>Darwinia peduncularis</i>	Vulnerable	-	Low. This species usually grows on or near rocky outcrops on sandy, well drained, low nutrient soil over sandstone. No such habitat was identified within the Subject Site. A targeted survey was undertaken however no individuals were identified.	No

Species	BC Act	EPBC Act	Likelihood of occurrence within the Subject Site	Further Impact Assessment Required?
<i>Epacris purpurascens</i> var. <i>purpurascens</i>	Vulnerable	-	Low. Found in a range of habitat types, most of which have a strong shale soil influence. Although potential habitat may exist within the Subject Site, it is heavily disturbed and is largely comprised of planted species. A targeted survey was undertaken however no individuals were identified.	No
<i>Eucalyptus camfieldii</i> (Camfield's Stringybark)	Vulnerable	Vulnerable	Low. Restricted distribution in a narrow band with the most northerly records in the Raymond Terrace area south to Waterfall. Localised and scattered distribution includes sites at Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai, Wattamolla and a few other sites in Royal National Park. Occurs on poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. No such habitat was identified on the Subject Site. A targeted survey was undertaken however no individuals were identified.	No
<i>Galium australe</i> (Tangled Bedstraw)	Endangered	-	Low. In NSW, Tangled Bedstraw has been recorded in Turpentine forest and coastal Acacia shrubland. In other States the species is found in a range of near-coastal habitats, including sand dunes, sand spits, shrubland and woodland. Although potential habitat exists within the Subject Site, it is heavily disturbed and is largely comprised of planted species. A targeted survey was undertaken however no individuals were identified.	No
<i>Genoplesium baueri</i> (Bauer's Midge Orchid)	Endangered	Endangered	Low. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded at locations now likely to be within the following conservation reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. Grows in dry sclerophyll forest and moss gardens over sandstone. No such soil exists within the Subject Site. The optimal survey months for this species are February and March; therefore, the site assessment was outside of the optimal survey period. This species, although unlikely to occur, couldn't be confirmed as being absent from the Subject Site.	No

Species	BC Act	EPBC Act	Likelihood of occurrence within the Subject Site	Further Impact Assessment Required?
<i>Genoplesium plumosum</i> (Tallong Midge Orchid)	Critically Endangered	Endangered	Low. This species is only known from two areas - the village of Tallong and its immediate environs, and a site in Morton National Park 8.5 km south-east of the town of Wingello. Occurs exclusively in heathland, generally dominated by Violet Kunzea (<i>Kunzea parvifolia</i>), Common Fringe-myrtle (<i>Calytrix tetragona</i>) and parrot-peas (<i>Dillwynia</i> spp.). Grows on very shallow soils, often with lichens and mosses on sandstone conglomerate rock shelves. No such soils or associated species occur within the Subject Site. The optimal survey months for this species are February and March; therefore, the site assessment was outside of the optimal survey period. This species, although unlikely to occur, couldn't be confirmed as being absent from the Subject Site.	No
<i>Grammitis stenophylla</i> (Narrow-leaf Finger Fern)	Endangered	-	Low. This species occurs in moist places, usually near streams on rocks or in trees, in rainforest, and moist eucalypt forest. No such habitat exists within the Subject Site. A targeted survey was undertaken however no individuals were identified.	No
<i>Haloragodendron lucasii</i>	Endangered	Endangered	Low. Associated with dry sclerophyll forest. Reported to grow in moist sandy loam soils in sheltered aspects, and on gentle slopes below cliff-lines near creeks in low open woodland. Associated with high soil moisture and relatively high soil-phosphorus levels. No such habitat exists within the Subject Site, it is heavily disturbed and is largely comprised of planted species. A targeted survey was undertaken however no individuals were identified.	No
<i>Lasiopetalum joyceae</i>	Vulnerable	Vulnerable	Low. This species has a restricted range occurring on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. Grows in heath on sandstone. The Subject Site is heavily disturbed and is largely comprised of planted species. A targeted survey was undertaken however no individuals were identified.	No

Species	BC Act	EPBC Act	Likelihood of occurrence within the Subject Site	Further Impact Assessment Required?
<i>Leptospermum deanei</i>	Vulnerable	Vulnerable	Low. This species occurs in woodland on lower hill slopes or near creeks. Sandy alluvial soil or sand over sandstone. Occurs in Riparian Scrub - e.g. <i>Tristaniopsis laurina</i> , <i>Baechea myrtifolia</i> ; Woodland - e.g. <i>Eucalyptus haemastoma</i> ; and Open Forest - e.g. <i>Angophora costata</i> , <i>Leptospermum trinervium</i> , <i>Banksia ericifolia</i> . No such habitat occurs within the Subject Site. A targeted survey was undertaken however no individuals were identified.	No
<i>Melaleuca deanei</i> (Deane's Paperbark)	Vulnerable	Vulnerable	Low. The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone. No such habitat occurs within the Subject Site, it is heavily disturbed and weed infested. A targeted survey was undertaken however no individuals were identified.	No
<i>Persoonia hirsuta</i> (Hairy Geebung)	Endangered	Endangered	Low. The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. It is usually present as isolated individuals or very small populations. No such soil exists within the Subject Site. A targeted survey was undertaken however no individuals were identified.	No
<i>Persoonia mollis</i> subsp. <i>maxima</i>	Endangered	Endangered	Low. 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 include <i>Angophora costata</i> (Smooth Barked Apple), <i>Eucalyptus piperita</i> (Sydney Peppermint), <i>Corymbia gummifera</i> (Red Bloodwood), <i>Syncarpia glomulifera</i> (Turpentine), <i>Ceratopetalum apetalum</i> (Coachwood), and <i>Callicoma serratifolia</i> (Black Wattle). Although associated canopy species exist within the Subject Site, no gullies or sandstone exist. A targeted survey was undertaken however no individuals were identified.	No

Species	BC Act	EPBC Act	Likelihood of occurrence within the Subject Site	Further Impact Assessment Required?
<i>Rhodamnia rubescens</i> (Scrub Turpentine)	Critically Endangered	-	Low. This species is found in littoral, warm temperate, and subtropical rainforest and wet sclerophyll forests, usually on volcanic or sedimentary soils. No such habitat exists within the Subject Site. A targeted survey was undertaken however no individuals were identified.	No
<i>Syzygium paniculatum</i> (Magenta Lilly Pilly)	Endangered	Vulnerable	Low. This species is restricted mainly to remnant stands of Littoral Rainforest. No such habitat occurs within the Subject Site. A targeted survey was undertaken however no individuals were identified.	No
<i>Tetratheca glandulosa</i>	Vulnerable	-	Low. Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gynea, Lambert and Falconbridge. Topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey/sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops. Vegetation structure varies from heaths and scrub to woodlands/open woodlands, and open forest. No such habitat exists within the Subject Site. A targeted survey was undertaken however no individuals were identified.	No

4.2 Threatened Fauna

4.2.1 Threatened Fauna Habitat

Details of the fauna habitat recorded within the Subject Site are included in **Table 10**. The likelihood of occurrence of threatened fauna species within the Subject Site is presented in **Table 11**.

Table 10. Fauna habitat values

Habitat component	Site values
Coarse woody debris	Absent.
Rock outcrops and bush rock	Absent.
Caves, crevices and overhangs	Absent.
Culverts, bridges, mine shafts, or abandoned structures	Absent.
Nectar/lerp-bearing trees	Native nectar-bearing trees were recorded within the Subject Site including <i>Angophora costata</i> , <i>Eucalyptus eugenioides</i> , <i>Eucalyptus haemastoma</i> , <i>Eucalyptus microcorys</i> , <i>Eucalyptus paniculata</i> , <i>Eucalyptus resinifera</i> , <i>Eucalyptus saligna</i> and <i>Syncarpia glomulifera</i> . These trees may provide intermittent nectar and/or lerp sources for nomadic nectivores such as the Grey-headed Flying-fox.
Nectar-bearing shrubs	Nectar-bearing shrubs were recorded within the Subject Site including <i>Acacia podalyriifolia</i> , <i>Banksia integrifolia</i> , <i>Callistemon viminalis</i> , and <i>Grevillea banksii</i> . These shrubs may provide intermittent nectar and/or lerp sources for similar species.
Koala feed trees	The following Koala feed trees were identified on the Subject Site: <i>Angophora costata</i> , <i>Eucalyptus eugenioides</i> , <i>Eucalyptus haemastoma</i> , <i>Eucalyptus microcorys</i> , <i>Eucalyptus paniculata</i> , <i>Eucalyptus resinifera</i> , <i>Eucalyptus saligna</i> and <i>Syncarpia glomulifera</i> . Although potential Koala feed trees occur within the Subject Site, the lack of recent, proximal records suggests the presence of this distinct arboreal mammal is low.
Large stick nests	Absent.
Sap and gum sources	Native sap and gum source trees were recorded within the Subject Site including <i>Eucalyptus resinifera</i> . These trees may provide intermittent nectar and/or lerp sources for various fauna species.
She-oak fruit (Glossy Black Cockatoo feed)	Absent.
Seed-bearing trees and shrubs	Seed-bearing trees such as <i>Angophora costata</i> , <i>Syncarpia glomulifera</i> , and eucalypt species may provide foraging habitat for Gang-gang Cockatoo.
Soft-fruit-bearing trees	Absent.
Dense shrubbery and leaf litter	Some leaf litter was present within the Subject Site, although this would often be disturbed given the urban nature of the site. This may provide intermittent habitat for native reptiles and invertebrates.
Tree hollows	Two hollow-bearing stags were recorded within the Subject Site (Figure 5). These trees may provide roosting/breeding habitat for a variety of bat species such as Eastern False Pipistrelle and Eastern Coastal Free-tailed Bat. The hollows identified within the Subject Site were small (<5 cm in diameter) and can only potentially accommodate small species.
Decorticating bark	Half-bark eucalypts such as <i>Eucalyptus saligna</i> provide decorticating bark habitat within the Subject Site. This may be an important resource for arboreal fauna that

Habitat component	Site values
	feed on insects which shelter in decorticating bark. Microbat species may also roost in this habitat.
Wetlands, soaks and streams	Absent.
Open water bodies	Absent.
Estuarine, beach, mudflats, and rocky foreshores	Absent.

A small suite of predominantly native, common avian fauna species were identified within and surrounding the Subject Site during the field survey. All native fauna species encountered were listed as ‘protected’ under the BC Act. The list of fauna recorded during the site visit was produced opportunistically (**Appendix B**).

4.2.2 Migratory Fauna Species

The following EPBC Act listed migratory fauna species were considered to occasionally use habitat within or around the Subject Site for foraging or passage:

- *Cuculus optatus* (Oriental Cuckoo);
- *Hirundapus caudacutus* (White-throated Needletail);
- *Monarcha melanopsis* (Black-faced Monarch);
- *Monarcha trivirgatus* (Spectacled Monarch);
- *Motacilla flava* (Yellow Wagtail);
- *Myiagra cyanoleuca* (Satin Flycatcher); and
- *Rhipidura rufifrons* (Rufous Fantail).

It was deemed that the proposed works will have no significant impact on these species. Therefore, a Referral to the Commonwealth pursuant to the EPBC Act is not required.



Figure 5. Hollow-bearing stags recorded within the Subject Site.

Table 11. Assessment of likely occurrence of threatened fauna species within the Subject Site

Species	BC Act	EPBC Act	Likelihood of Occurrence	Foraging Habitat Present Within the Subject Site	Breeding Habitat Present Within the Subject Site	Anticipated Impact	Further Impact Assessment Required?
<i>Anthochaera Phrygia</i> (Regent Honeyeater)	Critically Endangered	Critically Endangered	Potential	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River She-oak. 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. There may be potential habitat within the Subject Site, although it is highly fragmented and disturbed.	There are only two (2) known key breeding regions remaining in NSW: Capertee Valley and the Bundarra-Barraba region.	Potential impact to foraging habitat. No anticipated impact to breeding habitat.	Yes
<i>Calidris ferruginea</i> (Curlew Sandpiper)	Endangered	Critically Endangered	Low	This species generally occupies littoral and estuarine habitats and is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. No such habitat occurs within the Subject Site.	It roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast seaweed, or on rocky shores. No such habitat occurs within the Subject Site.	Negligible, no anticipated impact to foraging or breeding habitat.	No

Species	BC Act	EPBC Act	Likelihood of Occurrence	Foraging Habitat Present Within the Subject Site	Breeding Habitat Present Within the Subject Site	Anticipated Impact	Further Impact Assessment Required?
<i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo)	Vulnerable	-	Potential	In autumn and winter, this species often moves to drier more open eucalypt forests and woodlands, or in dry forest in coastal areas and often found in urban areas. Potential feed trees (<i>Eucalyptus</i> spp.) occur within the Subject Site.	This species favours Eucalypt tree species with hollows greater than 9 cm in diameter. No such hollows were identified within the Subject Site.	Minimal impact to foraging habitat due to the mobility of the species and the few potential feed trees proposed for removal. All trees being removed are being replaced with the proposed landscape plan. Potential foraging habitat will remain within the Subject Site and in the surrounding area. No anticipated net loss of breeding habitat.	No
<i>Calyptorhynchus lathami</i> (Glossy Black-Cockatoo)	Vulnerable	-	Low	This species feeds almost exclusively on the seeds of several species of she-oak (<i>Casuarina</i> and <i>Allocasuarina</i> species), shredding the cones with the massive bill. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of she-oak occur. No such foraging habitat occurs within the Subject Site.	Dependent on large hollow-bearing eucalypts for nest sites. No such hollows were identified within the Subject Site.	Negligible, no anticipated impact to foraging or breeding habitat.	No

Species	BC Act	EPBC Act	Likelihood of Occurrence	Foraging Habitat Present Within the Subject Site	Breeding Habitat Present Within the Subject Site	Anticipated Impact	Further Impact Assessment Required?
<i>Cercartetus nanus</i> (Eastern Pygmy-possum)	Vulnerable	-	Potential	This species is found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes, as well as insects. Possible feed trees exist within the Subject Site as well as potential prey items, although the Subject Site is highly disturbed, fragmented, and urbanised.	Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum dreys or thickets of vegetation, although hollows are preferred. The hollow-bearing stags identified within the Subject Site are proposed to be retained.	Minimal impact to foraging habitat for this mobile species as the proposed development will require the removal of few feed trees. All trees being removed are being replaced with the proposed landscape plan. Potential foraging habitat will remain within the Subject Site and in the surrounding area. No anticipated impact to breeding habitat.	No
<i>Chalinolobus dwyeri</i> (Large-eared Pied Bat)	Vulnerable	Vulnerable	Low	Found in caves (near their entrances), crevices in cliffs or old mine workings, frequenting low to mid-elevation dry open forest and woodland close to these features. No such habitat was identified within or in proximity to the Subject Site.	This species roosts in caves (near their entrances), crevices in cliffs, old mine workings, and in the disused, bottle-shaped mud nests of the Fairy Martin. No suitable breeding habitat was identified within or in proximity to the Subject Site.	Negligible, no anticipated net loss of foraging or breeding habitat.	No

Species	BC Act	EPBC Act	Likelihood of Occurrence	Foraging Habitat Present Within the Subject Site	Breeding Habitat Present Within the Subject Site	Anticipated Impact	Further Impact Assessment Required?
<i>Daphoenositta chrysoptera</i> (Varied Sittella)	Vulnerable	-	Potential	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee, and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy. Potential prey items may occur within the Subject Site although it is heavily degraded, fragmented, and urbanised.	Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years. No nests were identified during the site assessment.	Minimal impact to foraging habitat for this mobile species as the proposed development will require the removal of few trees. All trees being removed are being replaced with the proposed landscape plan. Potential foraging habitat will remain within the Subject Site and in the surrounding area. No anticipated net loss of breeding habitat.	No

Species	BC Act	EPBC Act	Likelihood of Occurrence	Foraging Habitat Present Within the Subject Site	Breeding Habitat Present Within the Subject Site	Anticipated Impact	Further Impact Assessment Required?
<i>Dasyurus maculatus</i> (Spotted-tailed Quoll)	Vulnerable	Endangered	Low	Consumes a variety of prey, including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits, reptiles and insects. Also eats carrion and takes domestic fowl. Potential prey items may occur within the Subject Site although it is heavily degraded, fragmented, and urbanised.	This species uses hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. The hollows identified within the Subject Site were likely too small for this species and no other potential breeding habitat exists within the Subject Site.	The development will require the removal of a small area (409 m ²) of low-quality potential foraging habitat. Better suited foraging habitat will remain within the immediate surrounds and in the revegetated areas within the Subject Site. No anticipated impact to breeding habitat.	No
<i>Falsistrellus tasmaniensis</i> (Eastern False Pipistrelle)	Vulnerable	-	Potential	This species prefers moist habitats with trees taller than 20m. Feeds on insects. Suitable foraging habitat is present within the Subject Site.	Generally, roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Eucalypt hollows were identified within the Subject Site.	Potential impact to foraging and breeding habitat.	Yes

Species	BC Act	EPBC Act	Likelihood of Occurrence	Foraging Habitat Present Within the Subject Site	Breeding Habitat Present Within the Subject Site	Anticipated Impact	Further Impact Assessment Required?
<i>Glossopsitta pusilla</i> (Little Lorikeet)	Vulnerable	-	Potential	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards. Potential foraging habitat exists within the Subject Site.	Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). Small hollows were identified within the Subject Site.	Potential impact to foraging and breeding habitat.	Yes
<i>Haematopus fuliginosus</i> (Sooty Oystercatcher)	Vulnerable	-	Low	Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels. No such habitat was identified within or in proximity to the Subject Site.	Breeds in spring and summer, almost exclusively on offshore islands, and occasionally on isolated promontories. The nest is a shallow scrape on the ground, or small mounds of pebbles, shells or seaweed when nesting among rocks. No such habitat was identified within or in proximity to the Subject Site.	Negligible, no anticipated impact to foraging or breeding habitat.	No

Species	BC Act	EPBC Act	Likelihood of Occurrence	Foraging Habitat Present Within the Subject Site	Breeding Habitat Present Within the Subject Site	Anticipated Impact	Further Impact Assessment Required?
<i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)	Vulnerable	-	Low	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. No such habitat was identified within or in proximity to the Subject Site.	Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nests are large structures built from sticks and lined with leaves or grass. No nests were identified within the Subject Site.	Negligible, no anticipated net loss of foraging or breeding habitat.	No
<i>Heleioporus australiacus</i> (Giant Burrowing Frog)	Vulnerable	Vulnerable	Low	Whilst in non-breeding habitat, this species burrows below the soil surface or in the leaf litter near waterways. Individual frogs occupy a series of burrow sites, some of which are used repeatedly. It has a generalist diet of invertebrates including ants, beetles, cockroaches, spiders, centipedes and scorpions. No such habitat was identified within or in proximity to the Subject Site.	Breeding habitat of this species is generally soaks or pools within first or second-order streams. No such habitat was identified within or in proximity to the Subject Site.	Negligible, no anticipated net loss of foraging or breeding habitat.	No
<i>Hieraaetus morphnoides</i> (Little Eagle)	Vulnerable	-	Low	Occupies open eucalypt forest, woodland or open woodland. She-Oak or Acacia woodlands and riparian woodlands of interior NSW are also used. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion. The Subject Site is heavily disturbed, fragmented, and urbanised.	Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. No nests were identified within the Subject Site.	The Subject Site is unlikely to provide suitable foraging habitat for this species, therefore anticipated impacts are low. No anticipated impact to breeding habitat.	No

Species	BC Act	EPBC Act	Likelihood of Occurrence	Foraging Habitat Present Within the Subject Site	Breeding Habitat Present Within the Subject Site	Anticipated Impact	Further Impact Assessment Required?
<i>Isoodon obesulus obesulus</i> (Southern Brown Bandicoot [eastern])	Endangered	Endangered	Low	Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruited) fungi. Their searches for food often create distinctive conical holes in the soil. The Subject Site is heavily disturbed, fragmented, and urbanised and is deemed unsuitable for this species.	Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. Nests may be located under Grass trees <i>Xanthorrhoea</i> spp., blackberry bushes and other shrubs, or in rabbit burrows. The upper surface of the nest may be mixed with earth to waterproof the inside of the nest. No such habitat was identified within the Subject Site.	Negligible, no anticipated impact to foraging or breeding habitat.	No
<i>Lathamus discolor</i> (Swift Parrot)	Endangered	Critically Endangered	Potential	On the mainland, this species occurs in areas where eucalypts are flowering profusely or where there are abundant lerp infestations (from sap-sucking bugs). Favoured feed trees include winter flowering species such as <i>Eucalyptus robusta</i> , <i>Corymbia maculata</i> , <i>C. gummifera</i> , <i>E. tereticornis</i> , <i>E. sideroxylon</i> , <i>E. pilularis</i> , and <i>E. albens</i> . Potential foraging habitat exists within the Subject Site, though there is a lack of favoured feed trees.	This species breeds in Tasmania.	Potential impact to foraging habitat. No anticipated impact to breeding habitat.	Yes

Species	BC Act	EPBC Act	Likelihood of Occurrence	Foraging Habitat Present Within the Subject Site	Breeding Habitat Present Within the Subject Site	Anticipated Impact	Further Impact Assessment Required?
<i>Limicola falcinellus</i> (Broad-billed Sandpiper)	Vulnerable	-	Low	Broad-billed Sandpipers favour sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayment's, lagoons, saltmarshes and reefs as feeding and roosting habitat. Feeds on insects, crustaceans, molluscs, worms, and seeds in the mud. No such habitat was identified within or in proximity to the Subject Site.	Broad-billed Sandpipers roost and breed on banks on sheltered sand, shell or shingle beaches. No such habitat was identified within or in proximity to the Subject Site.	Negligible, no anticipated impact to foraging or breeding habitat.	No
<i>Litoria aurea</i> (Green and Golden Bell Frog)	Endangered	Vulnerable	Low	Inhabits marshes, dams and stream-sides, particularly those containing <i>Typha</i> spp. (Bullrushes) or <i>Eleocharis</i> spp. (Spikerushes). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as <i>Gambusia holbrooki</i> (Plague Minnow), have a grassy area nearby and diurnal sheltering sites available. No such habitat was identified within or in proximity to the Subject Site.	This species breeds in the same habitat it forages in, floating in water. No such habitat was identified within or in proximity to the Subject Site.	Negligible, no anticipated impact to foraging or breeding habitat.	No
<i>Lophoictinia isura</i> (Square-tailed Kite)	Vulnerable	-	Low	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. It is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy. No such habitat was identified within or in proximity to the Subject Site.	Nest sites generally located along or near watercourses, in a fork or on large horizontal limbs. No such habitat was identified within or in proximity to the Subject Site.	Negligible, no anticipated net loss of foraging or breeding habitat.	No

Species	BC Act	EPBC Act	Likelihood of Occurrence	Foraging Habitat Present Within the Subject Site	Breeding Habitat Present Within the Subject Site	Anticipated Impact	Further Impact Assessment Required?
<i>Micronomus norfolkensis</i> (Eastern Coastal Free-tailed Bat)	Vulnerable	-	Potential	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range, feeding on insects. Potential foraging habitat may exist within the Subject Site.	Roost mainly in tree hollows but will also roost under bark or in man-made structures. Hollows were identified within the Subject Site.	Potential impact to foraging and breeding habitat.	Yes
<i>Miniopterus australis</i> (Little Bent-winged Bat)	Vulnerable	-	Potential	Found in moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. 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. Potential foraging and roosting habitat is present within the Subject Site.	Relies on large breeding colonies to provide the high temperatures needed to rear its young. No breeding colonies were observed within the Subject Site.	Potential impact to foraging habitat. No anticipated impact to breeding habitat.	Yes
<i>Miniopterus orianae oceanensis</i> (Large Bent-winged Bat)	Vulnerable	-	Potential	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Hunt in forested areas, catching moths and other flying insects above the tree tops. Potential foraging habitat is present within the Subject Site.	This species breeds in maternity caves in colonies between 100-150,000 individuals. No caves or breeding colonies were observed within the Subject Site.	Potential impact to foraging habitat. No anticipated impact to breeding habitat.	Yes

Species	BC Act	EPBC Act	Likelihood of Occurrence	Foraging Habitat Present Within the Subject Site	Breeding Habitat Present Within the Subject Site	Anticipated Impact	Further Impact Assessment Required?
<i>Ninox connivens</i> (Barking Owl)	Vulnerable	-	Potential	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Preferentially hunts small arboreal mammals such as Squirrel Gliders and Common Ringtail Possums, but when loss of tree hollows decreases these prey populations the owl becomes more reliant on birds, invertebrates and terrestrial mammals such as rodents and rabbits. Can catch bats and moths on the wing, but typically hunts by sallying from a tall perch. Potential foraging habitat is present within the Subject Site.	Two or three eggs are laid in hollows of large, old trees. Living eucalypts are preferred though dead trees are also used. The hollows recorded within the Subject Site are likely too small to accommodate this species.	Potential impact to foraging habitat. No anticipated impact to breeding habitat.	Yes
<i>Ninox strenua</i> (Powerful Owl)	Vulnerable	-	Potential	The species breeds and hunts in open or closed sclerophyll forest or woodlands and hunts small mammals. It roosts by day in dense vegetation comprising species such as Turpentine <i>Syncarpia glomulifera</i> , Black She-oak <i>Allocasuarina littoralis</i> , Blackwood <i>Acacia melanoxylon</i> , Rough-barked Apple <i>Angophora floribunda</i> , Cherry Ballart <i>Exocarpus cupressiformis</i> and a number of eucalypt species. Potential foraging habitat is present on the Subject Site.	This species favours hollows >20cm in diameter. The hollows identified within the Subject Site are too small to accommodate this owl.	Potential impact to foraging habitat. No anticipated impact to breeding habitat.	Yes

Species	BC Act	EPBC Act	Likelihood of Occurrence	Foraging Habitat Present Within the Subject Site	Breeding Habitat Present Within the Subject Site	Anticipated Impact	Further Impact Assessment Required?
<i>Petroica boodang</i> (Scarlet Robin)	Vulnerable	-	Low	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 mallee or wet forest communities, or in wetlands and tea-tree swamps. Foraging habitat usually contains abundant logs and fallen timber: these are important components of its habitat. No such habitat was identified within the Subject Site, it is heavily disturbed, fragmented, and urbanised.	This species' nest is an open cup made of plant fibres and cobwebs and is built in the fork of tree usually more than 2 metres above the ground; nests are often found in a dead branch in a live tree, or in a dead tree or shrub. No nests were identified within the Subject Site.	The Subject Site is unlikely to provide suitable foraging habitat for this species, therefore anticipated impacts are low. No anticipated impact to breeding habitat.	No
<i>Phascolarctos cinereus</i> (Koala)	Vulnerable	-	Low	Potential feed trees were identified throughout the Subject Site.	Potential breeding habitat exists on the feed trees identified throughout the Subject Site.	Although potential feed trees have been recorded within the Subject Site, it is heavily disturbed, fragmented, and urbanised. The lack of recent, proximal records suggests the presence of this distinct arboreal mammal is low.	No

Species	BC Act	EPBC Act	Likelihood of Occurrence	Foraging Habitat Present Within the Subject Site	Breeding Habitat Present Within the Subject Site	Anticipated Impact	Further Impact Assessment Required?
<i>Pseudophryne australis</i> (Red-crowned Toadlet)	Vulnerable	-	Low	Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. No such habitat was identified within the Subject Site.	Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters. No such habitat was identified within the Subject Site.	Negligible, no anticipated net loss of foraging or breeding habitat.	No
<i>Pteropus poliocephalus</i> (Grey-headed Flying Fox)	Vulnerable	Vulnerable	Potential	Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. Potential feed trees occur within the Subject Site.	No breeding camps were identified within the Subject Site.	Potential impact to foraging habitat. No anticipated impact to breeding habitat.	Yes
<i>Ptilinopus superbus</i> (Superb Fruit-Dove)	Vulnerable	-	Potential	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees. Potential foraging habitat exists within the Subject Site.	Breeding takes place from September to January. The nest is a structure of fine interlocked forked twigs, giving a stronger structure than its flimsy appearance would suggest, and is usually 5-30 metres up in rainforest and rainforest edge tree and shrub species. No nests were identified within the Subject Site.	Potential impact to foraging habitat. No anticipated impact to breeding habitat.	Yes

Species	BC Act	EPBC Act	Likelihood of Occurrence	Foraging Habitat Present Within the Subject Site	Breeding Habitat Present Within the Subject Site	Anticipated Impact	Further Impact Assessment Required?
<i>Saccolaimus flaviventris</i> (Yellow-bellied Sheathtail-bat)	Vulnerable	-	Potential	When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Potential foraging habitat exists within the Subject Site.	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. Hollows were identified within the Subject Site.	Potential impact to foraging and breeding habitat.	Yes
<i>Scoteanax rueppellii</i> (Greater Broad-nosed Bat)	Vulnerable	-	Potential	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. Potential foraging habitat exists within the Subject Site.	Although this species usually roosts in tree hollows, it has also been found in buildings. Hollows were identified within the Subject Site.	Potential impact to foraging and breeding habitat.	Yes
<i>Tyto novaehollandiae</i> (Masked Owl)	Vulnerable	-	Low	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. The typical diet consists of tree-dwelling and ground mammals, especially rats. Potential foraging habitat is present on the Subject Site.	Roosts and breeds in eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. The hollows identified within the Subject Site were likely too small for this owl.	Potential impact to foraging habitat. No anticipated impact to breeding habitat.	Yes

Species	BC Act	EPBC Act	Likelihood of Occurrence	Foraging Habitat Present Within the Subject Site	Breeding Habitat Present Within the Subject Site	Anticipated Impact	Further Impact Assessment Required?
<i>Tyto tenebricosa</i> (Sooty Owl)	Vulnerable	-	Low	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum or Sugar Glider. Potential foraging habitat is present on the Subject Site.	This species nests in very large tree-hollows. No such hollows were identified within the Subject Site.	Potential impact to foraging habitat. No anticipated impact to breeding habitat.	Yes
<i>Varanus rosenbergi</i> (Rosenberg's Goanna)	Vulnerable	-	Low	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. Feeds on carrion, birds, eggs, reptiles and small mammals. No such habitat was identified within the Subject Site.	Lays up to 14 eggs in a termite mound; the hatchlings dig themselves out of the mounds. No termite mounds were identified within the Subject Site.	Negligible, no anticipated net loss of foraging or breeding habitat.	No

5. Impact Summary

5.1 Impact Assessments

The likelihood of occurrence of threatened species within the Subject Site was assessed in **Table 9** and **Table 11**. It was then determined that an Assessment of Significance (5-part Test) was required for the following BC Act-listed threatened ecological communities and species (**Appendix C**):

- Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion;
- *Anthochaera phrygia* (Regent Honeyeater);
- *Glossopsitta pusilla* (Little Lorikeet);
- *Lathamus discolor* (Swift Parrot);
- *Pteropus poliocephalus* (Grey-headed Flying-fox);
- *Ptilinopus superbis* (Superb Fruit-Dove);
- Forest owls:
 - *Ninox connivens* (Barking Owl);
 - *Ninox strenua* (Powerful Owl);
 - *Tyto novaehollandiae* (Masked Owl); and
 - *Tyto tenebricosa* (Sooty Owl).
- Microchiropterian Bats (Microbats):
 - *Falsistrellus tasmaniensis* (Eastern False Pipistrelle);
 - *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat);
 - *Miniopterus australis* (Little Bent-winged Bat);
 - *Miniopterus orianae oceanensis* (Large Bent-winged Bat);
 - *Saccolaimus flaviventris* (Yellow-bellied Sheath-tailed Bat); and
 - *Scoteanax rueppellii* (Greater Broad-nosed Bat).

An Assessment of Significant Impact Criteria was also carried out for the following EPBC Act-listed threatened species (**Appendix D**):

- *Anthochaera phrygia* (Regent Honeyeater);
- *Lathamus discolor* (Swift Parrot); and
- *Pteropus poliocephalus* (Grey-headed Flying-fox).

5.2 Vegetation

All trees across the Subject Site have been assessed by a qualified AQF Level 5 Arborist who assessed the health of the trees and their suitability for removal (Urban Arbor 2020). The arborist identified a suite of trees that require removal for three broad reasons:

- The trees were unstable and therefore dangerous to leave standing;
- The trees would be removed entirely as they were in the way of the proposed development (e.g. proposed dwellings or infrastructure); or
- The health of individual trees would be compromised by proposed built structures (e.g. structures would encroach on TPZ).

All trees to be removed are summarised in **Table 12**. The removal of these trees is not likely to impact the biodiversity of the Subject Site as the proposed Landscape Plan (Taylor Brammer Landscape Architects 2020)

involves the planting of thirteen (13) native canopy tree species characteristic of STIF elsewhere within the Subject Site. All trees that are proposed to be retained will be protected during the development with the implementation of exclusion zones using protective fencing (**Figure 6**).

There are currently twenty-two (22) existing canopy trees characteristic of STIF within the Subject Site. With the implementation of the landscape plan, the minimum total number of STIF trees present post-development will be thirty-one (31). Therefore, the proposed development will see a net increase of nine (9) canopy trees characteristic of STIF.

Table 12. Summary of trees to be removed to accommodate the proposed development (Urban Arbor 2020).

Tree Species	Number of trees proposed for removal	Characteristic of STIF?
<i>Acer palmatum</i> *	1	No
<i>Angophora costata</i>	3	Yes
<i>Araucaria heterophylla</i> *	1	No
<i>Archontophoenix alexandrae</i> *	7	No
<i>Callistemon viminalis</i>	1	No
<i>Ceratopetalum gummiferum</i>	1	No
<i>Cinnamomum camphora</i> *	1	No
<i>Citrus</i> spp. *	1	No
<i>Cupressocyparis leylandii</i> *	1	No
<i>Cupressus sempervirens</i> *	2	No
<i>Cyathea cooperi</i>	1	No
<i>Eucalyptus microcorys</i>	1	No
<i>Hakea salicifolia</i>	1	No
<i>Jacaranda mimosifolia</i> *	1	No
<i>Macadamia</i> spp. *	1	No
<i>Melaleuca linariifolia</i>	1	No
<i>Morus nigra</i> *	1	No
<i>Prunus</i> spp. *	1	No
<i>Schinus mole</i> *	2	No
<i>Syagrus romanzoffianum</i> *	15	No
<i>Syncarpia glomulifera</i>	1	Yes
<i>Washingtonia robusta</i> *	1	No
Total STIF Trees Present Pre-development		22
Total Exotic Trees Removed		36
Total Native Trees Removed		10
Total STIF Trees Removed		4
Total STIF Trees Remaining Post-development (with plantings)		31

* Denotes exotic species

5.2.1 Areas of Vegetation

The development footprint is largely situated on areas of existing structures, hardstand, and Urban Native/Exotic Vegetation. The impacts of the proposed development on vegetation communities are summarised in **Table 13**.

Table 13. Approximate areas of vegetation impacted by the proposed development

Vegetation Community	Approximate Area Impacted
PCT 1281: Turpentine - Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion	409 m ²
Urban Native/Exotic	1,302 m ²
Total	1,711 m²

5.2.2 Local Occurrence of Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion (STIF)

The local occurrence of STIF was calculated using Southeast NSW Native Vegetation Classification and Mapping (OEH 2010) historic vegetation mapping. This was combined with Narla field-validated vegetation mapping to determine the impact of the proposed development on STIF within the locality (**Figure 7**). The impact on the local occurrence of STIF is outlined in **Table 14**.

Table 14. Impact upon the local occurrence of STIF

Local Occurrence	Total Area	Impacted STIF
STIF mapped in the locality	102,930 m ²	-
STIF mapped on the Subject Site	1,032 m ²	409 m ²
Total	103,962 m²	0.39%



Figure 6. Site plan with proposed protective tree fencing (Urban Arbor 2020).



Figure 7. Occurrence of STIF within the locality of the Subject Site.

6. Recommendations

6.1 Impact Mitigation and Minimisation Recommendations

This section of the report details recommended efforts to avoid and minimise impacts on biodiversity values associated with the proposed development. Measures to be implemented before, during, and post construction are detailed in **Table 15**.

Table 15. Measures to be implemented before, during, and after construction to avoid and minimise the impacts of the proposed development

Action	Outcome	Timing	Responsibility
Project Location, Design and Planning	The design of the proposed development is largely located in an area of existing hardstand and Urban Native/Exotic Vegetation. A small area of poor quality PCT 1281 (409 m²) will be affected. The proposed development has been redesigned to avoid impacts to STIF as much as possible. Due to the limited space within the Subject Site, there are no alternative locations to minimise potential impacts. Narla are satisfied that the position of the proposed development will have minimal potential impacts on biodiversity values within the Subject Site, provided the following mitigation measures are followed.	Pre-construction phase	Proponent
Assigning a Project Ecologist	Prior to the implementation of the development, the proponent should commission the services of a qualified and experienced Ecologist with a minimum tertiary degree in Science, Conservation, Biology, Ecology, Natural Resource Management, Environmental Science, or Environmental Management. The Ecologist must be licensed with a current Department of Primary Industries Animal Research Authority permit and New South Wales Scientific License issued under the BC Act. The Ecologist will be commissioned to: - Assist the proponent in identifying and assigning an appropriately skilled Bushland Restoration Professional to implement vegetation restoration; - Help the proponent undertake any threatened species habitat augmentation or translocation; - Undertake any required targeted searches for threatened flora prior to vegetation clearing;	Pre-construction phase	Proponent

Action	Outcome	Timing	Responsibility
	- Undertake an extensive pre-clearing survey, delineating habitat-bearing trees and shrubs to be retained/removed; and - Supervise the clearance of trees and shrubs (native and exotic) in order to capture, treat, and/or relocate any displaced fauna.		
Tree Protections	Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970) outlines that a Tree Protection Zone (TPZ) is the principal means of protecting trees on construction sites. It is an area isolated from construction disturbance so that the tree remains viable. Ideally, works should be avoided within the TPZ. A Minor Encroachment is less than 10% of the TPZ and is outside the structural root zone (SRZ). A Minor Encroachment is considered acceptable by AS-4970 when it is compensated for elsewhere and contiguous within the TPZ. A Major Encroachment is greater than 10% of the TPZ or inside the SRZ. Major Encroachments generally require root investigations undertaken by non-destructive methods or the use of tree sensitive construction methods.	Pre-construction phase	Proponent Arborist
Clearing of Vegetation/ Fauna Habitat – Minimisation of potential impacts	Before any vegetation (including exotic) is damaged or removed, a qualified Ecologist with fauna survey experience should be assigned to undertake a pre-clearing survey to determine presence of any suitable habitat for present in order to capture, treat, and/or relocate any fauna that has been displaced during the clearing process. All trees (including dead trees) should be felled by a qualified Arborists using a 'slow drop' technique. This involves knocking the trees to encourage any fauna to vacate (e.g. using an excavator bucket) before slowly pushing the trees to the ground.	Construction phase	Proponent Project Ecologist
Clearing of Hollow-bearing Trees	Hollow-bearing trees, including the hollow-bearing stags identified within the Subject Site (Figure 5), are to be retained and protected during development. In the event that a hollow-bearing tree is required to be remove, a qualified Ecologist should be on site to oversee the removal and to safely relocate any fauna that may be inside. If any hollows are required to be removed, they are to be replaced by nest boxes at a 1:1 ratio elsewhere within the Subject Site.	Construction phase	Proponent Project Ecologist

Action	Outcome	Timing	Responsibility
Erosion and Sedimentation	Appropriate erosion and sediment control must be erected and maintained at all times during construction in order to avoid the potential of incurring indirect impacts on biodiversity values. As a minimum, such measures should comply with the relevant industry guidelines such as 'the Blue Book' (Landcom 2004).	Construction phase	Proponent Construction Contractor
Storage and Stockpiling (Soil and Materials)	Allocate all storage, stockpile, and laydown sites away from any native vegetation that is planned to be retained. Any imported soil must be treated of weeds and pathogens to avoid the potential of incurring indirect impacts on biodiversity values.	Construction phase	Construction Contractors
Weed Eradication and Continued Suppression	Weeds should be eradicated across all areas of the Subject Site including retained garden beds. All priority weeds must be eradicated and continuously suppressed. Common environmental weeds must remain below 5% cover within the Subject Site at all times. Where possible, exotic garden plants should be replaced with locally indigenous plant species to improve the overall biodiversity value of the Subject Site. Three (3) priority weeds were identified within the Subject Site: • <i>Asparagus aethiopicus</i> (Ground Asparagus); • <i>Cortaderia selloana</i> (Pampas Grass); and • <i>Senecio madagascariensis</i> (Fireweed).	Construction phase Post-construction phase	Bush Regeneration Contractor
Landscaping and Revegetation	All existing native trees, shrubs, and ground covers that are located outside of the proposed development footprint will be protected and maintained. To mitigate the impacts of the removal of STIF tree species, the implementation of the landscape plan (Taylor Brammer Landscape Architects 2020) will involve the planting of thirteen (13) advanced nursery stock trees characteristic of STIF. The minimum total number of STIF trees present post-development will be thirty-one (31). Therefore, the proposed development will see a net increase of nine (9) canopy trees characteristic of STIF. Planting will preferably take place within or immediately adjacent to the mapped STIF patches to reduce the effects of fragmentation (Figure 4).	Construction phase Post-construction phase	Bush Regeneration Contractor

Action	Outcome	Timing	Responsibility
Stormwater	The proposed development is to be connected to a modern, approved, stormwater management and disposal system. It is unlikely there will be any adverse effects to local ecology and biodiversity from this system. Stormwater flow from the proposed aged care centre and hard surfaces will be directed to paths of stormwater runoff. Prior to any release, all stormwater is to be piped through any tanks that may be required by the regulating authorities as detailed in a Stormwater Management Plan. In the unlikely event of perceived adverse effects from storm water output exacerbated by the proposed development (e.g. confirmed enhanced nutrient enrichment and weed growth or dieback), an Ecologist and Geotechnical Engineer should be consulted to advise the best approach to action.	Post-construction phase	Proponent Construction Architect
Sewerage	All sewerage produced on site will be contained in an appropriate sewerage system. Containing all sewerage produced on site within a certified sewerage system will eliminate any adverse effects to the local ecology. The proposed sewer line is to avoid tree roots and tree protection zones.	Post-construction phase	Proponent

7. Conclusion

This assessment indicates that the relevant biodiversity conservation provisions of the Environmental Planning and Assessment Act 1979 and the relevant provisions of the HLEP 2013 and the HDCP 2013 have been satisfied.

After carrying-out Assessments of Significance (5-part Tests) (**Appendix C**) under the BC Act for any potential impacts to threatened species, ecological communities, and populations, it was deemed the proposed works will have no significant impact such that a viable local population will be placed at risk of extinction.

Similarly, after carrying out an Impact Assessment under the EPBC Act Significant Impact Guidelines for any potential impacts to the EPBC Act-listed threatened species, it was determined that the proposed works will have no significant impact on any Matters of National Environmental Significance (threatened species) (**Appendix D**).

Narla is satisfied that the proposed development has been appropriately located within the area identified as having least ecological impact. In summary, the proposed development will require the following:

- The removal of 409 m² of poor quality PCT 1281: Turpentine - Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion; and
- The removal of 1,302 m² of Urban Native/Exotic vegetation.

If the appropriate recommendations in this report are followed, the proposed DA will have minimal ecological impacts.

8. References

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- Urban Arbor (2020) – Arboricultural Impact Assessment Report, 461-473 Pacific Highway, Asquith NSW

9. Appendices

Appendix A. Flora species identified within the Subject Site

Appendix B. Fauna species identified within and surrounding the Subject Site

Appendix C. Biodiversity Conservation Act 2016 – Assessment of Significance (5-part Test)

Appendix D. Commonwealth Environment Protection and Biodiversity Conservation Act 1999– Assessment of Significant Impact Criteria

Appendix A. Flora species identified within the Subject Site

Scientific Name	Groundcover	Mid-Story	Canopy
<i>Acacia podalyriifolia</i> *		X	
<i>Acer palmatum</i> *		X	
<i>Acetosa sagittata</i> *	X		
<i>Adiantum aethiopicum</i>	X		
<i>Agapanthus africanus</i> *	X		
<i>Aloe vera</i> *	X		
<i>Angophora costata</i>			X
<i>Araucaria heterophylla</i> *			X
<i>Araujia sericifera</i> *	X		
<i>Archontophoenix alexandrae</i> *		X	
<i>Asparagus asparagoides</i> *	X		
<i>Banksia integrifolia</i>		X	
<i>Bidens pilosa</i> *	X		
<i>Bougainvillea</i> sp. *		X	
<i>Brachychiton acerifolius</i>		X	
<i>Callistemon citrinus</i>		X	
<i>Callistemon viminalis</i>		X	
<i>Camellia</i> spp. *		X	
<i>Cenchrus clandestinus</i> *	X		
<i>Ceratopetalum gummiferum</i>		X	
<i>Chlorophytum comosum</i> *	X		
<i>Cinnamomum camphora</i> *			X
<i>Citrus</i> spp.		X	
<i>Clivia</i> spp. *	X		
<i>Conyza bonariensis</i> *	X		
<i>Conyza sumatrensis</i> *	X		
<i>Cortaderia selloana</i> *	X		
<i>Cotoneaster glaucophyllus</i> *		X	
<i>Cupressocyparis leylandii</i> *		X	
<i>Cupressus sempervirens</i> *		X	
<i>Cyathea cooperi</i>		X	
<i>Cynodon dactylon</i>	X		
<i>Cyperus gracilis</i>	X		
<i>Cyperus rotundus</i> *	X		
<i>Dietes grandiflora</i> *	X		
<i>Digitaria sanguinalis</i> *	X		
<i>Dracaena marginata</i> *		X	
<i>Ehrharta erecta</i> *	X		
<i>Eragrostis curvula</i> *	X		
<i>Erigeron karvinskianus</i> *	X		
<i>Eucalyptus eugenioides</i>			X
<i>Eucalyptus haemastoma</i>			X
<i>Eucalyptus microcorys</i>			X

Scientific Name	Groundcover	Mid-Story	Canopy
<i>Eucalyptus paniculata</i>			x
<i>Eucalyptus resinifera</i>			x
<i>Eucalyptus saligna</i>			x
<i>Eucalyptus scoparia</i> *			x
<i>Euonymus japonicus</i> *	x		
<i>Euphorbia peplus</i> *	x		
<i>Gladiolus undulatus</i> *	x		
<i>Grevillea banksii</i> *		x	
<i>Hakea salicifolia</i>		x	
<i>Hydrangea</i> spp. *		x	
<i>Ipomoea cairica</i> *	x		
<i>Jacaranda mimosifolia</i> *			x
<i>Lantana montevidensis</i> *	x		
<i>Lastreopsis</i> sp.	x		
<i>Ligustrum lucidum</i> *		x	
<i>Ligustrum sinense</i> *		x	
<i>Liriope muscari</i> *	x		
<i>Macadamia tetraphylla</i> *		x	
<i>Magnolia</i> sp. *		x	
<i>Mangifera indica</i> *		x	
<i>Maranta arundinacea</i> *	x		
<i>Melaleuca linariifolia</i>		x	
<i>Metrosideros excelsa</i> *		x	
<i>Morus nigra</i> *		x	
<i>Murraya paniculata</i> *		x	
<i>Nandina domestica</i> *		x	
<i>Nephrolepis cordifolia</i> *	x		
<i>Nerium oleander</i> *		x	
<i>Ochna serrulata</i> *		x	
<i>Oxalis debilis</i> *	x		
<i>Oxalis latifolia</i> *	x		
<i>Parietaria judaica</i> *	x		
<i>Paspalum dilatatum</i> *	x		
<i>Passiflora subpeltata</i> *	x		
<i>Phoenix canariensis</i> *		x	
<i>Photinia serratifolia</i> *		x	
<i>Phyllanthus tenellus</i> *	x		
<i>Pinus radiata</i> *			x
<i>Plantago lanceolata</i> *	x		
<i>Plumeria rubra</i> *		x	
<i>Polygala myrtifolia</i> *		x	
<i>Protea</i> spp. *		x	
<i>Prunus</i> sp. *			x
<i>Pyracantha crenulata</i> *		x	

Scientific Name	Groundcover	Mid-Story	Canopy
<i>Rhododendron</i> spp. *		x	
<i>Rosa canina</i> *		x	
<i>Schinus molle</i> *		x	
<i>Senecio madagascariensis</i> *	x		
<i>Senna pendula</i> *	x		
<i>Setaria palmifolia</i> *	x		
<i>Solanum mauritianum</i> *	x		
<i>Solanum nigrum</i> *	x		
<i>Sonchus oleraceus</i> *	x		
<i>Sporobolus africanus</i> *	x		
<i>Stellaria media</i> *	x		
<i>Stenotaphrum secundatum</i> *	x		
<i>Strelitzia reginae</i> *	x		
<i>Syagrus romanzoffianum</i> *		x	
<i>Syncarpia glomulifera</i>			x
<i>Taraxacum officinale</i> *	x		
<i>Tecoma capensis</i> *		x	
<i>Trifolium repens</i> *	x		
<i>Viburnum tinus</i> *		x	
<i>Viola odorata</i> *	x		
<i>Washingtonia robusta</i> *		x	

* Denotes exotic species

Appendix B. Fauna species identified within and surrounding the Subject Site

Class	Scientific Name	Common Name	Status
Aves	<i>Acridotheres tristis</i>	Common Myna	Introduced
	<i>Anthochaera carunculata</i>	Red Wattlebird	Protected
	<i>Columba livia</i>	Rock Dove	Introduced
	<i>Corvus coronoides</i>	Australian Raven	Protected
	<i>Cracticus tibicen</i>	Australian Magpie	
	<i>Cracticus torquatus</i>	Grey Butcherbird	
	<i>Manorina melanocephala</i>	Noisy Miner	
	<i>Platycercus elegans</i>	Crimson Rosella	
	<i>Trichoglossus moluccanus</i>	Rainbow Lorikeet	

Appendix C. Biodiversity Conservation Act 2016 – Assessment of Significance (5-part Test)

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test) for Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion (STIF)	
Critically Endangered Ecological Community	
Species Ecology	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, red mahogany and various ironbarks. On the north shore these forests are found on shale-enriched sheltered sandstone slopes where ironbarks are less common and blackbutt is prevalent.
(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:	
(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,	Not Applicable – STIF is not a species.

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

for

Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion (STIF)

Critically Endangered Ecological Community

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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

i) The proposed development is not likely to have an adverse effect on the extent of STIF such that its local occurrence is likely to be placed at risk of extinction.

The proposed development will require the removal of 409 m² of poor quality STIF. This area accounts for only 0.39% of the locally occurring STIF.

Eighteen (18) STIF canopy trees will remain unaffected by the development within the Subject Site:

- Seven (7) – *Angophora costata*;
- Three (3) – *Eucalyptus paniculata*;
- Five (5) – *Eucalyptus resinifera*; and
- Three (3) – *Syncarpia glomulifera*.

These trees form fragmented patches of STIF within the Subject Site. The impact of the removal of STIF trees will be mitigated by the implementation of a landscape plan which involves the planting of thirteen (13) advanced STIF canopy trees within the proposed Subject Site.

The revegetation efforts will yield a minimum of thirty-one (31) trees characteristic of STIF post-development, a net increase of nine (9) STIF trees.

No STIF shrub or ground-layer species will be removed.

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

ii) The proposed development is not likely to substantially and adversely modify the composition of STIF such that its local occurrence is likely to be placed at risk of extinction.

The STIF vegetation proposed for removal form fragmented patches within the Subject Site over an area of 409 m². No native shrub or ground-layer species were identified under these trees. The impact of the removal of STIF trees will be mitigated by the implementation of the landscape plan which involves the planting of thirteen (13) advanced STIF canopy trees within the proposed Subject Site. The revegetation efforts will produce a net increase of STIF trees post-development. Furthermore, revegetation efforts will involve the planting of mid and ground-cover species characteristic of STIF, improving the overall complexity of STIF within the Subject Site.

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

for

Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion (STIF)

Critically Endangered Ecological Community

(c) in relation to the habitat of a threatened species or ecological community:	(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and	i) The proposed development will require the removal 409 m² of poor quality STIF accounting for only 0.39% of the local occurrence of STIF. The impact of the removal of STIF trees will be mitigated by the implementation of the landscape plan which involves the planting of thirteen (13) advanced STIF canopy trees within the proposed Subject Site. Eighteen (18) STIF canopy trees will remain unaffected by the proposed development and the revegetation efforts will produce a total of thirty-one (31) trees characteristic of STIF post-development (a net increase of nine (9) STIF canopy tree species).
	(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and	ii) The area of habitat of STIF is not likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity. This is because the habitat is already severely fragmented. The trees to be removed are isolated and the proposed development will not reduce the connectivity of STIF any further. The proposed development will result in an increase in vegetation characteristic of STIF within the Subject Site.
	(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,	iii) The habitat to be removed is not important to the long-term survival of STIF in the locality. The proposed development will result in the removal of 409 m² of poor quality STIF. The trees to be removed to accommodate the development will be replaced with thirteen (13) advanced nursery stock canopy trees. The proposed development will result in an increase in vegetation characteristic of STIF within the Subject Site.
(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),	The proposed development is not likely to have an adverse effect on any declared area of outstanding biodiversity value as there are no such areas in the vicinity of the development.	
(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.	The following Key Threatening Processes (KTPs) are documented to impact upon the survival of STIF: ▪ Clearing of native vegetation; ▪ Loss of hollow-bearing trees;	

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

for

Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion (STIF)

Critically Endangered Ecological Community

- Invasion and establishment of exotic vines and scramblers; and
- High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition.

The proposed development will reduce the overall impacts of these KTPs by active weed removal and native vegetation habitat complexity restoration. No hollow-bearing trees are proposed for removal.

The following KTP will be temporarily increased as a result of the proposed development, however, the impacts will be mitigated extensively:

- Clearing and loss of native vegetation.

The proposed development will see the restoration of native vegetation (STIF) across the Subject Site and enhancement of the overall coverage of this ecological community.

Conclusion

There will be no significant impact on the local occurrence of Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion. Therefore, the proposed action should not warrant the production of a Biodiversity Development Assessment Report (BDAR).

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Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

for

Pteropus poliocephalus (Grey-headed Flying-fox)

Vulnerable Species

Species Ecology

Grey-headed Flying-fox forage at night on flowering and fruiting trees. They travel distances of up to 30 km from camps, and occasionally up to 60-70 km per night, in response to sparsely distributed food resources. This species is a canopy-feeding frugivore, blossom-eater, and nectarivore of rainforests, open forests, woodlands, Melaleuca swamps, and Banksia woodlands. As such, it plays an important ecosystem function by providing a means of seed dispersal and pollination for many indigenous tree species. Grey-headed Flying-fox also feed on introduced trees including commercial fruit crops.

Grey-headed Flying-fox show a regular pattern of seasonal movement. Much of the population concentrates in May and June in northern NSW and Queensland where animals exploit winter-flowering trees such as *Eucalyptus robusta* (Swamp Mahogany), *E. tereticornis* (Forest Red Gum), and *Melaleuca quinquenervia* (Paperbark).

Grey-headed Flying-fox congregate in large numbers at roosting sites (camps) that may be found in rainforest patches, Melaleuca stands, mangroves, riparian woodland, or modified vegetation in urban areas. Individuals generally exhibit a high fidelity to traditional camps and return annually to give birth and rear offspring.

The Subject Site contains potential foraging habitat for this species. No suitable breeding or roost camps occur within or in proximity to the Subject Site.

(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

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

The proposed development is not likely to have an adverse effect on the life cycle of Grey-headed Flying-fox such that a viable local population of this species is likely to be placed at risk of extinction. Grey-headed Flying-fox is a mobile, flying species that is locally abundant. The Subject Site only provides intermittent foraging habitat. No suitable roosting habitat or breeding camps occur.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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

Not Applicable – Grey-headed Flying-fox is not an ecological community.

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

for

Pteropus poliocephalus (Grey-headed Flying-fox)

Vulnerable Species

	(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,	Not Applicable – Grey-headed Flying-fox is not an ecological community.
(c) in relation to the habitat of a threatened species or ecological community:	(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and	i) The proposed development will require the removal of various fruit-bearing and flowering exotic trees and shrubs, as well as 409 m² of poor quality STIF containing native flowering trees that could act as a potential feed trees. While these trees and shrubs may provide potential, intermittent foraging and shelter habitat for this species, they are located in highly-disturbed areas with a high level of human traffic. As a result, it is likely that these trees and shrubs provide sub-optimal ecological value to this species. The impact of the removal of the native trees will be mitigated by the implementation of the landscape plan (Taylor Brammer Landscape Architects 2020). Extensive suitable potential habitat for Grey-headed Flying-fox will remain within the broader Subject Site and in the nearby bushland.
	(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and	ii) The habitat for Grey-headed Flying-fox is unlikely to become isolated from other habitats as a result of the proposed development. This species is mobile and is not likely to be affected by localised tree loss. The habitat is already severely fragmented and the proposed development will not reduce its connectivity any further. Habitat connectivity will continue to occur across the greater landscape.

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

for

Pteropus poliocephalus (Grey-headed Flying-fox)

Vulnerable Species

	(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,	iii) The habitat proposed for removal is not important to the long-term survival of Grey-headed Flying-fox in the locality as the species is locally abundant and highly mobile. The proposed development will be situated predominantly in Urban/Native Exotic Vegetation within a historically developed landscape. The proposed development will involve the removal of a small number of trees which provide sub-optimal foraging habitat for the species in comparison to the extensive potential foraging habitat provided in the surrounding area. The trees on the Subject Site will only form temporary, intermittent foraging habitat and will be replaced with the implementation of the corresponding landscape plan.
(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),		The proposed development is not likely to have an adverse effect on any declared area of outstanding biodiversity value as there are no such areas in the vicinity of the development.
(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.		The following Key Threatening Processes (KTPs) are documented to impact upon the survival of Grey-headed Flying-fox: ▪ Clearing of native vegetation; ▪ Predation by <i>Vulpes Vulpes</i> (European Red Fox) (Linnaeus, 1758); ▪ Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants; ▪ Invasion of native plant communities by <i>Olea europaea</i> subsp. <i>cuspidata</i> (African Olive) (Wall. ex G. Don) Cif.; ▪ Invasion and establishment of exotic vines and scramblers; and ▪ Predation by the <i>Felis catus</i> (Feral Cat). The proposed development will reduce the overall impacts of these KTPs by active weed removal and native vegetation habitat restoration. The following KTP will be temporarily increased as a result of the proposed development, however, the impacts will be mitigated extensively: ▪ Clearing of native vegetation.

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

for

***Pteropus poliocephalus* (Grey-headed Flying-fox)**

Vulnerable Species

The proposed development will see the restoration of native vegetation across the Subject Site and an overall increase in habitat for this species.

Conclusion

There will be no significant impact on a viable local population of *Pteropus poliocephalus*. Therefore, the proposed action should not warrant the production of a Biodiversity Development Assessment Report (BDAR).

References

NSW Office of Environment and Heritage (2017) Grey-headed Flying-fox (*Pteropus poliocephalus*) – Species Conservation Project

NSW Government (2017) NSW Legislation: Biodiversity Conservation act 2016 No 63, Schedule 4: Key Threatening Processes <https://www.legislation.nsw.gov.au/acts/2016-63.pdf>

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

For

Forest Owls

Ninox connivens (Barking Owl), *Ninox strenua* (Powerful Owl), *Tyto novaehollandiae* (Masked Owl), and *Tyto tenebricosa* (Sooty Owl)

Vulnerable Species

Species Ecology

The Barking Owl is most common in open woodlands and riparian forest, but may be found in tall forests across eastern Australia. The species is not common, but it is widespread in NSW. Few breeding pairs exist in Sydney, the species mostly occurs in northern and western Sydney as a nomad.

The Powerful Owl is found in tall forests across eastern Australia, south of the tropics. It is mostly found east of the Great Dividing Range. The species is not common, but it is widespread in NSW. Multiple breeding pairs exist in Sydney.

The Masked Owl is most abundant on the eastern coast of Australia out to the western plains. It lives in eucalypt forests and woodlands from sea level to 1100 m ASL.

The Sooty Owl occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment, and eastern tablelands. It occurs in rainforests, including dry rainforest, subtropical and warm temperate rainforests, as well as moist eucalypt forests.

All species: All of these owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. While the female and young are in the nest hollow the male roosts nearby (10-200 m) guarding them, often choosing a dense 'grove' of trees that provide concealment from other birds that harass him. Pairs of owls demonstrate high fidelity to a large territory, the size of which varies with habitat quality and thus prey densities. In good habitats, a mere 400 ha can support a pair; where hollow-bearing trees and prey have been depleted, the owls need up to 4,000 ha.

No owls, or evidence of owls, were recorded within the Subject Site during the site assessment. It is possible for the Subject Site to exist within the home range of these owl species as individuals or small family groups are likely to live in the surrounding national parks, and may occasionally visit the Subject Site during foraging bouts. However, these species generally require very large permanent territories. The Subject Site provided some potential intermittent roosting habitat for the non-breeding members of these species. It is likely that the species may use the Subject Site for intermittent foraging and/or roosting in native the *Eucalyptus* spp. or exotic *Cinnamomum camphora* within the Subject Site. The hollow-bearing stags identified within the Subject Site are too small to accommodate these species, therefore, no breeding habitat exists within the Subject Site.

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

For

Forest Owls

Ninox connivens (Barking Owl), *Ninox strenua* (Powerful Owl), *Tyto novaehollandiae* (Masked Owl), and *Tyto tenebricosa* (Sooty Owl)

Vulnerable Species

(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,	The proposed action will not have an adverse effect on the life cycle of these owls such that a viable local population is likely to be placed at risk of extinction. The Subject Site is only expected to provide intermittent foraging habitat and intermittent roosting habitat for non-breeding individuals. No potential breeding habitat will be impacted. Few potential roost trees may be removed as a result of the proposed development; however, they do not provide any potential nesting habitat for these species. The impact of the removal of STIF trees will be mitigated by the implementation of the landscape plan which involves the planting of thirteen (13) advanced STIF canopy trees within the proposed Subject Site. The revegetation efforts will produce a net increase of STIF trees post-development. Extensive suitable potential habitat for these species will remain within the broader Subject Site and in the nearby bushland. There will be no significant impact upon the movement of these highly mobile species across the Subject Site and between the Subject Site and surrounding area.	
(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:	(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not Applicable – Forest Owls are not an ecological community.
	(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,	Not Applicable – Forest Owls are not an ecological community.

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

For

Forest Owls

***Ninox connivens* (Barking Owl), *Ninox strenua* (Powerful Owl), *Tyto novaehollandiae* (Masked Owl), and *Tyto tenebricosa* (Sooty Owl)**

Vulnerable Species

(c) in relation to the habitat of a threatened species or ecological community:	(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and	i) The proposed development will remove a small area of potential roosting habitat for these owls caused by a loss of dense canopy trees. This impact will be mitigated by the implementation of the landscape plan which involves the planting of thirteen (13) advanced STIF canopy trees within the proposed Subject Site. The revegetation efforts will produce a net increase of STIF species post-development. The trees to be removed do not provide any potential nesting habitat for the species.
	(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and	ii) The habitat for these owls is unlikely to become isolated from other habitats as a result of the proposed development. Forest Owls are mobile and not likely to be affected by localised tree loss. The habitat is already severely fragmented and the proposed development will not reduce its connectivity any further.
	(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,	iii) The habitat proposed for removal is not important to the long-term survival of these owls in the locality as the species are highly mobile. The potential roost trees on the Subject Site will only form temporary, intermittent foraging habitat. These trees will be replaced and the Subject Site will see an overall increase in vegetation and canopy density. No breeding habitat will be impacted by the development.
(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),	The proposed development is not likely to have an adverse effect on any declared area of outstanding biodiversity value as there are no such areas in the vicinity of the development.	
(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.	The following Key Threatening Processes (KTPs) are documented to impact upon the survival of Forest Owls: ▪ Habitat clearing and fragmentation; ▪ Logging;	

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

For

Forest Owls

Ninox connivens (Barking Owl), *Ninox strenua* (Powerful Owl), *Tyto novaehollandiae* (Masked Owl), and *Tyto tenebricosa* (Sooty Owl)

Vulnerable Species

- Loss of hollow-bearing trees;
- Fire;
- Predation by Fox and Lace Monitors; and
- Removal of dead wood and dead trees.

The following KTP will be temporarily increased as a result of the proposed development, however, the impacts will be mitigated extensively:

- Habitat clearing and fragmentation.

The proposed development will see the restoration of native vegetation across the Subject Site and an overall increase in habitat for this species.

Conclusion

There will be no significant impact on a viable local population of *Ninox strenua*, *Ninox connivens*, *Tyto novaehollandiae*, or *Tyto tenebricosa*. Therefore, the proposed action should not warrant the production of a Biodiversity Development Assessment Report (BDAR).

References

NSW Office of Environment and Heritage (2017) Masked Owl *Tyto novaehollandiae*– Conservation Projects and Species Profile <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10820>

NSW Office of Environment and Heritage (2017) Powerful Owl *Ninox strenua*– Conservation Projects and Species Profile <http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10562>

NSW Office of Environment and Heritage (2017) Sooty Owl *Ninox strenua*– Conservation Projects and Species Profile <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10821>

NSW Office of Environment and Heritage (2018) Barking Owl *Ninox connivens*– Conservation Projects and Species Profile <http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10561>

NSW Government (2017) NSW Legislation: Biodiversity Conservation act 2016 No 63, Schedule 4: Key Threatening Processes <https://www.legislation.nsw.gov.au/acts/2016-63.pdf>

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

For

Microbats

Falsistrellus tasmaniensis (Eastern False Pipistrelle), *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat), *Miniopterus australis* (Little Bent-winged Bat), *Miniopterus orianae oceanensis* (Large Bent-winged Bat), *Saccolaimus flaviventris* (Yellow-bellied Sheath-tailed Bat), and *Scoteanax rueppellii* (Greater Broad-nosed Bat).

Vulnerable Species

Species Ecology	All species: All of these microbats share foraging requirements. They all forage for flying insects at varying heights within woodland and forested areas with open or closed canopies. Each of these species has specific requirements for maternity roosts (breeding sites), but they all require short term roosting habitat when not breeding. All of these bat species primarily roost within tree hollows, under decorticating bark, in caves or occasionally within manmade structures. The habitat used by these species on the Subject Site includes tree hollows which would most likely only be used for temporary roosting by small groups and individuals. The spaces between trees within the Subject Site may be used as foraging habitat for these species. Use of the Subject Site by any of these species is expected to be limited, as they are all expected to forage over larger areas.
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(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,	The proposed development will not have an adverse effect on the life cycle of these microbats such that a viable local population of these species is likely to be placed at risk of extinction. The Subject Site is only expected to provide intermittent foraging habitat, and intermittent roosting habitat for non-breeding individuals. No potential breeding habitat will be impacted. The proposed development will not require the removal of any hollow-bearing stags identified within the Subject Site. There will be no effects on the movement of these highly mobile species across the Subject Site and between the Subject Site and adjoining areas.	
(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:	(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not Applicable – Microbats are not an ecological community.

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

For

Microbats

Falsistrellus tasmaniensis (Eastern False Pipistrelle), *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat),
Miniopterus australis (Little Bent-winged Bat), *Miniopterus orianae oceanensis* (Large Bent-winged Bat),
Saccolaimus flaviventris (Yellow-bellied Sheath-tailed Bat), and *Scoteanax rueppellii* (Greater Broad-nosed Bat).

Vulnerable Species

	(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,	Not Applicable – Microbats are not an ecological community.
(c) in relation to the habitat of a threatened species or ecological community:	(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and	i) The proposed development will not remove any hollow-bearing stags as identified within the Subject Site. In the unlikely event of the removal of a hollow-bearing tree, lost hollows will be replaced by augmented hollows. There will be no effects to the movement of these highly mobile species across the Subject Site, and between the Subject Site and adjoining areas.
	(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and	ii) The habitat for these species is unlikely to become isolated from other habitats as a result of the proposed development. Microbats are mobile and not likely to be affected by localised tree loss. The habitat is already severely fragmented and the proposed development will not reduce its connectivity any further.
	(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,	iii) The habitat proposed for removal is not important to the long-term survival of these species in the locality as the species are locally abundant and highly mobile. The potential roost trees on the Subject Site will only form temporary, intermittent foraging habitat. These trees will be replaced and the Subject Site will see an overall increase in vegetation. No breeding habitat will be impacted by the development. In the unlikely event of the removal of a hollow-bearing tree, lost hollows will be replaced by augmented hollows.
(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),		The proposed development is not likely to have an adverse effect on any declared area of outstanding biodiversity value as there are no such areas in the vicinity of the development.

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

For

Microbats

Falsistrellus tasmaniensis (Eastern False Pipistrelle), *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat), *Miniopterus australis* (Little Bent-winged Bat), *Miniopterus orianae oceanensis* (Large Bent-winged Bat), *Saccolaimus flaviventris* (Yellow-bellied Sheath-tailed Bat), and *Scoteanax rueppellii* (Greater Broad-nosed Bat).

Vulnerable Species

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The following Key Threatening Processes (KTPs) are documented to impact upon the survival of microbats:

- Clearing of native vegetation;
- High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition;
- Loss of hollow-bearing trees; and
- Removal of dead wood and dead trees.

No hollow-bearing trees are proposed for removal. In the unlikely event of the removal of a hollow-bearing tree, lost hollows will be replaced by augmented hollows.

The following KTP will be temporarily increased as a result of the proposed development, however, the impacts will be mitigated extensively:

- Habitat clearing and fragmentation.

The proposed development will see the restoration of native vegetation across the Subject Site and an overall increase in habitat for this species.

Conclusion

There will be no significant impact on a viable local population of *Falsistrellus tasmaniensis*, *Micronomus norfolkensis*, *Miniopterus australis*, *Miniopterus orianae oceanensis*, *Saccolaimus flaviventris*, or *Scoteanax rueppellii*. Therefore, the proposed action should not warrant the production of a Biodiversity Development Assessment Report (BDAR).

References

NSW Office of Environment and Heritage (2017) Eastern False Pipistrelle *Falsistrellus tasmaniensis* – Conservation Projects and Species Profile <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10331>

NSW Office of Environment and Heritage (2017) Eastern Coastal Free-tailed Bat *Micronomus norfolkensis* – Conservation Projects and Species Profile <https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10544>

NSW Office of Environment and Heritage (2018) Little Bent-wing Bat *Miniopterus australis* – Conservation Projects and Species Profile <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10533>

NSW Office of Environment and Heritage (2019) Large Bent-wing Bat *Miniopterus orianae oceanensis* – Conservation Projects and Species Profile <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10534>

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

For

Microbats

Falsistrellus tasmaniensis (Eastern False Pipistrelle), *Microsomus norfolkensis* (Eastern Coastal Free-tailed Bat),
Miniopterus australis (Little Bent-winged Bat), *Miniopterus orianae oceanensis* (Large Bent-winged Bat),
Saccolaimus flaviventris (Yellow-bellied Sheath-tailed Bat), and *Scoteanax rueppellii* (Greater Broad-nosed Bat).

Vulnerable Species

NSW Office of Environment and Heritage (2017) Yellow-bellied Sheath-tailed Bat *Saccolaimus flaviventris*–
Conservation Projects and Species Profile
<https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10741>

NSW Government (2017) NSW Legislation: Biodiversity Conservation act 2016 No 63, Schedule 4: Key Threatening
Processes <https://www.legislation.nsw.gov.au/acts/2016-63.pdf>

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

For

Glossopsitta pusilla (Little Lorikeet)¹

Lathamus discolour (Swift Parrot)²

Anthochaera phrygia (Regent Honeyeater)³

¹Vulnerable Species; ²Endangered Species, ³Critically Endangered Species

Species Ecology

The Little Lorikeet mostly occurs in dry, open, eucalyptus forests and woodlands where abundant nectar-bearing trees occur. The species does not undergo regular migration, but instead is considered nomadic with irregular large or small influxes of individuals occurring at any time of year. This is usually in response to seasonal variations in food supply. Little Lorikeets often forage in small groups with other species of lorikeet, feeding primarily on nectar and pollen from tall eucalyptus species. The Little Lorikeet may also forage within melaleucas and mistletoes. Breeding activity is known from the western slopes, where birds utilise small hollows (~3 cm) within tall, living, smooth-barked trees.

The Swift Parrot is a small parrot about 25 cm long. It is bright green with red around the bill, throat, and forehead. This species 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, this species 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 infestations (from sap-sucking bugs).

The Regent Honeyeater is a striking and distinctive, medium-sized, black and yellow honeyeater with a sturdy, curved bill. Adults weigh 35-50 grams, are 20-24 cm long, and have a wingspan of 30 cm. The Regent Honeyeater is a flagship threatened woodland bird whose conservation will benefit a large suite of other threatened and declining woodland fauna. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River She-oak. 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 an abundance of mistletoes.

Suitable foraging habitat on the Subject Site includes tall, smooth-barked *Eucalyptus* spp. when in flower, or *Eucalyptus* spp. foliage that is infested with lerp (psyllid bugs).

Suitable breeding habitat may exist for the Little Lorikeet within the hollow-bearing stags of the Subject Site.

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

For

Glossopsitta pusilla (Little Lorikeet)¹

Lathamus discolor (Swift Parrot)²

Anthochaera phrygia (Regent Honeyeater)³

¹Vulnerable Species; ²Endangered Species, ³Critically Endangered Species

(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

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

The proposed development is not likely to have an adverse effect on the life cycle of these species such that a viable local population of the species is likely to be placed at risk of extinction.

Little Lorikeet, Swift Parrot, and Regent Honeyeater are nomadic and highly mobile. The Subject Site would only provide intermittent foraging habitat. This habitat is of low quality, owing to the infrequency of flowering, the urban setting, and the abundance of local aggressive Noisy Miner and Australian Magpie within the Subject Site.

The proposed development will require the removal of 409 m² of STIF containing native flowering trees that could act as potential feed trees.

The impact of the removal of STIF trees will be mitigated by the implementation of the landscape plan which involves the planting of thirteen (13) advanced STIF canopy trees within the proposed Subject Site. The revegetation efforts will produce a net increase of STIF species post-development.

Extensive suitable potential habitat for these species will remain within the Subject Site post-development and in the nearby bushland.

There will be no significant impact upon the movement of these highly mobile species across the Subject Site and between the Subject Site and surrounding area.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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

Not Applicable – Little Lorikeet, Swift Parrot, and Regent Honeyeater are not an ecological community.

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

For

Glossopsitta pusilla (Little Lorikeet)¹

Lathamus discolor (Swift Parrot)²

Anthochaera phrygia (Regent Honeyeater)³

¹Vulnerable Species; ²Endangered Species, ³Critically Endangered Species

	(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,	Not Applicable – Little Lorikeet, Swift Parrot, and Regent Honeyeater are not an ecological community.
(c) in relation to the habitat of a threatened species or ecological community:	(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and	i) The proposed development will require the removal of 409 m² of STIF vegetation within highly disturbed and fragmented patches. Thirteen (13) advanced STIF trees will be replanted with the implementation of the landscape plan, yielding a net increase of nine (9) STIF trees within the Subject Site. The proposed development will not remove any hollow-bearing stags as identified within the Subject Site. In the unlikely event of the removal of a hollow-bearing tree, lost hollows will be replaced by augmented hollows. There will be no effects to the movement of these highly mobile species across the Subject Site, and between the Subject Site and adjoining areas.
	(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and	ii) The habitat for these species is unlikely to become isolated from other habitats as a result of the proposed development. The species are mobile and not likely to be affected by localised tree loss. The habitat is already severely fragmented and the proposed development will not reduce its connectivity any further.

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

For

Glossopsitta pusilla (Little Lorikeet)¹

Lathamus discolor (Swift Parrot)²

Anthochaera phrygia (Regent Honeyeater)³

¹Vulnerable Species; ²Endangered Species, ³Critically Endangered Species

	(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,	iii) The habitat proposed for removal is not important to the long-term survival of these species in the locality as the species are highly mobile. The trees on the Subject Site will only form temporary, intermittent foraging habitat, and the trees proposed for removal will be replaced with the implementation of the corresponding landscape plan. The hollow-bearing stags will be retained within the Subject Site and may continue to provide potential breeding habitat for Little Lorikeet.
(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),		The proposed development is not likely to have an adverse effect on any declared area of outstanding biodiversity value as there are no such areas in the vicinity of the development.
(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.		The following Key Threatening Processes (KTPs) are documented to impact upon the survival of these birds: ▪ Clearing of native vegetation; ▪ Infection of native plants by <i>Phytophthora cinnamomi</i>; ▪ High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition; ▪ Removal of dead wood and dead trees; ▪ Loss of hollow-bearing trees; ▪ Aggressive exclusion of birds from woodland and forest habitat by abundant <i>Manorina melanocephala</i> (Noisy Miners); ▪ Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners; and ▪ Infection by <i>Psittacine Circoviral</i> (beak and feather) disease affecting endangered psittacine species and populations. The following KTP will be temporarily increased as a result of the proposed development, however, the impacts will be mitigated extensively: ▪ Clearing of native vegetation.

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

For

Glossopsitta pusilla (Little Lorikeet)¹

Lathamus discolor (Swift Parrot)²

Anthochaera phrygia (Regent Honeyeater)³

¹Vulnerable Species; ²Endangered Species, ³Critically Endangered Species

The proposed development will see the restoration of native vegetation across the Subject Site and an overall increase in habitat for this species.

Conclusion

There will be no significant impact on a viable local population of *Glossopsitta pusilla*, *Lathamus discolor*, or *Anthochaera Phrygia*. Therefore, the proposed action should not warrant the production of a Biodiversity Development Assessment Report (BDAR).

References

NSW Office of Environment and Heritage (2017) Little Lorikeet (*Glossopsitta pusilla*) – Species Conservation Project <http://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10697>

NSW Office of Environment and Heritage (2017) Swift Parrot (*Lathamus discolor*) – Profile <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10455>

NSW Office of Environment and Heritage (2017) Regent Honeyeater (*Anthochaera phrygia*) – Species Conservation Project <http://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10841>

NSW Government (2017) NSW Legislation: Biodiversity Conservation act 2016 No 63, Schedule 4: Key Threatening Processes <https://www.legislation.nsw.gov.au/acts/2016-63.pdf>

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

For

***Ptilinopus superbus* (Superb Fruit-dove)**

Vulnerable Species

Species Ecology

The Superb Fruit-dove inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.

Part of the population is migratory or nomadic. There are records of single birds flying into lighted windows and lighthouses, indicating that birds travel at night. At least some of the population, particularly young birds, moves south through Sydney, especially in autumn.

Breeding takes place from September to January. The nest is a structure of fine interlocked forked twigs, giving a stronger structure than its flimsy appearance would suggest, and is usually 5-30 m high in rainforest and rainforest edge tree and shrub species.

Suitable foraging habitat on the Subject Site includes planted palms and exotic fruit trees. No suitable breeding habitat occurs for this species on the Subject Site.

(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

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

The proposed development is not likely to have an adverse effect on the life cycle of Superb Fruit-dove such that a viable local population of the species is likely to be placed at risk of extinction.

Superb Fruit-doves are nomadic and highly mobile. The Subject Site only provides intermittent foraging habitat. This habitat is of low quality, owing to the infrequency and limited abundance of fruiting. No suitable nesting habitat occurs. All native fruit bearing trees to be removed by the proposed development will be replaced with native equivalents as part of the implementation of the corresponding landscape plan. The proposed development will not result in a net loss of habitat for this species.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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

Not Applicable – Superb Fruit-doves are not an ecological community.

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

For

Ptilinopus superb (Superb Fruit-dove)

Vulnerable Species

	(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,	Not Applicable – Superb Fruit-doves are not an ecological community.
(c) in relation to the habitat of a threatened species or ecological community:	(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and	i) Flowering and fruit-bearing trees and shrubs will be removed for the proposed development. While these trees and shrubs may provide potential foraging habitat and shelter for these species, many of the trees have been planted and are located in highly-disturbed areas with a high level of human traffic. As a result, it is likely that these trees provide sub-optimal ecological value to the species. Thirteen (13) advanced STIF trees will be replanted with the implementation of the landscape plan, yielding a net increase of nine (9) STIF trees within the Subject Site. Therefore, the implementation of the landscape plan will increase potential habitat for these species within the Subject Site. No anticipated effects to breeding habitat.
	(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and	ii) The habitat for Superb Fruit-dove is unlikely to become isolated from other habitats as a result of the proposed development. This species is mobile and not likely to be affected by localised tree loss. The habitat is already severely fragmented and the proposed development will not reduce its connectivity any further.
	(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,	iii) The habitat proposed for removal is not important to the long-term survival of Superb Fruit-dove in the locality as the species is highly mobile. The trees on the Subject Site will only form temporary, intermittent foraging habitat, and will be replaced with the implementation of the corresponding landscape plan.

Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

For

Ptilinopus superbus (Superb Fruit-dove)

Vulnerable Species

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

The proposed development is not likely to have an adverse effect on any declared area of outstanding biodiversity value as there are no such areas in the vicinity of the development.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The following Key Threatening Processes (KTPs) are documented to impact upon the survival of Superb Fruit-Dove:

- Fragmentation – increased edge effects, and lack of genetic diversity;
- Invasion by ‘mixed weeds’;
- Human disturbance from recreational use;
- Urban run-off, which leads to increased nutrients and sedimentation;
- Predation from pest species – including cats, foxes and dogs (both domestic and feral);
- Loss of key fauna habitat through lack of recruitment of large overstorey trees; and
- Removal of vegetation, including mowing.

The following KTP will be temporarily increased as a result of the proposed development, however, the impacts will be mitigated extensively:

- Loss of key fauna habitat through lack of recruitment of large overstorey trees.

The proposed development will see the restoration of native vegetation across the Subject Site and an overall increase in habitat for this species.

Conclusion

There will be no significant impact on a viable local population of *Ptilinopus superbus*. Therefore, the proposed action should not warrant the production of a Biodiversity Development Assessment Report (BDAR).

References

NSW Office of Environment and Heritage (2018) Superb Fruit-Dove (*Ptilinopus superbus*) – Species Conservation Project <http://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10709>

NSW Government (2017) NSW Legislation: Biodiversity Conservation act 2016 No 63, Schedule 4: Key Threatening Processes <https://www.legislation.nsw.gov.au/acts/2016-63.pdf>

Appendix D. Commonwealth Environment Protection and Biodiversity Conservation Act 1999– Assessment of Significant Impact Criteria

Commonwealth Environment Protection and Biodiversity Conservation Act 1999– Assessment of Significant Impact Criteria	
For	
<i>Anthochaera phrygia</i> (Regent Honeyeater)	
<i>Lathamus discolor</i> (Swift Parrot)	
EPBC Act Status: Critically Endangered	
Significant Impact criteria An action is likely to have a significant Impact on a critically endangered or endangered species if there is a real chance or possibility that it will:	
Lead to a long-term decrease in the size of a population	The proposed action is not likely to lead to a long-term decrease in the size of a population of either bird species. The Regent Honeyeater and Swift Parrot were not observed on the Subject Site during the site assessment. No nests were located for the Regent Honeyeater, while the Swift Parrot only breeds in Tasmania. No hollow-bearing trees will be lost as a result of the proposed development. In the unlikely event of the removal of a hollow-bearing tree, lost hollows will be replaced by augmented hollows. Flowering and fruit-bearing trees and shrubs will be removed for the proposed development. While these trees and shrubs may provide potential foraging habitat and shelter for these species, many of the trees have been planted and are located in highly-disturbed areas with a high level of human traffic. As a result, it is likely that these trees provide sub-optimal ecological value to the species. Thirteen (13) advanced STIF trees will be replanted with the implementation of the landscape plan, yielding a net increase of nine (9) STIF trees within the Subject Site. Therefore, the implementation of the landscape plan will increase potential habitat for these species within the Subject Site.
Reduce the area of occupancy of the species	The proposed development is not likely to have an adverse effect on the life cycle of these species such that a viable local population of the species is likely to be placed at risk of extinction. Swift Parrot and Regent Honeyeater are nomadic and highly mobile. The Subject Site would only provide intermittent foraging habitat. This habitat is of low quality, owing to the infrequency of flowering, the urban setting, and the abundance of local aggressive Noisy Miner and Australian Magpie within the Subject Site.

Commonwealth Environment Protection and Biodiversity Conservation Act 1999– Assessment of Significant Impact Criteria

For

Anthochaera phrygia (Regent Honeyeater)

Lathamus discolor (Swift Parrot)

EPBC Act Status: Critically Endangered

	The proposed development will require the removal of 409 m² of STIF vegetation containing native flowering trees that could act as potential feed trees. The impact of the removal of all native trees will be mitigated by the implementation of the landscape plan that involves the planting of thirteen (13) advanced STIF trees. This will yield a net increase of nine (9) STIF trees within the Subject Site.
Fragment an existing population into two or more populations	These species are mobile and the proposed development is not likely to fragment an existing population of either species into two or more populations. This is because the habitat is already severely fragmented and the proposed development will not reduce its connectivity any further.
Adversely affect habitat critical to the survival of a species	The action will not adversely affect habitat critical to the survival of either of these species.
Disrupt the breeding cycle of a population	There will be no disruption to the breeding cycle of a population. Although no individuals were observed on the site during field surveys, if the species were to pass through or utilise the Subject Site for breeding, extensive suitable breeding and foraging habitat will remain on the Subject Site for Regent Honeyeater while the Swift Parrot only breeds in Tasmania.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The action will not modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species are likely to decline. The proposed development will be situated predominantly on Urban Native/Exotic vegetation and already developed lands that are mostly cleared of native vegetation. A small area of native vegetation (409 m²) will be removed. Trees to be removed by the proposed development will be replaced with the implementation of the corresponding landscape plan, therefore habitat will persist within the Subject Site.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or	It is unlikely that the proposed action will result in invasive species that are harmful to the species becoming established in species' habitat. The development will involve the removal and clearing of all noxious weeds present within the Subject Site.

Commonwealth Environment Protection and Biodiversity Conservation Act 1999– Assessment of Significant Impact Criteria

For

Anthochaera phrygia (Regent Honeyeater)

Lathamus discolor (Swift Parrot)

EPBC Act Status: Critically Endangered

critically endangered species' habitat	
Introduce disease that may cause the species to decline, or	The proposed action will not introduce disease that may cause the species to decline.
Interfere with the recovery of the species.	While 409 m ² of potential foraging habitat will be removed as a result of the proposed works, it is not deemed that this removal of minor, intermittent habitat will interfere with the recovery of the species which roam over most of eastern and central NSW in search of optimal food resources. Potential impacts are to be mitigated through the measures outlined in this report including the requirement for a qualified Ecologist to be present on-site during tree removal to supervise works and provide assistance to any birds directly impacted.

Conclusion

There will be no significant Impact on *Anthochaera Phrygia* or *Lathamus discolor*. Therefore, the proposed action should not warrant a Commonwealth EPBC Act Referral.

References

NSW Office of Environment and Heritage (2017) Regent Honeyeater – profile <http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10841> [May 017]

NSW Office of Environment and Heritage (2017) Swift Parrot– profile <http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10455> [May 2017]

Commonwealth Environment Protection and Biodiversity Conservation Act 1999– Assessment of Significant Impact Criteria

For

Pteropus poliocephalus (Grey-headed Flying-fox)

EPBC Act Status: Vulnerable

Significant Impact criteria

An action is likely to have a significant Impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

Lead to a long-term decrease in the size of a population	The proposed action is not likely to lead to a long-term decrease in the size of a population of Grey-headed Flying-fox. No roosts were identified within the Subject Site or immediate surrounding area. The proposed development will require the removal of 409 m² of native STIF vegetation with various fruit-bearing and flowering exotic/native trees and shrubs. While these trees and shrubs may provide potential, intermittent foraging and shelter habitat for the species, they are located in highly-disturbed areas with a high level of human traffic. As a result, it is likely that these trees and shrubs provide sub-optimal ecological value to the species. Thirteen (13) advanced STIF trees will be replanted with the implementation of the landscape plan, yielding a net increase of nine (9) STIF trees within the Subject Site. Extensive suitable potential habitat for the species will remain within the broader Subject Site and in the nearby bushland.
Reduce the area of occupancy of the species	The proposed development is not likely to have an adverse effect on the life cycle of these species such that a viable local population of the species is likely to be placed at risk of extinction. Grey-headed Flying-fox are nomadic and highly mobile. The Subject Site would only provide intermittent foraging habitat. This habitat is of low quality, owing to the infrequency of flowering, the urban setting, and the abundance of local aggressive Noisy Miner and Australian Magpie within the Subject Site. The impact of the removal of native feed trees will be mitigated by the implementation of the landscape plan which involves the planting of Thirteen (13) advanced STIF trees. This will yield a net increase of nine (9) STIF trees within the Subject Site.
Fragment an existing population into two or more populations	This species is mobile and not likely to fragment an existing population of either species into two or more populations. This is because the habitat is already severely fragmented and the proposed development will not reduce its connectivity any further.

Commonwealth Environment Protection and Biodiversity Conservation Act 1999– Assessment of Significant Impact Criteria

For

***Pteropus poliocephalus* (Grey-headed Flying-fox)**

EPBC Act Status: Vulnerable

Adversely affect habitat critical to the survival of a species	The action will not adversely affect habitat critical to the survival of this species.
Disrupt the breeding cycle of a population	There will be no disruption to the breeding cycle of a population as this species does not breed within or in proximity to the Subject Site.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The action will not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The proposed development will be situated predominantly on Urban Native/Exotic vegetation and already developed lands that are mostly cleared of native vegetation. A small area of native vegetation (409 m ²) will be cleared. Native trees to be removed by the proposed development will be replaced as part of the implementation of the corresponding landscape plan, therefore habitat will persist within the Subject Site.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	It is unlikely that the proposed action will result in invasive species that are harmful to the species becoming established in species' habitat. The development will involve the removal and clearing of all noxious weeds present within the Subject Site.
Introduce disease that may cause the species to decline, or	The proposed action will not introduce disease that may cause the species to decline.
Interfere with the recovery of the species.	While 409 m ² of native vegetation will be removed as a result of the proposed works, it is not deemed that this removal of minor, intermittent habitat will interfere with the recovery of the species. Potential impacts are to be mitigated through the measures outlined in this report including the requirement for a qualified Ecologist to be present on-site during tree removal to supervise works and provide assistance to any individuals directly impacted.

Conclusion

There will be no significant Impact on *Pteropus poliocephalus*. Therefore, the proposed action should not warrant a Commonwealth EPBC Act Referral.

References

- NSW Office of Environment and Heritage (2017) Regent Honeyeater – profile <http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10841> [May 017]
- NSW Office of Environment and Heritage (2017) Swift Parrot– profile <http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10455> [May 2017]



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