Travers

bushfire & ecology

Biodiversity Development Assessment Report

18 Jenner Street
Baulkham Hills

February 2021
(REF: 19ARD04)

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File:	19ARD04

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The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.

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List of abbreviations

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DEC	NSW Department of Environment and Conservation (superseded by DECC from April 2007)
DECC	NSW Department of Environment and Climate Change (superseded by DECCW from October 2009)
DECCW	NSW Department of Environment, Climate Change and Water (superseded by OEH from April 2011)
DEWHA	Commonwealth Department of Environment, Water, Heritage & the Arts (superseded by SEWPAC)
DOEE	Commonwealth Department of Environment & Energy (superseded by DAWE February 2020)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OEH	Office of Environment and Heritage (superseded by DPIE from August 2019)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

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Background 1

Travers bushfire & ecology has been engaged to undertake a biodiversity constraints assessment within Lot 4 DP 1108855, Lots 39-45 DP2489 and Lot Z DP 400638 at 18 Jenner Street, Baulkham Hills within The Hills Shire local government area (LGA). The extent of this entire lot is shown in Figure 1 below. This lot is subject to a proposed mixed-use development application (described in section 1.1) and will hereafter be referred to as the 'study area'.

The study area extends to the lot boundaries and it is assumed that cut and fill operations will likely impact the entire area, thus the 'development footprint' and study area are one of the same, shown on Figure 1 below.

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

Figure 1 – Study area

1.1 Proposed development

The Hills Club propose a planning proposal to redevelop The Hills Club, Baulkham Hills. The proposal seeks to retain the current *RE2 Private Recreation zone* under *The Hills Local Environmental Plan 2019* and include new uses on the site to support The Club and related activities. The additional uses include:

- a new Community Club with a diverse range of food and beverage offerings, members lounge, restaurant, cafe and dining facilities, multi-functional recreation areas, open air bowling green and an enclosed world championship bowling green with associated facilities, 200 car spaces and loading dock
- approximately 270 residential apartments across 4 buildings comprising residential and seniors housing
- commercial, retail and other ancillary uses
- site through link
- basement residential carparking for approximately 500 cars
- public domain upgrades
- signage

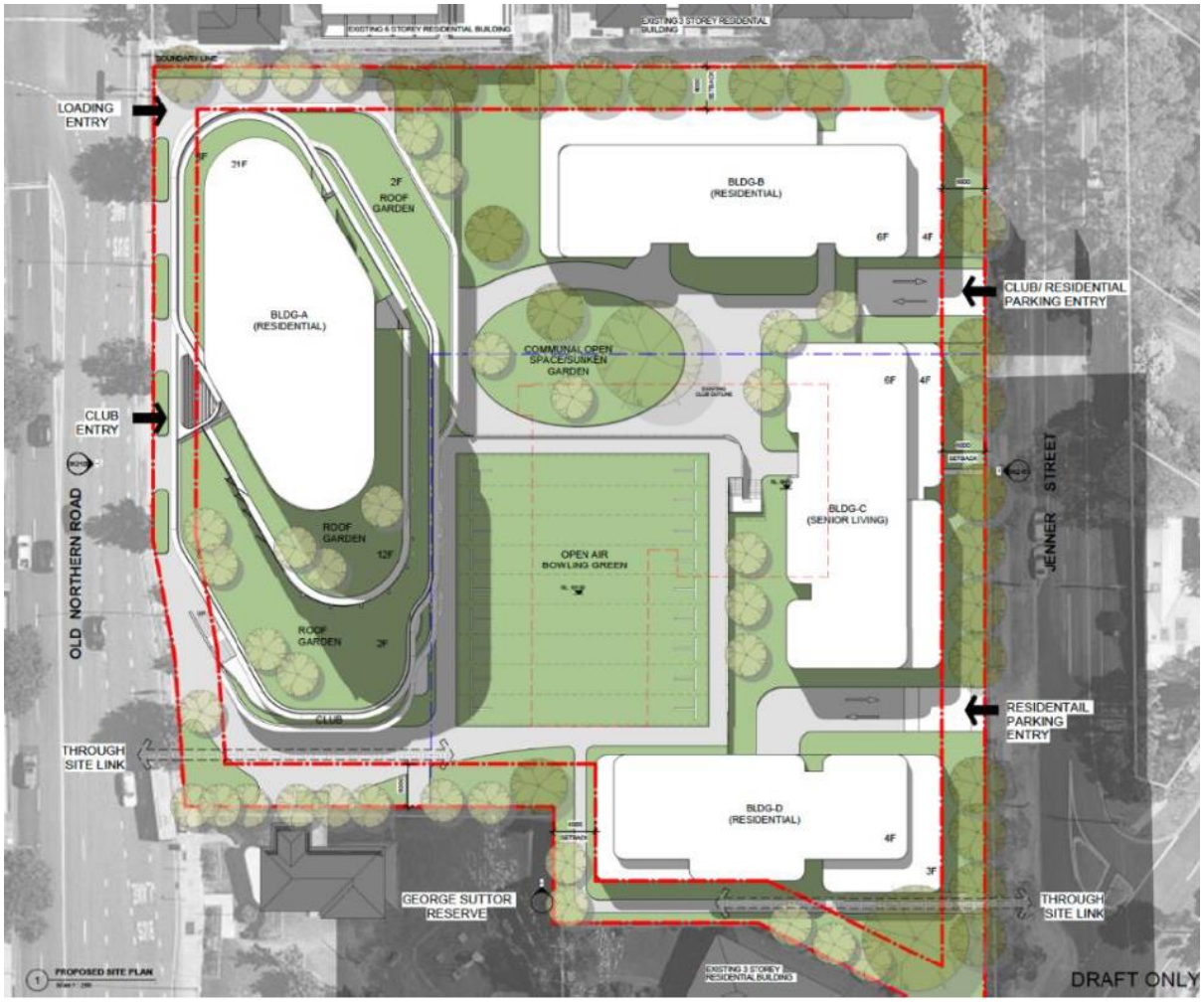

Figure 2 – Proposed development

(Source: Altis Architecture, date 07/07/2020)

The proposed Masterplan provides for four (4) main buildings designed around a central communal open space and multi-purpose recreational facilities. The Masterplan sets out future land uses, setbacks, building envelopes and building height controls ranging from 16

m to 69 m. The proposal seeks an overall floorspace ratio of 2.5:1 with access from both Old Northern Road (loading dock only) and Jenner Street, Baulkham Hills.

1.2 Site description

Table 1 provides a summary of the planning, cadastral, topographical, and disturbance details of the development footprint.

Table 1 – Site features

Location	18 Jenner Street, Baulkham Hills (refer to Figure 1)
Area	Approximately 1.34 ha
Development footprint	Approximately 1.34 ha
Local government area	The Hills
Zoning	RE2 Private recreation
Grid reference	314200E 6273550N MGA-56
Elevation	Approximately 95-110 m AHD
Topography	Situated on a very slight overall gradient with a north-east aspect
Geology and soils	Geology: Ashfield Shale. Soils: Luddenham Soil Landscape.
Catchment, drainage and steam order	There are no creek lines or drainages within the site or very close. The site is located almost on the plateau and likely to drain to the south or east towards Stevenson Creek or Northmead Gully, both of which are part of the Parramatta River Catchment.
Existing land use	There is an existing bowling club located on site containing car parking, three (3) bowling greens and a clubhouse.
Connectivity features	There is no vegetation and habitat connectivity across any part of the site.

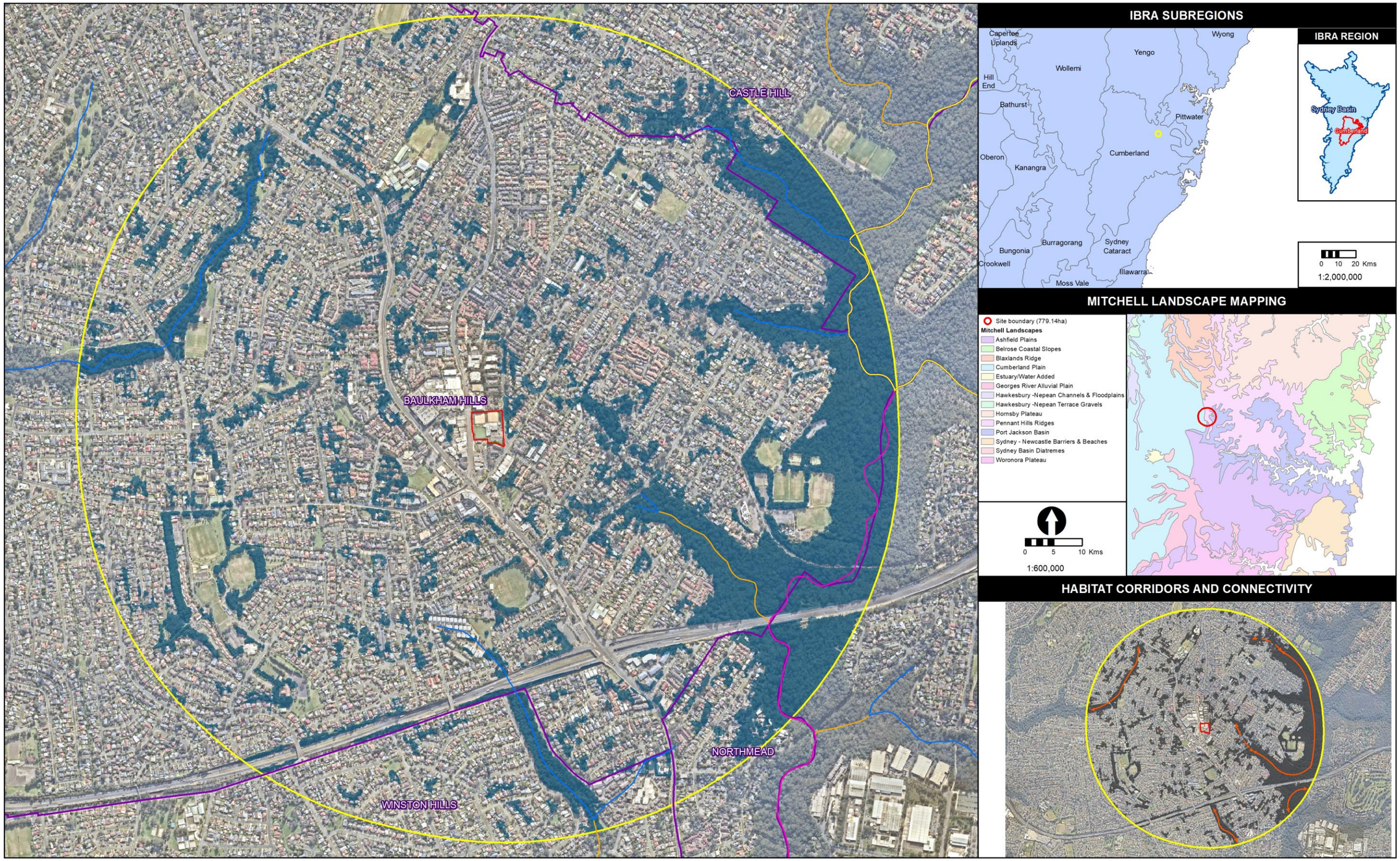

Figure 3 – Location map

Flora 2

2.1 Survey

Botanical survey was undertaken on 5 August 2020 over a time frame of approximately 2.5 hrs.

Botanical survey included a random meander in accordance with *Cropper* (1993) to gain a full species list of the plants within the site, and then one (1) BAM quadrat of 0.1 ha was undertaken in the north-eastern corner to assist in determining the plant community type (PCT). A review of the *Atlas of NSW Wildlife* (DPIE 2020) was undertaken prior to the site visit to determine threatened species previously recorded within 10 km of the development footprint, and relevant target searches were undertaken as suited, generally as near-linear transects underneath or adjacent to remnant canopy vegetation along the southern and eastern boundary.

All naturally occurring species were identified to species level where possible, and are listed in Appendix 1.

2.2 Vegetation communities

The Native Vegetation of the Sydney Metropolitan Area OEH (2016) did not map any of the vegetation on site as a plant community. The canopy vegetation on the eastern side of Jenner Street was mapped as Urban Native / Exotic and not attributed to any native PCT.

Field verification of the entire site found the following vegetation communities in regrowth or planted forms:

- PCT 1281 – Turpentine – Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion (0.03 ha) – regrowth / planted
- Landscaped garden beds (0.20 ha) – combination of native / exotic although most natives are not locally occurring

The vegetation along Jenner Street at the southern end is comprised of four (4) *Eucalyptus nicholii* trees and a sparsely planted ground layer of vegetation. Whilst the 'best fit' PCT is PCT 632 – Narrow-leaved Black Peppermint open forest mainly on acid volcanics in the western New England Tableland Bioregion, this PCT does not occur within the Sydney Basin Bioregion, nor does *Eucalyptus nicholii.* PCT 632 is associated with TEC vegetation, McKies Stringybark/Blackbutt Open Forest in the Nandewar and New England Tableland Bioregions, however given the site does not occur on acid volcanics in the western New England Tableland Bioregion, it cannot be TEC vegetation. As this area of vegetation cannot be attributed to a locally occurring PCT, it will be added to the Landscaped garden beds.

The vegetation along Jenner Street at the northern end is comprised of planted specimens, however many are native including *Westringia fruticosa, Lomandra longifolia, Grevillea* spp., *Callistemon* spp. and *Banksia integrifolia.* When entering native species into the tool that lists out potential PCTs, PCT 771 - Coastal sand Tea-tree – Banksia scrub was the best fit. All plants in this area have been planted as part of the landscaping works and PCT 771 only occurs over sandy substrates close to the ocean, well away from The Hills LGA. As such, it has also been added to the landscaped garden beds community.

Vegetation descriptions are provided below.

PCT 1281 – Turpentine – Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion (0.03 ha)

This occurs along the southern boundary of the site and contains a few individual *Angophora costata* and one (1) *Eucalyptus saligna,* along with planted *Casuarina glauca, Grevillea* species and both native and exotic ground covers and small shrubs, sparsely.

The local soils and geology are shale based but with *Angophora costata* being present, would indicate sandstone nearby. Sydney Turpentine Ironbark Forest threatened ecological community (TEC) occurs on nearby lands that would contain similar canopy species. Given the edaphic features and the locality, it is likely that this tiny bit of vegetation is a remnant of the TEC Sydney Turpentine Ironbark Forest. The seed bank is likely to have been severely depleted given the maintenance of the ground layer through weeding, herbicide sprays and sparse landscaping. Given the close proximity of the TEC to the site, this area of vegetation has been assigned PCT 1281 in line with nearby remnants mapped by OEH 2016.

Photo 1 – Young native vegetation along the southern boundary

Canopy - *Angophora costata, Eucalyptus saligna* and *Casuarina glauca* to 20 m in height and projected foliage cover of approximately 25-35%.

Mid-storey – Where present, all specimens are planted. *Grevillea* species, *Ligustrum lucidum, Viburnum odoratissimum* and *Coleonema pulchrum.*

Ground layer – Sparse and generally all planted except for some weed species coming through the bark. *Lomandra longifolia, Carex appressa* and *Agave sp.*

Landscaped Garden Beds

This vegetation community describes areas of planted vegetation that is mostly exotic species in the central and western areas, with a combination of planted native and exotic species along Jenner Street. The majority of planted native species are not locally occurring and don't appear to fit any PCT that would or could occur in the locality. These garden beds mostly align the existing lawn bowling greens. Some common plants include *Buxus microphylla, Beaucarnea recurvata, Agapanthus praecox, Rhododendron* spp., *Murraya paniculata, Hebe* spp., *Rosa* spp., *Nandina domestica, Syagrus romanzoffiana, Eucalyptus nicholii*, *Callistemon* spp*., Grevillea* spp*., Cupressus sp., Syzygium* spp., *Trachelospermum jasminoides, Camelia sasanqua, Camelia japonica, Westringia fruticose, Tradescantia fluminensis, Cycas revoluta* and *Dietes grandiflora.*

Photo 1 – Four *Eucalyptus nicholii* trees near the south-east corner of the site

Photo 2 – Planted Grevillea, Callistemon, Agapanthus and Westringia

Photo 4 – Landscaped garden beds between the two northern greens

Photo 5 – Planted conifers along boundary in south-west

2.3 Threatened flora species

BC Act – A search of the *Atlas of NSW Wildlife* (DPIE 2020) indicated a list of species that have been recorded within a 10 km radius of the development footprint. These species are listed in Table 7 (Appendix 2) and are considered for potential habitat within the development footprint.

EPBC Act – A review of the schedules of the *EPBC Act* indicated the potential for a list of threatened flora species to occur within a 10 km radius of the development footprint. These species have also been listed in Table 7 for consideration of potential to occur.

Based on the habitat assessment within Table 7 (Appendix 2) it is considered that the development footprint provides potential habitat for the following threatened flora species. These species will be considered in the test of significance within Appendix 3:

Table 2 – Threatened flora species with suitable habitat present

Scientific name	*BC Act*	*EPBC Act*	Potential to occur
Acacia bynoeana	E1	V	too degraded
Darwinia biflora	V	V	too degraded
Eucalyptus nicholii	V	V	planted specimens on site x4
Galium australe	E1	-	too degraded

All threatened species in both the BioNet (NSW) and *EPBC Act* coordinate search (National) were considered to have no suitable habitat within the study area because of previous clearing and landscaping works, past and ongoing land management practices, unsuitable soils / geology, unsuitable previous vegetation type or large distance to known specimens. The ground layer of vegetation contains only planted native species.

Four (4) planted specimens of *Eucalyptus nicholii* were noted just inside of the boundary near the south-east corner of the site. *Eucalyptus nicholii* occurs in the general vicinity of Nundle to north of Tenterfield in the New England Tablelands in soils derived from granite or metasedimentary rock.

These specimens occur outside their naturally occurring habitat and appear to have been planted as street trees. As this species occurs outside its natural population distribution it is not considered to be a viable local population within the guidelines of the NPWS (NPWS Information Circular No 2, 1996).

The state test of significance assessment (Appendix 3) and a review of *EPBC Act* impact criteria (Appendix 4) has concluded that the proposed development will not have a significant impact on threatened flora species or TECs. Therefore, (a) a Species Impact Statement is not required in respect to flora for the proposal and (b) biodiversity offsetting is not required.

2.4 Endangered flora populations

The endangered flora populations that occur within The Hills Shire Council LGA are listed below.

- *Dillwynia tenuifolia* Sieber ex D.C. in the Baulkham Hills local government area,
- *Wahlenbergia multicaulis*
- *Darwinia fascicularis* subsp. *oligantha* population in the Baulkham Hills and Hornsby local government areas

The subject site is too degraded to host either *Dillwynia* or *Darwinia,* and the *Darwinia* population is associated with rock platforms and rock heath which are absent from the site.

There is only one (1) record of the *Wahlenbergia* population within 10 km of the site. The species flowers sporadically, but with a peak usually in late spring and early summer. The species often occurs in disturbed locations, however in Western Sydney, it is more likely to

be associated with the Villawood Soil Landscape and the Cooks River / Castlereagh Ironbark Forest, both of which are absent from the site.

Given that the habitat attributes on site are not favourable for this species, and lack of noted locations locally, it is not expected to have potential habitat on site.

2.5 Threatened ecological communities

PCT 1281 is commensurate with the *BC Act* listed Sydney Turpentine Ironbark Forest in the Sydney Basin Bioregion (STIF). This is listed as critically endangered under the Act and critically endangered under the federal *EPBC Act* although the remnant does not meet the condition class to be described and assessed as being commensurate with the *EPBC Act* determination for this community.

The remnant on site is 0.03 ha in size and occurs near the south-east corner along the boundary, and comprises of only eight (8) trees; six (6) *Angophora costata* and two (2) *Eucalyptus saligna.* It was noted that the more dominant species of the community such as *Syncarpia glomulifera* were observed on nearby properties.

The remnant is of very poor condition due to understorey maintenance as the trees are located within a garden bed with sparse non-native and native landscaping specimens as indicated in Photo 1. The trees are generally young, and because of the garden maintenance, there is little to no likelihood of further recruitment.

The remnant TEC is very poor quality and has been managed for extreme periods. Google Earth images of the site in 2003 show basically the same vegetation as is present today. The 1943 imagery of the site shows about 10 trees across the site but none in the location of this garden bed with the current remnant trees. Even in 1943 there is 1 bowling green in the north-west corner of the site.

Therefore, any vegetation on site has been planted and isolated from remnant bushland for at least 80 years and thus the seed bank is likely to be depleted, reflected by the absence of a natural understorey.

The loss of eight (8) trees that are regrowth or planted in a tiny isolated patch that does not contribute to the local seed resource of STIF is considered to have low importance. There are some disturbed patches on the urban fringe that go into Bidjigal Reserve approximately 0.5-1 km to the east and north-east which are likely to be important for the preservation of the community locally.

There are remnant trees on adjoining and nearby residential lots of similar or better quality or age that provide limited value for this community. The loss of 8 trees that make up the TEC is not likely to place the ecological community at risk of local extinction.

The loss of eight (8) trees from the ecological community may also be compensated through strategic planting of STIF trees and partial understorey in select locations as part of the landscaping works.

PCT 632 – Narrow-leaved Black Peppermint open forest mainly on acid volcanics in the western New England Tableland Bioregion is associated with TEC vegetation, however given the site does not occur on acid volcanics in the western New England Tableland Bioregion, it cannot be classified as part of the TEC vegetation.

The Test of Significance in Appendix 3 concludes that the proposal will not cause a significant impact upon the STIF.

2.6 SEPP (Vegetation in Non-Rural Areas) 2017

The *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017* (Vegetation SEPP) was one of a suite of Land Management and Biodiversity Conservation (LMBC) reforms that commenced in New South Wales on 25 August 2017. The Vegetation SEPP (the SEPP) works together with the *Biodiversity Conservation Act 2016* and the *Local Land Services Amendment Act 2016* to create a framework for the regulation of clearing of native vegetation in NSW.

As 'development consent' is required for the proposed works the Vegetation SEPP does not apply.

Fauna 3

3.1 Survey

Fauna survey including afternoon/morning diurnal survey, nocturnal survey and threatened species habitat assessment was undertaken within the subject site and nearby surrounds on 17th and 18th of August 2020.

Diurnal fauna survey included:

- Opportunistic frog and reptile habitat searches,
- 2x bird census points (out to a radius of 20-40 m for 15 minutes),
- Opportunistic bird call and activity survey between census points,
- Habitat tree survey.
- Significant habitat tree survey.

Significant habitat trees are defined as trees containing large hollows suitable for owls/cockatoos and/or two or more good quality medium hollows and/or several small hollows and/or a tree showing notable use by a threatened species (eg. sap feed tree, raptor nest tree, microbat roost, etc.).

Weather conditions at the time of diurnal survey on the 17/08/20 were 1/8 cloud, 14 km/h W winds, no rain, 19-16°C between 15:50 – 17:30.
Weather conditions at the time of diurnal survey on the 18/08/20 were 7/8 cloud, 5 km/h W winds, no rain, 16-12°C between 17:30 – 18:30.

Nocturnal fauna survey included:

- Spotlighting,
- Ultrasonic microbat recording (x2 passive recording stations),
- Owl call-playback (Barking Owl),

Weather conditions at the time of nocturnal survey were 1/8 cloud, 11 km/h W wind, no rain, 1/3 moon, 16-14°C between 17:30 – 18:30.

Specific survey effort locations and results are shown on Figure 4. All fauna species recorded during survey within the development footprint and nearby surrounds are listed in Table 8 (Appendix 2).

A review of the Atlas of NSW Wildlife (DPIE 2020) was undertaken prior to the site visit to determine threatened species previously recorded within 10 km of the development footprint.

3.2 Habitat features

The following notable habitat features were observed present:

- Year-round nectar producing tree species,
- Surface soils suitable for foraging by bandicoots
- Abandoned commercial buildings

Hollow-bearing trees were surveyed during the fauna survey however none were recorded within the development footprint area.

3.3 Threatened fauna species

BC Act – A search of the *Atlas of NSW Wildlife* (DPIE 2020) provided a list of threatened fauna species previously recorded within a 10 km radius of the development footprint. These species are listed in Table 8 (Appendix 2) and are considered for potential habitat within the study area.

EPBC Act – A review of the schedules of the *EPBC Act* identified a list of threatened fauna species or species habitat likely to occur within a 10 km radius of the development footprint. These species have also been listed in Table 8.

In accordance with Table 8 (Appendix 2) the following state and nationally listed threatened fauna species are considered to have suitable habitat with varying potential to occur within the study area. The state listed species will be considered in the test of significance (Appendix 3):

Table 3 – Threatened fauna species with suitable habitat present

Common name	*BC Act*	*EPBC Act*	Potential to occur
Large Bent-winged Bat	V	-	Recorded
Little Lorikeet	V	-	✓
Grey-headed Flying-fox	V	V	✓
White-throated Needletail [MS]	-	V	Unlikely
Little Bent-winged Bat	V	-	Unlikely

The state test of significance assessment (Appendix 3) and a review of *EPBC Act* impact criteria (Appendix 4) has concluded that the proposed development will not have a significant impact on threatened fauna species. Therefore, (a) a Species Impact Statement is not required in respect to fauna for the proposal and (b) biodiversity offsetting is not required.

Fisheries Management Act (FM Act) – No habitats suitable for threatened aquatic species were observed within the study area and as such the provisions of this act do not require any further consideration.

3.4 Protected migratory species (National)

The EPBC Act Protected Matters Report provides additionally listed terrestrial, wetland and marine migratory species of national significance likely to occur, or with habitat for these species likely to occur, within a 10 km radius of the development footprint. The habitat potential of migratory species is considered in Table 9 (Appendix 2). The habitat potential of threatened migratory species are instead considered with other threatened species in Table 8 (Appendix 2).

No nationally protected migratory bird species were recorded present within the study area during survey.

3.5 Endangered fauna populations

There are no endangered fauna populations identified specifically to the The Hills Shire LGA.

3.6 SEPP (Koala Habitat Protection) 2019

The Hills Shire LGA is not listed in Schedule 1 of the new State Environmental Planning Policy (SEPP) Koala Habitat Protection 2019 therefore no considerations to this policy apply to the study area.

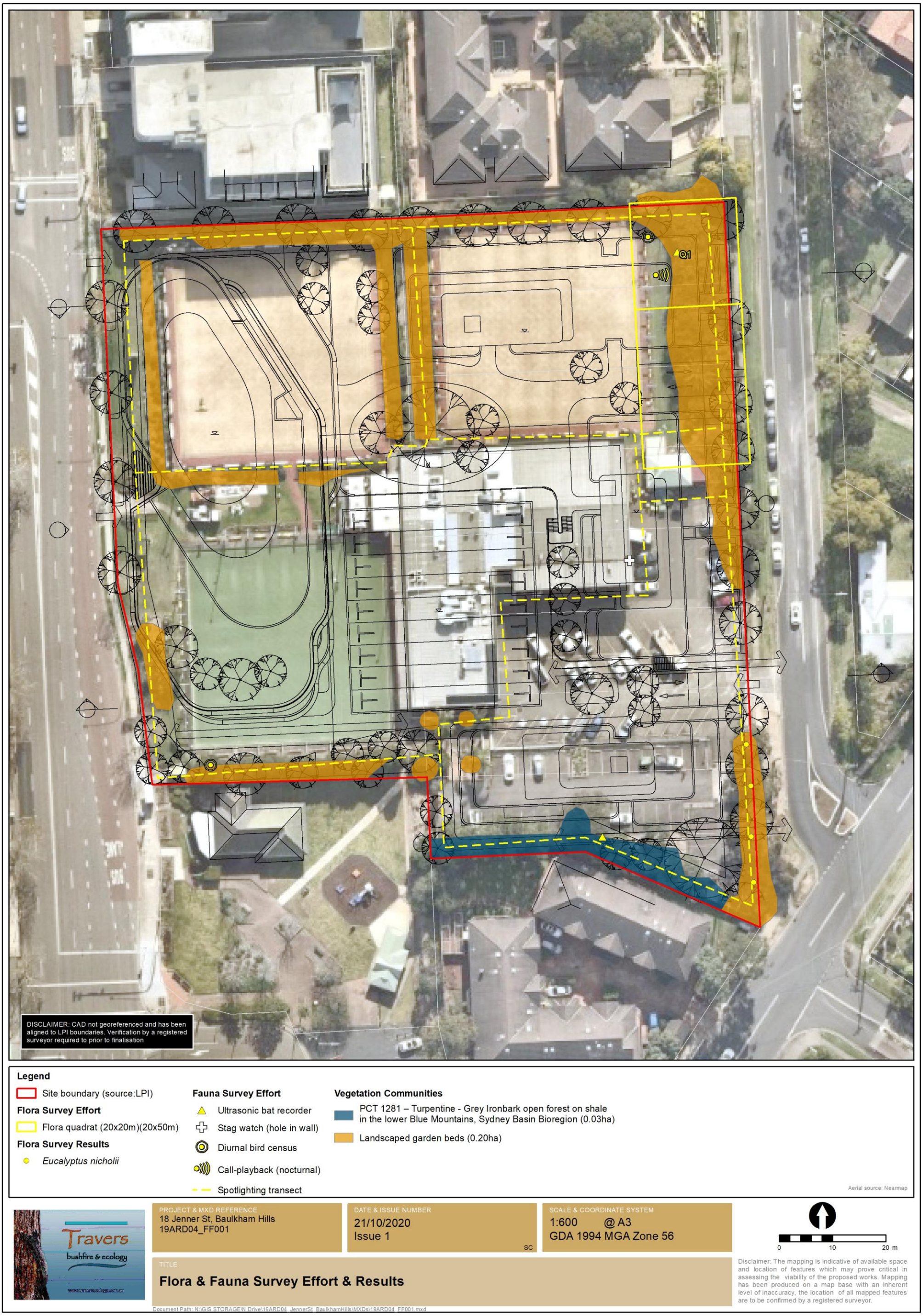

Figure 4 – Flora & fauna survey effort & results

Watercourses & Wetlands

4

4.1 Endangered wetland communities

A number of wetland communities have been listed as an 'endangered ecological community' under the NSW *BC Act*.

Impacts on wetland communities must be assessed under the *BC Act* and if present the management of wetland communities must be given due consideration in accordance with the objectives and principles of management as contained within the NSW Wetlands Policy (2010), and appropriate management as determined by NSW DPIE - Office of Water in their general terms of approval. This may include but not limited to the provision of buffers, management of stormwater runoff and maintenance of natural inflows or runoff into those wetland communities.

- Artesian springs ecological community
- Castlereagh Swamp Woodland Community
- Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions
- Coastal Upland Swamp in the Sydney Basin bioregion
- Coolibah–Black Box woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands bioregions
- Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions
- Kurri sand swamp woodland in the Sydney Basin Bioregion
- Lagunaria swamp forest on Lord Howe Island
- Maroota Sands swamp forest
- Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion
- Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions
- Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions
- The shorebird community occurring on the relict tidal delta sands at Taren Point
- Upland wetlands of the drainage divide of the New England Tableland Bioregion
- Wingecarribee Swamp

In accordance with the *WM Act*, endangered wetland communities are through the definition of ‘lakes’ potentially classed as waterfront land. Referral to NSW Natural Resources Access Regulator (NRAR) may be required for determination under the *WM Act* as a controlled activity. As well as protection, a buffer may be applied to these communities as specified by the NRAR.

No endangered wetland communities were present within the study area and therefore a referral is not required for impacts on waterfront land.

4.2 Groundwater dependent ecosystems (GDEs)

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

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

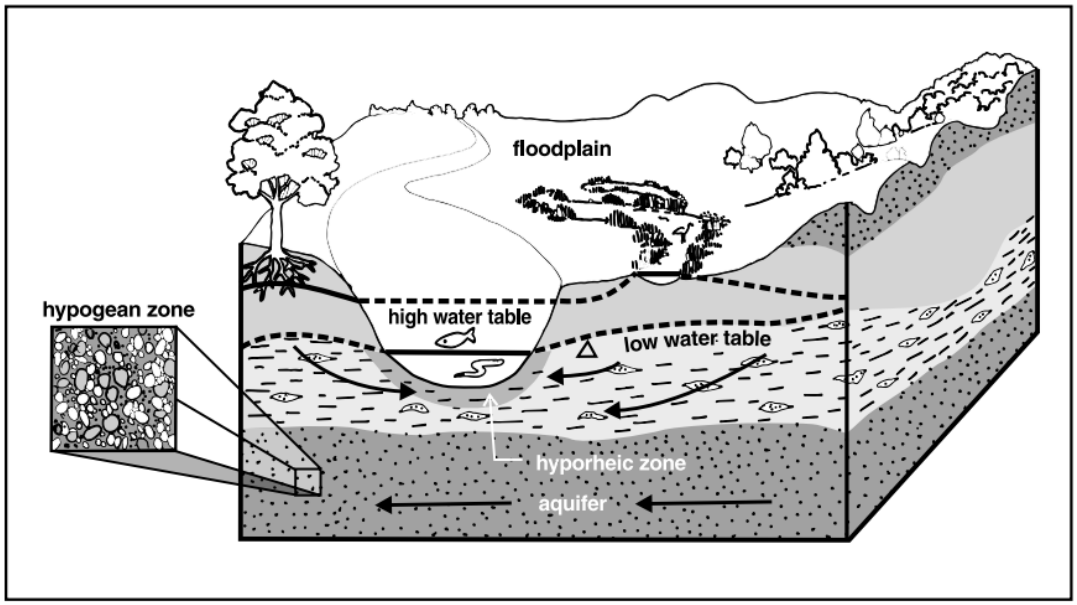

Figure 5 – Alluvial groundwater system discharging into a river

The vegetation communities on site are not part of any GDE and therefore the policy does not require any further consideration. A referral is not required for impacts on waterfront land.

4.3 Watercourse assessment

There are no mapped watercourses within the subject site or adjacent that will require protection buffers that affect the site.

4.4 Coastal Management SEPP

The NSW DPE *Coastal Wetlands and Littoral Rainforests Area Map* (http://webmap.environment.nsw.gov.au/PlanningHtml5Viewer/?viewer=SEPP_CoastalManagement) identifies an area within the wetland as "coastal wetlands", and a buffer area surrounding the margin of the wetland as "proximity area for coastal wetlands" (Figure 6).

As stated in the *State Environmental Planning Policy (Coastal Management) 2018*, development consent is required for any development within these areas and must not be given unless the consent authority is satisfied that sufficient measures have been, or will be, taken to protect, and where possible enhance, the biophysical, hydrological and ecological integrity of the coastal wetland. Additionally, within the "proximity area for coastal wetlands" area, development consent must not be given unless the consent authority is satisfied that

the proposed development will not significantly impact on the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland.

The proposal will not impact any coastal wetlands or their proximity areas as mapped in the Coastal Management SEPP. The nearest locations to mapped areas are greater than 6 km away as shown in the figure below.

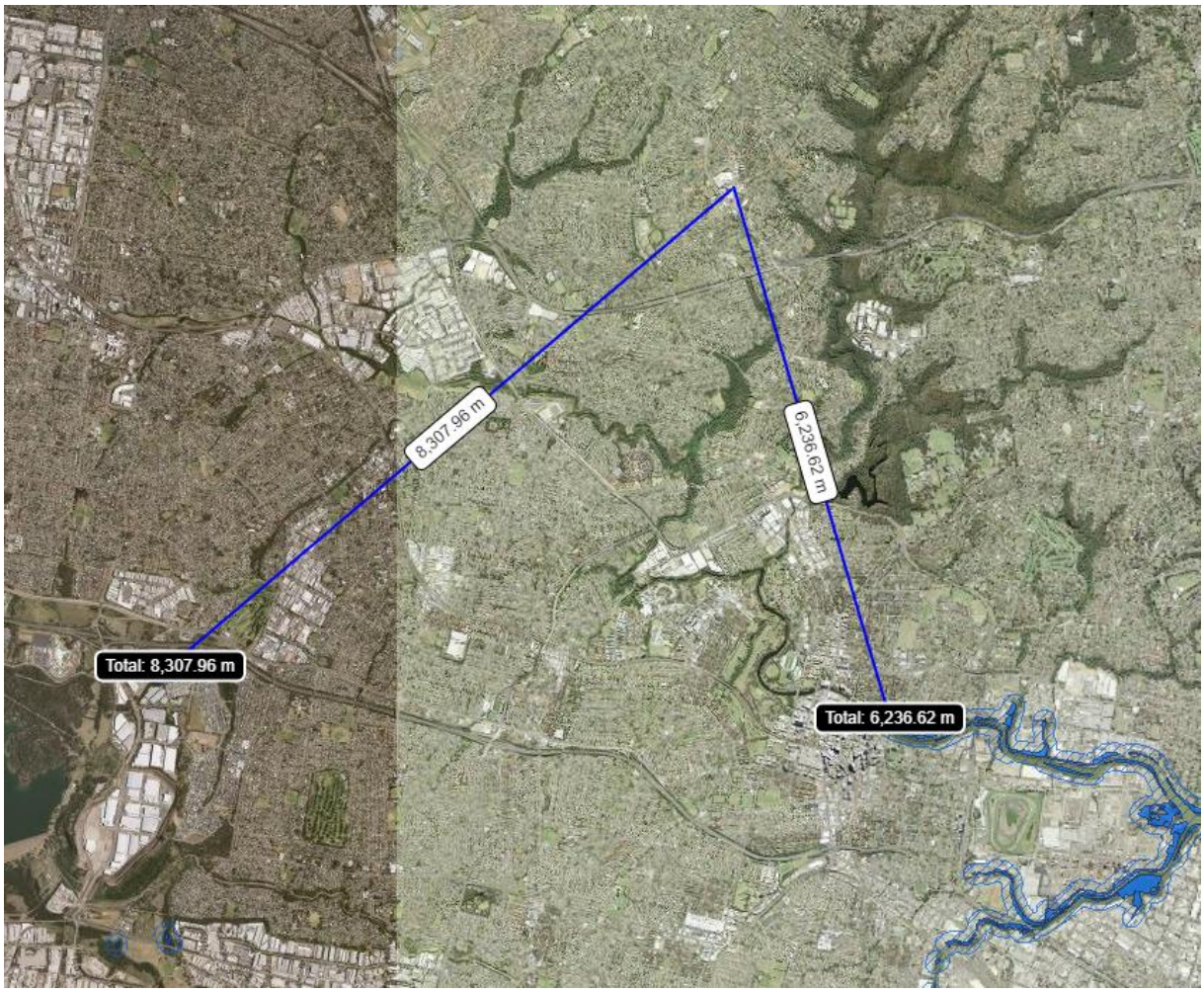

Figure 6 – Coastal wetlands area map

(solid blue - coastal wetlands; hatched blue - proximity area for coastal wetlands).

Biodiversity Impact Assessment 5

5.1 Biodiversity Offsets Scheme (BOS)

The *BC Act* repeals the *Threatened Species Conservation Act 1995*, the *Nature Conservation Trust Act 2001* and the animal and plant provisions of the *National Parks and Wildlife Act 1974*. Together with the *Biodiversity Conservation Regulation 2017*, the *BC Act* establishes a new regulatory framework for assessing and offsetting biodiversity impacts on proposed developments and clearing. It establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme (BOS). Where development consent is granted, the authority may impose as a condition of consent an obligation to retire a number and type of biodiversity credits determined under the new Biodiversity Assessment Method (BAM).

Where development consent is granted, the authority may impose as a condition of consent an obligation to retire a number and type of biodiversity credits determined under the new Biodiversity Assessment Method (BAM).

The Biodiversity Offsets Scheme applies to:

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

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

5.2 Threshold assessment

The BOS includes three (3) elements to the threshold test – an area trigger, a Biodiversity Values Land Map trigger and the Test of Significance. If impacts exceed at least one of these triggers, the Biodiversity Offset Scheme applies to the proposed clearing.

5.2.1 Biodiversity Values Land Map

Biodiversity Values Land has not been mapped within the study area – an offset is not required under this trigger. Figure 7 below shows the site (blue) in relation to those areas (coloured mauve) as having biodiversity values.

Figure 7 – Biodiversity values land (mauve shading) in the local area

(Source: DPIE – Biodiversity Values Map – February 2021)

5.2.2 Area clearing threshold

The area threshold varies depending 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).

Table 4 – BOS Entry Threshold Report

Date of Calculation	12/02/2021 4:06 PM	**BDAR Required***
Total Digitised Area	1.17 ha	
Minimum Lot Size Method	LEP	
Minimum Lot Size	0.06 ha	
Area Clearing Threshold	0.25 ha	
Area clearing trigger Area of native vegetation cleared	Unknown #	Unknown #
Biodiversity values map trigger Impact on biodiversity values map(not including values added within the last 90 days)?	no	no
Date of the 90 day Expiry	N/A	

Table 4 identifies that the BOS entry threshold report has determined the area threshold based on the minimum lot size of 600 m^2, and the area clearing threshold for which the BOS applies is 0.25 ha. Clearing of 'native vegetation' that exceeds 0.25 ha will require a biodiversity offset to be obtained. Note that 'native vegetation' includes planted native species. The development proposal will not impact more than 0.25 ha of native vegetation therefore offsetting will not be required under this trigger.

5.2.3 Test of Significance

The state test of significance assessment (Appendix 3) has concluded that the proposed development will not have a significant impact on threatened species or TECs. Therefore, biodiversity offsetting is not triggered under this third threshold.

5.3 Serious and irreversible impacts on biodiversity values

Development consent cannot be granted for non-State significant development under Part 4 of the *Environmental Planning and Assessment Act 1979* (NSW) if the consent authority is of the opinion it is likely to have serious and irreversible impacts (SAII) on biodiversity values. The determination of SAII is to be made in accordance with principles prescribed section 6.7 of the *BC Regulation* (2017). As the BOS is not triggered, no SAII assessment is required.

5.4 Potential ecological impacts

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

5.4.1 BC Reg Prescribed impacts

The following potential impacts on biodiversity values as a result of the proposal are prescribed (subject to subclause (2) of the *BC Reg*) as biodiversity impacts to be assessed under the biodiversity offsets scheme:

- Human made structures,
- Non-native vegetation.

Human made structures

Threatened microbat species will often roost in human-made structures, particularly those that are derelict or irregularly used. The human made structures on site are well used and reasonably quality, with lighting and noise surrounding that would deter threatened microbats.

Non-native vegetation

Several threatened fauna species may potentially use non-native vegetation within the site for foraging. Given the location is in the middle of busy suburbia, foraging values are very limited to those species which have adapted well to living with human presence and are opportunistic. These are not strong attributes of threatened species. Only those that are the most highly mobile are likely potential species that would utilise the site, eg birds and bat species. Based on survey results the proposed area of impact is not likely of high quality, of any breeding importance or central to the home range requirements of any threatened fauna species.

5.4.2 Direct impacts

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

- Removal of 0.03 ha of native vegetation commensurate with Sydney Turpentine Ironbark Forest
- Removal of 0.20 ha of exotic and non-endemic native landscaping garden beds, taking into consideration the prescribed impacts.
- Removal of up to one hundred and twenty-four (124) assessed trees. All but eight (8) trees have been planted (in the STIF community).
- Removal of foraging habitat for local fauna.
- Loss of four (4) specimens of planted *Eucalyptus nicholii.*

5.4.3 Indirect impacts

The entire site is going to be impacted by the proposal. There is high density residential to the north, commercial use to the west and south, and low density residential to the east. Given these surroundings, there is very little native flora and fauna habitat on surrounding allotments apart from some scattered remnant trees.

There are no nearby wetlands, watercourses or GDEs that would likely be indirectly impacted by the proposal.

5.4.4 Cumulative impacts

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

- Cumulative loss of STIF
- Cumulative loss of native vegetation within the local area
- Cumulative loss of foraging habitat for native fauna

5.5 Avoidance actions

Given the scale of development and small area of impact and absence quality habitat and vegetation that had strong connectivity value, avoidance actions have not been undertaken. The eight (8) regrowth trees of moderate age provide no real value to STIF in the locality as they have no real ability for regeneration given their location in mulched and landscaped garden beds. In order to retain the trees, the south-east corner building (Building D on Figure 2) would need to moved north a few metres.

5.6 Mitigation measures

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

(a) Landscaping within the property is to use locally occurring native species commensurate the naturally occurring vegetation, STIF for 50% of plantings.

(b) Remnant native trees being removed, should be replaced at a 2:1 ratio. Eight (8) remnant trees are proposed for removal.

Conclusions 6

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

In respect of matters required to be considered under the *Environmental Planning and Assessment Act 1979* and relating to the species / provisions of the *Biodiversity Conservation Act 2016*, one (1) threatened fauna species Large Bent-winged Bat (*Miniopterus orianae oceanensis*), one (1) threatened flora species *Eucalyptus nicholii*, no endangered populations and one TEC, Sydney Turpentine Ironbark Forest, were recorded within the study area.

The state assessment of significance (Appendix 3) has concluded that the proposed development will not have a significant impact on any threatened species, populations or TECs. Therefore, (a) a Species Impact Statement is not required for the proposal and (b) biodiversity offsetting is not required.

Offsetting under the Biodiversity Offsets Scheme (BOS) is not required for the proposal as:

- The study area is not located on lands mapped as Biodiversity Values Land.
- The proposed clearing of 0.03 ha of native vegetation is less than the area clearing threshold of 0.25 ha.
- The test of significance concludes a not-significant impact on the relative entities being tested.

In respect of matters required to be considered under the *Environment Protection and Biodiversity Conservation Act 1999*, no threatened fauna species, no threatened flora species, and no TECs were recorded within the study area.

The proposal was not considered to have a significant impact on or be constrained by matters of national environmental significance. As such a referral to Department of Environment and Energy should not be required.

In respect of matters relative to the *Fisheries Management Act 1994*, no suitable habitat for threatened marine or aquatic species was observed within the development footprint and there are no matters requiring further consideration under this Act.

Appendix 1
Flora & Fauna Species Lists

Table 5 – Flora species recorded (Appendix 1)

Family	Scientific name	Common name
TREES		
Myrtaceae	*Angophora costata*	Smooth-barked Apple
Casuarinaceae	*Casuarina glauca*	Swamp Oak
Cupressaceae	*Cupressus* sp*	Cypress
Cyatheaceae	*Cyathea australis*	Rough Tree-fern
Cycadaceae	*Cycas revoluta**	Sago Palm
Myrtaceae	*Eucalyptus nicholii*[TS]	Narrow-leaved Black Peppermint
Myrtaceae	*Eucalyptus saligna*	Sydney Blue Gum
Proteaceae	*Grevillea robusta*	Silky Oak
Bignoniaceae	*Jacaranda mimosifolia**	Jacaranda
Hamamelidaceae	*Liquidambar styraciflua**	Sweet Gum
Arecaceae	*Livistona australis*	Cabbage Tree Palm
Arecaceae	*Phoenix canariensis**	Canary Island Date Palm
Arecaceae	*Syagrus romanzoffiana**	Cocos Palm
Myrtaceae	*Syzygium* sp. (cultivar)*	Northern Lights
SHRUBS		
Agavaceae	*Agave americana**	Century Plant
Proteaceae	*Banksia integrifolia* subsp. *Integrifolia*	Coast Banksia
Proteaceae	*Banksia spinulosa*	Hairpin Banksia
Nolinaceae	*Beaucarnea recurvata**	Ponytail
Begoniaceae	*Begonia* sp.*	Begonia
Buxaceae	*Buxus microphylla**	Japanese Box
Myrtaceae	*Callistemon* sp. (cultivar)	-
Myrtaceae	*Callistemon viminalis*	Weeping Bottlebrush
Theaceae	*Camellia japonica**	Camellia
Theaceae	*Camellia sasanqua**	Camellia
Solanaceae	*Cestrum parqui**	Chilean Cestrum
Rutaceae	*Coleonema pulchellum**	Diosma
Rubiaceae	*Gardenia* sp. (cultivar)*	Gardenia
Proteaceae	*Grevillea* sp. (cultivar)	-
Lamiaceae	*Lavandula stoechas**	French Lavender
Proteaceae	*Leucadendron* sp.*	-
Oleaceae	*Ligustrum lucidum**	Large-leaved Privet
Magnoliaceae	*Magnolia* sp.*	-
Rutaceae	*Murraya paniculata**	Orange Jessamine
Berberidaceae	*Nandina domestica**	Sacred Bamboo
Ochnaceae	*Ochna serrulata**	Mickey Mouse Plant
Oleaceae	*Olea europaea* subsp. *cuspidata**	African Olive
Polygalaceae	*Polygala myrtifolia**	-
Malaceae	*Rhaphiolepis indica**	Indian Hawthorn
Ericaceae	*Rhododendron* sp. (cultivar)*	Azalea
Rosaceae	*Rosa* sp. (cultivar)*	Rose
Melastomataceae	*Tibouchina urvilleana**	-
Caprifoliaceae	*Viburnum* sp.*	-
Lamiaceae	*Westringia fruticosa*	Coast Westringia
GROUNDCOVERS		

Family	Scientific name	Common name
Polygonaceae	*Acetosa sagittata**	Turkey Rhubarb
Liliaceae	*Agapanthus praecox**	Agapanthus
Haemodoraceae	*Anigozanthos* sp. (cultivar)*	Kangaroo Paw
Asparagaceae	*Asparagus aethiopicus**	Asparagus Fern
Asteraceae	*Bidens pilosa**	Cobbler's Pegs
Cyperaceae	*Carex appressa*	Tall Sedge
Poaceae	*Cenchrus alopecuroides**	Swamp Foxtail Grass
Poaceae	*Cenchrus clandestinus**	Kikuyu
Poaceae	*Cenchrus setaceum**	Fountain Grass
Amaryllidaceae	*Clivia miniata**	Bush Lily
Asteraceae	*Conyza bonariensis**	Flaxleaf Fleabane
Asteraceae	*Conyza sumatrensis**	Fleabane
Apiaceae	*Cyclospermum leptophyllum**	Slender Celery
Poaceae	*Cynodon dactylon*	Common Couch
Phormiaceae	*Dianella caerulea*	Flax Lily
Iridaceae	*Dietes grandiflora**	Large Wild Iris
Poaceae	*Ehrharta erecta**	Panic Veldtgrass
Euphorbiaceae	*Euphorbia peplus**	Spurge
Fumariaceae	*Fumaria muralis**	Wall Fumitory
Asteraceae	*Gamochaeta spicata**	Cudweed
Asteraceae	*Gazania rigens**	Treasure Flower
Scrophulariaceae	*Hebe* sp. (cultivar)*	Veronica
Asteraceae	*Hypochaeris radicata**	Flatweed
Juncaceae	*Juncus usitatus*	Common Rush
Lomandraceae	*Lomandra longifolia*	Spiky-headed Mat-rush
Malvaceae	*Malva sylvestris**	Tall Mallow
Malvaceae	*Modiola caroliniana**	Red-flowered Mallow
Davalliaceae	*Nephrolepis cordifolia**	Fish-bone Fern
Oxalidaceae	*Oxalis pes-caprae**	Soursob
Urticaceae	*Parietaria judaica**	Asthma Weed
Poaceae	*Poa annua**	Winter Grass
Asteraceae	*Senecio madagascariensis**	Fireweed
Malvaceae	*Sida rhombifolia**	Paddy's Lucerne
Solanaceae	*Solanum nigrum**	Black Nightshade
Asteraceae	*Soliva sessilis**	Jojo
Asteraceae	*Sonchus oleraceus**	Common Sow-thistle
Poaceae	*Stenotaphrum secundatum**	Buffalo Grass
Strelitzeaceae	*Strelitzia reginae**	Bird of Paradise
Asteraceae	*Taraxacum officinale**	Dandelion
Commelinaceae	*Tradescantia fluminensis**	Wandering Jew
Fabaceae	*Trifolium repens**	White Clover
Plantaginaceae	*Veronica persica**	Creeping Speedwell
Apocynaceae	*Vinca major**	Blue Periwinkle
Campanulaceae	*Wahlenbergia gracilis*	Australian Bluebell
Xanthorrhoaceae	*Xanthorrhoea arborea*	-
VINES		
Apocnyaceae	*Araujia sericifera**	Mothvine
Vitaceae	*Cayratia clematidea*	Native Grape
Fabaceae	*Glycine clandestina*	Twining Glycine

Family	Scientific name	Common name
Apocynaceae	*Trachelospermum jasminoides**	Star Jasmine

* denotes exotic species
TS denotes threatened species

It should be noted that not all garden, cultivar or landscape species have been identified as part of this assessment.

Table 6 – Fauna species recorded (Appendix 1)

Common name	Scientific name	Method observed
Birds		**17 Aug 2020**
Australian Magpie	*Cracticus tibicen*	OW
Noisy Miner	*Manorina melanocephala*	OW
Rainbow Lorikeet	*Trichoglossus haematodus*	OW
Sulphur Crested Cockatoo	*Cacatua galerita*	OW
Mammals		
Black Rat	*Rattus rattus*	O
Common Brushtail Possum	*Trichosurus Vulpecula*	O
Domesticated Dog *	*Canis lupus familiaris*	O
Large Bent-winged Bat[TS]	*Miniopterus orianae oceanensis*	U
Gould's Wattled Bat	*Chalinolobus gouldii*	U
Reptiles		
Eastern Water Skink	*Eulamprus quoyii*	O

Note: * indicates introduced species
[TS] indicates threatened species
[MS] indicates Migratory species

All species listed are identified to a high level of certainty unless otherwise noted as:

[PR] indicates species identified to a 'probable' level of certainty – more likely than not
[PO] indicates species identified to a 'possible' level of certainty – low-moderate level of confidence

E - Nest/roost	H - Hair/feathers/skin	P - Scat	W - Heard call
F - Tracks/scratchings	K - Dead	Q - Camera	X - In scat
FB - Burrow	O - Observed	T - Trapped/netted	Y - Bone/teeth/shell
G - Crushed cones	OW - Obs & heard call	U - Anabat/ultrasound	Z - In raptor/owl pellet

Appendix 2
Threatened Flora & Fauna Habitat Assessment

Table 7 – Threatened flora species habitat assessment (Appendix 2)

Scientific name DATABASE SOURCE1	***BC Act***	***EPBC Act***	**Growth form and habitat requirements** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Acacia bynoeana DPIE EPBC	E1	V	Erect or spreading shrub to 0.3m high growing in heath and dry sclerophyll open forest on sandy soils. Often associated with disturbed areas such as roadsides. *Distribution limits N-Newcastle S-Berrima.*	x	x	-	-	Site too degraded	x
Acacia clunes-rossiae DPIE	V	-	Shrub to 2m tall, flowering in September. Grows in dry sclerophyll forest in valleys and on rocky slopes from the Kowmung River and adjacent Coxs River district.	x	x	-	-	x	x
Acacia pubescens DPIE EPBC	V	V	Spreading shrub 1-4m high open sclerophyll growing in open forest and woodlands on clay soils. *Distribution limits N-Bilpin S-Georges River.*	x	x	-	-	x	x
Allocasuarina glareicola EPBC	E1	E	Small shrub 1-2m high growing in open sclerophyll forest on lateritic soils derived from tertiary alluviums. *Distribution limits Castlereagh NR region.*	x	x	-	-	Outside of geographic range	x
Asterolasia elegans EPBC	E1	E	Erect shrub 1-3m high growing in moist sclerophyll forests on Hawkesbury sandstone slopes hillsides. *Distribution limits Maroota region.*	x	x	-	-	Outside of geographic range	x
Caladenia tessellata EPBC	E1	V	Terrestrial orchid. Clay-loam or sandy soils. LHCCREMS guidelines suggest the species grows in Map Unit 34 – Coastal Sand Wallum Woodland - Heath. Flowers in September – November. *Distribution limits N-Swansea S-south of Eden.*	x	x	-	-	No records within 10 km	x
Callistemon linearifolius DPIE	V	-	Shrub to 4m high. Dry sclerophyll forest on coast and adjacent ranges. *Distribution limits N-Nelson Bay S-Georges River.*	x	x	-	-	x	x
Cryptostylis hunteriana EPBC	V	V	Saprophytic orchid. Grows in swamp heath on sandy soils. *Distribution limits N-Gibraltar Range S-south of Eden.*	x	x	-	-	No records within 10 km	x

Scientific name DATABASE SOURCE1	***BC Act***	***EPBC Act***	**Growth form and habitat requirements** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Cynanchum elegans EPBC	E1	E	Climber or twiner to 1m. Grows in rainforest gullies, scrub & scree slopes. *Distribution limits N-Gloucester S-Wollongong.*	x	x	-	-	No records within 10 km	x
Darwinia biflora DPIE EPBC	V	V	Erect or spreading shrub to 0.8m high. Grows in heath or understorey of woodland on or near shale-capped ridges underlain by Hawkesbury sandstone. *Distribution limits N-Gosford S-Cheltenham.*	x	x	-	-	Site too degraded	x
Darwinia peduncularis DPIE	V	-	Divaricate shrub to 1.5m high. Grows in dry sclerophyll forest on sandstone hillsides and ridges. *Distribution limits N-Glen Davis S-Hornsby.*	x	x	-	-	x	x
Epacris purpurascens var. *purpurascens* DPIE	V	-	Erect shrub to 1.5m high growing in sclerophyll forest and scrub and near creeks and swamps on sandstone. *Distribution limits N-Gosford S-Blue Mountains.*	x	x	-	-	x	x
Eucalyptus camfieldii DPIE EPBC	V	V	Stringybark to 10m high. Grows on coastal shrub heath and woodlands on sandy soils derived from alluviums and Hawkesbury sandstone. *Distribution limits N-Norah Head S-Royal NP.*	x	x	-	-	x	x
Eucalyptus nicholii DPIE	V	-	This species is widely planted as an urban street tree and in gardens but is quite rare in the wild. *It is confined to the New England Tablelands of NSW, where it occurs from Nundle to north of Tenterfield, largely on private property.*	✓	x	-	-	Whilst outside of natural range, there are 4 planted specimens on site	✓
Eucalyptus scoparia DPIE	E1	V	Smooth-barked tree only known from vicinity of Bald Rock.	x	x	-	-	x	x

Scientific name DATABASE SOURCE1	***BC Act***	***EPBC Act***	**Growth form and habitat requirements** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Eucalyptus sp. Cattai DPIE	E1	-	Tree to 4.5m high. Rare emergent in scrub heath and low woodland on sandy soils usually flat areas or ridge tops. *Distribution limits N-Colo Heights S-Castle Hill.*	x	x	-	-	x	x
Galium australe DPIE	E1	-	A herb. Records in the Sydney area are yet to be confirmed. In NSW (and ACT Territory in Jervis Bay), Tangled Bedstraw has been recorded in Turpentine forest and coastal Acacia shrubland.	x	x	-	-	Site too degraded	x
Genoplesium baueri DPIE EPBC	E1	E	A terrestrial orchid that grows in sparse sclerophyll forest and moss gardens over sandstone. Flowers Feb–Mar. *Distribution limits N – Hunter Valley S – Nowra.*	x	x	-	-	x	x
Grammitis stenophylla DPIE	E1	-	A small lithophytic fern with fronds generally <5cm. *Occurs in rainforest and wet sclerophyll forest in the coastal divisions of NSW.* Usually grown on rocks.	x	x	-	-	x	x
Grevillea juniperina subsp. *juniperina* DPIE	V	-	Erect to spreading shrub 0.5-1.5m tall. Grows on laterite and Tertiary alluvium. *Distribution limits St Marys-Londonderry-Prospect.*	x	x	-	-	x	x
Haloragodendron lucasii EPBC	E1	E	Straggling shrub to 1.5m high. Grows in open forest on sheltered slopes near creeks. *Distribution limits Ku-ring-gai Plateau and Mt Wilson.*	x	x	-	-	x	x
Hibbertia spanantha DPIE	E4A	CE	Grows in forest with canopy species including *E. pilularis, E. resinifera, C. gummifera* and *A. costata*. The understorey is open with species of Poaceae, Orchidaceae, Fabaceae and Liliaceae. Flowers Oct-Nov with odd flowers throughout the year. Substrate is identified as a light clay occurring on a shale sandstone soil transition.	x	x	-	-	x	x
Hibbertia superans DPIE	E1	-	Small spreading shrub to 0.3m high. Grows on sandstone, usually in or near SSTF. *Distribution limits N-Glenorie S-Kellyville disjunct Mt Boss.*	x	x	-	-	x	x

Scientific name DATABASE SOURCE1	***BC Act***	***EPBC Act***	**Growth form and habitat requirements** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Isotoma fluviatilis subsp. *Fluviatilis* (*Hypsela sessiliflora*) EPBC	-	X	A prostrate shrub that grows in damp places on the Cumberland Plain, including freshwater wetland, grassland/alluvial woodland and an alluvial woodland/shale plains woodland (Cumberland Plain Woodland) ecotone.	x	x	-	-	x	x
Lasiopetalum joyceae DPIE EPBC	V	V	Erect shrub to 2m high. Grows in heath and open forest on Hawkesbury sandstone. *Distribution limits Hornsby Plateau.*	x	x	-	-	x	x
Leptospermum deanei DPIE EPBC	V	V	Shrub to 5m high. Grows on forested slopes. *Distribution limits near watershed of Lane Cove River.*	x	x	-	-	x	x
Leucopogon fletcheri subsp. *fletcheri* DPIE	E1	-	Shrub to 1.8m high growing in woodland on lateritic soils. Distribution limits N-St Albans S-Springwood.	x	x	-	-	x	x
Melaleuca biconvexa DPIE EPBC	V	V	Tall shrub. Grows in wetlands adjoining perennial streams and on the banks of those streams, generally within the geological series known as the Terrigal Formation. *Distribution limits N-Port Macquarie S-Jervis Bay.*	x	x	-	-	x	x
Melaleuca deanei DPIE EPBC	V	V	Shrub to 3m high. Grows in heath on sandstone. *Distribution limits N-Gosford S-Nowra.*	x	x	-	-	x	x
Persicaria elatior EPBC	V	V	Herb to 90cm tall which grows in damp places especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance. *Varied distribution from SE NSW to QLD.*	x	x	-	-	x	x
Persoonia hirsuta DPIE EPBC	E1	E	Erect to decumbent shrub. Grows in dry sclerophyll forest and woodland on Hawkesbury sandstone with infrequent fire histories. *Distribution limits N-Glen Davis S-Hill Top.*	x	x	-	-	x	x

Scientific name DATABASE SOURCE1	***BC Act***	***EPBC Act***	**Growth form and habitat requirements** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Persoonia mollis subsp. *maxima* DPIE EPBC	E1	E	Erect to prostrate shrub. Grows in moist to wet sclerophyll forests on Hawkesbury sandstone. *Distribution limits N-Cowan S-Hornsby.*	x	x	-	-	x	x
Persoonia nutans EPBC	E1	E	Erect to spreading shrub. Grows in dry sclerophyll forest and woodland on laterite and alluvial sands. *Distribution limits Cumberland Plain.*	x	x	-	-	x	x
Pimelea curviflora var. *curviflora* DPIE EPBC	V	V	Woody herb or sub-shrub to 0.2-1.2m high. Grows on Hawkesbury Sandstone near shale outcrops. *Distribution Sydney.*	x	x	-	-	x	x
Pimelea spicata DPIE EPBC	E1	E	Decumbent or erect shrub to 0.5m high. Occurs principally in woodland on soils derived from Wianamatta Shales. *Distribution limits N-Lansdowne S-Shellharbour.*	x	x	-	-	x	x
Pomaderris brunnea DPIE	V	V	Shrub to 3m high. *Confined to Upper Nepean and Colo Rivers where it grows in open forest.*	x	x	-	-	x	x
Pterostylis gibbosa EPBC	E1	E	Terrestrial orchid which occurs near Wollongong and in Hunter Valley in sclerophyll forest, sometimes with paperbarks.	x	x	-	-	x	x
Pterostylis nigricans DPIE	V	-	Terrestrial orchid. Prefers coastal heathland with Heath Banksia (Banksia ericifolia), and lower-growing heath with lichen-encrusted and relatively undisturbed soil surfaces, on sandy soils. *The Dark Greenhood occurs in north-east NSW north from Evans Head, and in Queensland.*	x	x	-	-	x	x
Pterostylis saxicola DPIE EPBC	E1	E	Terrestrial orchid. Grows in shallow sandy soil above rock shelves, usually near Wianamatta / Hawkesbury transition. *Distribution limits N-Hawkesbury River S-Campbelltown.*	x	x	-	-	x	x

Scientific name DATABASE SOURCE1	***BC Act***	***EPBC Act***	**Growth form and habitat requirements** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Pultenaea parviflora DPIE EPBC	E1	V	Erect shrub. Grows in dry sclerophyll forest at the intergrade between Tertiary Alluviums and Wianamatta Shales. *Distribution limits Cumberland Plain.*	x	x	-	-	x	x
Rhodamnia rubescens *DPIE*	E4A	-	Shrub to small tree to 25m tall. Widespread in warmer rainforest and on rainforest margins on range of volcanically derived and sedimentary soils. Mainly coastal areas; north from Batemans Bay. Flowers late winter to spring.	x	x	-	-	x	x
Syzygium paniculatum DPIE EPBC	V	V	Small tree. Subtropical and littoral rainforest on sandy soil. *Distribution limits N-Forster S-Jervis Bay.*	x	x	-	-	1 specimen of *Syzygium* was recorded hanging over the fence line. Unsure which species it was, but not expected to be impacted.	x
Tetratheca glandulosa DPIE	V	-	Spreading shrub to 0.2m high. Sandy or rocky heath or scrub. *Distribution limits N-Mangrove Mountain S-Port Jackson.*	x	x	-	-	x	x
Thesium australe EPBC	V	V	Erect herb to 0.4m high. Root parasite. Themeda grassland or woodland often damp. *Distribution limits N-Tweed Heads S-south of Eden.*	x	x	-	-	x	x
Triplarina imbricata DPIE	E1	E	A shrub to 2.8m tall, flowers from Nov-Dec. Occurs in heath, often in damp places along creek lines; coast and adjacent ranges. *Known from the Tabulam and Nymboida districts in NE NSW.*	x	x	-	-	x	x

Scientific name DATABASE SOURCE1	***BC Act***	***EPBC Act***	**Growth form and habitat requirements** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Wilsonia backhousei DPIE	V	-	Perennial subshrub with procumbent branches. Grows in coastal saltmarshes. *Wilsonia backhousei* is salt tolerant and is found in intertidal saltmarshes and, more rarely, on sea cliffs. In New South Wales *Wilsonia backhousei* is scattered along the coast, reaching a northern limit at Wamberal Lagoon. In the Sydney region there has been a considerable decline in the abundance of the species over the last 100yrs, largely as a result of loss of habitat. *Distribution limits N-Sydney S-South of Eden.*	x	x	-	-	x	x
Zannichellia palustris DPIE	E1	-	Submerged herb. Fresh or slightly saline stationary or slow-flowing water. *Distribution limits N-Tweed Heads S-Newcastle.*	x	x	-	-	x	x
Zieria involucrata EPBC	E1	V	Tall erect shrub to 2m tall. Occurs primarily on Hawkesbury sandstone. Also occurs on Narrabeen Group sandstone and on Quaternary alluvium. Found primarily in sheltered forests on mid- to lower slopes and valleys although some populations extend upslope into drier vegetation. The canopy typically includes Syncarpia glomulifera, Angophora costata, Eucalyptus agglomerata and Allocasuarina torulosa. *Distributed throughout Baulkham Hills, Hawkesbury, Hornsby and Blue Mountains LGAs.*	x	x	-	-	x	x

DPIE	-	Denotes species listed within 10 km of the development footprint on the *Atlas of NSW Wildlife*
EPBC	-	Denotes species listed within 10 km of the development footprint in the *EPBC Act* habitat search
V	-	Denotes vulnerable listed species under the relevant Act
E or E1	-	Denotes endangered listed species under the relevant Act
E4A or CE	-	Denotes critically endangered listed species under the relevant Act

Scientific name DATABASE SOURCE1	***BC Act***	***EPBC Act***	**Growth form and habitat requirements** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	

NOTE:	1. This field is not considered if no suitable habitat is present within the development footprint 2. 'records' refer to those provided by the *Atlas of NSW Wildlife* 3. 'nearby' or 'recent' records are species specific accounting for home range, dispersal ability and life cycle

Table 8 – Threatened fauna species habitat assessment (Appendix 2)

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Giant Burrowing Frog *Heleioporus australiacus* DPIE EPBC	V	V	Inhabits open forests and riparian forests along non-perennial streams, digging burrows into sandy creek banks. *Distribution limit: N-Near Singleton S-South of Eden.*	x	x	-	-	x	x
Stuttering Frog *Mixophyes balbus* DPIE EPBC	E	V	Terrestrial inhabitant of rainforest and wet sclerophyll forests. *Distribution limit: N-near Tenterfield S-South of Bombala*.	x	x	-	-	x	x
Red-crowned Toadlet *Pseudophryne australis* DPIE	V	-	Prefers sandstone areas, breeds in grass and debris beside non-perennial creeks or gutters. Individuals can also be found under logs and rocks in non-breeding periods. *Distribution limit: N-Pokolbin. S-near Wollongong.*	x	x	-	-	x	x
Green and Golden Bell Frog *Litoria aurea* DPIE EPBC	E	V	Prefers the edges of permanent water, streams, swamps, creeks, lagoons, farm dams and ornamental ponds. Often found under debris. *Distribution limit: N-Byron Bay S-South of Eden.*	x	x	-	-	x	x
Littlejohn's Tree Frog *Litoria littlejohni* DPIE EPBC	V	V	Found in wet and dry sclerophyll forest associated with sandstone outcrops at altitudes 280-1,000m on eastern slopes of Great Dividing Range. Prefers flowing rocky streams. *Distribution limit: N-Hunter River S-Eden.*	x	x	-	-	x	x
Southern Bell Frog *Litoria raniformis* DPIE EPBC	E	V	Prefers the edges of permanent water, streams, swamps, creeks, lagoons, farm dams and ornamental ponds. Often found under debris. *Distribution limit: N-ACT Bay. S-Albury.*	x	x	-	-	x	x

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Broad-headed Snake *Hoplocephalus bungaroides* DPIE EPBC	E	V	Sandstone outcrops, exfoliated rock slabs and tree hollows in coastal and near coastal areas. *Distribution limit: N-Mudgee Park. S-Nowra.*	x	x	-	-	x	x
Freckled Duck *Stictonetta naevosa* DPIE	V	-	Occurs mainly within the Murray-Darling basin and the channel country within large cool temperate to sub-tropical swamps, lakes and floodwaters with cumbungi, lignum or melaleucas. *Distribution limit: N- Tenterfield. S-Albury.*	x	x	-	-	x	x
Superb Fruit-dove *Ptilinopus superbus* DPIE	V	-	Rainforests, adjacent mangroves, eucalypt forests, scrubland with native fruits. *Distribution limit: N-Border Ranges National Park. S-Batemans Bay.*	x	x	-	-	x	x
Australasian Bittern *Botaurus poiciloptilus* EPBC	E	E	Found in or over water of shallow freshwater or brackish wetlands with tall reedbeds, sedges, rushes, cumbungi, lignum and also in ricefields, drains in tussocky paddocks, occasionally saltmarsh, brackish wetlands. *Distribution limit: N-North of Lismore. S- Eden.*	x	x	-	-	x	x
Black Bittern *Ixobrychus flavicollis* DPIE	V	-	Found in shadowy, leafy waterside trees such as callistemons, casuarinas, paperbarks, eucalypts, mangroves and willows along tidal creeks, freshwater and brackish streams and ponds, sheltered mudflats and oyster slats. *Distribution limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x
Spotted Harrier *Circus assimilis* DPIE	V	-	Utilises grassy plains, crops and stubblefields; saltbush, spinifex associations; scrublands, mallee, heathlands; open grassy woodlands. *Distribution limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
White-bellied Sea Eagle (*Haliaeetus leucogaster*) DPIE	V	-	Occupies coasts, islands, estuaries, inlets, large rivers, inland lakes and reservoirs. *Sedentary; dispersive. N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x
Little Eagle *Hieraaetus morphnoides* DPIE	V	-	Utilises plains, foothills, open forests, woodlands and scrublands; river red gums on watercourses and lakes. *Distribution limit - N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x
Square-tailed Kite *Lophoictinia isura* DPIE	V	-	Utilises mostly coastal and sub-coastal open forest, woodland or lightly timbered habitats and inland habitats along watercourses and mallee that are rich in passerine birds. *Distribution limit: N-Goondiwindi. S-South of Eden.*	x	x	-	-	x	x
Eastern Osprey *Pandion cristatus* DPIE	V	-	Utilises waterbodies including coastal waters, inlets, lakes, estuaries and offshore islands with a dead tree for perching and feeding. *Distribution limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x
Grey Falcon *Falco hypoleucos* DPIE	V	-	Occurs over mainly inland drainage systems of open plains and lightly timbered country including the acacia scrub, spinifex and tussock grasslands. *Distribution limit: N-Mullumbimby. S-Bega.*	x	x	-	-	x	x
Black Falcon *Falco subniger* DPIE	V	-	Inhabits plains, grasslands, foothills, timbered watercourses, wetland environs, crops; occasionally over towns and cities. *N-Tweed Heads. S-South of Eden*	x	x	-	-	x	X
Bush Stone-curlew *Burhinus grallarius* DPIE	E	-	Utilises open forests and savannah woodlands, sometimes dune scrub, savannah and mangrove fringes. *Distribution limit: N-Border Ranges National Park. S-Near Nowra.*	x	x	-	-	x	X

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Gang-gang Cockatoo *Callocephalon fimbriatum* DPIE	V	-	Prefers wetter forests and woodlands from sea level to > 2,000m on the Great Dividing Range, timbered foothills and valleys, timbered watercourses, coastal scrubs, farmlands and suburban gardens. *Distribution limit: mid north coast of NSW to western Victoria.*	x	x	-	-	x	X
Glossy Black-Cockatoo *Calyptorhynchus lathami* DPIE	V	-	Open forests with *Allocasuarina* species and hollows for nesting. *Distribution limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	X
Little Lorikeet *Glossopsitta pusilla* DPIE	V	-	Inhabits forests, woodlands; large trees in open country; timbered watercourses, shelterbeds, and street trees. *Distribution limit: N-Tweed Heads. S-South of Eden*.	x	Marginal	✓	✓	✓	✓
Swift Parrot *Lathamus discolour* DPIE EPBC	E	E	Inhabits eucalypt forests and woodlands with winter flowering eucalypts. *Distribution limit: N-Border Ranges National Park. S-South of Eden*.	x	x	-	-	x	X
Turquoise Parrot *Neophema pulchella* DPIE	V	-	Inhabits coastal scrubland, open forest and timbered grassland, especially ecotones between dry hardwood forests and grasslands. *Distribution limit: N-Near Tenterfield. S-South of Eden.*	x	x	-	-	x	X
Superb Parrot *Polytelis swainsonii* DPIE EPBC	V	V	Inhabits open woodland and riverine forests of inland NSW. *Distribution limit: N-Near Walgett. S-South of Deniliquin.*	x	x	-	-	x	X

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Barking Owl *Ninox connivens* DPIE	V	-	Inhabits principally woodlands but also open forests and partially cleared land and utilises hollows for nesting. *Distribution limit: N-Border Ranges National Park. S-Eden.*	x	x	-	-	x	X
Powerful Owl *Ninox strenua* DPIE	V	-	Forests containing mature trees for shelter or breeding and densely vegetated gullies for roosting. *Distribution limits: N-Border Ranges National Park. S-Eden.*	x	x	-	-	x	X
Grass Owl *Tyto longimembris* DPIE	V	-	Inhabits grassland, coastal heath and lignum swamps, sheltering in dense grass tussocks by day. *Distribution limit: N-Tweed Heads. S-Lithgow.*	x	x	-	-	x	X
Masked Owl *Tyto novaehollandiae* DPIE	V	-	Open forest and woodlands with cleared areas for hunting and hollow trees or dense vegetation for roosting. *Distribution limit: N-Border Ranges National Park. S-Eden.*	x	x	-	-	x	X
Sooty Owl *Tyto tenebricosa* DPIE	V	-	Tall, dense, wet forests containing trees with very large hollows. *Distribution limit: N-Border Ranges National Park. S-South of Eden.*	x	x	-	-	x	X
White-throated Needletail [MS] *Hirundapus caudacutus* *DPIE EPBC*	-	V	Airspace over forests, woodlands, farmlands, plains, lakes, coasts, towns; companies often forage along favoured hilltops and timbered ranges. Breeds Siberia, Himalayas, east to Japan. Summer migrant to eastern Australia. *Distribution limit: N-Tweed Heads. S-South of Eden.*	x	Marginal	✓	✓	Unlikely	✓

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Brown Treecreeper *Climacteris picumnus victoriae* DPIE	V	-	Occupies eucalypt woodlands, open woodland lacking a dense understorey with fallen dead timber. *Distribution limit: (Sub species victoriae) Central NSW west of Great Div. Cumberland Plains, Hunter Valley, Richmond, Clarence, and Snowy River Valleys.*	x	x	-	-	x	X
Speckled Warbler *Chthonicola sagittata* DPIE	V	-	Found in temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts. *Distribution limit: N-Urbanville. S-Eden.*	x	x	-	-	x	X
Regent Honeyeater *Xanthomyza Phrygia* DPIE EPBC	E4A	CE	Found in temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts. *Distribution limit: N-Urbanville. S-Eden.*	x	x	-	-	x	X
White-fronted Chat *Epithianura albifrons* DPIE	V	-	Found in open damp ground, grass clumps, fencelines, heath, samphire saltmarshes, mangroves, dunes, saltbush plains. *Distribution limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	X
Painted Honeyeater *Grantiella picta* DPIE EPBC	V	V	A nomadic bird occurring in low densities within open forest, woodland and scrubland feeding on mistletoe fruits. Inhabits primarily Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. *Distribution limit: N-Boggabilla. S-Albury with greatest occurrences on the inland slopes of the Great Dividing Range.*	x	x	-	-	x	X

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Black-chinned Honeyeater *Melithreptus gularis gularis* DPIE	V	-	Found in woodlands containing box-ironbark associations and River Red Gums, also drier coastal woodlands of the Cumberland Plain and Hunter Richmond and Clarence. *Distribution limit: N-Cape York Pen. Qld. S-Victor H. Mt Lofty Ra & Flinders Ra. SA.*	x	x	-	-	x	X
Varied Sittella *Daphoenositta chrysoptera* DPIE	V	-	Open eucalypt woodlands / forests (except heavier rainforests); mallee, inland acacia, coastal tea-tree scrubs; golf courses, shelterbelts, orchards, parks, scrubby gardens. *Distribution limit: N-Border Ranges National Park. S-South of Eden.*	x	x	-	-	x	X
Dusky Woodswallow *Artamus cyanopterus cyanopterus* DPIE	V	-	Found in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests. Prefers habitat with an open understorey. Often observed in farmland tree patches or roadside remnants. *Widespread in eastern, southern and south-western Australia.*	x	x	-	-	x	X
Scarlet Robin *Petroica boodang* DPIE	V	-	Found in foothill forests, woodlands, watercourses; in autumn-winter, more open habitats: river red gum woodlands, golf courses, parks, orchards, gardens. *Distribution limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	X
Flame Robin *Petroica phoenicea* DPIE	V	-	Summer: forests, woodlands, scrubs, from sea-level to *c.* 1800 m. Autumn-winter: open woodlands, plains, paddocks, golf courses, parks, orchards. *Distribution limit: N northern NSW tablelands. S-South of Eden.*	x	x	-	-	x	X

Common name *Scientific name* Database source	*BC Act*	*EPBC Act*	Preferred habitat *Distribution limit*	Recorded on site (✓)	If not recorded on site				Considered in test of significance (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and/or high number of record(s) (✓) *Notes 1,2 & 3*	Record(s) from recent years (✓) *Notes 1,2 & 3*	Potential to occur	
Pink Robin *Petroica rodinogaster* DPIE	V	-	Found in dense gullies, rainforests and open forests, dispersing into drier more open habitats in winter. *Distribution limit: N-Sydney. S-South of Eden.*	x	x	-	-	x	X
Diamond Firetail *Stagonopleura guttata* DPIE	V	-	Found in eucalypt woodlands, forests and mallee where there is grassy understorey west of the Great Div. also drier coastal woodlands of the Cumberland Plain and Hunter Richmond and Clarence River Valleys. *Distribution limit: N-Rockhampton Q. S-Eyre Pen Kangaroo Is. SA.*	x	x	-	-	x	X
Spotted-tailed Quoll *Dasyurus maculatus* DPIE EPBC	V	E	Dry and moist open forests containing rock caves, hollow logs or trees. *Distribution limit: N-Mt Warning National Park. S-South of Eden.*	x	x	-	-	x	X
Southern Brown Bandicoot *Isoodon obesulus* DPIE EPBC	E	E	Utilises a range of habitats containing thick ground cover - open forest, woodland, heath, cleared land, urbanised areas and regenerating bushland. *Distribution limit: N-Kempsey. S-South of Eden.*	x	x	-	-	x	X
Koala *Phascolarctos cinereus* DPIE EPBC	V	V	Inhabits both wet and dry eucalypt forest on high nutrient soils containing preferred feed trees. *Distribution limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	X
Yellow-bellied Glider *Petaurus australis* DPIE	V	-	Tall mature eucalypt forests with high nectar producing species and hollow bearing trees. *Distribution limit: N-Border Ranges National Park. S-South of Eden*.	x	x	-	-	x	X

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Squirrel Glider *Petaurus norfolcensis* DPIE	V	-	Mixed aged stands of eucalypt forest & woodlands including gum barked & high nectar producing species & hollow bearing trees. *Distribution limit: N-Tweed Heads. S-Albury.*	x	x	-	-	x	X
Greater Glider *Petauroides volans* EPBC	-	V	Favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. Population density is optimal at elevation levels at 845 m above sea level. Prefer overstorey basal areas in old-growth tree stands. Highest abundance typically in taller, montane, moist eucalypt forests, with relatively old trees and abundant hollows *Distribution limit: N-Border Ranges National Park. S- South of Eden.*	x	x	-	-	x	X
Brush-tailed Rock-wallaby *Petrogale penicillata* EPBC	E	V	Found in rocky gorges with a vegetation of rainforest or open forests to isolated rocky outcrops in semi-arid woodland country. *Distribution limit: N-North of Tenterfield. S-Bombala.*	x	x	-	-	x	X
Grey-headed Flying-fox *Pteropus poliocephalus* DPIE EPBC	V	V	Found in a variety of habitats including rainforest, mangroves, paperbark swamp, wet and dry open forest and cultivated areas. Forms camps commonly found in gullies and in vegetation with a dense canopy. *Distribution limit: N-Tweed Heads. S-Eden.*	x	✓	✓	✓	✓	✓
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* DPIE	V	-	Rainforests, sclerophyll forests and woodlands. *Distribution limit: N-North of Walgett. S-Sydney.*	x	x	-	-	x	X

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Eastern Coastal Free-tailed Bat *Micronomus norfolkensis* DPIE	V	-	Inhabits open forests and woodlands foraging above the canopy and along the edge of forests. Roosts in tree hollows, under bark and buildings. *Distribution limit: N-Woodenbong. S-Pambula.*	x	Marginal	✓	x	Not likely	X
Large-eared Pied Bat *Chalinolobus dwyeri* DPIE EPBC	V	V	Warm-temperate to subtropical dry sclerophyll forest and woodland. Roosts in caves, tunnels and tree hollows in colonies of up to 30 animals. *Distribution limit: N-Border Ranges National Park. S-Wollongong.*	x	x	-	-	x	X
Eastern False Pipistrelle *Falsistrellus tasmaniensis* DPIE	V	-	Recorded roosting in caves, old buildings and tree hollows. *Distribution limit: N-Border Ranges National Park. S-Pambula.*	x	x	-	-	x	X
Little Bent-winged Bat *Miniopterus australis* DPIE	V	-	Roosts in caves, old buildings and structures in the higher rainfall forests along the south coast of Australia. *Distribution limit: N-Border Ranges National Park. S-Sydney.*	x	Marginal	x	✓	Unlikely	✓
Large Bent-winged Bat *Miniopterus orianae oceanensis* DPIE	V	-	Prefers areas where there are caves, old mines, old buildings, stormwater drains and well-timbered areas. *Distribution limit: N-Border Ranges National Park. S-South of Eden.*	✓	-	-	-	Recorded	✓

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Southern Myotis *Myotis macropus* DPIE	V	-	Roosts in caves, mines, tunnels, buildings, tree hollows and under bridges. Forages over open water. *Distribution limit: N-Border Ranges National Park. S-South of Eden.*	x	x	-	-	x	X
Greater Broad-nosed Bat *Scoteanax rueppellii* DPIE	V	-	Inhabits areas containing moist river and creek systems, especially tree lined creeks. *Distribution limit: N-Border Ranges National Park. S-Pambula.*	x	x	-	-	x	x
Eastern Cave Bat *Vespadelus troughtoni* DPIE	V	-	Inhabits drier open forests and woodlands. Roosts in well-lit parts of caves and mineshafts. *Distribution limit: Along GDR from N-Tweed Heads. S-Kempsey.*	x	x	-	-	x	x
New Holland Mouse *Pseudomys novaehollandiae* EPBC	-	V	Occurs in heathlands, woodlands, open forest and paperbark swamps and on sandy, loamy or rocky soils. Coastal populations have a marked preference for sandy substrates, a heathy understorey of leguminous shrubs less than 1m high and sparse ground litter. Recolonises in regenerating burnt areas. *Distribution limit: N-Border Ranges National Park. S-South of Eden.*	x	x	-	-	x	x
The Golden Sun Moth *Synemon plana* DPIE	E	-	Inhabits natural treeless grasslands containing *Austrodanthonia carphoides. Distribution limit: Southern Tablelands and South West Slopes.*	x	x	-	-	x	x

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in test of significance (✓) Refer to Appendix 3**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Cumberland Plain Land Snail *Meridolum corneovirens* DPIE	E	-	Inhabits remnant eucalypt woodland of the Cumberland Plan. Shelters under logs, debris, clumps of grass, around base of trees and burrowing into loose soil. *Distribution limit: Cumberland Plain of Sydney Basin Bioregion.*	x	x	-	-	x	x
Dural Land Snail *Pommerhelix duralensis* EPBC	E	E	Occurs on shale-sandstone transitional forest landscapes within the Blue Mountains, Penrith, The Hills, Wollondilly, Hornsby and Parramatta LGA's. Occurs in low abundance and shelters under rocks or inside curled-up bark, beneath leaves and light woody debris. *Distribution limit: St Albans to Mulgoa with most records from The Hills LGA.*	X	x	-	-	x	x

DPIE	Denotes species listed within 10 km of the development footprint on the *Atlas of NSW Wildlife*
EPBC	Denotes species listed within 10 km of the development footprint in the *EPBC Act* habitat search
TBE	Denotes additional species considered by *Travers bushfire & ecology* to have potential habitat based on regional knowledge and other records
V	Denotes vulnerable listed species under the relevant Act
E or E1	Denotes endangered listed species under the relevant Act
E4a or CE	Denotes critically endangered listed species under the relevant Act
NOTE:	1. This field is not considered if no suitable habitat is present within the development footprint 2. 'records' refer to those provided by the *Atlas of NSW Wildlife* 3. 'nearby' or 'recent' records are species specific accounting for home range, dispersal ability and life cycle
Unlikely	Represents such a low margin but not enough to 100% rule it one. A test of significance is required.
Not likely	Means 0% change of occurring, despite there being potential habitat. A test of significance is not applied to these species.

A detailed assessment in accordance with Section 1.7 of the *EP&A Act* will be completed for these species in Appendix 3 of this report.

Table 9 provides an assessment of potential habitat within the study area for nationally *protected* migratory fauna species recorded within 10 km on the *EPBC Act* Protected Matters Tool. Nationally *threatened* migratory species are instead considered above in Table 8.

Table 9 – Protected migratory bird habitat assessment (Appendix 2)

Common name ***Scientific name***	**Preferred habitat** ***Migratory breeding***	**Suitable habitat present (✓)**	**Recorded on site (✓)**	**Comments**
Oriental Cuckoo (*Cuculus optatus*)	Mainly inhabits forests, occurring in coniferous, deciduous and mixed forest. It feeds mainly on insects and their larvae, foraging for them in trees and bushes as well as on the ground.	x	x	-
Fork-tailed Swift (Apus pacificus)	Aerial: over open country, from semi-arid deserts to coasts, islands; sometimes over forests, cities. Breeds Siberia, Himalayas, east to Japan south east Asia. Summer migrant to east Australia. Mass movements associated with late summer low pressure systems into east Australia. Otherwise uncommon.	✓	x	-
Rainbow Bee-eater (*Merops ornatus*)	Open woodlands with sandy, loamy soil; sandridges, sandspits, riverbanks, road cuttings, beaches, dunes, cliffs, mangroves, rainforest, woodlands, golf courses. *Breeding resident in northern Australia. Summer breeding migrant to south east and south west Australia.*	x	x	-
Black-faced Monarch (*Monarcha melanopsis*)	Rainforests, eucalypt woodlands; coastal scrubs; damp gullies in rainforest, eucalypt forest; more open woodland when migrating. *Summer breeding migrant to coastal south east Australia, otherwise uncommon.*	x	x	-
Spectacled Monarch (*Monarcha trivirgatus*)	Understorey of mountain / lowland rainforest, thickly wooded gullies, waterside vegetation, mostly well below canopy. *Summer breeding migrant to south-east Qld and north-east NSW down to Port Stephens from Sept / Oct to May. Uncommon in southern part of range.*	x	x	-
Satin Flycatcher (*Myiagra cyanoleuca*)	Heavily vegetated gullies in forests, taller woodlands, usually above shrub-layer; during migration, coastal forests, woodlands, mangroves, trees in open country, gardens. *Breeds mostly south-east Australia and Tasmania over warmer months, winters in north east Qld.*	x	x	-
Rufous Fantail (*Rhipidura rufifrons*)	Undergrowth of rainforests / wetter eucalypt forests / gullies; monsoon forests, paperbarks, sub-inland and coastal scrubs; mangroves, watercourses; parks, gardens. On migration, farms, streets buildings. *Breeding migrant to south-east Australia over warmer months. Altitudinal migrant in north-east NSW in mountain forests during warmer months.*	x	x	-
Yellow Wagtail (*Motacilla flava*)	The yellow wagtail typically forages in damp grassland and on relatively bare open ground at edges of rivers, lakes and wetlands, but also feeds in dry grassland and in fields of cereal crops.	x	x	-

Appendix 3
Test of Significance

Flora and fauna survey and habitat assessments of the study area have resulted in the identification of suitable habitat for the following threatened biodiversity that was recorded present or considered otherwise with varying potential to occur. The potential for any direct or indirect impacts on species has been considered and noted.

Table 10 – Threatened flora impact summary (Appendix 3)

Scientific name	*BC Act*	Potential to occur	Potential habitat impact
Eucalyptus nicholii	V	✓	Likely removal of 4 specimens

Table 11 – Threatened fauna impact summary (Appendix 3)

Common name	*BC Act*	Potential to occur	Potential habitat impact
Large Bent-winged Bat	V	Recorded	Indirect – on potential foraging and unlikely roosting
Little Lorikeet	V	✓	Direct – on potential foraging
Grey-headed Flying-fox	V	✓	Direct – on potential foraging
Little Bent-winged Bat	V	Unlikely	Indirect – on potential foraging and unlikely roosting

Threatened ecological communities

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

BC ACT 2016 - SECTION 7.3
TEST OF SIGNIFICANCE

As outlined in Section 7.2 of the *BC Act* development or an activity is *likely to significantly affect threatened species* if:

(a) It is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in Section 7.3, or
(b) The development exceeds the threshold if the BOS applies to the impacts of the development on biodiversity values, or
(c) It is carried out in a declared area of outstanding biodiversity value.

With respect to (a) above, and outlined in Section 7.3 of the *BC Act,* the following *test of significance* is a set of five main considerations, with sub-considerations for determining whether proposed development or activity 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 direct and indirect impacts of the proposal are considered within Section 5.4 of this BDAR.

With consideration to the relative direct and indirect impacts on all threatened species with varying potential to occur, it is considered that the proposal is unlikely to disrupt the life cycle for any of these listed species such that a viable local population would be placed at risk of extinction. Species recorded present during survey, previously recorded nearby or with high potential to occur and requiring further discussion given potential impacts are further discussed in detail below.

Summary of threatened species recorded or potential habitat species

Eucalyptus nicholii

This species is a small to medium sized tree with rough bark that is persistent to the small branches. Grows in woodland in the Northern Tablelands of NSW from Walcha to Glen Innes. Often found growing on porphyry or granitic soils. This species is commonly planted as a street or parkland tree throughout NSW.

A detailed search observed 4 specimens of this species scattered throughout the subject site. It is expected that the proposed development will likely remove the specimens to facilitate the construction activities.

These specimens occur outside of their naturally occurring habitat and appear to have been planted as street trees. As this species occurs outside its natural population distribution it is not considered to be a viable local population within the guidelines of the NPWS (NPWS Information Circular No 2, 1996). It is considered that the action proposed is not 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.

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

Grey-Headed Flying-foxes are canopy feeding frugivores and nectarivores, inhabiting a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and cultivated areas. This species roosts in camps, which may contain tens of thousands of individuals.

Camps are commonly formed in gullies, typically not far from water and usually in vegetation with a dense canopy (Tidemann 1998). Camps can be found in riparian rainforest patches, Melaleuca stands, mangroves, riparian woodland or modified vegetation in urban areas. Loyalty to a site is high and some camps in NSW have been used for over a century (NSW NPWS 2001). Some camps are used at the same time every year by hundreds of thousands of flying-foxes while others are used sporadically by a few hundred individuals (Strahan 1995). Generally foraging is within 20 km of camps but individuals are known to commute up to 50 km to a productive food source.

No Grey-headed Flying-foxes were recorded during survey. The development footprint provides only seasonal foraging habitat for the Grey-headed Flying-fox as no suitable roosting or subsequent breeding habitat is present. Foraging habitat is otherwise well represented in the surrounding locality such that removal of habitat will not significantly impact on a local population. It is recommended that foraging habitat is replaced by locally native flowering eucalypts within landscaping areas.

Little Lorikeet (*Glossopsitta pusilla*)

Little Lorikeets mostly occur in dry, open eucalypt forests and woodlands. Little Lorikeets are gregarious, usually foraging in small flocks, often with other species of lorikeet. They feed

primarily on nectar and pollen in the tree canopy, particularly on profusely-flowering eucalypts, but also on a variety of other species including Melaleucas and mistletoes.

There is no evidence of regular migration, but Little Lorikeets are generally considered to be nomadic (Higgins 1999), with irregular large or small influxes of individuals occurring at any time of year, apparently related to food availability. Long term investigations indicate that breeding birds are resident from April to December, and even during their non-resident period, they may return to the nest area for short periods if there is some tree-flowering in the vicinity (Courtney & Debus 2006).

Approximately 3 cm diameter nest hollows are located mostly in living, smooth-barked eucalypts, and are kept open by the activities of the occupants, which use their beaks to bite away living bark from around the opening. When nest hollows are deserted, e.g. after storm-damage to trees, hollows can close over within 14 months (Courtney & Debus 2006). Nest hollows are occasionally located in dead trees, but birds generally desert hollows within two years of tree death. Nest-hollows are used “traditionally”, with the same hollow (not necessarily by the same individuals) (Courtney & Debus 2006). The breeding season extends from May to September (Higgins 1999) and, if eucalypt nectar and pollen are available throughout this period, two broods of fledglings can be raised in a season.

The major threats to Little Lorikeets are loss of breeding sites and food resources from ongoing land clearing. New nest hollows are not being recruited at a rate that compensates this loss.

It is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and ‘locally nomadic’ movements are suspected of breeding pairs. The Little Lorikeet roosts in treetops, often distant from feeding areas but nests in proximity to feeding areas if possible. The Nesting season extends from May to September. In years when flowering is prolific, Little Lorikeet pairs can breed twice, producing 3-4 young per attempt. However, the survival rate of fledglings is unknown.

Little Lorikeet was recorded on the 22 of July 2020 during diurnal survey flying over the study area. However, the development footprint provides only seasonal foraging habitat for Little Lorikeet as no suitable roosting or hollows for breeding habitat is present. 0.22 ha of seasonal foraging habitat may be impacted assuming all vegetation on site was suitable. However, this is otherwise well represented in the surrounding locality such that removal of habitat will not significantly impact on a local population. It is recommended that foraging habitat is replaced by locally native flowering eucalypts within landscaping areas.

Little Bent-winged Bat & Large Bent-winged Bat (*Miniopterus australis* and *Miniopterus orianae oceanensis*)

These two species are considered here together because of their similar roosting/breeding habitat requirements and subsequent assessment outcome.

The Little Bent-winged Bat forages below the canopy within open forests and woodlands, feeding on small insects (Dwyer 1995b). This species roosts in caves, tunnels, tree hollows and occasionally old buildings (Dwyer 1995b). Caves are an important resource for this species, particularly for breeding where maternity caves must have suitable temperature, humidity and physical dimensions to permit breeding (Dwyer 1995b). One record exists of this species utilising a tree hollow however hollows are not currently considered as preferred habitat for this species (pers. com. Brad Law).

The Large Bent-winged Bat forages above and below the canopy within open forests and woodlands, feeding on small flying insects, predominantly moths (Dwyer 1995). The Large Bent-winged Bat is known to roost in a range of habitats including stormwater channels, under bridges, occasionally in buildings, old mines and, in particular, caves (Dwyer 1995). Caves are an important resource for this species, particularly for breeding where maternity caves must have suitable temperature, humidity and physical dimensions to permit breeding (Dwyer 1995). Roost sites in tree hollows have not been reported within the literature reviewed. This species has not been identified as utilising culverts for maternity roosts. Maternity roosts rather are occupied by up to 100 000 females with only 12 maternity roosts known throughout the complete range (Hoy & Hall 2008).

The Large Bent-winged was recorded within the study area overnight from the 17 of August 2020. It is considered that the development footprint provides suitable foraging only habitat for the Little Bent-winged Bat and Large Bent-winged Bat. The Little Bent-winged Bat would forage more predominantly below the canopy where an open structure below the shrub layer permits. The Large Bent-winged Bat would forage more predominantly above the canopy and down in more open areas. Concentrated activity is likely in some locations such as along the creek, forest fringes and trails, particularly for the Large Bent-winged Bat.

Whilst foraging by both species may be more concentrated in some habitats (most based on structure and insect activity) no specific valued habitat features within the study area are identified. No important roosting or breeding habitat is likely present within the study area. Roosting locations are expected to occur throughout the locality and many of these are likely within man-made structures.

Given the highly mobile nature of both of these species, the absence of any important habitat, their known ability to move across and utilise some urban landscapes and that the proposed development will not inhibit local movements and dispersal, neither species will be likely significantly impacted by the proposed habitat clearance.

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

PCT 1281 – Turpentine – Grey Ironbark open forest on shale in the lower Blue Mountains is commensurate with the TEC Sydney Turpentine Ironbark Forest in the Sydney Basin Bioregion (STIF). The extent of this community on site is confined to the boundary garden bed in the south-eastern corner of the site and approximately 0.03 ha. There are eight (8) remnant trees that make up the majority of the canopy, coupled with plantings of *Casuarina glauca* and *Grevillea robusta.* The understorey is completely planted with no remnant shrubs or groundcovers.

The remnant TEC is very poor quality and has been managed for decades. Google Earth images of the site in 2003 show basically the same vegetation as what is present today. The 1943 imagery of the site shows about 10 trees across the site but none in the location of this garden bed with the current remnant trees. Even in 1943 there is 1 bowling green in the north-west corner of the site.

Any vegetation on site has been isolated from remnant bushland for at least 80 years and thus the seed bank is likely to be depleted, hence no natural understorey.

The loss of 8 trees that are regrowth in a tiny isolated patch that does not contribute to the local seed resource of STIF is considered to have low importance. There are some disturbed patches on the urban fringe that go into Bidjigal Reserve approximately 0.5–1 km to the east and north-east which are likely to be important for the preservation of the community locally.

There are remnant trees on adjoining and nearby residential lots of similar or better quality or age that provide limited value for this community. The loss of 8 trees that make up the TEC is not likely to place the ecological community at risk of local extinction.

The loss of 8 trees from the ecological community may also be compensated through strategic planting of STIF trees and partial understorey in select locations as part of the landscaping works.

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

The entire remnant of STIF is proposed for removal which includes only 8 trees. There is no natural shrub or ground layer remaining within the garden bed, and given the land use of several decades, the seed bank has likely been depleted.

The composition on adjoining and nearby lots is similar, with residences containing remnant trees, although many of those trees appear to be more mature than the ones proposed for removal on site.

It is unlikely that the proposed development will substantially and adversely modify the composition of STIF such that its local occurrence is likely to be placed at risk of extinction.

c) In relation to the habitat of threatened species or ecological community:

It is considered that the habitat attributes of the development footprint provide known or potential habitat for *Eucalyptus nicholii,* STIF*,* Large Bent-winged Bat, Little Bent-winged Bat, White-throated Needletail, Grey-headed Flying-fox and Little Lorikeet.

i. The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

The proposal will likely see the removal or impact to all ‘native’ vegetation across the site. The majority of what is described as native vegetation occurs along the southern and eastern site boundary, however the clear majority is planted and dominated by shrub species such as Grevillea’s and Callistemon’s as opposed to naturally occurring species of shale origin. The proposal is expected to remove 8 young Eucalyptus / Angophora trees over a total area of 0.03 ha (of STIF), as well as a 0.20 ha of exotic and non-endemic landscaped garden beds around the lawn bowling greens. No hollow-bearing trees are being impacted.

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

The vegetation on site does not hold major importance for habitat and vegetative connectivity. The majority of the vegetation is planted and not locally endemic to the area, and with heavy urbanization surrounding, has poor linkages to quality remnants.

Therefore, it is considered that known habitat for a threatened species, population or ecological community within the local area and region is unlikely to become isolated or fragmented as a result of the proposal.

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

There are only 8 remnant native trees present, with a planted understorey. No other locally occurring native understorey species exists in the area of remnant vegetation. There may be just a handful of native herbs of climbers scattered across the site.

The only bit of remnant native vegetation in the south-east is young and only comprises 8 remnant naturally occurring trees. Whilst the vegetation may be aligned to STIF, its importance is considered to be low given the likely depletion of the seed bank and lack of connectivity.

The site is too degraded to host threatened flora species habitat and is surrounded by urban development. Whilst 4 individual *Eucalyptus nicholii* have been recorded and are expected to be removed, these are all planted specimens that don't naturally occur in the Sydney Basin Bioregion.

The site provides no derelict buildings or tree hollows that may provide breeding habitat for a number of species, and is not important with regards to connectivity.

The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population and ecological communities in the locality is considered to be minimal.

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 development footprint is not within any declared area of outstanding biodiversity value. Therefore, the proposal will not have any adverse effects on any declared area of outstanding biodiversity value (either directly or indirectly).

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.

A key threatening process is defined as a process that threatens, or could threaten, the survival or evolutionary development of species, populations or ecological communities.

The current list of key threatening processes, and whether the proposed activity is recognised as a threatening process, is shown below.

Table 12 – Key threatening processes (Appendix 3)

Listed key threatening process	Development a threatening process?		
	Likely	**Possible**	**Unlikely**
Aggressive exclusion of birds by Noisy Miners (*Manorina*			✓

Listed key threatening process	Development a threatening process?		
	Likely	Possible	Unlikely
melanocephala)			
Alteration of habitat following subsidence due to longwall mining			✓
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands			✓
Anthropogenic Climate Change			✓
Bushrock removal			✓
Clearing of native vegetation	✓		
Competition and habitat degradation by feral goats			✓
Competition and grazing by the feral European Rabbit (*Oryctolagus cuniculus*)			✓
Competition from feral honeybees			✓
Death or injury to marine species following capture in shark control programs on ocean beaches			✓
Entanglement in, or ingestion of anthropogenic debris in marine and estuarine environments			✓
Forest Eucalypt dieback associated with over-abundant psyllids and bell miners			✓
High frequency fire resulting in the disruption of life-cycle processes in plants and animals and loss of vegetation structure and composition			✓
Herbivory and environmental degradation caused by feral deer			✓
Importation of red imported fire ants into NSW			✓
Infection by *Psittacine circoviral* (beak and feather) disease affecting endangered psittacine species and populations			✓
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis			✓
Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae			✓
Infection of native plants by *Phytophthora cinnamomi*			✓
Introduction of the large earth bumblebee (*Bombus terrestris*)			✓
Invasion and establishment of exotic vines and scramblers			✓
Invasion and establishment of Scotch Broom (*Cytisus scoparius*)			✓
Invasion and establishment of the Cane Toad (*Bufo marinus*)			✓
Invasion, establishment and spread of *Lantana camara*			✓
Invasion of native plant communities by bitou bush & boneseed *Chrysanthemoides monilifera*			✓
Invasion of native plant communities by exotic perennial grasses			✓
Invasion of native plant communities by African Olive (*Olea europaea* subsp. *cuspidata*)			✓
Invasion of the Yellow Crazy Ant (*Anoplolepis gracilipes*)			✓

Listed key threatening process	Development a threatening process?		
	Likely	Possible	Unlikely
Loss of Hollow-bearing trees			✓
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants			✓
Loss and/or degradation of sites used for hill-topping by butterflies			✓
Predation and hybridisation by feral dogs (*Canis lupus familiaris*)			✓
Predation by the European Red Fox (*Vulpes vulpes*)			✓
Predation by the Feral Cat (*Felis catus*)			✓
Predation by Gambusia holbrooki Girard, 1859 (plague minnow or mosquito fish)			✓
Predation by the Ship Rat (*Rattus rattus*) on Lord Howe Island			✓
Predation, habitat degradation, competition & disease transmission from Feral pigs (*Sus scofa*)			✓
Removal of dead wood and dead trees	✓		

The above key threatening processes have been considered in reference to the proposal. It was considered that the proposal may contribute to a small degree to a number these processes as described below. It was not considered that the proposal will have a large or significant impact on any of the following key threatening processes. Some mitigation measures have been listed under each process to minimise or reduce such impacts upon those processes.

Summary of "likely" or "possible" Key Threatening Processes

This section identifies what mitigation measures can be implemented to address threatening processes.

Clearing of native vegetation

The proposal will likely remove 8 remnant trees as well as other planted native vegetation. Whilst the remnant trees may be linked to STIF, they have limited fauna value and no native understorey. The removal of native vegetation on the development footprint is not likely to significantly affect the biodiversity of the local area due to the small size and degraded nature of that which is present. The loss of such trees can readily be replaced as part of the future landscaping around the site. It is recommended that approximately 50% of the future landscaping of the site consider the utilisation of STIF species within the garden beds.

Removal of dead wood and dead trees

The proposal will require the removal of deadwood. Four (4) dead trees have been identified in the arboricultural assessment that will be removed for the development. In the context of the site location and habitat quality, the loss of this feature is considered to minimal and unlikely to host threatened fauna species habitat.

Appendix 4
EPBC significance assessment criteria

EPBC Act Significance Assessment Criteria

Under the *EPBC Act* an action will require approval from the Australian Government Environment Minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance. The following significant impact criteria were sourced from the *EPBC Act* Policy Statement 1.1 (May 2006):

CRITICALLY ENDANGERED AND ENDANGERED SPECIES

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;
- Reduce the area of occupancy of the species;
- Fragment an existing population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of a population;
- Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;
- Introduce disease that may cause the species to decline; or
- Interfere with the recovery of the species.

>> What is a population of a species?

A 'population of a species' is defined under the *EPBC Act* as an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:

- a geographically distinct regional population, or collection of local populations; or
- a population, or collection of local populations, that occurs within a particular bioregion.

>> What is habitat critical to the survival of a species or ecological community?

'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:

- For activities such as foraging, breeding, roosting, or dispersal;
- For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- To maintain genetic diversity and long-term evolutionary development; or
- For the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the *EPBC Act.*

VULNERABLE SPECIES

Significant impact criteria

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

- lead to a long-term decrease in the size of an important population of a species;
- reduce the area of occupancy of an important population;
- fragment an existing important population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of an important population;
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;
- introduce disease that may cause the species to decline; or
- interfere substantially with the recovery of the species.

>> What is an important population of a species?

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or
- Populations that are near the limit of the species range.

CRITICALLY ENDANGERED AND ENDANGERED ECOLOGICAL COMMUNITIES

Significant impact criteria

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

- Reduce the extent of an ecological community;
- Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines;
- Adversely affect habitat critical to the survival of an ecological community;
- Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns;
- Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting;
- Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
  - assisting invasive species, that are harmful to the listed ecological community, to become established; or
  - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community; or
- Interfere with the recovery of an ecological community.

MIGRATORY SPECIES

Significant impact criteria

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

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

>> What is important habitat for a migratory species?

An area of 'important habitat' for a migratory species is:

a) Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or
b) Habitat that is of critical importance to the species at particular life-cycle stages; and/or
c) Habitat utilised by a migratory species which is at the limit of the species range; and/or
d) Habitat within an area where the species is declining.

>> What is an ecologically significant proportion?

Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with the species (each circumstance will need to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness and species-specific behavioural patterns (for example, site fidelity and dispersal rates).

>> What is the population of a migratory species?

'Population', in relation to migratory species, means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.