APPENDIX J BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

Travers

bushfire & ecology

Biodiversity Development Assessment Report

1408 Anzac Parade,
Little Bay

July 2019
(REF: 19MER02)

Biodiversity Development Assessment Report

1408 Anzac Parade
Little Bay

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File:	19MER02

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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*
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DEC	NSW Department of Environment and Conservation (superseded by DECC from April 2007)
DECC	NSW Department of Environment and Climate Change (superseded by DECCW from October 2009)
DECCW	NSW Department of Environment, Climate Change and Water (superseded by OEH from April 2011)
DEWHA	Commonwealth Department of Environment, Water, Heritage & the Arts (superseded by SEWPAC)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
EEC	endangered ecological community
EPA	Environmental Protection Agency
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)*
NSW DPI	NSW Department of Industry and Investment
OEH	Office of Environment and Heritage
PCT	plant community type
PFC	projected foliage cover
RFS	NSW Rural Fire Service
ROTAP	rare or threatened Australian plants
SAII	Serious And Irreversible Impacts
SEPP	State Environmental Planning Policy
SEWPAC	Commonwealth Dept. of Sustainability, Environment, Water, Population & Communities (superseded by DOEE)
SIS	species impact statement
SULE	safe useful life expectancy
TEC	threatened ecological community
TPZ	tree preservation zone
TSC Act	*Threatened Species Conservation Act (1995) – Superseded by the Biodiversity Conservation Act (2016)*
VMP	vegetation management plan

Biodiversity Assessment

1.0 Background

Travers bushfire & ecology has been engaged to prepare a Biodiversity Development Assessment Report for 1408 Anzac Parade, Little Bay within Randwick City Council local government area (LGA). The extent of this entire lot is shown in Figure 1. This lot is subject to a updated masterplan and will hereafter be referred to as the 'study area'.

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

Figure 1 – Study area (red)

1.1 Proposed development

This site in Little Bay has an approved masterplan (Figure 2) that provides for a community property that contains some remnant revegetation, coupled with some existing recreational facilities such as pathways. This community property protects the remnant vegetation including the critically endangered Eastern Suburbs Banksia Scrub remnant near the eastern site boundary.

Two (2) residential flat buildings have been constructed towards the western end of the site with frontages to Anzac Parade, as well as two (2) single dwellings, with Meriton acquiring all of the remaining development land that still remains vacant including the lots containing the roads and parks which have not been transferred to the Council.

Figure 2 – Approved masterplan

(Source: Hill Thalis + Candlepas Associates 29/08/2008)

Meriton proposes a rezoning of the site to allow increased residential development that will have a very similar footprint to the approved masterplan dated August 2008 (Figure 3). A Flora and Fauna Assessment for this masterplan was undertaken by *Travers Environmental* in February 2009.

The height of the proposed buildings varies from 2–22 storeys across the site to create a sense of transition into the low density development surrounding the subject site.

The tallest parts of the proposal are in the north-west corner, which minimises overshadowing to sensitive areas and the surrounding development.

The current proposal utilises the same footprint as the approved development and as such will not impact on any additional vegetation or habitat. Clearing of vegetation under the previous activated consent has been undertaken and therefore the removal of any regrowth shrubs within the development footprint has been approved and is not subject to any biodiversity offsetting.

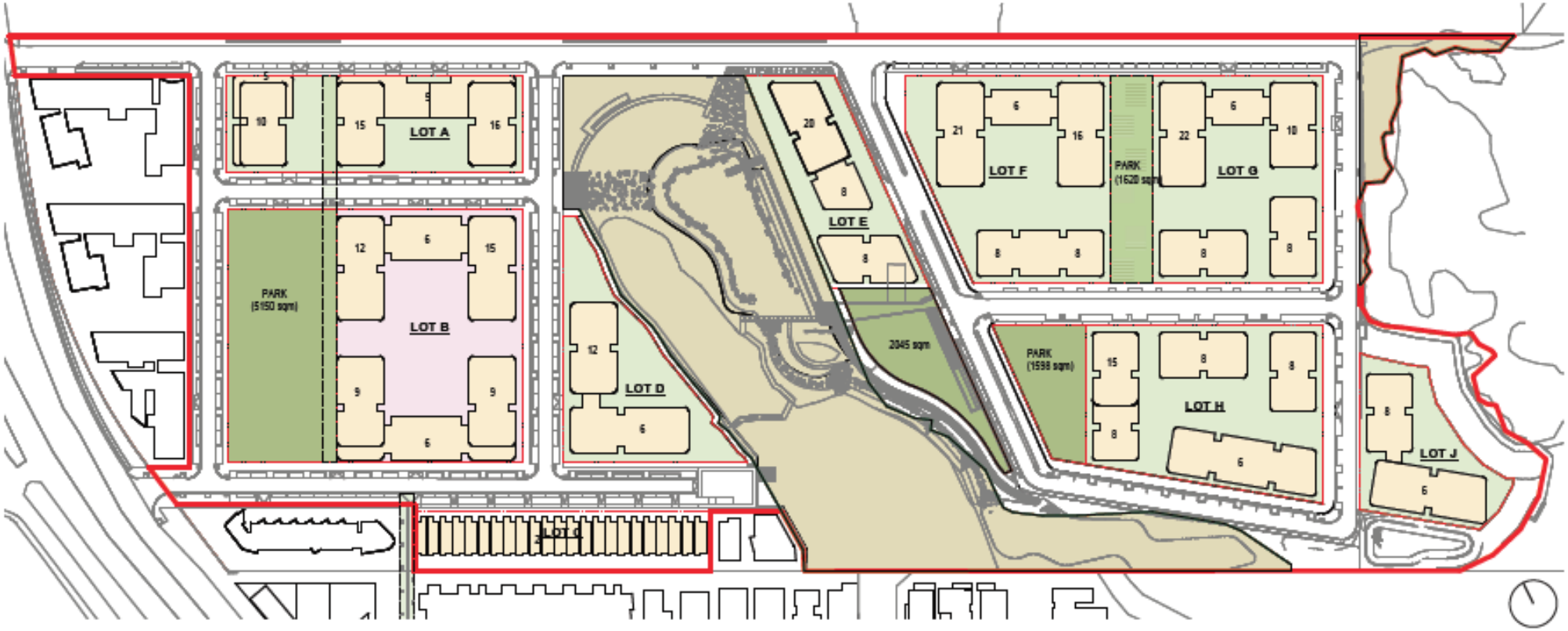


Figure 3 – Proposed Masterplan – Site Layout Plan

1.2 Site description

Table 1 provides a summary of the planning, cadastral, topographical, and disturbance details of the subject site.

Table 1 – Site features

Location	1408 Anzac Parade, Little Bay
Size	Approximately 12.3 hectares
Local government area	Randwick City Council
Grid reference	337910E 6239240N
Elevation	Approximately 20-40 metres Australian Height Datum (AHD)
Topography	Gradients of the study area are generally less than 5%. The study area is situated on undulating to rolling hills, with more rock outcrops located in the eastern portion.
Geology and soils	Geology: Western half of the site is Triassic medium to coarse grained quartz sandstone, very minor shale and laminate lenses. Eastern half is primarily characterised by Hawkesbury Sandstone of the Triassic Period. Tertiary sedimentary geology (Sand, clay and peat, variably ferruginous) occurs in the far eastern parts of the site. The soils are shallow and siliceous with rock outcrops. Ettalong Soils are found around the watercourse and are generally deep, extremely acid, organic soils of low fertility. Tuggerah soils, derived from Pleistocene aged Aeolian sand deposits, are restricted to the central and western portions of the study area. Newport Soils derived from Holocene aged Aeolian sand deposits are found on the central/eastern portion of the study area. Sand deposits generally have a high erosion hazard and are low in fertility. Lambert soils derived from Hawkesbury Sandstone lie predominantly under the eastern portion of the study area near the Golf Course and are characterised by rocky outcrops and shallow soils with low fertility.
Catchment and drainage	Watercourses drain in a westerly direction into two dams within the centre of the study area. Surface runoff flows in an easterly direction in the eastern portion of the site.
Vegetation	Grassland with Scattered Trees and Shrubs (GSTS), Disturbed Shrubland, Coastal Heath and Eastern Suburbs Banksia Scrub (ESBS).
Existing land use	Currently zoned R1: General Residential.
Clearing	Majority of original canopy vegetation has been previously cleared.

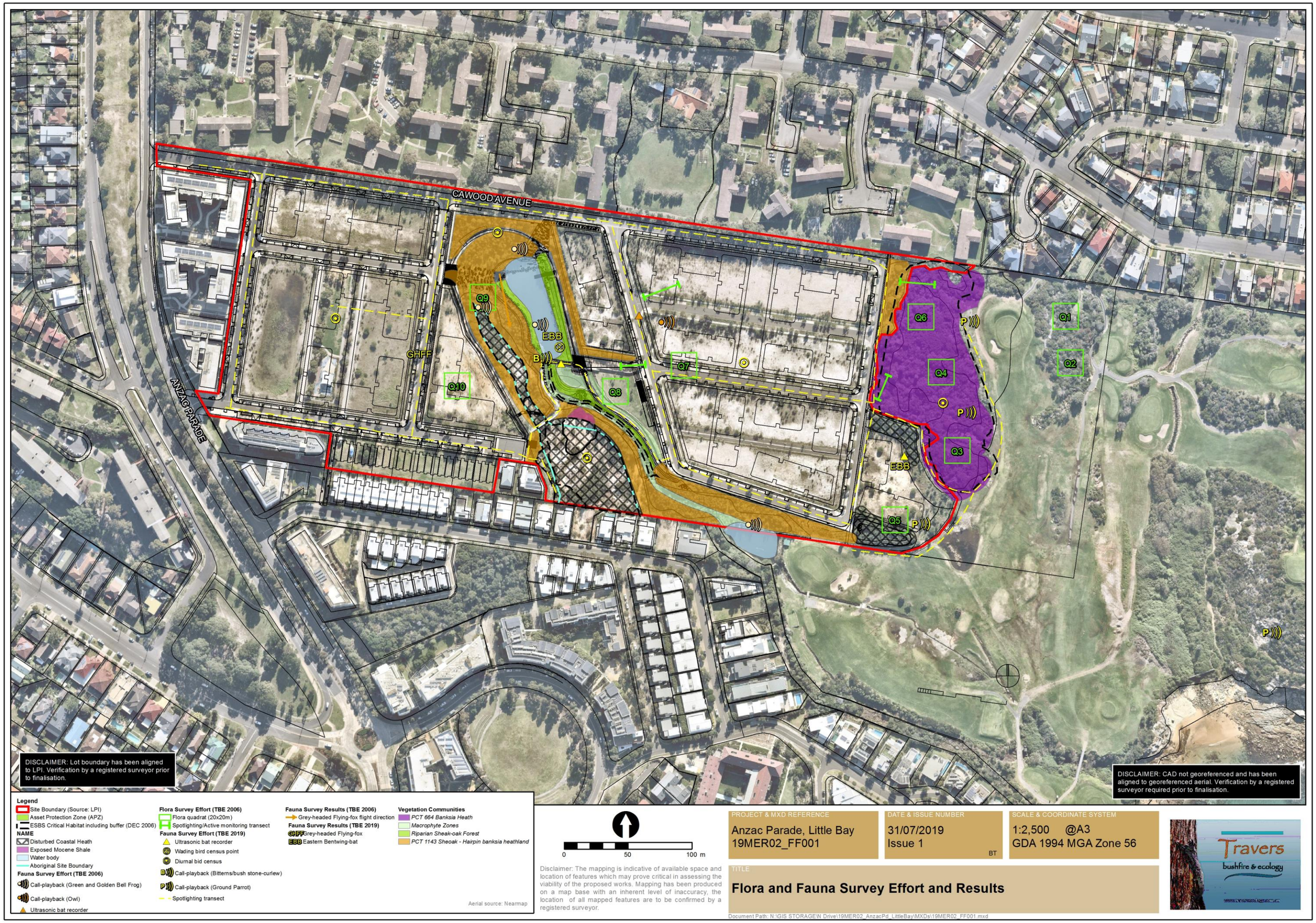


Figure 4 – Flora and fauna survey effort and results

2.0 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).

2.1 Threshold assessment

The BOS includes two (2) elements to the threshold test – an area trigger and a Sensitive Biodiversity Values Land Map trigger. If clearing exceeds either trigger, the BOS applies to the proposed clearing.

2.1.1 Sensitive Biodiversity Land Map

Sensitive Biodiversity Values Land has not been mapped within the study area – an offset is not required under this trigger. Figure 5 shows the site (blue) in relation to those areas (coloured mauve) as having biodiversity values.

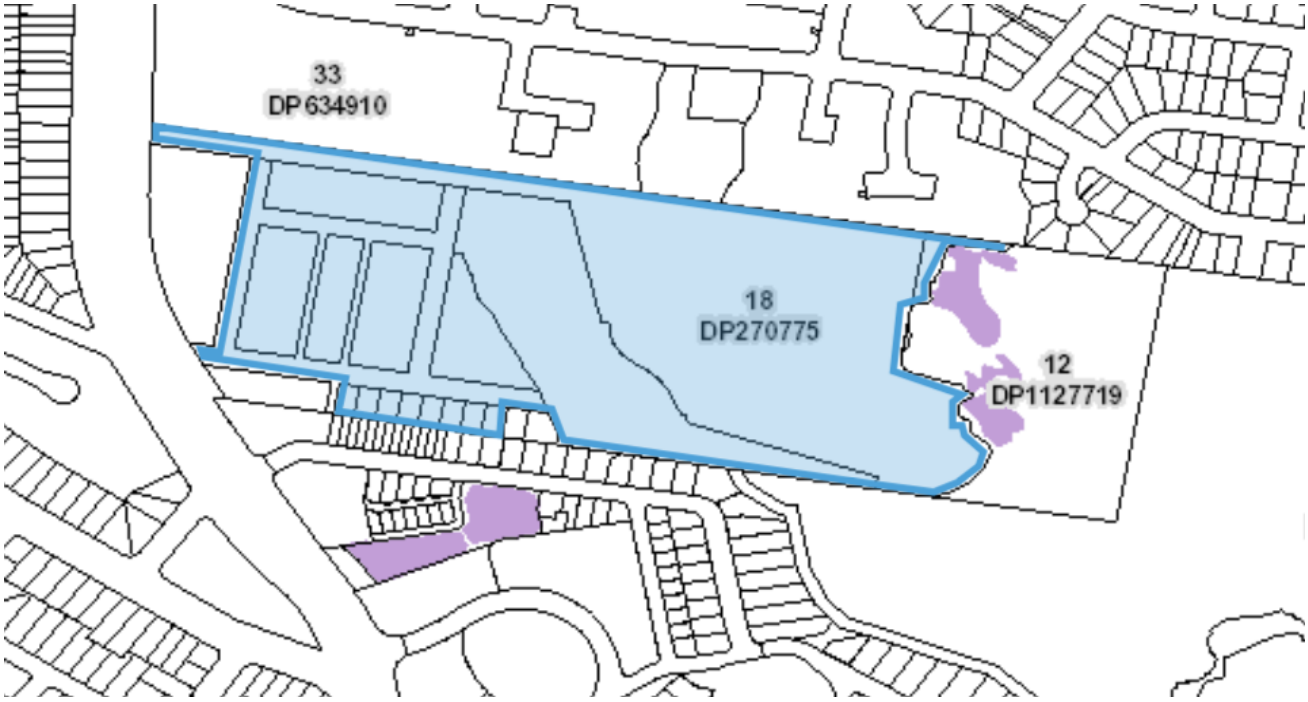


Figure 5 – Biodiversity value land
(Source: OEH – Biodiversity Values Map – March 2019)

2.1.2 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).

The Randwick LEP does not specify a minimum lot size for this site.

Table 2 – BOS entry threshold report

Date of Calculation	17/07/2019 4:28 PM		**BDAR Required***
Total Digitised Area	0.11	ha	
Minimum Lot Size Method	Lot size		
Minimum Lot Size	0.5	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 2 identifies that the BOS entry threshold report has determined the area threshold based on the minimum lot size for which the BOS applies is 0.25ha. Clearing of 'native vegetation' that exceeds 0.25ha will require a biodiversity offset to be obtained. Note that 'native vegetation' includes planted native species.

The current proposal utilises the same footprint as the approved development and as such will not impact on any additional vegetation or habitat. Clearing of vegetation under the previous activated consent has been undertaken and therefore the removal of any regrowth shrubs within the development footprint has been approved and is not subject to any biodiversity offsetting.

The updated masterplan will not cause any additional impacts on native vegetation that is not already accounted for under the approved and activated consent. Consequently offsetting will not be required under this trigger.

2.2 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). The principles have been designed to capture those impacts which are likely to contribute significantly to the risk of extinction of a threatened species or ecological community in New South Wales.

Candidate SAII entities/species recorded or with varying potential to occur within the study area include:

- Eastern Bentwing-bat (recorded)

- Orange-bellied Parrot
- Little Bentwing-bat

The additional impact assessment provisions for threatened species are outlined under Section 10.2.3 of the BAM (2017) and have been applied to the recorded Eastern Bentwing-bat within Appendix 3. As a result of this assessment it is considered that the proposal will not likely cause a serious or irreversible impact on this microbat species.
The ecological data profiles of each of the remaining above listed candidate fauna species has been reviewed to determine any habitat constraints present for breeding and foraging. There is no presence of these constraints and therefore the proposal is not considered likely to cause serious and irreversible impacts.

3.0 Flora

3.1 Survey

Botanical survey was undertaken on 11 and 12 December 2006. The flora survey targeted all vegetation communities present within the study area. Clearing of vegetation under the previous activated consent has been undertaken and therefore the removal of any regrowth shrubs within the development footprint has been approved and is not subject to any biodiversity offsetting. As the revised masterplan will not impact on any additional vegetation, further flora survey has not been undertaken, which is in accordance with the BAM.

Botanical survey included using a systematic sampling regime was undertaken within each of the identified natural vegetation communities (20 x20 meter quadrats and observations of 100 meter transect lines) on both. Random meanders (*Cropper 1993*) were undertaken throughout the site to gain a full species list of the plants within site. A review of the *Atlas of NSW Wildlife* (OEH 2019) was undertaken prior to the site visit to determine threatened species previously recorded within 10km of the subject site, and relevant target searches were undertaken as suited, generally as near-linear transects underneath or adjacent to remnant canopy vegetation.

A brief site inspection was undertaken on 17 July 2019 to identify if there were any significant changes to the landscape.

All naturally occurring species were identified to species level where possible, and are listed in Appendix 2.

3.2 Vegetation communities

The Native Vegetation of the Sydney Metropolitan Area (OEH 2016) maps vegetation within the study area as Undifferentiated Regenerating Shrubs and Artificial Wetland. In Lot 12 to the east, vegetation is mapped as PCT 1822 - Heath-leaved Banksia - Scrub She-oak heath on sandstone headlands in the Sydney basin, and PCT 664 Banksia heath on aeolian sands of eastern Sydney suburbs, Sydney Basin Bioregion. PCT 664 is equivalent to the threatened ecological community (TEC) Eastern Suburbs Banksia Scrub.

Field verification of the study area in 2006 found the following vegetation communities

- Coastal Heath – within Lot 12;
- Eastern Suburbs Banksia Scrub (ESBS) – within Lot 12;
- Disturbed Grassland with Scattered Trees and Shrubs – within Lots 10 & 11;
- Disturbed Shrubland – within Lots 10 & 11; and
- Open Water Bodies & Aquatic Herbfield – upper and lower basin.

Based on the 2006 survey data and updated aerial imaging, these vegetation communities were converted to the following plant community types (PCTs) for the current BAR:

- PCT 1143 - She-oak - Hairpin Banksia heathland on sandstone headlands
- PCT 664 - Banksia heath on aeolian sands of eastern Sydney suburbs (TEC)
- PCT 1071 - Phragmites australis and Typha orientalis coastal freshwater wetland

PCT 1143 - She-oak - Hairpin Banksia heathland on sandstone headlands:

Occurrence - This vegetation community occurs across the site in various condition states and is mostly restricted to the central corridor, and the southeastern and eastern boundaries. Part of this vegetation is part of an old ochre harvesting area which is regenerating with native species and forms a derived community as a result of those works.

Structure - This includes all trees to 8m high with a projective foliage cover (PFC) of less than 5%, shrubs up to 6m high with a PFC 70–90%, understorey consisting of a variable groundcover of herbs and grasses to 1.5m high with a PFC of 10–60%.

Disturbances - This vegetation community has, over a period of 30 years or more, been disturbed by the construction of the Golf Course adjacent to the study area and ongoing filling wastes, weed spraying, earthworks, exotic weeds and rubbish dumping within the study area.

Common Species (In order of dominance)

The common plant species on the site:

Trees: *Allocasuarina littoralis* (Black She-oak), *Casuarina glauca* (Swamp Oak) and *Erythrina X sykesii* (Coral Tree).

Shrubs: *Acacia longifolia* (Coastal Wattle)*, Acacia suaveolens* (Sweet-scented Wattle), *Banksia aemula, Banksia integrifolia* ssp. *integrifolia* (Coast Banksia), *Banksia spinulosa* var. *spinulosa* (Hairpin Banksia), *Kunzea ambigua* (Tick Bush), *Leptospermum laevigatum* (Coast Tea-tree)*, Melaleuca nodosa* (Ball Honey Myrtle), *Lantana camara* (Lantana), *Chrysanthemoides monilifera* subsp. *rotundata* (Bitou Bush), *Epacris longiflora* (Native Fuschia), *Westringia fruticosa* (Coast Westringia) and *Callistemon salignus* (Willow Bottlebrush).

Groundcovers: *Lomandra longifolia* (Spiky-headed Mat-rush), *Cynodon dactylon* (Common Couch), *Entolasia stricta* (Wiry Panic), *Eragrostis curvula* (African Lovegrass) *Andropogon virginicus* (Whisky Grass)*, Avena fatua* (Wild Oats), *Briza maxima* (Quaking Grass), *Cynodon dactylon* (Common Couch), *Dactylis glomerata* (Cocksfoot)*, Ehrharta erecta* (Panic Veldtgrass), *Paspalum dilatatum* (Paspalum), *Verbena bonariensis* (Purpletop).and *Araujia sericifera* (Moth Vine).

Weeds: *Avena fatua* (Wild Oats), *Lantana camara* (Lantana), *Chrysanthemoides monilifera* ssp. *rotundata* (Bitou Bush), *Cynodon dactylon* (Common Couch), *Bidens pilosa* (Cobbler's Pegs), *Taraxacum officinale* (Dandelion), *Eragrostis curvula* (African Lovegrass), *Paspalum dilatatum* (Paspalum), *Solanum nigrum* (Black Nightshade) and *Araujia sericifera* (Moth Vine).

Classification: PCT 1143 is not associated with any listed TEC

PCT 664 - Banksia heath on aeolian sands of eastern Sydney suburbs Vegetation:

Occurrence - This vegetation community occurs in the western portion of the site and covers approximately 8% of the site.

Structure - Trees to 6m high with a projective foliage cover (PFC) of less than 5%, shrubs to 4m high with a PFC 70-80%, understorey consists of a sparse to moderate groundcover consisting of herbs and grasses to 1.5m high with a PFC of 10%.

Disturbances - This vegetation community has been disturbed by the construction of a Golf Course adjacent to the site but is in moderately good condition.

Common Species (In order of dominance)

Trees: *Allocasuarina distyla* (Scrub She-oak), *Angophora costata* (Smooth-barked Apple), *Eucalyptus capitellata* (Brown Stringybark) and *Eucalyptus haemastoma* (Scribbly Gum).

Shrubs: *Banksia ericifolia* (Heath-Leaved Banksia), *Melaleuca nodosa* (Ball Honey Myrtle), *Acacia longifolia* (Sydney Golden Wattle), *Callistemon linearis* (Narrow-leaved Bottlebrush), *Acacia suaveolens* (Sweet-scented Wattle), *Monotoca elliptica* (Tree Broom-heath), *Kunzea ambigua* (Tick Bush), *Leptospermum laevigatum* (Coast Tea-tree), *Leptospermum polygalifolium* (Lemon Scented Tea-tree) and *Leptospermum trinervium* (Paperbark Tea-tree).

Groundcovers: *Bidens pilosa* (Cobbler's Pegs), *Dichelachne crinita* (Long-hair Plume Grass), *Sonchus oleraceus* (Common Sow-thistle), *Taraxacum officinale* (Dandelion), *Lepidosperma laterale* (Variable Sword-sedge), *Pteridium esculentum* (Bracken), *Goodenia paniculata* (Swamp Goodenia), *Juncus subsecundus* (Finger Rush), *Lindsaea linearis* (Screw Fern), *Lomandra longifolia* (Spiky-headed Mat-rush), *Avena fatua* (Wild Oats) and *Cynodon dactylon* (Common Couch).

Weeds: *Avena fatua* (Wild Oats), *Chrysanthemoides monilifera* ssp. *rotundata* (Bitou Bush), *Lantana camara* (Lantana), *Bidens pilosa* (Cobbler's Pegs), *Eragrostis curvula* (African Lovegrass) and *Paspalum dilatatum* (Paspalum).

Classification: This vegetation is commensurate with Eastern Suburbs Banksia Scrub which is listed as a critically endangered ecological community under the *BC Act*, and as an endangered ecological community under the *EPBC Act.*

PCT 1071 - *Phragmites australis* and *Typha orientalis* coastal freshwater wetland

Occurrence – Vegetation associated with the large artificial basin near the centre of the study area.

Structure – Dominated by *Eleocharis, Baumea, Juncus* and *Phragmites* species with the occasional shrub or tree.

Disturbances – With the exception of the western banks of the upper basin, this vegetation community is highly disturbed because of weed invasion and from cut and fill operations nearby.

Common Species

Trees: *Erythrina sykesii* (Coral Tree).

Shrubs: *Ludwigia peruviana* (Water Primrose), *Acacia longifolia* var. *sophorae* (Coastal Wattle), *Lantana camara* (Lantana) and *Toxicodendrum succedaneum* (Rhus).

Groundcovers: *Hydrocotyle bonariensis* (Pennywort), *Commelina cyanea* (Scurvy Weed), *Juncus subsecundus,* (Finger Rush), *Eleocharis sphacelata* (Tall Spike Rush), *Phragmites australis* (Common Rush), *Baumea juncea* (Tall Clubrush), *Juncus usitatus* (Common Rush), *Chloris gayana* (Rhodes Grass), *Paspalum dilatatum* (Paspalum) and *Typha australis* (Cumbungi).

Weeds: *Erythrina sykesii* (Coral Tree), *Ludwigia peruviana* (Water Primrose), *Lantana camara* (Lantana), *Toxicodendrum succedaneum* (Rhus), *Hydrocotyle bonariensis* (Pennywort), *Chloris gayana* (Rhodes Grass) and *Paspalum dilatatum* (Paspalum).

Classification: PCT 1071 is recognised as forming part of Sydney Freshwater Wetlands in the Sydney Basin Bioregion (SFW), which is listed as an endangered ecological community (EEC) under the *BC Act.* However, as this wetland is artificial it is not considered to form part of this EEC. Aerial imagery from 1943 sourced from Six Maps shows no wetlands within the site at that time. According to the final determination, SFW is restricted to freshwater swamps in swales and depressions on sand dunes and low nutrient sandplain sites in coastal areas.

3.3 Threatened flora species

BC Act – A search of the *Atlas of NSW Wildlife* (OEH, 2019) indicated a list of species that have been recorded within a 10 km radius of the subject site. These species are listed in Appendix 3 Table A3.1 and are considered for potential habitat within the subject site.

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 10km radius of the subject site. These species have also been listed in Appendix 3 Table A3.1 for consideration of potential to occur.

Based on the habitat assessment within Table A3.1 it is considered that the subject site provides potential habitat for the following threatened flora species. These species will be considered in the significance of impact test within Appendix 4:

Table 3 – Threatened flora species with suitable habitat present

Scientific name	*BC Act*	*EPBC Act*	Potential to occur
Acacia terminalis subsp. *terminalis*	E1	E	✓

Acacia terminalis subsp. *terminalis* is the only threatened species of flora with potential to occur. All other threatened species in both the Bionet (NSW) and *EPBC Act* coordinate search (National) were considered to have no likely potential 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.

3.4 Endangered flora populations

No endangered flora populations occur within Randwick LGA

3.5 Threatened ecological communities and critical habitat

Eastern Suburbs Banksia Scrub (ESBS) is located almost entirely outside the lot boundary to th east, with some small slivers just inside the eastern boundary of the site (Figure 4). The ESBS will not be impacted by the proposal and will be protected insitu.

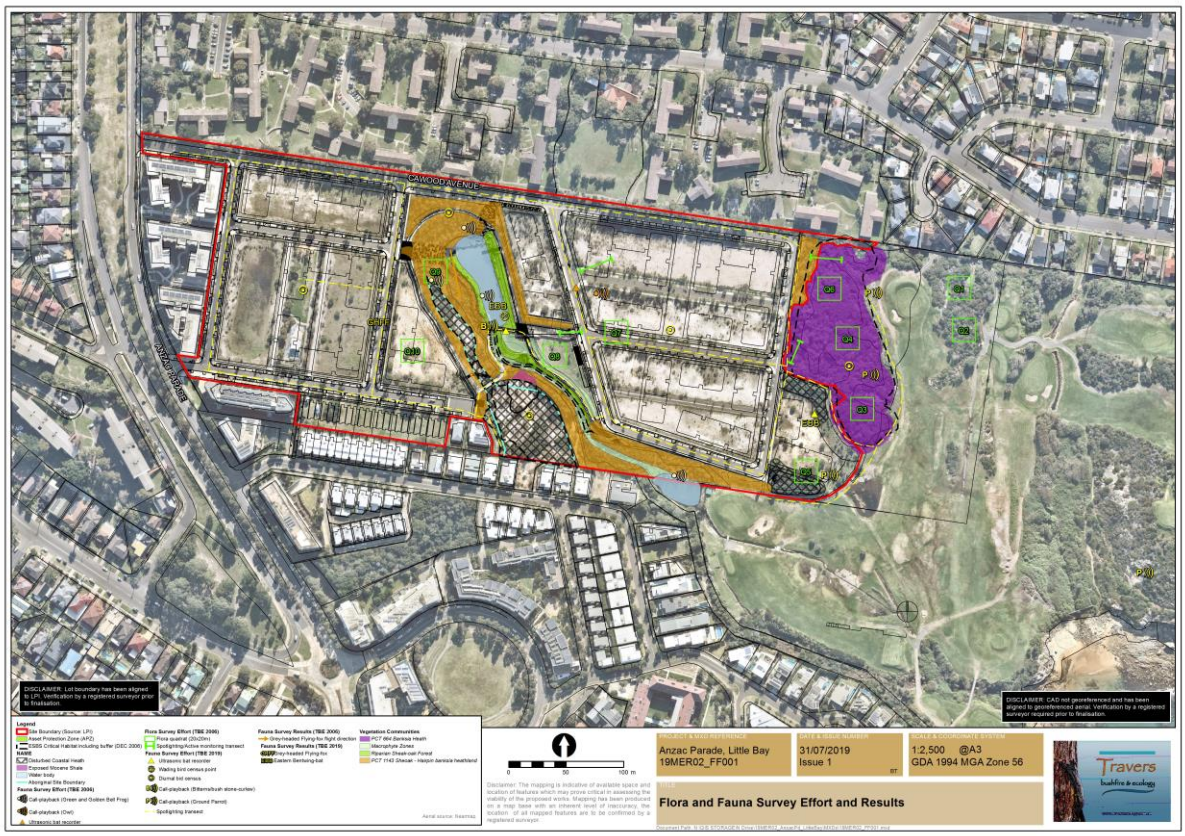
The previous activated conservation plan and masterplan has fully protected the mapped area of critical habitat and associated buffer. The update masterplan as proposed does not encroach with in the buffer or mapped area or critical habitat for ESBS.

3.6 State Environmental Planning Policy (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.

The SEPP will ensure the BOS (established under the Land Management and Biodiversity reforms) will apply to all clearing of native vegetation that exceeds the offset thresholds in urban areas and environmental conservation zones that <u>does not require development consent.</u>

Vegetation SEPP applies to the following local government areas:



Bayside, City of Blacktown, Burwood, Camden, City of Campbelltown, Canterbury-Bankstown, Canada Bay, Cumberland, City of Fairfield, Georges River, City of Hawkesbury, Hornsby, Hunter's Hill, Georges River, Inner West, Ku-ring-gai, Lane Cove, City of Liverpool,

Mosman, Newcastle, North Sydney, Northern Beaches, City of Parramatta, City of Penrith, City of Randwick, City of Ryde, Strathfield, Sutherland Shire, City of Sydney, The Hills Shire, Waverley, City of Willoughby, Woollahra.

The Vegetation SEPP also applies to land within a variety of zones as set out in the legislation 'Land to which the policy applies'.

3.6.1 Is an Authority to clear vegetation required

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

4.0 Fauna

4.1 Survey / Habitat assessment

Fauna survey was undertaken previously on site for the previous proposal in summer 2006 and spring 2008. Both visits included diurnal and nocturnal surveys.

More recent and updated survey was undertaken in late winter 2019. Refer to Appendix 1 for survey effort and weather conditions.

Recent diurnal fauna survey included:

- Frog and reptile habitat searches,
- 5x bird census points (out to a radius of 30-50m for 15 minutes),
- Opportunistic bird call and activity survey between census points,
- Mammal activity searches (scats, scratches, diggings, burrows, etc.)
- Early morning call-playback for Ground Parrot in the eastern portions of the study area out into the golf course habitats,
- Habitat tree survey.

Recent nocturnal fauna survey included:

- Spotlighting and microbat active monitoring,
- Frog call identification,
- Ultrasonic microbat recording (x2 passive recording stations for 2 nights),
- Call-playback for Grass Owl, Bush Stone-curlew, Black Bittern and Australasian Bittern in the central portions of the site adjacent to the lagoon,

Specific survey effort locations and results are shown on Figure 2. All fauna species recorded during survey within the subject site and nearby surrounds are listed in Table A2.2 in Appendix 2.

A review of the *Bionet* (OEH 2019) was undertaken prior to the site visit to determine threatened species previously recorded within 10km of the subject site.

The following notable habitat features were observed present:

- Constructed open water lagoon with fringing rushes and scrub vegetation,
- Small depressions containing frog breeding opportunity after rain,
- Native and regrowth coastal scrub with nectar producing plants, principally *Banksia* and *Acacia,*

- winter flowering is represented by banksias, and spring-summer flowering shrub and tree species,
- Seed producing *Casuarina* trees,
- Dense to open regrowth vegetation structure on sandy soils suitable for burrowing,
- Artificial ground refuse providing shelter opportunity,
- No hollows-bearing trees, large dead stags or terrestrial hollows were recorded.

4.2 Threatened fauna species

BC Act – A search of the *Atlas of NSW Wildlife* (OEH, 2019) provided a list of threatened fauna species previously recorded within a 10km radius of the subject site. These species are listed in Appendix 3 Table A3.2 and are considered for potential habitat within the subject site. Strictly pelagic and estuarine birds have not been included as the site is located on the higher headland plateau. Some marine birds such as terns, may fly over the site but are unlikely to utilise the terrestrial habitats present so have not been included in the habitat assessment.

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

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 10km radius of the subject site. These species have also been listed in Appendix 3 Table A3.2.

In accordance with Table A3.2 the following state and nationally listed threatened fauna species are considered to have suitable habitat with varying potential to occur within the subject site. The state listed species will be considered in the significance of impact test (Appendix 4):

Table 4 – Threatened fauna species with suitable habitat present

Common name	*BC Act*	*EPBC Act*	Potential to occur
Grey-headed Flying-fox	V	V	recorded
Eastern Bentwing-bat	V	-	recorded
Little Lorikeet	V	-	✓
White-bellied Sea Eagle	V	-	low
Eastern Osprey	V	-	low
Green and Golden Bell Frog	E	V	unlikely
Black Bittern	V	-	unlikely
Eastern Ground Parrot	V	-	unlikely
Orange-bellied Parrot	E	E	unlikely
Grass Owl	V	-	unlikely
White-fronted Chat	V	-	unlikely
Dusky Woodswallow	V	-	unlikely
Yellow-bellied Sheathtail-bat	V	-	unlikely
Little Bentwing-bat	V	-	unlikely
Large-footed Myotis	V	-	unlikely

Two (2) threatened species, Grey-headed Flying-fox *(Pteropus poliocephalus)* and Eastern Bentwing-bat (*Miniopteus schreibersii oceansis*) were recorded within the study area both during recent and previous surveys.

Previously the Grey-head Flying was recorded drinking from the northern dam during nocturnal surveys conducted on the evening of the 14th December 2006. This species was heard calling assumed to be foraging on flowering Tallowwood along the entry road during recent nocturnal survey on the 17th July 2019.

The Eastern Bentwing-bat was previously recorded foraging in airspace above a northern dam on the 13th October 2008. This species was recorded foraging in airspace above both ultrasonic recorders during recent overnight recording on the 16 & 17th July 2019. It was also recorded during active monitoring of the eastern portions. Recorded locations are shown on Figure

An assessment of significance test has been undertaken for the Eastern Bentwing-bat, Grey-headed Flying-fox and other state listed threatened fauna with considered potential to occur within Appendix 4. This assessment has concluded that the proposal will not likely have a significant impact on any of these species.

The Significant Impact Criteria for a vulnerable species listed under the *EPBC Act* 1999 (Appendix 4) was also reviewed to assess the impacts on Grey-headed Flying-fox. As the subject site does not contain any likely roosting or subsequent breeding habitat and foraging habitat will remain well represented in the locality, it is concluded that there will not be any significant impact on this species, or other nationally listed threatened fauna species with potential to occur, as a result of the proposal.

4.3 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 10km radius of the subject site. The habitat potential of migratory species is considered in Table A3.3 (Appendix 3). The habitat potential of threatened migratory species is considered in Table A3.3 Table A3.2 (Appendix 3).

No nationally protected migratory bird species were recorded present within the study area during the surveys. The impact assessment for nationally protected migratory species with potential to occur has concluded a not significant impact.

4.4 Endangered fauna populations

There are no endangered fauna populations identified within the Randwick LGA.

4.5 Connectivity

The vegetation within the site does not currently form part of a vegetation corridor. The Eastern Suburbs Banksia Scrub (ESBS) is found in the eastern portion of the study area. This remnant of Eastern Suburbs Banksia Scrub plays an important role in plant dispersal between fragmented Eastern Suburbs Banksia Scrub within the Sydney area. The proposed Master Plan will not impact on the Eastern Suburbs Banksia Scrub.

The revegetated surrounds of the constructed open water lagoon in the central areas of the site also combine to provide ongoing and diverse habitat benefits to fauna. Both the banksia scrub to the east as well as the lagoon habitats have tenuous connectivity between them as

well as beyond into the golf course area to the east and south (refer to Figure 6). Given that notable records of Eastern Ground Parrot and Orange-bellied Parrot have historically occurred along the coastal plateau heath in the locality, such habitat connectivity, whilst now fragmented, still may hold notable benefits and should where possible be enhanced instead of further fragmented where possible.

In accordance with the approved VMP, connectivity will be maintained under the updated masterplan as shown in Figure 6.

Figure 6 – Local connectivity

5.0 Watercourses and wetlands

5.1 Endangered wetland communities

A number of wetland communities have been listed as an 'endangered ecological community' under the NSW *BC Act*. We note that ‘wetlands’ are included in the definition of ‘waterfront lands’ in accordance with the *Water Management Act* (*WM Act*) 2000, due to their inclusion in the definition of a ‘lake’ under the same 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 DPI - Office of Water in their general terms of approval (GTA’s). 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 - endangered ecological community listing
- Castlereagh swamp woodland community - endangered ecological community listing

- Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing
- Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing
- Kurri sand swamp woodland in the Sydney Basin Bioregion - endangered ecological community listing
- Lagunaria swamp forest on Lord Howe Island - endangered ecological community listing
- Maroota Sands swamp forest - endangered ecological community listing
- Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion - endangered ecological community listing
- Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing
- Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological listing
- Sydney Freshwater Wetlands in the Sydney Basin Bioregion - endangered ecological community listing
- The shorebird community occurring on the relict tidal delta sands at Taren Point - endangered ecological community listing
- Upland wetlands of the drainage divide of the New England Tableland Bioregion - endangered ecological community listing
- Wingecarribee Swamp - endangered ecological community listing

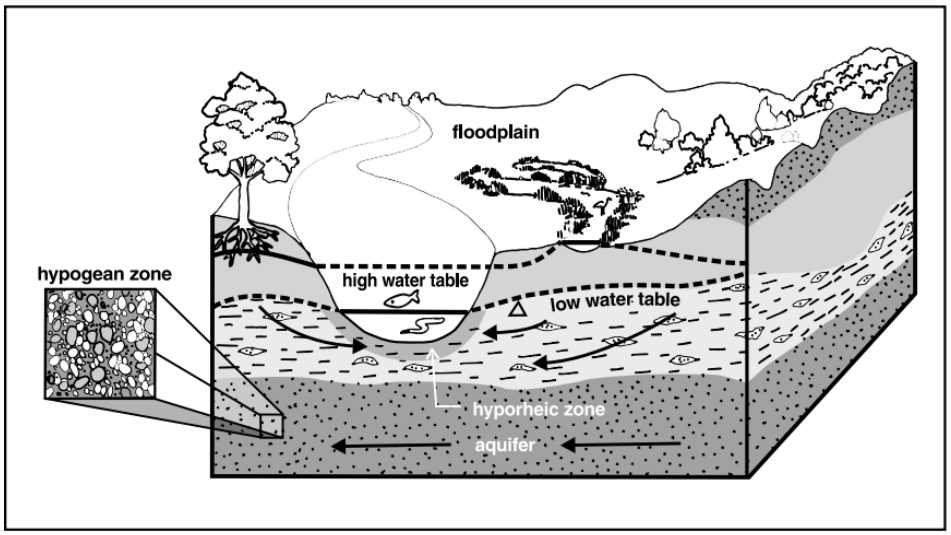
In accordance with the *WM Act*, endangered wetland communities are through the definition of 'lakes' potentially classed as waterfront land. Referral to DPI WaterNSW may be required for determination under the *WM Act* as a controlled activity. As well as protection, a buffer may be applied to these communities as specified by DPI WaterNSW.

PCT 1071 is generally considered commensurate with Sydney Freshwater Wetlands in the Sydney Basin Bioregion, which is an endangered wetland community. However, as this wetland is artificial it is not considered to form part of this EEC.

5.2 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.



Alluvial groundwater system discharging into a river

Groundwater dependent ecosystems are therefore ecosystems which have their species composition and their natural ecological processes determined by groundwater (NSW State Groundwater Dependent Ecosystems Policy April 2002).

No Groundwater Dependent Ecosystems (GDEs) were observed within the study area.

6.0 Conclusions

Updated fauna survey and biodiversity assessment has been undertaken for the proposed rezoning and development at 1408 Anzac Parade, Little Bay.

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

6.1 Legislative compliance

In respect of matters required to be considered under the *Environmental Planning and Assessment Act 1979* and relating to the species / provisions of the *Biodiversity Conservation Act 2016*, two (2) threatened fauna species including Eastern Bentwing-bat (*Miniopterus orianae oceanensis*) and Grey-headed Flying-fox (*Pteropus poliocephalus*), no threatened flora species, and one (1) TECs Eastern Suburbs Banksia Scrub, were recorded within the study area.

The state assessment of significance has concluded that the proposed rezoning and associated development will not have a significant impact on any threatened species, populations or TECs. Therefore, a Species Impact Statement should not be required for the proposal.

Offsetting under the Biodiversity Offsets Scheme (BOS) and *BC Act* is not required for the development associated with the proposed rezoning as:

- The study area is not located on lands mapped as Biodiversity Values Land.
- The proposed clearing of vegetation is less than the lot size threshold.

- The proposal will not cause any Serious or Irreversible Impacts (SAII) of threatened biodiversity most at risk of extinction.

In respect of matters required to be considered under the *Environment Protection and Biodiversity Conservation Act 1999*, one (1) threatened fauna species Grey-headed Flying-fox (*Pteropus poliocephalus*), no protected migratory bird species, no threatened flora species, and one (1) TEC, Eastern Suburbs Banksia Scrub, listed under this Act were recorded within the study area.

The development associated with the proposed rezoning is not considered to have a significant impact on 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 subject site and there are no matters requiring further consideration under this Act.

6.2 Potential ecological impacts

There are no direct impacts of the proposal.

The indirect impacts of the proposal are considered to include the following:

- Shading, lighting and noise spillover effects onto the remaining vegetated areas.

Some impacts may be avoided or mitigated as recommended in Section 6.3.

6.3 Recommendations

To minimise adverse ecological impacts, the following mitigation measures are proposed:

1. Control and eradication of invasive ecological weeds should continue to be undertaken to prevent further invasion by these species. Invasive species such as Lantana, Coral Tree, Chilean Cestrum, Bitou Bush, Water Primrose, Whisky Grass, Asparagus Fern, Pampas Grass and Panic Veldtgrass were observed within the study area.

2. A project ecologist is to be engaged to ensure compliance will all restoration and mitigation measures. Ongoing maintenance of protected area is recommended as part of this proposal.

3. Continued implementation of the approved VMP is to be continued. Targeted removal of weeds within the central drainage corridor is required to be continued and as are selective revegetation works as recommended by the project ecologist.

Appendix 1
Fauna Survey Effort

Table A1.1 – Fauna survey effort

Fauna group	Date	Weather conditions	Survey technique(s)	Time effort (24hr)
Diurnal birds	14/12/6	03/8 cloud, no wind, temp 20ºC	Diurnal opportunistic	2hr 1800 – 2000
	13/10/8	6/8 cloud, light-mod NE wind, no rain, 25ºC	Diurnal opportunistic	1hr 50min 1745 – 1935
	16/7/19	0/8 cloud, light W wind, no rain, 18ºC	Diurnal opportunistic	1hr 5 min 1155 – 1300
	17/7/19	0/8 cloud, no wind, no rain, 17ºC	Diurnal census / opportunistic	55min 1625 – 1720
	18/7/19	0/8 cloud, Light wind, no rain, 17ºC	Diurnal census / opportunistic	1hr 15min 0645 – 0800
Nocturnal birds	14/12/6	8/8 cloud, 6-11kph E, temp 12ºC, light rain	Owl call-playback	1hr 15min 2015 – 2130
	13/10/8	1/8 cloud, light-mod NE wind, no rain, 25ºC, 4/4 moon	Bush Stone-curlew call-playback	1hr 50min 2100 – 2150
	17/7/19	0/8 cloud, no wind, no rain, 17ºC	Spotlighting / call-playback	1hr 45min 1720 – 1905
Arboreal mammals	14/12/6	3/8 cloud, no wind, temp 20ºC	Habitat searches	2hr 1800 – 2000
	13/10/8	8/8 cloud, 6-11kph E, temp 12ºC, light rain	Spotlighting + Elliott trapping	1hr 2030 – 2130
		6/8 cloud, light-mod NE wind, no rain, 25ºC	Habitat searches	1hr 50min 1745 – 1935
		1/8 cloud, light-mod NE wind, no rain, 25ºC, 4/4 moon	Spotlighting + Elliott trapping	2hr 10min 1940 – 2150
	17/7/19	0/8 cloud, no wind, no rain, 17 ºC	Spotlighting	1hr 45min 1720 – 1905
Terrestrial mammals	14/12/6	3/8 cloud, no wind, temp 20ºC	Habitat searches	2hr 1800 – 2000
		8/8 cloud, 6-11kph E, temp 12ºC, light rain	Spotlighting + Elliott trapping	1hr 2030 – 2130
	13/10/8	6/8 cloud, light-mod NE wind, no rain, 25ºC	Habitat searches	1hr 50min 1745 – 1935
		1/8 cloud, light-mod NE wind, no rain, 25ºC, 4/4 moon	Spotlighting + Elliott trapping	2hr 10min 1940 – 2150
	17/7/19	0/8 cloud, no wind, no rain, 17 ºC	Spotlighting	1hr 45min 1720 – 1905
Bats	14/12/6	8/8 cloud, 6-11kph E, temp 12ºC, light rain	Anabat II / Spotlight	1hr 2015-2115
	13/10/8	1/8 cloud, light-mod NE wind, no rain, 25ºC, 4/4 moon	Anabat II x2 / Spotlight	2hr 15min 1925 – 2140
	16-17/7/19	0/8 cloud, light W wind, no rain, 18ºC	Ultrasonic recorder x2 (passive)	O'night for 2 nights
	17/7/19	0/8 cloud, no wind, no rain, 17ºC	Spotlighting / Active monitoring	1hr 45min 1720 – 1905
Reptiles	14/12/6	3/8 cloud, no wind, temp 20ºC	Habitat search	2hr 1800 – 2000
		8/8 cloud, 6-11kph E, temp 12ºC, light rain	Spotlight	1hr 2030 – 2130
	13/10/8	6/8 cloud, light-mod NE wind, no rain, 25ºC	Habitat searches	1hr 50min 1745 – 1935
		1/8 cloud, light-mod NE wind, no rain, 25ºC, 4/4 moon	Spotlight	2hr 10min 1940 – 2150
	16/7/19	0/8 cloud, light W wind, no rain, 18ºC	Opportunistic	1hr 5 min 1155 – 1300
	17/7/19	0/8 cloud, no wind, no rain, 17ºC	Habitat searches, opportunistic	55min 1625 – 1720
	18/7/19	0/8 cloud, Light wind, no rain, 17ºC	Habitat searches, opportunistic	1hr 15min 0645 – 0800

Amphibians	14/12/6	3/8 cloud, no wind, temp 20ºC 8/8 cloud, 6-11kph E, temp 12ºC, light rain	Habitat search + call detection Spotlight + call detection + Green & Golden bell Frog call playback	2hr 1800 – 2000 1hr 2030 – 2130
	13/10/8	6/8 cloud, light-mod NE wind, no rain, 25ºC 1/8 cloud, light-mod NE wind, no rain, 25ºC, 4/4 moon	Habitat search + call detection. Spotlight + call detection + Wallum Froglet and Green & Golden bell Frog call playback.	1hr 50min 1745 – 1935 2hr 10min 1940 – 2150
	17/7/19	0/8 cloud, no wind, no rain, 17 ºC	Spotlighting and call identification	1hr 45min 1720 – 1905

Appendix 2
Flora & Fauna Species List

Table A2.1 – Flora species recorded within Study area

Family	Scientific name	Common name
TREES		
Mimosaceae	*Acacia parramattensis*	Sydney Green Wattle
Casuarinaceae	*Allocasuarina littoralis*	Black She-oak
Myrtaceae	*Angophora costata*	Smooth-barked Apple
Casuarinaceae	*Casuarina glauca*	Swamp Oak
Fabaceae	*Erythrina X sykesii**	Coral Tree
Myrtaceae	*Eucalyptus capitellata*	Brown Stringybark
Myrtaceae	*Eucalyptus haemastoma*	Scribbly Gum
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum
SHRUBS		
Mimosaceae	*Acacia falcata*	Sickle Wattle
Mimosaceae	*Acacia longifolia* var. *longifolia*	Sydney Golden Wattle
Mimosaceae	*Acacia longifolia* var. *sophorae*	Coastal Wattle
Mimosaceae	*Acacia stricta*	Hop Wattle
Mimosaceae	*Acacia suaveolens*	Sweet Scented Wattle
Mimosaceae	*Acacia ulicifolia*	Prickly Moses
Casuarinaceae	*Allocasuarina distyla*	Scrub She-oak
Myrtaceae	*Baeckea diosmifolia*	-
Myrtaceae	*Baeckea imbricata*	-
Proteaceae	*Banksia aemula*	-
Proteaceae	*Banksia ericifolia*	Heath-Leaved Banksia
Proteaceae	*Banksia integrifolia* subsp. *integrifolia*	Coast Banksia
Proteaceae	*Banksia spinulosa* var. *spinulosa*	Hairpin Banksia
Myrtaceae	*Callistemon lineraris*	Narrow-leaved Bottlebrush
Myrtaceae	*Callistemon pinifolius*	Pine-leaved Bottlebrush
Myrtaceae	*Callistemon rigidus*	Stiff Bottlebrush
Myrtaceae	*Callistemon salignus*	Willow Bottlebrush
Solanaceae	*Cestrum parqui**	Chilean Cestrum
Asteraceae	*Chrysanthemoides monilifera* ssp. *rotundata**	Bitou Bush
Rutaceae	*Correa reflexa*	Native Fuschia
Malaceae	*Cotoneaster glaucophyllus**	Grey-leaved Cotoneaster
Sapindaceae	*Dodonaea triquetra*	Hop Bush
Epacridaceae	*Epacris longiflora*	Native Fuschia
Rutaceae	*Eriostemon australasius* ssp. *australasius*	Pink Wax Flower
Proteaceae	*Hakea sericea*	Needlebush
Proteaceae	*Hakea teretifolia*	Dagger Hakea
Myrtaceae	*Kunzea ambigua*	Tick Bush
Verbenaceae	*Lantana camara**	Lantana
Myrtaceae	*Leptospermum laevigatum*	Coast Tea-tree
Myrtaceae	*Leptospermum polygalifolium*	Lemon Scented Tea-tree
Myrtaceae	*Leptospermum trinervium*	Paperbark Tea-tree
Myrtaceae	*Melaleuca armillaris*	Bracelet Honey Myrtle
Myrtaceae	*Melaleuca nodosa*	Ball Honey Myrtle
Epacridaceae	*Monotoca elliptica*	Tree Broom-heath
Proteaceae	*Persoonia lanceolata*	Lance-leaved Geebung
Proteaceae	*Persoonia linearis*	Narrow-leaved Geebung
Pittosporaceae	*Pittosporum revolutum*	Yellow Pittosporum

Family	Scientific name	Common name
Apiaceae	*Platysace lanceolata*	Lance-leaf Platysace
Anacardiaceae	*Toxicodendrum succedaneum**	Rhus
Lamiaceae	*Westringia fruiticosa*	Coast Westringia
Epacridaceae	*Woollsia pungens*	-
GROUNDCOVERS		
Polygonaceae	*Acetosa saggitata**	Turkey Rhubarb
Poaceae	*Alopecurus pratensis*	Meadow Foxtail
Poaceae	*Andropogon virginicus**	Whisky Grass
Poaceae	*Anisopogon avenaceus*	Oat Speargrass
Asparagaceae	*Asparagus scandens**	Asparagus Fern
Poaceae	*Avena fatua**	Wild Oats
Asteraceae	*Bidens pilosa**	Cobbler's Pegs
Brassicaceae	*Brassica rapa**	Wild Turnip
Poaceae	*Briza maxima**	Quaking Grass
Poaceae	*Briza minor**	Shivery Grass
Poaceae	*Bromus uniloides**	Prairie Grass
Poaceae	*Cenchrus clandestinus**	Kikuyu
Gentianaceae	*Centaurium erythraea**	Pink Stars
Apiaceae	*Centella asiatica*	Swamp Pennywort
Poaceae	*Chloris gayana**	Rhodes Grass
Commelinaceae	*Commelina cyanea*	Scurvy Weed
Asteraceae	*Coreopsis lanceolata**	-
Poaceae	*Cortaderia jubata**	Pink Pampas Grass
Poaceae	*Cortaderia selloana**	Pampas Grass
Cyperaceae	*Cyathochaeta diandra*	-
Poaceae	*Cynodon dactylon*	Common Couch
Poaceae	*Dactylis glomerata**	Cocksfoot
Phormiaceae	*Dianella caerulea* var. *caerulea*	Flax Lily
Phormiaceae	*Dianella caerulea* var. *revoluta*	Spreading Flax Lily
Poaceae	*Dichelachne crinita*	Long-hair Plume Grass
Poaceae	*Ehrharta erecta**	Panic Veldtgrass
Poaceae	*Entolasia stricta*	Wiry Panic
Poaceae	*Eragrostis curvula**	African Lovegrass
Euphorbiaceae	*Euphorbia peplus**	Spurge
Gleicheniaceae	*Gleichenia dicarpa*	Pouched Coral Fern
Goodeniaceae	*Goodenia paniculata*	Swamp Goodenia
Dennstaedtiaceae	*Histiopteris incisa*	Bat's Wing Fern
Apiaceae	*Hydrocotyle bonariensis**	Kurnell Curse / Pennywort
Asteraceae	*Hypochaeris radicata**	Flatweed
Juncaceae	*Juncus subsecundus*	Finger Rush
Juncaceae	*Juncus usitatus*	Common Rush
Cyperaceae	*Lepidosperma laterale*	Variable Sword-sedge
Restionaceae	*Lepyrodia scariosa*	Scale Rush
Liliaceae	*Lilium formosanum**	Formosan Lily
Lindsaeaceae	*Lindsaea linearis*	Screw Fern
Lomandraceae	*Lomandra longifolia*	Spiky-headed Mat-rush
Poaceae	*Microlaena stipoides* var. *stipoides*	Weeping Rice Grass
Poaceae	*Paspalum dilatatum**	Paspalum

Family	Scientific name	Common name
Poaceae	*Phalaris canariensis**	Canary Grass
Thymelaeaceae	*Pimelea linifolia* subsp. *Linifolia*	Slender Rice Flower
Plantaginaceae	*Plantago lanceolata**	Ribwort
Dennstaedtiaceae	*Pteridium esculentum*	Bracken
Polygonaceae	*Rumex crispus**	Curled Dock
Poaceae	*Setaria pumila**	Pale Pigeon Grass
Solanaceae	*Solanum nigrum**	Black Nightshade
Asteraceae	*Sonchus oleraceus**	Common Sow-thistle
Poaceae	*Sporobolus africanus**	Parramatta Grass
Asteraceae	*Taraxacum officinale**	Dandelion
Verbenaceae	*Verbena bonariensis**	Purpletop
Xanthorrhoaceae	*Xanthorrhoea resinifera*	-
VINES		
Asclepiadaceae	*Araujia sericifera**	Mothvine
Pittosporaceae	*Billardiera scandens* var. *scandens*	Apple Dumplings
Lauraceae	*Cassytha glabella*	Slender Devil's Twine
Lauraceae	*Cassytha pubescens*	Common Devil's Twine
Fabaceae	*Kennedia rubicunda*	Dusky Coral Pea
Smilacaceae	*Smilax australis*	Lawyer Vine
Smilacaceae	*Smilax glyciphylla*	Native sarsaparilla
WATERPLANTS		
Typhaceae	*Typha australis*	Cumbungi
Onagraceae	*Ludwigia peruviana**	Water Primrose
Cyperaceae	*Eleocharis sphacelata*	Tall Spike Rush
Poaceae	*Phragmites australis*	Common Rush
*** denotes exotic species** **[TS] denotes threatened species**		

Table A2.2 – Fauna species recorded

Common name	Scientific name	Method observed		
Birds		**Dec 2006**	**Dec 2008**	**July 2019**
Australasian Grebe	*Tachybaptus novaehollandiae*	O W	O W	
Australian Magpie	*Gymnorhina tibicen*	O W	O W	O W
Australian Magpie-Lark	*Grallina cyanoleuca*	O W	O W	
Australian Raven	*Corvus coronoides*	O W	O W	O W
Australian White Ibis	*Threskiornis molucca*		O	O
Black-shouldered Kite	*Elanus axillaris*	O		
Brown Thornbill	*Acanthiza pusilla*			W [PR]
Clamorous Reed-Warbler	*Acrocephalus stentoreus*	O W	O W	O
Common Blackbird *	*Turdus merula*	C		
Common Koel	*Eudynamys scolopacea*	C	C	
Common Myna *	*Acridotheres tristis*	O W	O W	
Common Starling *	*Sturnus vulgaris*	O W	O W	O
Crested Pigeon	*Ocyphaps lophotes*	O	O W	
Darter	*Anhinga melanogaster*			O
Dusky Moorhen	*Gallinula tenebrosa*	O W	O W	O
Eastern Whipbird	*Psophodes olivaceus*			W
Eurasian Coot	*Fulica atra*			O W
Feral Pigeon	*Columba livia*	O	C	
Galah	*Cacatua roseicapilla*		O W	
Grey Butcherbird	*Cracticus torquatus*	O W	O W	
Laughing Kookaburra	*Dacelo novaeguineae*	O W	O W	
Little Black Cormorant	*Phalacrocorax sulcirostris*	O	O	
Little Pied Cormorant	*Phalacrocorax melanoleucos*	O		
Little Wattlebird	*Anthochaera chrysoptera*	O W	O W	W
Masked Lapwing	*Vanellus miles*	C		O W
New Holland Honeyeater	*Phylidonyris novaehollandiae*		O W	O W
Noisy Miner	*Manorina melanocephala*		O W	O W
Pacific Black Duck	*Anas supercilliosa*	O	O	O
Pied Currawong	*Strepera graculina*	O W	O W	O W
Purple Swamphen	*Porphyrio porphyrio*	O W		O
Rainbow Lorikeet	*Trichoglossus haematodus*		O W	O W
Red Wattlebird	*Anthochaera carunculata*	O W	O W	O W
Red-browed Finch	*Neochmia temporalis*			
Rock Dove *	*Columba livia*			O
Silvereye	*Zosterops lateralis*	O W		O W
Spotted Turtle-dove *	*Streptopelia chinensis*	O W	O W	O W
Sulphur Crested Cockatoo	*Cacatua galerita*		C	O W
Superb Fairy-wren	*Malurus cyaneus*	O W	O W	O W
Welcome Swallow	*Hirundo neoxena*	O W	O W	O
White-browed Scrubwren	*Sericornis frontalis*			W
White-faced Heron	*Egretta novaehollandiae*			O
White-necked Heron	*Ardea pacifica*			O
Willie Wagtail	*Rhipidura leucophrys*	O W	O W	O W
Yellow-faced Honeyeater	*Caligavis chrysops*			O W

Common name	Scientific name	Method observed		
Yellow-tailed Black-Cockatoo	*Calyptorhynchus funereus*			O W
Mammals				
Cat *	*Felis cattus*		O	O
Dog *	*Canis familiaris*	O	O	O
Eastern Bentwing-bat[TS]	*Miniopterus orianae oceansis*		U	U
European Red Fox *	*Vulpes vulpes*	O P	O	
Gould's Wattled Bat	*Chalinolobus gouldii*		U	U
Grey-headed Flying-fox[TS]	*Pteropus poliocephalus*	O		W
Reptiles				
Eastern Blue Tongue	*Tiliqua scincoides*	O		
Eastern Striped Skink	*Ctenotus robustus*			O
Eastern Water Skink	*Eulamprus quoyii*			O
Garden Skink	*Lampropholis guichenoti*	O	O	
Amphibians				
Broad-palmed Frog	*Litoria latopalmata*	W	W	
Common Eastern Froglet	*Crinia signifera*			W
Dwarf Tree Frog	*Litoria fallax*	W	W	
Striped Marsh Frog	*Limnodynastes peronii*		W	
Fish				
Plague Minnow *	*Gambusia holbrooki*	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 3
Threatened Flora and Fauna Species Habitat Assessment

Table A3.1 – Threatened flora species habitat assessment

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 assessment of significance test (✓) 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 pubescens 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
Acacia terminalis subsp. *terminalis* OEH EPBC	E1	E	Erect shrub to 2m tall, flowers from March to July. Occurs in eucalypt woodland or forest, usually in sandy soil on creek banks, hillslopes or in shallow soil in rock crevices and sandstone platforms on cliffs. *Typically restricted to the Port Jackson and eastern suburbs of Sydney.*	x	✓	500 m	2017	✓	✓
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	-	-	x	x
Caladenia tessellata OEH 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	-	-	x	x
Callistemon linearifolius OEH	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
Chamaesyce psammogeton OEH	E1	-	Prostrate herb. Coastal dunes. *Distribution limits N-Tweed Heads S-Jervis Bay.*	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	-	-	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 assessment of significance test (✓) 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**	
Dichanthium setosum OEH	V	V	An erect perennial grass to <1m high. Flowers in summer. Grows in woodland and is associated with heavy basaltic black soils and stony red-brown hard-setting loam with clay subsoil. Known chiefly on the northern tablelands in the Saumarez area, west of Armidale, and 18-30 km east of Guyra. It is more rarely found on the north-western slopes, central western slopes and north-western plains of NSW.	x	x	-	-	x	x
Diuris arenaria OEH	E1	-	Terrestrial orchid. Confined to Tomaree Peninsula where it grows in heathy dry sclerophyll forest on sandy soil.	x	x	-	-	x	x
Epacris purpurascens var. *purpurascens* OEH	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	low	x	2010	x	x
Eucalyptus fracta OEH	V	-	Small tree or mallee to 8m tall with grey-black ironbark to smaller branches which are smooth white bark. Confined largely to State Forest. Restricted to the northern Broken Back Range near Cessnock. The dominant tree in a narrow band along the upper edge of a sandstone escarpment. Occurs in dry eucalypt woodland in shallow soils in association with *Eucalyptus sparsifolia, E. punctata, Corymbia maculata* and *Angophora euryphylla.*	x	x	-	-	x	x
Eucalyptus nicholii OEH	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	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 assessment of significance test (✓) 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 pulverulenta OEH	V	V	A small tree, typically mallee-like on shallow soils in open forest, typically dominated by Brittle Gum (*Eucalyptus mannifera*), Red Stringybark (*E. macrorhynca*), Broad-leafed Peppermint (*E. dives*), Silvertop Ash (*E. sieberi*) and Apple Box (*E. bridgesiana*). There are two main areas or occurrence including Lithgow to Bathurst, and Bredbo to Bombala.	x	x	-	-	x	x
Eucalyptus scoparia OEH	E1	V	Smooth-barked tree only known from vicinity of Bald Rock.	x	x	-	-	x	x
Genoplesium baueri 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
Hibbertia puberula OEH	E1	-	Shrublet with branches up to 30cm long. It favours dry sclerophyll woodland or low heath on sandy soils or rarely in clay, with or without rocks underneath. *It extends from Wollemi National Park south to Morton National Park and the south coast near Nowra. Early records are from Hawkesbury River area in Sydney and the Blue Mountains.*	x	x	-	-	x	x
Melaleuca biconvexa 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 OEH	V	V	Shrub to 3m high. Grows in heath on sandstone. *Distribution limits N-Gosford S-Nowra.*	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 assessment of significance test (✓) 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**	
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	low	x	x	x	x
Persoonia hirsuta OEH 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
Pimelea curviflora var. *curviflora* 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 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
Prostanthera densa OEH	V	V	Erect shrub 0.5-2m. Grows in sclerophyll forest and shrubland. *Distribution limits N-Nelson Bay S-Beecroft Peninsula.*	x	x	-	-	x	x
Prostanthera marifolia OEH	CE	CE	Erect shrub to 0.3m high. Woodland dominated by Eucalyptus sieberi and Corymbia gummifera. In deeply weathered clay soil with ironstone nodules. Has been recorded previously in the Sydney Harbour region.	x	x	-	-	x	x
Pterostylis sp. Botany Bay OEH EPBC	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	low	6km S	2005	not likely	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 assessment of significance test (✓) 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**	
Senecio spathulatus OEH	E1	-	A low growing daisy that prefers primary dunes. *Known to occur at Cape Howe and between Kurnell north to Myall Lakes National Park. Also occurs in coastal locations in eastern Victoria.*	x	x	-	-	x	x
Syzygium paniculatum OEH EPBC	V	V	Small tree. Subtropical and littoral rainforest on sandy soil. *Distribution limits N-Forster S-Jervis Bay.*	x	x	-	-	x	x
Tetratheca juncea OEH	V	V	Prostrate shrub to 1m high. Dry sclerophyll forest and heath. *Distribution limits N-Bulahdelah S-Port Jackson.*	x	x	-	-	x	x
Thelymitra atronitida OEH	CE	-	A terrestrial orchid with dark blue flowers, presented in mid-late spring. There is a hooded lobe that is distinctly glossy black in colour with a yellow apex in the flower's centre. *Known in NSW from two localities, Cape Solander in Botany Bay National Park in southern Sydney, and Bago State Forest south of Tumut.* At Cape Solander this species is recorded from shallow black peaty soil in coastal heath on sandstone. In the Bago area it is recorded as occurring in open forest with a heathy understorey on well-drained sand or clay-loam soils.	x	marginal	6km S	1988	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

OEH	-	Denotes species listed within 10km of the subject site on the *Atlas of NSW Wildlife*
EPBC	-	Denotes species listed within 10km of the subject site 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

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 assessment of significance test (✓) 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**	
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 subject site 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 A3.2 – Threatened fauna species habitat assessment

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in assessment of significance test (✓) (Refer to Appendix 2)**
					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**	
Wallum Froglet *Crinia tinnula* OEH	V	-	Found in acidic paperbark swamps and wallum country with dense groundcover. Breeds in temporary and permanent pools and ponds of high acidity. *Distribution limit: N-Tweed Heads S-Kurnell.*	X	x	-	-	x	x
Green and Golden Bell Frog *Litoria aurea* OEH 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	unlikely	✓
Rosenberg's Goanna *Varanus rosenbergi* OEH	V	-	Hawkesbury sandstone outcrop specialist. Inhabits woodlands, dry open forests and heathland sheltering in burrows, hollow logs, rock crevices and outcrops. *Distribution limit: N-Nr Broke. S-Nowra Located in scattered patches near Sydney, Nowra and Goulburn.*	X	x	-	-	x	x
Magpie Goose *Anseranas semipalmata* OEH	V	-	A strongly nomadic species found in tropical through to sub-tropical wetlands, flood plains, large swamps, dams and wet grasslands with dense growths of rushes and sedges. *Distribution limit: N-Tweed Heads. S-Mulwala.*	X	x	-	-	x	x
Blue-billed Duck *Oxyura australis* OEH	V	-	A completely aquatic species occurring mainly throughout the Murray-Darling basin in cool to warm temperate deep permanent freshwater lakes, lagoons and swamps with extensive reed-beds. *Distribution limit: N-Tenterfield. 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 assessment of significance test (✓) (Refer to Appendix 2)**
					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**	
Freckled Duck *Stictonetta naevosa* OEH	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* OEH	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* OEH 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* OEH	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	Sub-optimal	x	✓	unlikely	✓
Spotted Harrier *Circus assimilis* OEH	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 assessment of significance test (✓) (Refer to Appendix 2)**
					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*) OEH	V	-	Occupies coasts, islands, estuaries, inlets, large rivers, inland lakes and reservoirs. *Sedentary; dispersive. N-Tweed Heads. S-South of Eden.*	X	✓	✓	x	low	✓
Little Eagle *Hieraaetus morphnoides* OEH	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* OEH	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	marginal	x	x	Not likely	x
Eastern Osprey *Pandion cristatus* OEH	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	Sub-optimal	x	x	low	✓
Bush Stone-curlew *Burhinus grallarius* OEH	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	marginal	x	x	Not likely	x
Australian Painted Snipe *Rostratula australis* OEH EPBC	E	E	Most numerous within the Murray-Darling basin and inland Australia within marshes and freshwater wetlands with swampy vegetation. *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 assessment of significance test (✓) (Refer to Appendix 2)**
					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* OEH	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* OEH	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* OEH	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	✓	✓	x	✓	✓
Swift Parrot *Lathamus discolour* OEH 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
Eastern Ground Parrot *Pezoporus wallicus wallicus* OEH	V	-	Inhabits low heath, sedgeland and buttongrass plains with dense vegetation to provide suitable roosting cover. *Distribution limit: N-North of Tweed Heads. S-South of Eden.*	X	✓	✓	x	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 assessment of significance test (✓) (Refer to Appendix 2)
					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	
Superb Parrot *Polytelis swainsonii* OEH	V	V	Inhabits open woodland and riverine forests of inland NSW. *Distribution limit: N-Near Walgett. S-South of Deniliquin.*	X	x	-	-	x	x
Orange-bellied Parrot *Neophema chrysogaster* OEH EPBC	E	E	Favours small islands, peninsulas in coastal areas; with saltmarsh plants; coastal pastures, golf courses; crops of millet and sunflowers; dunes, beaches. *Distribution limit: N-Southern Sydney coast. S-South of Eden.*	X	✓	✓	x	unlikely	✓
Powerful Owl *Ninox strenua* OEH	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* OEH	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	unlikely	✓
Masked Owl *Tyto novaehollandiae* OEH	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
Eastern Bristlebird *Dasyornis brachypterus* OEH EPBC	E	E	Coastal woodlands, dense scrubs and heathlands, especially where low heathland borders taller woodland or dense tall tea-tree. *Distribution limit: N-Tweed Heads. S-South of Eden.*	X	✓	✓	x	Not likely	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 assessment of significance test (✓) (Refer to Appendix 2)
					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	
Striated Fieldwren *Calamanthus fuliginosus* OEH	V	-	Inhabits low shrubs, tussock, swamp fringes, alpine, coastal heaths and dune-vegetation. *Distributed in coastal SE Australia and Tasmania from NW of Sydney through the S and E of Victoria inland to the Gram* *pians NP in S.A.*	x	✓	x	x	Not likely	x
Regent Honeyeater *Xanthomyza Phrygia* OEH 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* OEH	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	unlikely	✓
Painted Honeyeater *Grantiella picta* 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
Varied Sittella *Daphoenositta chrysoptera* OEH	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	Not likely	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 assessment of significance test (✓) (Refer to Appendix 2)**
					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**	
Dusky Woodswallow *Artamus cyanopterus cyanopterus* OEH	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	unlikely	✓
Scarlet Robin *Petroica boodang* OEH	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
Star Finch *NeochmIa ruficauda* OEH	E4	E	Occurs mainly in tall rank streamside grass and rushes within warm temperate to tropical swamps and woodlands. *Distribution limit: N-Tweed Heads. S-Campbelltown(?).*	x	x	-	-	x	x
Diamond Firetail *Stagonopleura guttata* OEH	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	Not likely	x
Koala *Phascolarctos cinereus* OEH 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

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Considered in assessment of significance test (✓) (Refer to Appendix 2)**
					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 Pygmy Possum *Cercatetus nanus* OEH	V	-	Found in a variety of habitats from rainforest through open forest to heath. Feeds on insects but also gathers pollen from banksias, eucalypts and bottlebrushes. Nests in banksias and myrtaceous shrubs. *Distribution limit: N-Tweed Heads. S-Eden.*	X	x	-	-	x	x
Grey-headed Flying-fox *Pteropus poliocephalus* OEH 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.*	✓	-	-	-	-	✓
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* OEH	V	-	Rainforests, sclerophyll forests and woodlands. *Distribution limit: N-North of Walgett. S-Sydney.*	X	Sub-optimal	x	x	unlikely	✓
Little Bentwing-bat *Miniopterus australis* OEH	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	✓	x	x	unlikely	✓
Eastern Bentwing-bat *Miniopterus orianae oceanensis* OEH	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.*	✓	-	-	-	-	✓

Common name *Scientific name* Database source	*BC Act*	*EPBC Act*	Preferred habitat *Distribution limit*	Recorded on site (✓)	If not recorded on site				Considered in assessment of significance test (✓) (Refer to Appendix 2)
					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	
Large-footed Myotis *Myotis macropus* OEH	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	unlikely	✓
Greater Broad-nosed Bat *Scoteanax rueppellii* OEH	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	Not likely	x

OEH	Denotes species listed within 10km of the subject site on the *Atlas of NSW Wildlife*
EPBC	Denotes species listed within 10km of the subject site 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
NOTE:	1. This field is not considered if no suitable habitat is present within the subject site 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 significance of impact test is required.
Not likely	Means 0% change of occurring, despite there being potential habitat. A significance of impact test is not applied to these species.

Table A3.3 provides an assessment of potential habitat within the subject site for nationally *protected* migratory fauna species recorded within 10km on the *EPBC Act* Protected Matters Tool. Nationally *threatened* migratory species are considered in Table A3.2.

Table A3.3 – Migratory fauna habitat assessment

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	-	
White-throated Needletail (*Hirundapus caudacutus*)	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.*	✓	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	-
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	-	-
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	-	-
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	-	-
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	-
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	-	-

Common name *Scientific name*	Preferred habitat *Migratory breeding*	Suitable habitat present (✓)	Recorded on site (✓)	Comments
Swinhoe's Snipe (*Gallinago megala*)	During the non-breeding season Swinhoe's Snipe occurs at the edges of wetlands, eg. Wet paddy fields, swamps and freshwater streams. Also known in grasslands, drier cultivated areas and market gardens. Habitat specific to Australia includes the dense clumps of grass and rushes around the edges of fresh and brackish wetlands. This includes swamps, billabongs, river pools, small streams and sewage ponds. Also found in drying claypans and inundated plains pitted with crab holes. *Breeds in central Siberia and Mongolia and moving south for the boreal winter.*	x	-	-
Pin-tailed Snipe (*Gallinago stenura*)	During non-breeding period the Pin-tailed Snipe occurs most often in or at the edges of shallow freshwater swamps, ponds and lakes with emergent, sparse to dense cover of grass/sedge or other vegetation. The species is also found in drier, more open wetlands such as claypans in more arid parts of species' range. It is also commonly seen at sewage ponds; not normally in saline or inter-tidal wetlands. *Breeds in Russia. Australian distribution is not well understood. There are confirmed records from NSW, with a single banded bird reported near West Wyalong.*	x	-	-
Latham's Snipe (*Gallinago hardwickii*)	Soft wet ground or shallow water with tussocks and other green or dead growth; wet parts of paddocks; seepage below dams; irrigated areas; scrub or open woodland from sea-level to alpine bogs over 2,000m; samphire on saltmarshes; mangrove fringes. *Breeds Japan. Regular summer migrant to Australia. Some overwinter.*	x	-	-

Appendix 4
Significance of Impact Test

Section 7.2 of the *BC Act* requires a determination as to whether a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. Henceforth this is referred to as the 'Significance of Impact Test'.

For the purposes of this part, 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.

Section 7.3 of the *BC Act* provides the terms of the test for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats.

The following significance of impact test relies on the biodiversity assessment provided in this report and should be read making reference to the relevant discussion on each threatened species or their habitats, endangered population and ecological community.

Flora and fauna survey of the study area have resulted in the identification of suitable habitat for the following threatened species and populations with varying potential to occur. Species recorded or with a considered potential to occur have been noted. The potential for any direct or indirect impacts on these species has also been considered and noted.

Threatened flora

Scientific name	BC Act	Potential to occur	Potential impact
Acacia terminalis subsp. *terminalis*	E1	✓	no impact

Threatened ecological communities

Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion

Threatened fauna

Common name	*BC Act*	Potential to occur	Potential impact
Grey-headed Flying-fox	V	recorded	Direct – potential removal of seasonal foraging habitat
Eastern Bentwing-bat	V	recorded	Indirect – on foraging airspace habitat
Little Lorikeet	V	✓	Direct – potential removal of seasonal foraging habitat
White-bellied Sea Eagle	V	low	Indirect – on low potential terrestrial habitat
Eastern Osprey	V	low	None anticipated
Green and Golden Bell Frog	E	unlikely	Direct – on unlikely shelter, foraging and overwintering habitat
Black Bittern	V	unlikely	Indirect – on unlikely foraging habitat
Eastern Ground Parrot	V	unlikely	Indirect – on unlikely habitat
Orange-bellied Parrot	E	unlikely	Indirect – on unlikely foraging habitat
Grass Owl	V	unlikely	Indirect – on unlikely foraging habitat
White-fronted Chat	V	unlikely	Indirect – on unlikely foraging, roosting & nesting habitat

Common name	*BC Act*	Potential to occur	Potential impact
Dusky Woodswallow	V	unlikely	Indirect – on unlikely foraging habitat
Yellow-bellied Sheathtail-bat	V	unlikely	Indirect – on unlikely foraging habitat
Little Bentwing-bat	V	unlikely	Indirect – on unlikely foraging habitat
Large-footed Myotis	V	unlikely	Indirect – on unlikely foraging habitat

Endangered populations

- None for fauna

***BC ACT 2016* - SECTION 7.3 – SIGNIFICANCE OF IMPACT TEST**

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

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

The direct and indirect impacts of the proposal are considered within Section 5.2.

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 with potential to occur

Acacia terminalis* ssp. *terminalis

This species is an erect or spreading shrub from 1 to 5 metres high. The flowering period for this species is between February and October. Despite a detailed search, this species was not found on the study area. Despite the presence of sub-optimal habitat for *Acacia terminalis* ssp *terminalis* within the study area, it is considered that the proposal is unlikely to have an adverse effect on the life cycle of this 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 20km of camps but individuals are known to commute up to 50km to a productive food source.

Previously the Grey-head Flying was recorded drinking from the northern dam during nocturnal surveys conducted on the evening of the 14th December 2006. This species was heard calling assumed to be foraging on flowering Tallowwood along the entry road during recent nocturnal survey on the 17th July 2019.

The subject site 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.

Eastern Bentwing-bat *(Miniopterus orianae oceanensis)*

The Eastern Bentwing-bat forages above and below the canopy within open forests and woodlands, feeding on small flying insects, predominantly moths (Dwyer 1995). The Eastern Bentwing-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.

The Eastern Bentwing-bat was previously recorded foraging in airspace above a northern dam on the 13th October 2008. This species was recorded foraging in airspace above both ultrasonic recorders during recent overnight recording on the 16 & 17th July 2019. It was also recorded during active monitoring of the eastern portions. Recorded locations are shown on Figure

It is considered that the study area provides only suitable foraging habitat for the Eastern Bentwing-bat. Foraging habitat is otherwise well represented in the locality such that removal of this habitat within the study area is not likely to cause a significant impact on this species.

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

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

One (1) TEC – Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion – were observed within the subject site.

The proposed Master Plan is not likely to have an adverse effect on Eastern Suburbs Banksia Scrub (ESBS). The ESBS and critical habitat buffer will be entirely retained. There is a managed landscape buffer proposed to protect the ESBS. It is considered that the proposed masterplan is not likely to have an adverse effect on the ESBS such that its local occurrence is likely to be placed at risk of extinction.

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 proposal will not impact on the ESBS, as the ESBS is to be completely retained. The approved VMP is to be implemented to manage weeds and provide the guidelines on the restoration of the natural vegetation within the ESBS. A managed buffer is proposed to protect the ESBS. Therefore, it is considered that the proposed Masterplan is not likely to substantially or adversely modify the composition of the ESBS such that the local occurrence of this community 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 subject site provide known or potential habitat for *Acacia terminalis spp terminalis,* Eastern Suburbs Banksia Scrub (ESBS), Green and Golden Bell Frog, Black Bittern, White-bellied Sea Eagle, Eastern Osprey, Little Lorikeet, Eastern Ground Parrot, Orange-bellied Parrot, Grass Owl, White-fronted Chat, Dusky Woodswallow, Grey-headed Flying-fox, Yellow-bellied Sheathtail-bat, Little Bentwing-bat, Eastern Bentwing-bat and Large-footed Myotis.

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

The current proposal will not remove or modify any additional habitat.

ii. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

Areas of habitat will not be further fragmented by the revised masterplan.

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

In respect to threatened fauna species recorded or with potential to occur the proposed area of impact is not likely of high quality, of any breeding importance or central to the home range requirements of any species such that behaviour or ecology of these species will be significantly altered in any way.

As no further vegetation is to be cleared, here will be no impacts on threatened flora or TECs.

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),

A small section of the study area has been preliminarily identified as critical habitat under the provisions of the *TSC Act* (1995) for the Eastern Suburbs Banksia Scrub (ESBS) by DECC (2006). This area is restricted to the larger patch of ESBS within the eastern portion of the site and has been mapped in Figure 4. All critical habitat of ESBS will be retained within the study area. Managed buffers and permanent barriers adjacent to the Eastern Suburbs Banksia Scrub ensure that the critical habitat is protected from invasive grasses and exotic species.

The proposal is unlikely to affect the ESBS indirectly by changes in the natural water flow regimes through the study area. The proposed masterplan will incorporate Water Sensitive

Urban Design principles. This design will attempt to minimise influx of sediment and nutrients into the Eastern Suburbs Banksia Scrub. Therefore, it is considered that the proposed Masterplan is unlikely to have an adverse effect on critical habitat, 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.

Listed key threatening process (as described in the final determination of the Scientific Committee to list the threatening process)	**Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?**		
	Likely	**Possible**	**Unlikely**
Aggressive exclusion of birds by Noisy Miners (*Manorina 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		✓	

Listed key threatening process (as described in the final determination of the Scientific Committee to list the threatening process)	Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?		
	Likely	**Possible**	**Unlikely**
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*)			✓
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.

Invasion and establishment of exotic vines and scramblers

The subject site currently contains exotic vine and scrambler species such as *Araujia sericifera* (Mothvine). The proposal will provide an opportunity to remove, control and possibly eradicate these species within the subject site. This will result in a beneficial outcome by reducing the likelihood of this Key Threatening Process (KTP) from impacting on the site.

Infection of native plants by Phytophthora cinnamomi

The proposal may temporarily increase the risk of fungal infection on site as it may be spread via vehicular movement and relocation of soil and vegetation. Consequently standard *Phytophthora cinnamomi* protocol applies to the cleaning of all plant, equipment, hand tools and work boots prior to delivery onsite to ensure that there is no loose soil or vegetation material caught under or on the equipment and within the tread of vehicle tyres or tracks. Any equipment found to contain soil or vegetation material from offsite is to be cleaned in a quarantined work area or wash station and treated with anti-fungal pesticides prior to commencing work.

Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae

'Myrtle Rust' may be spread via machinery, animals and humans as well as by environmental factors such as wind. The presence of machinery and construction works is likely to slightly increase the potential for spread of this key threatening process. Similar protocols as to *Phytophthora cinnamomi* should be applied.

Invasion, establishment and spread of Lantana camara

The site currently contains this species, however it is expected that the proposal will provide an opportunity to remove, control and manage this species throughout the whole of the site by the application of a bushland management plan or weed control program.

Invasion of native plant communities by *Chrysanthemoides monilifera*

The site currently contains this species, however it is expected that the proposal will provide an opportunity to remove, control and manage this species throughout the whole of the site by the application of a bushland management plan or weed control program.

Invasion of native plant communities by exotic perennial grasses

The proposal is of a class of development recognised as a threatening process due to possible incursions of grasses such as Pampas Grass and Panic Veldtgrass. However the vegetation within the subject site is of a degraded nature and the proposal is not expected to significantly increase the prevalence of exotic perennial grasses.

Appendix 5
SAII Impact Assessment - Species

The additional impact assessment provisions for threatened species to determine a Serious and Irreversible Impact (SAII) are outlined under Section 10.2.3 of the BAM (2017) and have been applied to the recorded Eastern Bentwing-bat as follows:

(a) The action and measures taken to avoid the direct and indirect impact on the potential entity for an SAII

No specific measures are considered necessary to apply to this species given that no important habitat will be likely directly or indirectly impacted.

(b) The size of the local population directly and indirectly impacted by the development, clearing or biodiversity certification

Due to the migratory nature of this species to breeding caves within inland regions of the state, the local population is difficult to predict at any time. This species is expected to be well represented in the locality with regular recordings.

(c) The extent to which the impact exceeds any threshold for the potential entity that is specified in the Guidance to assist a decision-maker to determine a serious and irreversible impact 46 Biodiversity Assessment Method

No breeding habitat will be impacted for this species and no such habitat is present within the remaining study area.

(d) The likely impact (including direct and indirect impacts) that the development, clearing or biodiversity certification will have on the habitat of the local population, including but not limited to:

(i) An estimate of the change in habitat available to the local population as a result of the proposed development

The habitat for the species will remain virtually unchanged. This species is known to forage along streetlights and around developed landscapes. The central vegetated lagoon area within the site will continue to provide prey species habitat.

(ii) The proposed loss, modification, destruction or isolation of the available habitat used by the local population, and

The proposal will not remove any additional vegetated habitat.

(iii) Modification of habitat required for the maintenance of processes important to the species' life cycle (such as in the case of a plant – pollination, seed set, seed dispersal, germination), genetic diversity and long-term evolutionary development. BioNet Atlas records or other documented, quantifiable means must be used by the assessor to estimate what percentage of the species' population and habitat is likely to be lost in the long term within the IBRA subregion due to the direct and indirect impacts of the development

No habitat important to the life-cycle of this species will be impacted.

(e) The likely impact on the ecology of the local population. At a minimum, address the following:

(i) for Fauna:

– Breeding – No breeding habitat will be impacted
– Foraging – Negligible foraging habitat will be impacted
– Roosting, and – No likely roosting will be impacted
– Dispersal or movement pathways – the species is highly mobile over urban landscapes. The proposal will not inhibit or reduce the local movement pathways.

(ii) for Flora, address how the proposal is likely to affect the ecology and biology of any residual plant population that will remain post development including where information is available:

– Pollination cycle – N/A
– Seedbanks – N/A
– Recruitment, and – N/A
– Interactions with other species – N/A
(e.g. pollinators, host species, mycorrhizal associations)

(f) A description of the extent to which the local population will become fragmented or isolated as a result of the proposed development

The proposal will not likely cause any fragmentation or isolation of habitat for the local population.

(g) The relationship of the local population to other population/populations of the species. This must include consideration of the interaction and importance of the local population to other population/populations for factors such as breeding, dispersal and genetic viability/diversity, and whether the local population is at the limit of the species' range

All individuals in the locality, region ansd extending out to this part of the state are part of the same population.

(h) The extent to which the proposed development will lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population

No such threats are likely to arise from the development.

(i) An estimate of the area, or number of populations and size of populations that is in the reserve system in NSW, the IBRA region and the IBRA subregion

This is difficult to predict for this species however this species disperses from breeding locations throughout the eastern half of the state and foraging extent is expected to be relatively evenly represented in the reserve system in NSW, the IBRA region and the IBRA subregion.

(j) The measure/s proposed to contribute to the recovery of the species in the IBRA subregion.

- Control foxes and feral cats around roosting sites, particularly maternity caves.
- Retain native vegetation around roost sites, particularly within 300 m of maternity caves.

- Minimise the use of pesticides in foraging areas.
- Protect roosting sites from damage or disturbance.

None of the above measure are considered of relevance to the proposal. No roosting sites have been identified or are expected within the subject site.