total earth care

Biodiversity Development Assessment Report (BDAR)

William Charlton Village
Allambie Heights

Total Earth Care Pty Ltd
September 2020

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Prepared for:	Allambie Heights Village		
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EXECUTIVE SUMMARY

Total Earth Care has been commissioned by Allambie Heights Village to prepare this Biodiversity Development Assessment Report (BDAR) for the proposed independent living development at William Charlton Village, 181 Allambie Road, Allambie Heights, NSW 2100 (Lot 2615 DP 752038). The subject site is within the Northern Beaches Council Local Government Area (LGA).

Total Earth Care previously prepared a Biodiversity Management Plan (BMP in February 2020), Waterway Impact Statement (WIS) in February 2020 and BDAR in April 2018. Since the previous BDAR the development plans have been altered to reduce the ecological impact and meet Asset Protection Zone (APZ) requirements. This BDAR incorporates the new plans and additional up to date survey data.

Allambie Heights Village has leased the 3.72 ha property, with the intention of extending the existing William Charlton Village retirement village to include independent living facilities. The development will be a state-of-the-art assisted living village infrastructure precinct which will augment its current capacity and service the burgeoning need for aged care and assisted living. The site is currently being used as a Residential Aged Care Facility, however the western end of the property has not been developed and consists of planted and remnant bushland.

The native vegetation survey determined that the site contains a total of 2.02 ha of native vegetation which is comprised of five (5) Plant Community Types (PCTs). Two (2) of these are PCTs made up of planted native trees and a mix of fragmented understory of native and exotic shrubs and mostly exotic grasses. No Threatened Ecological Communities (TECs) were determined to be present on site. Seven (7) condition zones were determined from the five (5) PCTs. Of these, the majority of the vegetation to be cleared as a result of the proposal is within poor condition zones, with an area 0.12 ha of moderate and good condition vegetation being partially cleared for an Outer Protection Area.

Eight (8) threatened fauna species have been identified on site during the current and previous surveys and the presence of three (3) threatened flora species was assumed under the BAM. The proposed development design was largely sited to avoid impacts on areas of good condition vegetation, where possible.

This report details the direct and indirect impacts of the proposal and the number of biodiversity credits required to offset these impacts on the native vegetation and threatened species. These credits have been calculated using the BAM calculator. Mitigation measures and management actions have also been provided, designed to address management issues as a result of this work.

Large-eared Pied Bat (*Chalinolobus dwyeri*) which is listed as Vulnerable under the BC Act and EPBC Act was recorded on site during the current survey. The presence of breeding habitat and breeding indiviudals for this species is listed as a potential SAII (DPIE 2018). Potential breeding habitat is described as areas within 100m of rocky areas which contain caves, rock overhangs, crevices, cliffs, escarpments, old mines, tunnels, culverts and derelict concrete buildings (DPIE 2020b). The National recovery plan for the Large-eared Pied Bat *Chalinolobus dwyeri* states that "*the structure of maternity roosts appears to be very specific (arch caves with dome roofs). Caves need to be high and deep enough to allow juvenile bats to learn to fly safely inside and have indentations in the roof.*" (DERM 2011). Suitable breeding habitat was not observed on site or within 100m and so SAII will not occur.

No other species, populations or ecological communities assessed as present on the site or likely to utilise the site, are listed as a threatened entity at risk of SAII, nor are they considered to be at risk of a serious and irreversible impact following the principles for determining a SAII.

STAGE 1: BIODIVERSITY ASSESSMENT

1 INTRODUCTION

1.1 Background

Total Earth Care has been commissioned by Allambie Heights Village to prepare this Biodiversity Development Assessment Report (BDAR) for the proposed independent living development at William Charlton Village, 181 Allambie Road, Allambie Heights, NSW 2100 (Lot 2615 DP 752038). The subject site is within the Northern Beaches Council Local Government Area (LGA).

Total Earth Care previously prepared a Biodiversity Management Plan (BMP in February 2020), Waterway Impact Statement (WIS) in February 2020 and BDAR in April 2018. Since the previous BDAR the development plans have been altered to reduce the ecological impact and meet Asset Protection Zone (APZ) requirements. This BDAR incorporates the new plans and additional up to date survey data.

1.2 Subject Site and Study Area

The subject site (the site) comprises the area of land likely to be directly, or indirectly impacted by the proposal. See Map 1. The study area comprises the subject site in addition to the surrounding land that may be potentially indirectly affected by the proposal or affect the proposal. The locality encompasses a larger area that includes neighbouring properties and includes areas of native biodiversity values nearby. The site comprises a 3.72 ha property, on Lot 2615 DP 752038, in which the extension of the existing William Charlton Village is proposed. The site is currently being used as an independent living facility, with existing two-storey independent living apartments, located on the east of the site. However, the western end of the property has not been developed and consists of planted and remnant bushland.

The site is zoned as R2 Low Density Residential under the Warringah Council's Local Environmental Plan (LEP) 2011 and adjoins the Manly Warringah War Memorial Park which is a 375ha passive and active recreational bushland park located on the western and southern boundaries of the subject land (Warringah Council LEP 2011). The northern boundary adjoins a Sydney Water reticulation pipe and bushland easement. The Allambie Heights Village has a common boundary on the subject land's southern boundary.

It should be noted that the remnant bushland section of the site has been partially developed by the past lessee. A sealed road has been built on cut and filled soil through the centre of the site, Martin Luther Place. Two (2) drains have been excavated into solid sandstone rock which have created de-facto creeks.

1.3 Proposed Development

Allambie Heights Village has leased the 3.72 ha property, with the intention of extending the existing William Charlton Village retirement village to include independent living facilities. The development will be a state-of-the-art assisted living village infrastructure precinct which will augment its current capacity and service the burgeoning need for aged care and assisted living. The site is currently being used as a Residential Aged Care Facility, however the western end of the property has not been developed and consists of planted and remnant bushland.

The proposed works consist of the construction of twenty-four (24) independent living units across two (2) buildings and an additional communal building:

- Building A, located north of the existing road (Martin Luther Place) and west of the existing buildings on site, consists of a two-storey complex with eight (8) independent living units, courtyards and twenty-four (24) below ground car spaces;
- Building B, located south of the existing road (Martin Luther Place) and west of the existing buildings on site, consists of a two-storey complex with sixteen (16) independent living units and courtyards; and
- Communal Building, located south of Building B.

Two (2) visitor parking areas are also proposed along the southern side of this existing road. A vehicle access way will run from the space between building A and B and join the existing road. A bushfire emergency access path will run along the north of building A and join the proposed vehicle access way. A services easement will run approximately east to west in line with the existing road.

This will involve clearing of 0.56 ha of native vegetation (some of these areas include weed species and planted exotics but also contain native flora). Additionally, 0.12 ha will be managed as an Outer Protection Areas (OPA) and will require additional clearing to meet the criteria set out by the Planning for Bushfire Protection (NSW RFS 2019) document.

The proposal plans used for this assessment (Appendix A) are:

- Site Plan – Allambie Heights Village, Project No. 2017019, Drawing No. DA-011, Issue A, Jackson Teece Approved and Generated 09/03/2018
- Stormwater Management Plan, Allambie Heights Village - Project 2, Project No. 38509-CI-RE_001, Wood & Grieve Engineers, prepared by Ian Harris, for Allambie Heights Village Pty Ltd, dated 14 February 2020
- Landscape Concept Plan – Allambie Heights Village – Project 2 L-SD-01 Revision P1 dated 24/10/2019

1.4 Legislative Requirements

1.4.1 NSW Environmental Planning and Assessment Act 1979 and NSW Biodiversity Conservation Act 2016

Any proposal for the site should be assessed in accordance with the *Environmental Planning and Assessment (EPA) Act 1979* and the *Environmental Planning and Assessment (EPA) Regulation 2000*. The Act institutes a system for environmental planning and assessment, including approvals and environmental impact assessment.

The NSW *Biodiversity Conservation (BC) Act 2016*, with associated regulations and maps, repealed the *Threatened Species Conservation Act 1995* on the 25th of August 2017. Under the BC Act 2016, areas of "Biodiversity Value" are shown on the Biodiversity Values Map. This map identifies land with high biodiversity value, as defined by clause 7.3(3) of the *Biodiversity Conservation (BC) Regulation 2017.* Areas of Outstanding Biodiversity Value are areas which have been declared by the Minister to be critical habitat.

The Biodiversity Values Map and Threshold Report (Appendix C) advises that the Subject Site contains areas identified as "Biodiversity Value" on the Biodiversity Value Map and therefore the requirement for a BDAR is triggered and the Biodiversity Offset Scheme (BOS) applies. Furthermore, the area clearing threshold for the site is 0.5 ha, which will be exceeded by this proposal.

Therefore, this BDAR will be written in accordance with the *NSW Biodiversity Conservation Act 2016* (BC Act) and supporting documents.

The BDAR will:

- Assess in accordance with the Biodiversity Assessment Method (BAM) (OEH 2017) the biodiversity values of the land subject to the proposed development, activity or clearing;
- Assess in accordance with the BAM (OEH2017) the impact of proposed development, activity or clearing on the biodiversity values of that land;
- Set out the measures that the proponent of the proposed development, activity or clearing proposes to take to avoid or minimise the impact of the proposed development, activity or clearing, and;
- Specify in accordance with the BAM the number and class of biodiversity credits that are required to be retired to offset the residual impacts on biodiversity values of the actions to which the BOS applies.

This BDAR will be written in accordance with:

1 Commonwealth laws including:
   a. *Environment Protection and Biodiversity Conservation Act 1999*
2 NSW laws including:
   a. *Environmental Planning and Assessment Act 1979*

b. *Biodiversity Conservation Act 2016*
c. *Biosecurity Act 2015*
d. *Water Management Act 2000*
e. *Fisheries Management Act 1994*
f. *State Environment Planning Policy 2018 (Coastal Management)*
g. *State Environmental Planning Policy (Koala Habitat Protection) 2019*

3 Local Council Planning Instruments:
a. *Warringah Local Environment Plan 2011*
b. *Warringah Development Control Plan 2011*

1.5 Sources of Information

The following databases and Geographic Information Systems (GIS) layers were used in this assessment:

- Nearmap (2020);
- BioNet Atlas Search Tool (DPIE 2020a);
- BioNet Threatened Biodiversity Data Collection (TBDC) (DPIE 2020b);
- BioNet Vegetation Classification Database (DPIE 2020c);
- EPBC Protected Matters Search Report;
- eSPADE 2.0 (DPIE 2013);
- SEED Geocortex Viewer (DPIE 2020d);
- Native Vegetation of the Sydney Metropolitan Area version 3.1 (OEH 2016a&b); and
- NSW Wetlands Spatial Data (DPIE 2011).

Refer to the References section of this report (Section 9) for additional reports used for this assessment and report.

2 LANDSCAPE CONTEXT AND FEATURES

The landscape features are summarised in the following table. More detail is provided in the following sections.

Table 1. Site Information

Category	Details
Site address	181 Allambie Road, Allambie Heights, NSW 2100
Title reference	Lot 2615/K/DP752038
Local Government Area	Northern Beaches Council (previously Warringah Council)
Zoning	R2 Low Density Residential
Subject Site land area (ha)	3.72 ha
Interim Biogeographic Regionalisation for Australia (IBRA)	Sydney Basin
IBRA Sub Region	Pittwater
NSW Landscape Region	Belrose Coastal Slopes
% Native vegetation cover within 1500m	57%
Landscape features	
Rivers and streams	Three (3) small artificial drainage lines, which only flow after rains and do not hold standing water.
Wetlands	None
Connectivity features	Contiguous with the bushland corridor surrounding Manly Warringah War Memorial Park, known as Manly Dam
Areas of geological significance and soil hazard features	One (1) sandstone rock overhang along the westernmost drain (Map 1) approximately 10m to the west of the Subject Site and three (3) low-lying sandstone rock outcrops in the centre of the site.
Areas of Outstanding Biodiversity Value identified under the BC Act 2016	None

2.1 IBRA Bioregions and Subregions

The site and entire study area is located within the Sydney Basin Bioregion which is characterised by Mesozoic sandstones and shales and dissected plateaus (DEE 2018, Environment Australia 2000). Vegetation typically consists of forest, woodlands and heaths. The IBRA sub-region is the Pittwater Sub-region (SYB07) which is characterised by Triassic Hawkesbury Sandstone with thin ridge cappings of Ashfield Shale, Narrabeen sandstones exposed in valleys and along the coast and quaternary coastal sands. The landform includes Hornsby plateau of quartz sandstone with occasional shale caps, small beach, dune and lagoon barrier systems and steep coastal cliffs and rock platforms. The vegetation is characterised by shale caps that support tall forest of Sydney blue gum and blackbutt or turpentine and grey ironbark, sandstone plateau; Sydney peppermint, smooth-barked apple, scribbly gum, red bloodwood, yellow bloodwood, with diverse shrubs and patches of heath, deep sheltered gullies supporting blackbutt, turpentine, coachwood and water gum and spotted gum, Deane's gum, bangalow palm, and forest oak on Narrabeen sandstone lower slopes. Banksia, tea-tree heath on dunes. Bangalay, swamp mahogany, cabbage tree palm, swamp oak, common reed and cumbungi in fresh swamps and Mangrove and saltmarsh communities in quiet estuaries (Morgan 2001 and DPIE 2020e).

2.2 NSW Landscape Region

The entire study area forms part of the Belrose Coastal Slopes (Map 2) (DPIE 2016) which is characterised by benched hill slopes and deep valleys of the coastal fall on horizontal Triassic quartz sandstone, lithic sandstone and shales. This region typically contains a high proportion of rock outcrop with discontinuous cliffs to 5m high and low woodland of scribbly gum (*Eucalyptyus haeomostoma*), red bloodwood (*Corymbia gummifera*), yellow-top ash *(Eucalyptus leuhmanniana*), and narrow-leaved apple (*Angophora bakeri*) in deeper soils on ridges. Scrub and heath of she-oak (*Allocasuarina distyla*) and heath banksia (*Banksia ericifolia*), with other *Hakea, Grevillea*, and *Baeckea* sp*.*, on ridges and upper benches. Wet heath and swamps with *Gahnia* sp*.* and swamp banksia (*Banksia robur*) in hanging valleys. Coastal forest in sheltered areas on better quality shale soil with; Sydney blue gum *(Eucalyptus saligna*), blackbutt *(Eucalyptus pilularis*), turpentine (*Syncarpia glomulifera*), grey ironbark *(Eucalyptus paniculata*), spotted gum *(Corymbia maculata*), southern mahogany *(Eucalyptus botryoides*), cabbage-tree palm (*Livistona australis*) and burrawang (*Macrozamia* sp.). Coastal headlands with scrub of *Allocasuarina distyla*, coast rosemary (*Westringea fruticosa*), and dwarf kangaroo grass (*Themeda triandra*) (Mitchell 2002).

2.3 Soil Landscape

The entire study area is mapped as the Lambert Soil Landscape (Map 3) (DPIE 2013). This landscape is characterised by undulating to rolling rises and low hills on Hawkesbury Sandstone with a local relief of 20-120 m and slopes of 20%. The landscape consist of rock outcrops, broad ridges, gently to moderately inclined slopes, wide rock benches with low broken scarps, small hanging valleys and areas of poor drainage. The soils are characterised by shallow (<50 cm) discontinuous Earthy Sands and Yellow Earths on crests and insides of benches; shallow (<20 cm) Siliceous Sands/Lithosols on leading edges; shallow to moderately deep (<150 cm) Leached Sands, Grey Earths and Gleyed Podzolic Soils in poorly drained areas and localised Yellow Podzolic Soils associated with shale lenses.

2.4 Areas of Geological Significance and Soil Hazard Features

There are no karsts, caves, crevices, cliffs within the subject land or within the assessment area surrounding the subject land. No soil hazard features are mapped within the subject or buffer area including Acid Sulphate Soils. There is one (1) sandstone rock overhang along the westernmost drain (Map 1) approximately 10m to the west of the Subject Site and three (3) low-lying sandstone rock outcrops in the centre of the site and are typical features of the underlying Lambert Soil Landscape (DPIE 2013).

2.5 Native Vegetation Cover

The 1500m buffer area around the subject site contains approximately 481 ha of native vegetation which equates to approximately 57% of the total buffer area (846.9 ha) and falls within the >30-70% native vegetation class. The buffer area includes the Manly Warringah War Memorial Park bushland adjacent to the site in the south-west and Allenby Park in the north-east. See Map 4 for the extent of the native vegetation which was estimated from aerial imagery and previous vegetation mapping (OEH 2016a). There were no discrepancies between the mapped native vegetation cover and the aerial imagery. Isolated street trees and planted vegetation were excluded.

Figure 1. An example of the native vegetation on site, S_HL08 Heath-Mallee (PCT1824) in good condition

2.6 Cleared Areas

The subject land contains 0.87 ha of extant cleared areas. The cleared areas include the existing buildings, footpaths and the access road bisecting the site in an approximately east to west direction. The lower verge of the road is formed from a fill batter that is topped with an exotic lawn. A walking track/4WD track runs through the south western corner of the site and were probably created for access for the power lines running just outside the property boundary.

Figure 2. Exotic lawn lacking understorey with a sparse planted canopy, west of the existing building, looking south

2.7 Rivers and Streams

Within the subject land three (3) drainage lines have been artificially excavated into sandstone bedrock and have created de-facto creeks. These artificial creeks are not mapped by the Office of Water as streams recognised by the Strahler System. The drainage line to the west of the site is approximately 80m long, the drainage line in the centre of the site is approximately 200m long and the drainage line to the east is approximately 60m long. All creeks generally flow in a north-south direction (See Map 1. Subject Site).

The central drainage line forms part a first order creek and is mapped as part of the upper headwaters of Curl Curl Creek within the Manly Creek sub-catchment (Warringah Creek Management Study 2004). Northern Beaches Council have determined the beginning of Curl Curl Creek does begin on site at the culvert below the existing road.

The River Styles of both of these creek lines is “urban modified”, meaning their channels have been modified to the extent that they no longer function as rivers (WCMS 2004). The creeks function as open drainage lines to transport the flow of stormwater (see Figure 3). They are both ephemeral and only flow after rain events.

The vegetation along the creek lines is not distinctly riparian in contrast with the surrounding bushland. An artificial detention basin is located below the eastern creek line and is sparsely vegetated with riparian species.

Figure 3. The central creek line excavated into sandstone bedrock, looking south [Left] and north [Right] after a recent rain period

2.8 Wetlands

There are no wetlands located within or adjacent to the subject land. However, Manly Reservoir is located approximately 1.2km downstream of the site and is classified as a wetland according to the NSW Wetlands dataset (OEH 2011).

Manly Reservoir is not listed in the Directory of Important Wetlands of Australia (DIWA) and does not correspond to a SEPP 14 Coastal wetland. As such, it is defined as a local wetland for the purposes of the BAM.

2.9 Connectivity Features

The subject land is contiguous with the Manly Warringah War Memorial Park which is a 375ha park located on the western and southern boundaries of the subject land, 78% of which is bushland. The northern boundary adjoins a Sydney Water reticulation pipe and bushland easement. Other areas of bushland situated in the locality include Allenby Park approximately 450m to the east, Goroka Park approximately 480m to the north east, and Garigal National Park approximately 1km to the south west. There are high levels of connectivity with other areas of bushland to the south and west of the subject land and poor connectivity to the north and east due to urban development.

For the connectivity of different areas of habitat that may facilitate the movement of threatened species across their range, see Map 4.

Title: Subject Site

Map No: 1
Site: William Charlton Village
Client: Allambie Heights Village
Date: May 2020
Project No: C11661
Author: G Barron

- Subject Site
- Lot
- Pipeline
- Contour
- Drainage lines and 10m buffer
- Cleared Areas
- Sandstone Rock Outcrops

IBRA Bioregion: Sydney Basin (SYB)
IBRA Sub-region: Pittwater (SYB07)

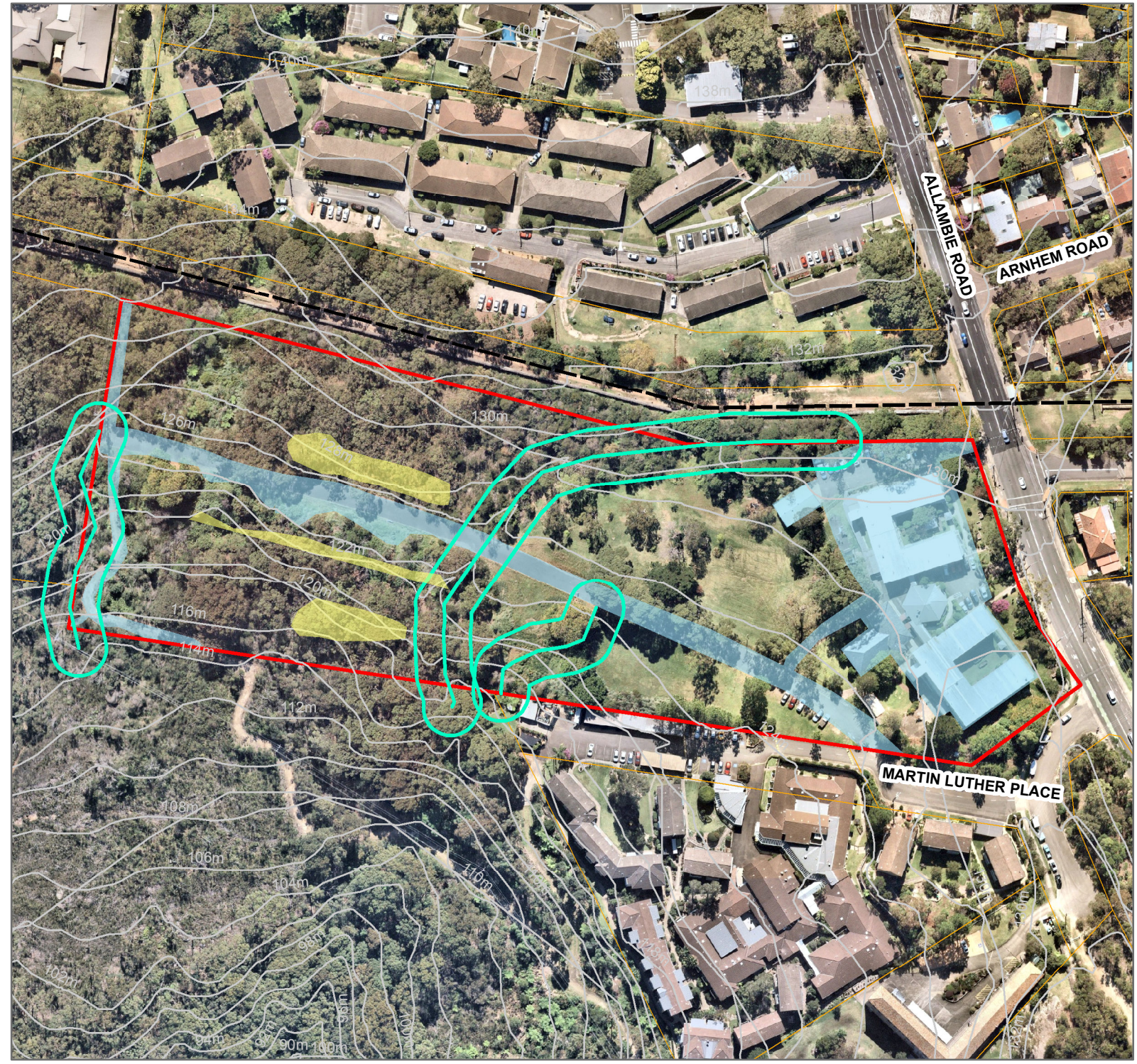
0 15 30 60 Meters

N

Data Source:
Total Earth Care
Nearmap

Tel: 02 9913 1432 Fax: 02 9913 1434

total earth care



Title: Subject Site and Study Area

Map No: 2
Site: William Charlton Village
Client: Allambie Heights Village
Date: May 2020
Project No: C11661
Author: G Barron

Study Area
Subject Site
Pipeline

Stream Order

1st
2nd

Riparian Corridor

1st Order
2nd Order

Mitchell Landscape

Belrose Coastal Slopes
Estuary/Water Added
Sydney - Newcastle Barriers and Beaches

IBRA Bioregion: Sydney Basin (SYB)
IBRA Sub-region: Pittwater (SYB07)

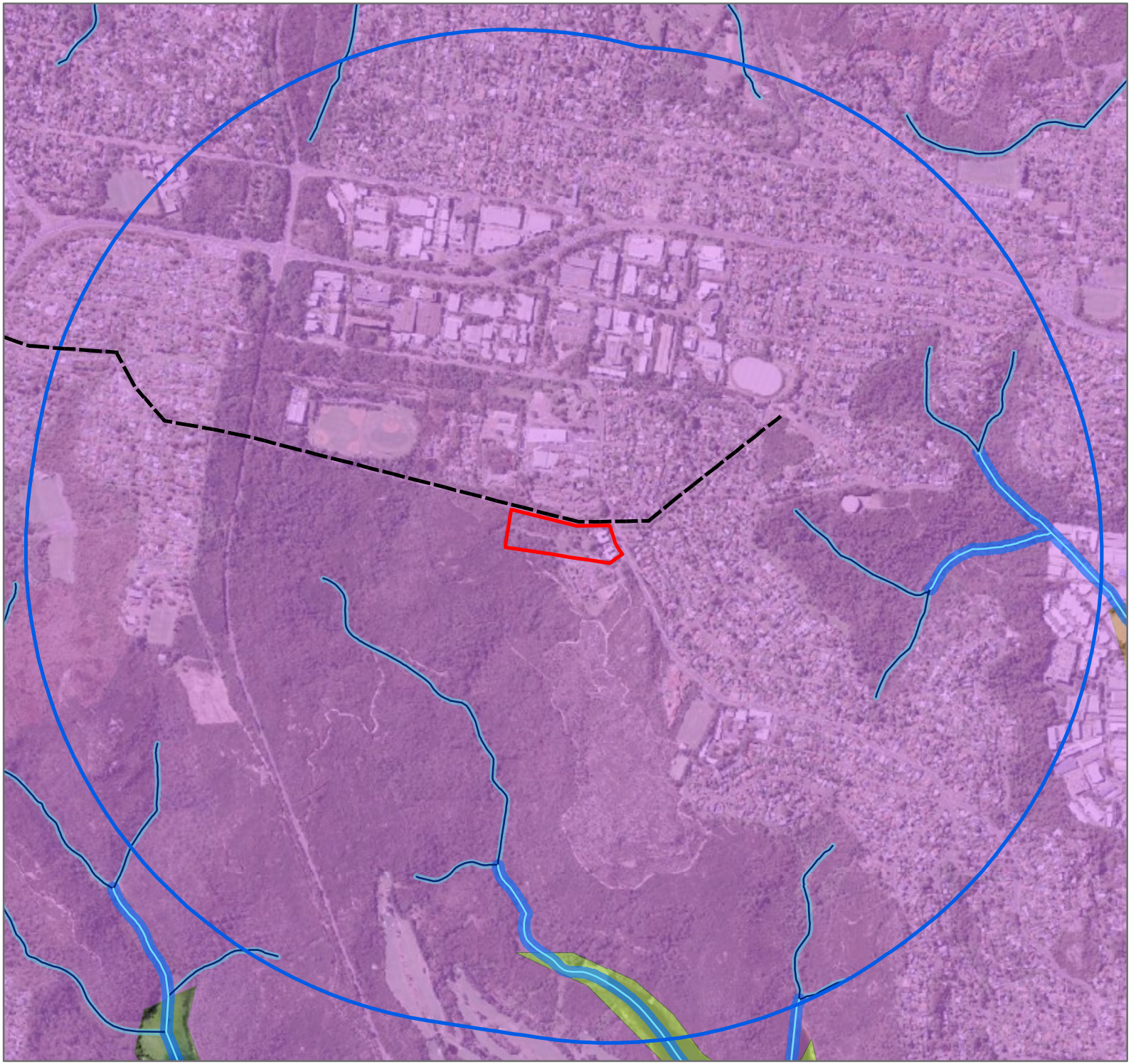
0 165 330 660 Meters

N

Data Source:
Total Earth Care
SIX Maps
DPIE 2016

Tel: 02 9913 1432 Fax: 02 9913 1434

total earth care



Title: Native Vegetation Cover & Habitat Connectivity within 1500m

Map No: 3
Site: William Charlton Village
Client: Allambie Heights Village
Date: May 2020
Project No: C11661
Author: G Barron

Study Area
Subject Site
Native Vegetation Cover
Pipeline

Stream Order

1st
2nd

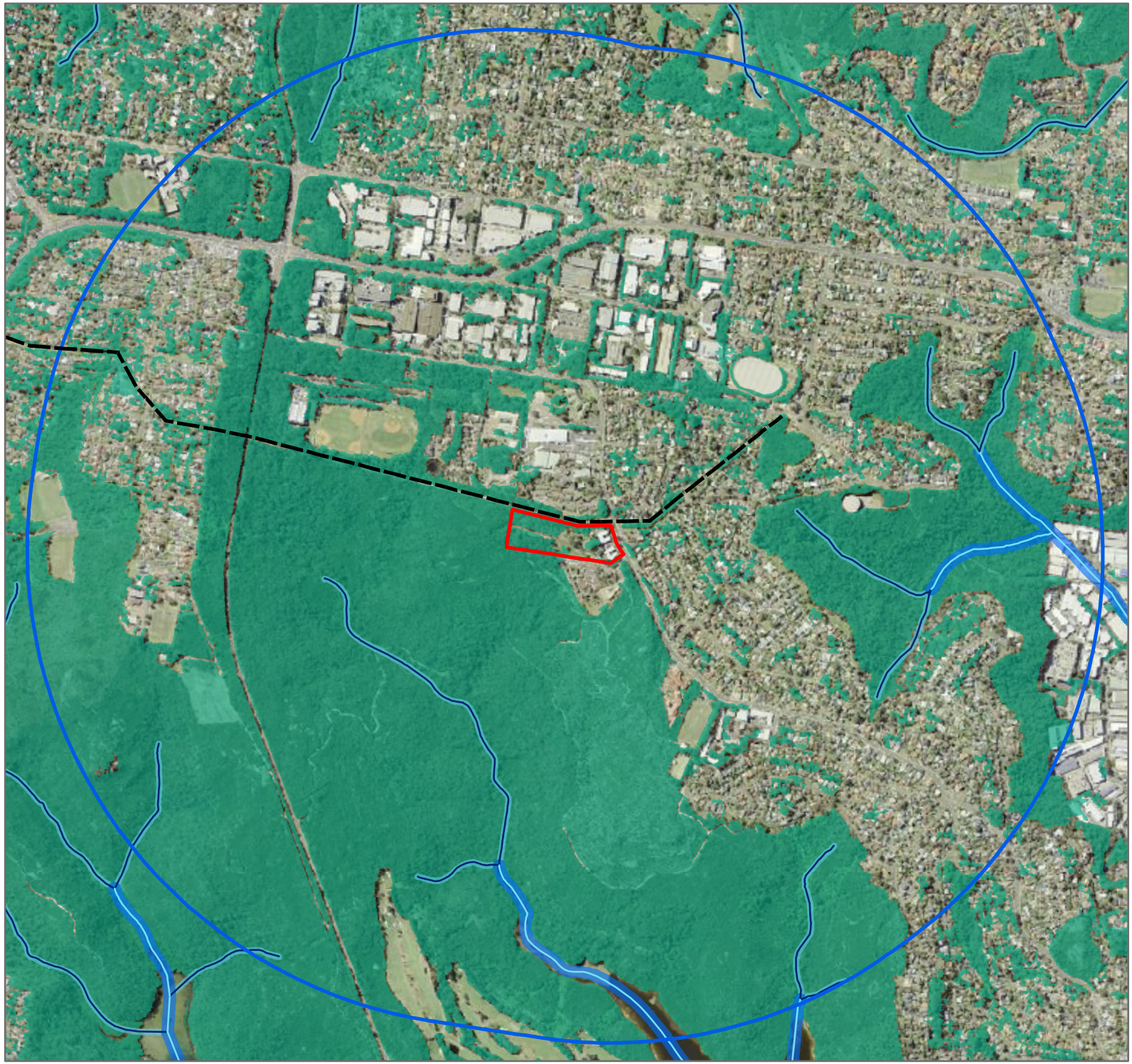
Riparian Corridor

1st Order
2nd Order

IBRA Bioregion: Sydney Basin (SYB)
IBRA Sub-region: Pittwater (SYB07)

0 165 330 660 Meters

N



Data Source:
Total Earth Care
SIX Maps
OEH 2016

Tel: 02 9913 1432 Fax: 02 9913 1434

total earth care

Title: Vegetation Communities

Map No: 4
Site: William Charlton Village
Client: Allambie Heights Village
Date: May 2020
Project No: C11661
Author: G Barron

Study Area
Subject Site
Pipeline
Drainage lines and 10m buffer

Vegetation Communities

Coastal Sandstone Gully Forest (S_DSF09, PCT 1250)
Sydney North Exposed Sandstone Woodland (S_DSF11, PCT 1783)
Coastal Sandstone Heath-Mallee (S_HL08, PCT 1824)

Urban Exotic/Native
Weeds and Exotics

IBRA Bioregion: Sydney Basin (SYB)
IBRA Sub-region: Pittwater (SYB07)

0 15 30 60 Meters

N

Data Source:
Total Earth Care
Nearmap
OEH 2016

Tel: 02 9913 1432 Fax: 02 9913 1434

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3 NATIVE VEGETATION

3.1 Methods

3.1.1 Vegetation Integrity Survey

3.1.1.1 Stratification

As per the BAM, native vegetation must be stratified into Vegetation Zones. A *vegetation zone* means an area of native vegetation on the subject land that is the same Plant Community Type (PCT) and has a similar broad condition state (OEH 2017). The site was initially stratified using the most recent vegetation mapping (listed above), aerial photos of the site, and condition based on local knowledge.

Subject site and study area mapping was then ground truthed by random meander transects and plot based surveys. Any mapped vegetation outside of the study area was not field verified with data.

3.1.1.2 BAM Plots

The PCT survey was completed using BAM plots within each vegetation zone. A minimum number of seven (7) BAM plots was determined using Table 4 of the BAM (OEH 2017). BAM plots were conducted in accordance with the BAM (OEH 2017) and each consisted of:

- One (1) 400m^2 plot (standard 20m x 20m) to assess species composition and structure attributes;
- One (1) 1000 m^2 (standard 20m x 50m) to assess the function attributes: number of large trees, stem, stem size class, tree regeneration and length of logs; and
- Five (5) 1m^2 sub-plots to assess average litter cover, bare ground cover, cryptogram cover and rock cover.

3.1.2 Vegetation Classification and Mapping

After reviewing the most up-to-date mapping, aerial photography, and completing BAM plots, the data of each BAM plot was compared to the:

- Definitions under the relevant final determination under the BC Act or conservation listing advice under the EPBC Act if available;
- Sydney Metropolitan Catchment Management Authority Community Descriptions (OEH 2016b)
- NSW Plant Community Type profiles accessed from BioNet Vegetation Classification database (DPIE 2019c)

3.1.3 Survey Effort and Timing

The survey was conducted by four (4) of Total Earth Care's Ecologists over thirty (30) person-hours in March 2020.

Table 2. PCT Survey Effort

Survey Dates	Effort	Weather	Survey Methods
19/03/2020	Two (2) Ecologists for 9 hours each	Sunny, 22°C-32°C	*Plant Community Type survey* – seven (7) BAM plots and 'Random meander'. See for photos of the BAM plot starting points. See Map 5 for the locations of the BAM plots and survey efforts. The following information was collected at each of the vegetation plots: 1. Observers, location and date, 2. Plot dimensions and orientation 3. Photographic record of vegetation 4. Vegetation class and plant community type (PCT) 5. Physical features and disturbance history 6. Full flora list 7. Growth form, cover and abundance of each species 8. Exotic and high threat exotic plant cover 9. Number of large trees 10. Recruitment of canopy trees 11. Presence of hollow-bearing trees; 12. Length of Logs; and; 13. Litter cover. The field data collected was tallied and input into the BAM calculator to determine a vegetation integrity score for the vegetation zones.
27/03/2020	Two (2) Ecologists for 6 hours each	Sunny, 20°C-24°C	

Table 3. BAM plot start points

BAM Plot Number	Photo at Start
1	
2	

BAM Plot Number	Photo at Start
3	
4	

BAM Plot Number	Photo at Start
5	
6	

BAM Plot Number	Photo at Start
7	

3.1.4 Survey Limitations

NSW has been experiencing drought conditions since approximately mid-2017 (DPI 2020) with lower than average rainfall across Greater Sydney in 2019 (BOM 2020). Rainfall had occurred just prior to the vegetation surveys. Vegetation communities within the Sydney Basin typically receive upwards of 900mm of annual rainfall (OEH 2016b) and with the current drought, species which may normally be present, may be dormant in the seedbank. As a result species which may be present, may not have been detected at the time of the survey. Similarly, species which may be present at certain times of the year, such as orchids, may not have been present during the March surveys.

When reviewing maps please note that the hand-held GPS equipment used is only accurate to 3 metres.

3.2 Results

3.2.1 Vegetation Description

A total of one hundred and twenty-three (123) plant species were recorded during the flora survey. The survey identified ninety-one (91) occurring native species, and thirty (30) introduced species. Of the thirty (30) introduced species, three (3) are listed as Weeds of National Significance (WONS) under the *Biosecurity Act 2015*. See Appendix E for the full flora inventory and Appendix F for weeds listed under the *Biosecurity Act 2015.*

Thirteen (13) protected species under the BC Act 2016 was identified on site. No threatened flora species or flora populations were recorded on the site.

The western portion of the site consists of closed woodland and heath. There are some areas of previous disturbance that contain high densities of weeds including the southern edge of the access road, a previously cleared area in the north-west of the site and the edges of the bushland where it meets the managed lawn. The eastern portion of the site consists of planted native trees including *Eucalyptus botryoides* and *Eucalyptus saligna x botryoides* with a managed exotic lawn. Weeds and planted exotics ornamental including *Ligustrum sinense* (Small-leaved Privet), *Paspalum quadrifarium* (Tussock Grass) and *Musa sp.* (Banana Tree) species are found throughout this area.

Five (5) native Plant Community Types (PCTs) were identified on the site. See Map 6 for native vegetation extent within the development site.

OEH (2016a) mapped the subject site as containing three (3) native NSW PCTs, and two (2) more PCTs were assigned to patches of planted native vegetation as the BAM requires and areas containing native flora species to be assigned to a PCT that most closely aligns to the vegetation. See Map 6 for native vegetation extent within the development site. The PCTs on site are:

- PCT 1231 (Planted): Swamp Mahogany Swamp Sclerophyll Forest on Coastal Lowlands of the Sydney Basin and South East Corner
- PCT 661 (Planted): Bangalay – Smooth-barked Apple – Swamp Mahogany low open forest of southern Sydney, Sydney Basin Bioregion
- PCT 1250: Sydney Peppermint - Smooth-barked Apple - Red Bloodwood shrubby open forest on slopes of moist sandstone gullies, eastern Sydney Basin Bioregion
- PCT 1783: Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
- PCT 1824: Mallee - Banksia - Tea-tree - Hakea heath-woodland of the coastal sandstone plateaus of the Sydney basin

3.2.2 Evidence to Support Identification of NSW PCTs Onsite

The PCTs identified was in accordance with those mapped on the subject site under OEH vegetation mapping (See Map 6). The plant species identified during the plot based surveys was tested against OEH Native Vegetation Profiles Version 3.1 (OEH 2016b) bench mark figures for these communities. The results are presented in Table 4 below. Although the number of positive diagnostic species for some plots were closely aligned to more than one (1) PCT the community was selected based the best fit for both the overall community structure, geology and topography of the zone.

Given the relatively small size of the vegetation zones, some transition between communities is likely to have been picked up despite best efforts to locate the plots within distinct communities.

Table 4 BAM plot floristics compared with positive diagnostic (PD) species in each PCT

PCT	OEH Veg Map Code	Total species required in 0.04 Ha	Total PD species required	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7
1231 (Planted)	**FoW04 PD**	-	-	2	0	0	1	3	1	0
661 (Planted)	**WSF03 PD**	17	11	2	0	0	1	3	0	3
1250	**DSF09 PD**	45	32	6	15	20	21	1	0	14
1783	**DSF11 PD**	41	27	3	19	21	14	0	0	10
1824	**HL08 PD**	42	31	4	25	23	20	0	0	8
Total number of species				34	34	34	34	20	18	39
Total number of native species				19	34	34	34	10	7	9
Total number of introduced species				15	0	0	0	10	11	30

Plot PCT determined using all survey evidence.

3.2.3 PCT 1231: Swamp Mahogany Swamp Sclerophyll Forest on Coastal Lowlands of the Sydney Basin and South East Corner

A patch of planted vegetation directly west of the existing building and directly south between the buildings and Martin Luther Place has been assigned to PCT 1231 as the closest PCT based on the species present. Within Plot 6, the vegetation was dominated by mown lawn, exotic garden species and a high abundance of weed species. The canopy consisted of a large planted *Populus deltoides* and two (2) *Eucalptus saligna x botryoides,* with scattered *Pittosporum undulatum* and *Ligustrum lucidum* in the mid-storey. The planted vegetation south of the existing building consists of a mix of most likely planted native species, including a mid-storey of *Pittosporum undulatum* and *Acacia longifolia,* however was still significantly weedy and classed as the same poor condition.

Figure 4. Platned vegetation south of the existing building assigned to PCT 1231 in poor condition, looking north

Table 5 Summary of PCT 1231

PCT 1231 (Planted)	**Coastal Sand Swamp Mahogany Forest (S_FoW04), Swamp Mahogany Swamp Sclerophyll Forest on Coastal Lowlands of the Sydney Basin and South East Corner (PCT 1231)**
Formation	Forested Wetlands
Class	Coastal Swamp Forests
Estimated % Cleared Within Sydney Basin	85-95%
Estimated % to be Cleared on Site	75%
Associated Threatened Ecological Community (TEC)	The PCT is associated with the *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* Endangered Ecological Community (EEC) and the *Sydney Freshwater Wetlands in the Sydney Basin Bioregion* EEC however as the PCT is planted it does not conform to either of these EECs according to the Final Determination by the Scientific Committee..
BC Act Status	Not listed
EPBC Act Status	Not listed
Extent within Site	0.17 ha approximately

3.2.4 PCT 661: Bangalay – Smooth-barked Apple – Swamp Mahogany low open forest of southern Sydney, Sydney Basin Bioregion

Consists of a canopy of planted *Eucalyptus botryoides* and *Eucalyptus robusta,* over a mown lawn and no understorey. Due to the canopy species, this patch of planted vegetation (Plot 5) was assigned to PCT 661, and only three positive diagnostic species align with this PCT.

Figure 5. Vegetation consisting of a canopy of planted *Eucalyptus botryoides* and *Eucalyptus robusta* assigned to PCT 661, adjacent to the existing road, looking north-east

Table 6 Summary of PCT 661

PCT 661 (Planted)	**Coastal Sand Littoral Forest (S_WSF03), Bangalay – Smooth-barked Apple – Swamp Mahogany low open forest of southern Sydney, Sydney Basin Bioregion (PCT 661)**
Formation	Wet Sclerophyll Forests
Class	North Coast Wet Sclerophyll Forests
Estimated % Cleared Within Sydney Basin	Not Available
PCT % Cleared	91%
Associated Threatened Ecological Community (TEC)	The PCT is associated with the *Kurnell Dune Forest in the Sutherland Shire and City of Rockdale* EEC however as the PCT is planted it does not conform to EECs according to the Final Determination by the Scientific Committee.
BC Act Status	Not listed
EPBC Act Status	Not listed
Extent within Site	0.19 ha

3.2.5 PCT 1250: Sydney Peppermint - Smooth-barked Apple - Red Bloodwood shrubby open forest on slopes of moist sandstone gullies, eastern Sydney Basin Bioregion

The access road bisecting the remnant bushland was built along the slope transition, with the increase in slope below the road facing south providing a less sun-exposed aspect. Much of the PCT south of this road was determined to be Sydney Peppermint - Smooth-barked Apple - Red Bloodwood shrubby open forest on slopes of moist sandstone gullies, eastern Sydney Basin Bioregion (PCT 1250). The extant floristics and topography indicate that PCT 1250 extends further west than was mapped by OEH. Twenty-one (21) positive diagnostic species align with this PCT.

Canopy species found include *Corymbia gummifera*, *Eucalyptus haemastoma*, and *E. sieberi*, with a subcanopy of *Allocasuarina distyla* and *Banksia serrata*. Prominent mid-storey species include *Bauera rubioides*, *Banksia ericifolia*, *Hakea gibbosa*, *Acacia longifolia*, *Lomatia silaifolia* and *Leptospermum polygalifolium*, while prominent groundcovers include *Anisopogon avenaceus*, *Lomandra longifolia*, *Entolasia stricta* and *Lepidosperma laterale*. The vegetation in the centre of this community had no presence of weed species (Plot 4) and was classed as good condition. Minor infestations of weeds such as *Lantana camara*, *Senna pendula* var. *glabrata*, *Ehrharta erecta* and *Paspalum quadrifarium* were evident in a patch near the western boundary, and where the vegetation joins the mown grass areas in the east (Plot 7), due to the change in hydrology from the drainage lines, therefore was classed as moderate condition. The northern extent of this PCT is the exotic weed covered embankment of the road verge which has not been included in the communities calculated area.

Figure 6. PCT 1250 Sydney Peppermint - Smooth-barked Apple - Red Bloodwood shrubby open forest in good condition, south of the existing road, facing north-west

Table 7 Summary of PCT 1250

PCT 1250	**Coastal Sandstone Gully Forest (S_DSF09), Sydney Peppermint - Smooth-barked Apple - Red Bloodwood shrubby open forest on slopes of moist sandstone gullies, eastern Sydney Basin Bioregion (PCT 1250)**
Formation	Dry Sclerophyll Forest
Class	Sydney Coastal Dry Sclerophyll Forests
Estimated % Cleared Within Sydney Basin	15-30%
Estimated % to be Cleared on Site	23% to be cleared for landscaped areas or managed as an Outer Protection Area (OPA)
Associated Threatened Ecological Community (TEC)	N/A
BC Act Status	Not listed
EPBC Act Status	Not listed
Extent within Site	0.72 ha

3.2.6 PCT 1783: Red Bloodwood - Scribbly Gum / Old-man Banksia open forest

The central section north of the access road was not found to be consistent with the mapped community of Sydney Peppermint - Smooth-barked Apple - Red Bloodwood shrubby open forest on slopes of moist sandstone gullies, eastern Sydney Basin Bioregion (PCT 1250). The extant floristics and the drier flatter topography indicate that the area is Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast (PCT 1783). Twenty-one (21) positive diagnostic species align with this PCT.

Canopy species include *Corymbia gummifera*, *Eucalyptus haemastoma*, *E. sieberi*, and *E. capitellata*, while subcanopy species include *Angophora hispida* and *Banksia serrata*. Mid layer species include *Hakea* spp*., Banksia spinulosa*, *Persoonia levis*, *Boronia ledifolia*, *Lambertia Formosa* and *Kunzea ambigua*. Groundcovers include *Anisopogon avenaceus*, *Entolasia stricta, Lepidosperma laterale, Eleocharis gracilis*, *Lomandra spp*. and *Cyathochaeta diandra*. These floristics (Plot 3) as well as the elevated position in the landscape are consistent with PCT 1783 rather than with PCT 1250.

A change in the hydrology immediately to the west has led to a total infestation by weeds such as *Paspalum quadrifarium*, *Ageratina adenophora*, *Senna pendula* var*. glabrata*, and *Zantedeschia aethiopica*. The almost complete loss of all native strata makes this area of weeds inconsistent with either of the bordering plant communities.

Figure 7. PCT 1783 Red Bloodwood - Scribbly Gum / Old-man Banksia open forest in good condition, north of the access road

Table 8 Summary of PCT 1783

PCT 1783	**Sydney North Exposed Sandstone Woodland (S_DSF11), Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast (PCT 1783)**
Formation	Dry Sclerophyll Forest
Class	Sydney Coastal Dry Sclerophyll Forest
Estimated % Cleared Within Sydney Basin	30.-50%
Estimated % to be Cleared on Site	0%
Associated Threatened Ecological Community (TEC)	N/A
BC Act Status	Not listed
EPBC Act Status	Not listed

Extent within Site	0.31 ha

3.2.7 PCT 1824: Mallee - Banksia - Tea-tree - Hakea heath-woodland

This community was identified on shallow soils on sandstone benches in two locations on the northern side of the central access road. OEH mapping had the majority of the north of the access road mapped as PCT 1250 (See Map 4). However, the extant floristics and exposed geological features indicate that these areas are Mallee - Banksia - Tea-tree - Hakea heath-woodland of the coastal sandstone plateaus of the Sydney basin (PCT 1824). Twenty-five (25) positive diagnostic species align with this PCT. See Map 6 for ground-truthed vegetation mapping.

Prominent canopy and midstorey species include *Corymbia gummifera*, *Angophora hispida*, *Allocasuarina distyla*, *Banksia ericifolia*, *Leptospermum squarrosum, Petrophile pulchella* and *Kunzea ambigua*. Diverse native groundcovers include *Caustis pentandra, Lepidosperma laterale, Epacris microphylla, Micromyrtus ciliate, Platysace linearifolia* and *Woollsia pungens*. An impervious sandstone shelf underlying the area has resulted in skeletal sandy soils and boggy conditions in parts. These features are consistent with PCT 1824 rather than with PCT 1250.

This bushland demonstrates high resilience and very few weed species are present, therefore has been classed as good condition demonstrated by Plot 2. The vegetation in the north western section of the subject site has been mapped as PCT 1824, by OEH. Based on the ground truthed floristics and structural elements, the vegetation is consistent with this mapping.

Figure 8. PCT 1824 Mallee - Banksia - Tea-tree - Hakea heath-woodland in good condition, north of the access road

Table 9 Summary of PCT 1824

PCT 1824	**Coastal Sandstone Heath-Mallee (S_HL08), Mallee - Banksia - Tea-tree - Hakea heath-woodland of the coastal sandstone plateaus of the Sydney basin (PCT 1824)**
Formation	Heathlands
Class	Sydney Coastal Heaths
Estimated % Cleared Within Sydney Basin	<10%
Estimated % to be Cleared on Site	34%
Associated Threatened Ecological Community (TEC)	N/A
BC Act Status	Not listed
EPBC Act Status	Not listed
Extent within Site	0.63 ha

3.3 Vegetation Integrity

3.3.1 Vegetation Zones

Seven (7) vegetation zones were assessed for vegetation integrity from five (5) PCTs. The zones were divided based on their condition and were split into good, moderate and poor. Good areas for PCT 1250, 1783 and 1824 were mapped in the western portion of the site where less disturbance has occurred. As a result these areas had very few weed species present and contained a diverse range of species in all strata relevant to the PCT. See Figure 9 for a photo of this vegetation zone and Map 6 for the extent of the good condition areas within the site.

Moderate zones for PCT 1250 have been mapped (Map 6) on the western side of the access road where weeds are present within the PCT in moderate densities. Weed intrusions include *Lantana camara*, *Ageratina adenophora* and *Paspalum quadrifarium.* The canopy, shrub and ground layers are otherwise relatively in tack.

Poor condition zones include an area of PCT 1824 that follows the central drainage line which is most likely contributing to the high weed presence. This area is also subject to edge effect as it abuts the open manage areas of lawn. Weeds in this zone include *Lantana camara*, *Ageratina adenophora, Ligustrum sinense* and *Paspalum quadrifarium* which have prevented any occurrence of native shrub and ground species in parts of this zone.

The other two (2) poor condition zones are that of the planted PCTs 661 and 1231. These consist of mostly native canopy species which have most likely been planted. The under storey in both these zones contains mostly exotic mown grasses and some planted exotics including Banana trees and ornamental species.

The Vegetation Zones Report generated by the BAM calculator is provided in Appendix H.

Figure 9. PCT 1250 Good Zone

Figure 10. PCT 1783 Good Zone

Figure 11. PCT 1824 Good Zone

Figure 12. PCT 1250 Moderate Zone

Figure 13. PCT 1824 Poor Zone

Figure 14. PCT 1231 Planted Poor Zone

Figure 15. PCT 661 Planted Poor Zone

3.3.2 Patch Size

Patch size was calculated as per the BAM (OEH 2017). All plots consisted of intact woody native vegetation that are within 100m of each other and contiguous with the bushland of Manly Warringah War Memorial Park. An approximate patch size common to all zones of 300ha is calculated.

3.3.3 Vegetation Integrity Score

The vegetation integrity score was determined using the BAM calculator. The data collected from the seven (7) plots was entered to give a score for each zone including species composition, vegetation structure and function condition. See Appendix D for plot field data sheets. The vegetation integrity scores for each zone are provided in Table 10 below.

Table 10. Summary of Vegetation Zones and Integrity Assessment

NSW PCT No.	Veg Zone	Area (ha)	Patch size (ha)	Plot	Composition Condition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
1824	1824 Poor	0.29	>300	1	39.0	56.6	63.9	52
1824	1824 Good	0.34	>300	2	82.0	95.1	81.2	85.9
1783	1783 Good	0.31	>300	3	67.2	41.1	44.8	49.9
1250	1250 Good	0.56	>300	4	66.2	74.7	41.1	58.8
1250	1250 Moderate	0.16	>300	7	53.0	9.3	43.1	27.7
661	661 (Planted) Poor	0.19	>300	5	26.2	12.6	38.4	23.3
1231	1231 (Planted) Poor	0.17	>300	6	19.8	19.9	49.5	26.9

Section 10.3.1.1 of the BAM (OEH 2017) states that offsets are required for impacts of the development if one of the following criteria are met:

a) *"a vegetation zone that has a vegetation integrity score ≥15 where the PCT is representative of an endangered or critically endangered ecological community, or*

b) a vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community, or

c) a vegetation zone that has a vegetation integrity score ≥20 where the PCT is not representative of a TEC or associated with threatened species habitat."

None of the vegetation zones are considered to be representative of an EEC or CEEC under the BC Act 2016 or EPBC Act. The two (2) planted PCTs, PCT 661 and PCT 1231 are listed as EECs however as these are planted they do not meet the Scientific Committee Final Determinations for these EECs. All seven (7) zones are also associated with threatened species habitat. The vegetation integrity scores are above twenty (20) for the good, moderate and poor zones. Therefore offsets are required for all vegetation zones being cleared as a result of the proposed development.

Title: Survey Effort

Map No: 5
Site: William Charlton Village
Client: Allambie Heights Village
Date: May 2020
Project No: C11661
Author: G Barron

Study Area
Subject Site
Pipeline
Drainage lines and 10m buffer

Survey Effort

BAM Plot
BAM Plot Start Point
Anabat
Camera
Powerful Owl call playback
Red-crowned Toadlet and Giant Burrowing Frog call playback

Survey Tracks

AM Bird Survey
BAM Plots
BAM Plots & AM Bird Survey
Bird Survey/Random Meander
Nocturnal Survey

IBRA Bioregion: Sydney Basin (SYB)
IBRA Sub-region: Pittwater (SYB07)

0 15 30 60 Meters

N

Data Source:
Total Earth Care
Nearmap

Tel: 02 9913 1432 Fax: 02 9913 1434

total earth care

Title: Current Vegetation Communities

Map No: 6
Site: William Charlton Village
Client: Allambie Heights Village
Date: May 2020
Project No: C11661
Author: G Barron

- Study Area
- Subject Site
- BAM Plot
- BAM Plot Start Point
- Drainage lines and 10m buffer

ZoneName

- Exotic
- PCT 1231 - Planted Poor
- PCT 661 - Planted Poor
- PCT 1250 - Good Condition
- PCT 1250 - Moderate Condition
- PCT 1783 - Good Condition
- PCT 1824 - Good Condition
- PCT 1824 - Poor Condion

IBRA Bioregion: Sydney Basin (SYB)
IBRA Sub-region: Pittwater (SYB07)

0 15 30 60 Meters

N

Data Source:
Total Earth Care
Nearmap

total earth care

Tel: 02 9913 1432 Fax: 02 9913 1434

Title: Habitat Features

Map No: 7
Site: William Charlton Village
Client: Allambie Heights Village
Date: May 2020
Project No: C11661
Author: G Barron

Study Area
Subject Site
Pipeline
Drainage lines and 10m buffer

Habitat Features

- Disused drey
- Old small birds nest
- Potential Red-crowned Toadlet habitat
- Powerful Owl observe
- Red-crowned Toadlet recorded calling
- Ringtail Possum drey
- Ringtail Possum drey in use
- Rock overhang
- Used nestbox

IBRA Bioregion: Sydney Basin (SYB)
IBRA Sub-region: Pittwater (SYB07)

0 15 30 60 Meters

N

Data Source:
Total Earth Care
Nearmap

total earth care

Tel: 02 9913 1432 Fax: 02 9913 1434

4 THREATENED SPECIES

4.1 Predicted Threatened Species (Ecosystem Credit Species)

Ecosystem credit species are threatened species which are predicted to occur by the native plant community found on site and other landscape features onsite.

Some species which have specialised breeding requirements have dual credit classes to account for differences in foraging and breeding habitat. For example, Glossy Black Cockatoo (*Calyptorhynchus lathami)* foraging habitat can be reliably predicted through vegetation associations, however breeding habitat requires large hollow-bearing trees (DPIE 2020b).

The BAM calculator produced a list of ecosystem credit species based on a number of attributes including IBRA bioregion and subregion, patch size and the vegetation and habitat data collected in the field. Targeted survey is not required for these species (OEH 2017).

Section 6.4.1.3 of the BAM (OEH 2017) states that the ecosystem credit species generated by the BAM calculator must be assessed using the following criteria:

a) *"the distribution of the species includes the IBRA subregion which the subject land is, in the opinion of the assessor, mostly located within, and*
b) *the subject land is within any geographic constraints of the distribution of the species within the IBRA subregion, and*
c) *the species is associated with any of the PCTs identified by the assessor under Chapter 5 as occurring within the subject land, and*
d) *the native vegetation cover within an assessment area 1500m wide surrounding the boundary of the subject site as determined by the assessor in accordance with Subsection 4.3.2 is equal to or greater than the minimum class that is required for the species (unless the development is, or is part of, a linear shaped development), and*
e) *the patch size which the vegetation zone is part of, as identified in Subsection 5.3.2 is equal to or greater than the minimum specified for that species, and*
f) *the species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection."*

The ecosystem credit species for this development are provided in Table 11 with an explanation as to whether they fulfil the relevant criteria provided in Section 6.4.1.3 of BAM (OEH 2017) and whether or not the site contains the habitat constraints. The Predicted Species Report generated by the BAM calculator is provided in Appendix I.

Table 11. Predicted Threatened Species (Ecosystem Credit Species)

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Geographic Limitations	Veg Zone	Sensitivity to Gain Class	BC Status	EPBC Status	Notes
Regent Honeyeater	*Anthochaera phrygia*	(Foraging)			1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Critically Endangered	Critically Endangered	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*				1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	Moderate	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Geographic Limitations	Veg Zone	Sensitivity to Gain Class	BC Status	EPBC Status	Notes
Australasian Bittern	*Botaurus poiciloptilus*		Waterbodies; Brackish or freshwater wetlands		1231 (Planted) - Poor condition	Moderate	Endangered	Endangered	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017). No permanent waterbodies - Brackish or freshwater wetlands on site
Gang-gang Cockatoo	*Callocephalon fimbriatum*	(Foraging)			1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	Moderate	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Geographic Limitations	Veg Zone	Sensitivity to Gain Class	BC Status	EPBC Status	Notes
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	(Foraging)	Other - Presence of Allocasuarina and casuarina species		1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017). Presence of Allocasuarina species
Spotted Harrier	*Circus assimilis*				1824 - Poor condition 1824 - Good condition	Moderate	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).
Varied Sittella	*Daphoenositta chrysoptera*				1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition	Moderate	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Geographic Limitations	Veg Zone	Sensitivity to Gain Class	BC Status	EPBC Status	Notes
					1250 - Moderate condition				
Spotted-tailed Quoll	*Dasyurus maculatus*				1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Vulnerable	Endangered	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*				1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).
Little Lorikeet	*Glossopsitta pusilla*				1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 661 (Planted) -	High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Geographic Limitations	Veg Zone	Sensitivity to Gain Class	BC Status	EPBC Status	Notes
					Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition				
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	(Foraging)	Waterbodies - Within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines		1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017). Waterbody within 1km
Little Eagle	*Hieraaetus morphnoides*	(Foraging)			1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition	Moderate	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Geographic Limitations	Veg Zone	Sensitivity to Gain Class	BC Status	EPBC Status	Notes
					1250 - Moderate condition				
Broad-headed Snake	*Hoplocephalus bungaroides*	(Foraging)			1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 1250 - Moderate condition	High	Endangered	Vulnerable	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).
Black Bittern	*Ixobrychus flavicollis*		Waterbodies; Land within 40m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation		1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	Moderate	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017). Not within 40m of permanent water

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Geographic Limitations	Veg Zone	Sensitivity to Gain Class	BC Status	EPBC Status	Notes
Swift Parrot	*Lathamus discolor*	(Foraging)			1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	Moderate	Endangered	Critically Endangered	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).
Square-tailed Kite	*Lophoictinia isura*	(Foraging)			1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 1231 (Planted) - Poor condition 1250 - Moderate condition	Moderate	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017). Was observed on site in 2018
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis gularis*				1783 - Good condition	Moderate	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Geographic Limitations	Veg Zone	Sensitivity to Gain Class	BC Status	EPBC Status	Notes
Eastern Coastal Free-tailed Bat	*Micronomus norfolkensis*				1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).
Little Bent-winged Bat	*Miniopterus australis*	(Foraging)			1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017). Detected on site.

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Geographic Limitations	Veg Zone	Sensitivity to Gain Class	BC Status	EPBC Status	Notes
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	(Foraging)			1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017). Detected on site.
Turquoise Parrot	*Neophema pulchella*				1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 1250 - Moderate condition	High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).
Barking Owl	*Ninox connivens*	(Foraging)			1783 - Good condition 1250 - Good condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Geographic Limitations	Veg Zone	Sensitivity to Gain Class	BC Status	EPBC Status	Notes
Powerful Owl	*Ninox strenua*	(Foraging)			1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017). Detected on site (26/03/20)
Eastern Osprey	*Pandion cristatus*	(Foraging)			1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	Moderate	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).
Yellow-bellied Glider	*Petaurus australis*		Hollow bearing trees; Hollows > 25cm diameter			High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017). No hollows >25cm

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Geographic Limitations	Veg Zone	Sensitivity to Gain Class	BC Status	EPBC Status	Notes
Scarlet Robin	*Petroica boodang*				1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 1250 - Moderate condition	Moderate	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).
Flame Robin	*Petroica phoenicea*				1825 - Poor condition 1824 - Good condition 1250 - Good condition 1250 - Moderate condition	Moderate	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).
Koala	*Phascolarctos cinereus*	(Foraging)			1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Vulnerable	Vulnerable	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Geographic Limitations	Veg Zone	Sensitivity to Gain Class	BC Status	EPBC Status	Notes
Golden-tipped Bat	*Phoniscus papuensis*				1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).
Eastern Chestnut Mouse	*Pseudomys gracilicaudatus*				1231 (Planted) - Poor condition	High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).
Grey-headed Flying-fox	*Pteropus poliocephalus*	(Foraging)			1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Vulnerable	Vulnerable	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017). Detected foraging on site (26/03/20 & 29/03/20)
Rose-crowned Fruit-Dove	*Ptilinopus regina*				661 (Planted) - Poor condition	Moderate	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Geographic Limitations	Veg Zone	Sensitivity to Gain Class	BC Status	EPBC Status	Notes
									BAM (OEH 2017).
Superb Fruit-Dove	*Ptilinopus superbus*				661 (Planted) - Poor condition	Moderate	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*				1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).
Greater Broad-nosed Bat	*Scoteanax rueppellii*				1824 - Poor condition 1824 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Geographic Limitations	Veg Zone	Sensitivity to Gain Class	BC Status	EPBC Status	Notes
Masked Owl	*Tyto novaehollandiae*	(Foraging)			1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).
Rosenberg's Goanna	*Varanus rosenbergi*				1824 - Poor condition 1824 - Good condition 1783 - Good condition 1250 - Good condition 661 (Planted) - Poor condition 1231 (Planted) - Poor condition 1250 - Moderate condition	High	Vulnerable	Not Listed	Meets all criteria in Section 6.4.1.3 of BAM (OEH 2017).

4.2 Candidate Threatened Species (Species Credit Species)

Species credit species are threatened species or elements of their habitat that cannot be confidently predicted by vegetation surrogates and landscape features. Targeted survey is required for these species if the development site contains suitable habitat components and is within the predicted range of the species.

Section 6.4.1.17 of the BAM (OEH 2017) states the following:

"A candidate species credit species will be considered unlikely to occur on the subject land (or specific vegetation zones) if:

a) after carrying out a field assessment of the habitat constraints or microhabitats on the subject land, the assessor determines that the habitat is substantially degraded such that the species is unlikely to utilise the subject land (or specific vegetation zones), or
b) an expert report that is prepared in accordance with Subsection 6.5.2 states that the species is unlikely to be present on the subject land or specific vegetation zones."

The species credit species generated by the BAM calculator are provided in Table 12 with a description as to whether or not they are confirmed as a candidate threatened species and therefore require further survey. The Candidate Species Report generated by the BAM calculator is provided in Appendix J.

Table 12. Candidate Threatened Species (Species Credit Species)

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
Acacia bynoeana	Bynoe's Wattle						High	Endangered	Vulnerable	Occurs in heath or dry sclerophyll forest on sandy soils. Known suitable habitat includes open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds, and in recently burnt patches.	Yes
Acacia prominens - endangered population	Gosford Wattle, Hurstville and Kogarah Local Government Areas				LGAs listed in the Determination (inclusive of Georges River LGA))		Moderate	Endangered Population	Not Listed	An isolated population of *Acacia prominens* occurs in Hurstville and Kogarah Local Government Areas, disjunct from other populations and at the southern limit of the range of the species. There are records for the species being here in the nineteenth century. Occurs at a few sites along the railway line at Penshurst, at Carss Bush Park, Carss Park and there is an unconfirmed siting at Oatley Park, Oatley. This population is disjunct from other populations (Hunter Valley to Gosford region) and at the southern limit of the range of the species. Grows in open situations on clayey or sandy soils. Flowers from July to September and pods are produced in September-October. Pollination of Acacia flowers is usually by insects and birds. Acacia species generally have high seed dormancy and long-lived persistent soil seedbanks. Seeds are bird and/or ant dispersed.	No - not within the listed LGAs
Acacia terminalis subsp. terminalis	Sunshine Wattle						Moderate	Endangered	Endangered	Very limited distribution, mainly in near-coastal areas from the northern shores of Sydney Harbour south to Botany Bay, with most records from the Port Jackson area and the eastern suburbs of Sydney. Recent collections have mainly been made from the Quarantine Station, Clifton Gardens, Dover Heights, Parsely Bay, Nielson Park, Cooper Park, Chifley and Watsons Bays. Occurs in coastal scrub and dry sclerophyll woodland on sandy soils. Habitat is generally sparse and scattered. Most areas of habitat or potential habitat are small and isolated. Most sites are highly modified or disturbed due to surrounding urban development. This species flowers in autumn. Small birds and bees are natural pollinators. Seeds mature in November and are dispersed by ants. Seed viability is high and recruitment occurs mainly after fire. A fire temperature of 60 degrees is required for optimum germination. Although plants are killed by fire, they have been recorded sprouting from the base.	Yes

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
Allocasuarina portuensis	Nielsen Park She-oak				East of Gladesville bridge, within 5 km of Sydney Harbour foreshore		High	Endangered	Endangered	The original known habitat of the Neilsen Park She-oak is at Nielsen Park, in Woollahra local government area. There are no plants left at the original site where it was discovered. However, propagation material has been planted successfully at a number of locations at Nielsen Park and other locations in the local area, e.g. Gap Bluff, Hermit Point and Vaucluse House. The original habitat is tall closed woodland. Canopy species include: *Ficus rubiginosa, Angophora costata, Elaeocarpus reticulatus* and *Gloichidion ferdinandi* with a shrub layer of *Pittosporum revolutum, Kunzea ambigua* and *Monotoca elliptica*. The original habitat occurs above a sandstone shelf approximately 20 m above the harbour. The shallow sandy soils are highly siliceous, coarsely textured and devoid of a soil profile. The plantings have occurred on similar soils. Flowering occurs throughout the winter months (April-August), though many of the in situ plantings have also been observed to flower during January and March. The species is probably wind pollinated. Species in the Casuarinaceae are generally obligate seed regenerators. Most species are killed by fire, although some species can resprout. It is most conservative to assume that it is killed by fire unless otherwise shown. Reproductive success is dependent on the availability of pollen. Life span is greater than 10 years, and possibly up to 30 years.	Yes
Ancistrachne maidenii							High	Vulnerable	Not Listed	Restricted to northern Sydney, around St Albans - Mt White - Maroota - Berowra areas and to the Shannon Creek area south-west of Grafton. Habitat requirements appear to be specific, with populations occurring in distinct bands in areas associated with a transitional geology between Hawkesbury and Watagan soil landscapes. Flowers in summer. Grows in dry sclerophyll forest on sandstone-derived soils.	No - outside of known distribution and geology

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
Anthochaera phrygia	Regent Honeyeater	(Breeding)	As per mapped areas				High	Critically Endangered	Critically Endangered	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. Once recorded between Adelaide and the central coast of Queensland, its range has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests. The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. Other tree species may be regionally important. For example the Lower Hunter Spotted Gum forests have recently been demonstrated to support regular breeding events. Flowering of associated species such as Thin-leaved Stringybark *Eucalyptus eugenioides* and other Stringybark species, and Broad-leaved Ironbark *E. fibrosa* can also contribute important nectar flows at times. Nectar and fruit from the mistletoes *Amyema miquelii*, A. pendula and *A. cambagei* are also utilised. When nectar is scarce lerp and honeydew can comprise a large proportion of the diet. Insects make up about 15% of the total diet and are important components of the diet of nestlings.	No - site is not within a known key breeding region

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
Asterolasia elegans							Moderate	Endangered	Endangered	Occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby local government areas. Also likely to occur in the western part of Gosford local government area. Known from only seven populations, only one of which is wholly within a conservation reserve. Occurs on Hawkesbury sandstone. Found in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest. The canopy at known sites includes Turpentine (*Syncarpia glomulifera subsp. glomulifera*), Smooth-barked Apple (*Angophora costata*), Sydney Peppermint (*Eucalyptus piperita*), Forest Oak (*Allocasuarina torulosa*) and Christmas Bush (*Ceratopetalum gummiferum*). Ecological knowledge about this species is very limited. The species is considered to be fire sensitive and reliant on seed germination after disturbance to maintain populations. A soil seedbank appears to be established by this species, so for a number of years following fire or other disturbance the species may not be apparent, but be present only as seed in the soil. The size of the seedbank depends not only on the amount of seed contributed by mature plants each season, but on the level of dormancy of the seed which can vary from year to year. The longevity of each crop of seed in the soil is probably relatively short (perhaps 5 - 10 years). Either heat or smoke or a combination of these factors may play a role in breaking soil-stored seed dormancy. Both the amount of smoke and the level of heating could influence germination success. A certain level of heat may be optimal for breaking seed dormancy (such that too little heat results in seeds staying dormant, while too much heat kills seeds).	No - not within known distribution
Astrotricha crassifolia	Thick-leaf Star-hair						Very High	Vulnerable	Vulnerable	Occurs near Patonga (Gosford LGA), and in Royal NP and on the Woronora Plateau (Sutherland and Campbelltown LGAs). There is also a record from near Glen Davis (Lithgow LGA). Occurs in dry sclerophyll woodland on sandstone. Flowers in spring. Resprouter from root suckers or basal stem buds after fire. Seed storage and dispersal ecology and germination requirements are unknown. Not enough data to rank sensitivity to either frequent or infrequent fires.	No - not within known distribution
Caladenia tessellata	Thick Lip Spider Orchid						Moderate	Endangered	Vulnerable	Populations at Wyong, Ulladulla and Braidwood in NSW. There are no recent records of the species occurring in the Sydney region. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. The single leaf regrows each year. Flowers appear between September and	No - not within known distribution

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
										November (but apparently generally late September or early October in extant southern populations).	
Callistemon linearifolius	Netted Bottle Brush						Moderate	Vulnerable	Not Listed	Grows in dry sclerophyll forest on the coast and adjacent ranges. Flowers spring – summer. Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. Recorded in 2000 at Coalcliff in the northern Illawarra. For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. The species was more widespread in the past, and there are currently only 5-6 populations remaining from the 22 populations historically recorded in the Sydney area. Three of the remaining populations are reserved in Ku-ring-gai Chase National Park, Lion Island Nature Reserve and Spectacle Island Nature Reserve. The species has also been recorded from Yengo National Park.	Yes
Callocephalon fimbriatum	Gang-gang Cockatoo	(Breeding)	Hollow bearing trees - Eucalypt tree species with hollows greater than 9 cm diameter				High	Vulnerable	Not Listed	The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern New South Wales. In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. It occurs regularly in the Australian Capital Territory. It is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee. In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. May also occur in sub-alpine Snow Gum (*Eucalyptus pauciflora*) woodland and occasionally in temperate rainforests. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts	No - no breeding habitat on site

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
Callocephalon fimbriatum - endangered population	Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas				Hornsby and Ku-ring-gai LGAs		High	Endangered Population	Not Listed	This endangered population is found in the Ku-ring-gai and Hornsby local government areas. The population is believed to be largely confined to an area bounded by Thornleigh and Wahroonga in the north, Epping and North Epping in the south, Beecroft and Cheltenham in the west and Turramurra/South Turramurra to the east. It is known to inhabit areas of Lane Cove National Park, Pennant Hills Park and other forested gullies in the area. Occurs within a variety of forest and woodland types. Usually frequents forested areas with old growth attributes required for nesting and roosting purposes. Also utilises less heavily timbered woodlands and urban fringe areas to forage, but appears to favour well-timbered country through which it habitually flies as it moves about. Individuals of this population are likely to move outside the 'defined' population boundary in the general area and should still be considered of this population. Significant as it is the last known breeding population in the Sydney Metropolitan area. Has a small population size, estimated to be between 18 - 40 pairs.	No - not within the listed LGAs
Calyptorhynchus lathami	Glossy Black-Cockatoo	(Breeding)	Hollow bearing trees - Living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground				High	Vulnerable	Not Listed	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000m in which stands of she-oak species, particularly Black She-oak (*Allocasuarina littoralis*), Forest She-oak (*A. torulosa*) or Drooping She-oak (*A. verticillata*) occur. Foraging: Feeds almost exclusively on the seeds of several species of she-oak (Casuarina and Allocasuarina species). Breeding: March – August. Dependent on large hollow-bearing eucalypts for nest sites. Relevant threats: Nest raids by feral cats and possums. Competition for nests from Galahs and introduced honey bees	No - no breeding habitat on site
Camarophyllopsis kearneyi			Other - creeks or drainage lines or within 500 m; Semi-permanent /ephemeral wet areas or within 500 m; Swamps or waterbodies				High	Endangered	Not Listed	Known only from its type locality in Lane Cove Bushland Park in the Lane Cove local government area in the Sydney metropolitan region. Its occurrence appears to be limited to the Lane Cove Bushland Park. Surveys in potentially suitable habitats elsewhere in the Sydney Basin Bioregion have failed to find *Camarophyllopsis kearneyi*. Does not produce basidiomes (above-ground fruiting structures) all year, but may be present only as non-reproductive hyphal structures below ground.	No - not within known distribution

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
Cercartetus nanus	Eastern Pygmy-possum						High	Vulnerable	Not Listed	The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extends from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes. Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. Also feeds on insects throughout the year; this feed source may be more important in habitats where flowers are less abundant such as wet forests. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (*Pseudocheirus peregrinus*) dreys or thickets of vegetation, (e.g. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. Appear to be mainly solitary, each individual using several nests, with males having non-exclusive home-ranges of about 0.68 hectares and females about 0.35 hectares. Young can be born whenever food sources are available, however most births occur between late spring and early autumn. Agile climbers, but can be caught on the ground in traps, pitfalls or postholes; generally nocturnal. Frequently spends time in torpor especially in winter, with body curled, ears folded and internal temperature close to the surroundings.	Yes
Chalinolobus dwyeri	Large-eared Pied Bat		Cliffs - Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels				Very High	Vulnerable	Vulnerable	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies. The relatively short, broad wing combined with the low weight per unit area of wing indicates manoeuvrable	Yes

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
										flight. This species probably forages for small, flying insects below the forest canopy. Likely to hibernate through the coolest months. It is uncertain whether mating occurs early in winter or in spring.	
Cryptostylis hunteriana	Leafless Tongue Orchid						Moderate	Vulnerable	Vulnerable	The Leafless Tongue Orchid has been recorded from as far north as Gibraltar Range National Park south into Victoria around the coast as far as Orbost. It is known historically from a number of localities on the NSW south coast and has been observed in recent years at many sites between Batemans Bay and Nowra (although it is uncommon at all sites). Also recorded at Munmorah State Conservation Area, Nelson Bay, Wyee, Washpool National Park, Nowendoc State Forest, Ku-Ring-Gai Chase National Park and Ben Boyd National Park. Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*). Little is known about the ecology of the species; being leafless it is expected to have limited photosynthetic capability and probably depends upon a fungal associate to meet its nutritional requirements from either living or dead organic material. In addition to reproducing from seed, it is also capable of vegetative reproduction and thus forms colonies which can become more or less permanent at a site. On the Central Coast of NSW, populations have been recorded in woodland dominated by Scribbly Gum (*Eucalyptus haemastoma*), Brown Stringybark (*Eucalyptus capitellata*), Red Bloodwood (*Corymbia gummifera*) and also associated with Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*).	Yes

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
Darwinia biflora							High	Vulnerable	Vulnerable	Recorded in Ku-ring-gai, Hornsby, Baulkham Hills and Ryde local government areas. The northern, southern, eastern and western limits of the range are at Maroota, North Ryde, Cowan and Kellyville, respectively. Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. Associated overstorey species include *Eucalyptus haemastoma, Corymbia gummifera* and/or *E. squamosa.* The vegetation structure is usually woodland, open forest or scrub-heath. Longevity is thought to be 15-20 years. Flowering occurs throughout the year but is concentrated in autumn, with mature fruits being produced from May to August. Self-pollination is the usual form of pollination. Flowers and fruit are produced 18 months after germination, though at this stage few reach maturity. Maturation rates are higher for plants older than 5 years. Seed viability is high (up to 99%). Fire is an important factor in the life cycle of this species. Fire kills all plants, but also produces a flush of germination from seed stored in the soil. The number of individuals at a site then declines with time since fire, as the surrounding vegetation develops.	Yes
Darwinia glaucophylla			Rocky areas - rocky platforms or within 100 m				Moderate	Vulnerable	Not Listed	Occurs between Gosford and the Hawkesbury River around Calga, Kariong and Mt Karing. Known from approximately 15 sites, several within or near to Brisbane Waters NP and one within Popran NP. Occurs entirely within the Gosford Local Government Area of the Sydney Basin Bioregion. Occurs in sandy heath, scrub and woodlands often associated with sandstone rock platforms or near hanging swamps and friable sandstone shallow soils. Associated species in scrub include: *Banksia ericifolia, Acacia terminalis, A. oxycedrus, Angophora hispida, Hakea teretifolia, Bauera rubioides*, and in woodland: *Corymbia gummifera, C. eximia, Eucalyptus haemastoma* and *E. punctata*. Flowers winter and spring. Seed is dispersed by ants. Germination is from soil stored seed which requires heat to break seed dormancy. Germination is unlikely in the absence of fire. Killed by fire and populations may flucuate in relation to time since the last fire. Highly sensitive to too frequent and infrequent fire. Recommended fire interval is 5-10 years. Hybrids with *D. fascicularis* are readily identifiable by their erect habit.	Yes

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
Darwinia peduncularis			Rocky areas - rocky platforms or within 50 m							Occurs as local disjunct populations in coastal NSW with a couple of isolated populations in the Blue Mountains. It has been recorded from Brooklyn, Berowra, Galston Gorge, Hornsby, Bargo River, Glen Davis, Mount Boonbourwa and Kings Tableland. Usually grows on or near rocky outcrops on sandy, well drained, low nutrient soil over sandstone. Flowers in winter to early spring. Not likely to be capable of vegetative spread but may resprout after some disturbance. Likely to be killed by fire, based on the response of other Darwinia species. Pollinators are honeyeater birds.	Yes
Diuris bracteata							High	Endangered	Extinct	For over 100 years *Diuris bracteata* was known only from the original collection made near Gladesville in northern Sydney. In recent years plants of *Diuris platichila* from Duffy's Forest, Mount White and Kulnura were misidentified as *Diuris bracteata* (Peter Weston May 2013). The complete absence of records for most of the 20th Century resulted in this species being listed as 'presumed extinct' on Part 4 of Schedule 1 of the Biodiversity Conservation Act. Dry sclerophyll woodland and forest with a predominantly grassy understorey.	No - presumed extinct
Eucalyptus camfieldii	Camfield's Stringybark						High	Vulnerable	Vulnerable	Restricted distribution in a narrow band with the most northerly records in the the Raymond Terrace area south to Waterfall. Localised and scattered distribution includes sites at Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai, Wattamolla and a few other sites in Royal National Park. Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges. Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas. Associated species frequently include stunted species of *E. oblonga* Narrow-leaved Stringybark, *E. capitellata* Brown Stringybark and *E. haemastoma* Scribbly Gum. Population sizes are difficult to estimate because its extensive lignotubers may be 20 m across. A number of stems arise from these lignotubers giving the impression of individual plants. Flowering period is irregular, flowers recorded throughout the year. Poor response to too frequent fires.	Yes

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
Genoplesium baueri	Bauer's Midge Orchid						Moderate	Endangered	Endangered	The species has been recorded from locations between Ulladulla and Port Stephens. About half the records were made before 1960 with most of the older records being from Sydney suburbs including Asquith, Cowan, Gladesville, Longueville and Wahroonga. No collections have been made from those sites in recent years. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded at locations now likely to be within the following conservation reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments. Grows in dry sclerophyll forest and moss gardens over sandstone. Flowers February to March.	Yes
Genoplesium plumosum	Tallong Midge Orchid		Rocky areas - Heath on skeletal soils over Sydney Sandstone. Does not occur beneath tree canopies				High	Critically Endangered	Endangered	The Tallong Midge Orchid was originally collected at Kurnell in 1947; presumably it also occurred south of there, but it is now only known from two areas - the village of Tallong and its immediate environs, and a site in Morton National Park 8.5 km south-east of the town of Wingello. At Tallong it occurs within an area of less than two kilometres north and east of the town centre and the largest population of flowering plants that has been recorded (in 2001) is less than 300 plants. The Morton National Park site was discovered in 2001 and there were only 10 flowering plants at that time. Surveys have failed to locate any plants there since then. Occurs exclusively in heathland, generally dominated by Violet Kunzea (*Kunzea parvifolia*), Common Fringe-myrtle (*Calytrix tetragona*) and parrot-peas (*Dillwynia spp*.). Grows on very shallow soils, often with lichens and mosses on sandstone conglomerate rock shelves. Plants exists only as a dormant tuber for much of the year, with leaves or fruiting stems dying back in late winter. Flowering stems emerge from late February to March, depending on the seasonal condiitons, and they develop to flowering stage within about four weeks. Plants do not flower every year and often produce only a leaf. Leaves usually emerge a few weeks later than the stems that will produce flowers. Following flowering numerous fine dust like seeds develop in fleshy capsules which take several weeks to mature. After the capsules split and shed the seed the capsules remain on the old stems for up to a few months. Reproduction is by seed only and the species has no mechanism for vegetative reproduction. While the pollination biology of this species is not known, most midge orchids are pollinated by vinegar flies, although some are self-pollinating.	No - suitable habitat not present on site

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
Grammitis stenophylla	Narrow-leaf Finger Fern						Moderate	Endangered	Not Listed	Occurs in eastern Queensland and eastern NSW. In NSW it has been found on the south, central and north coasts and as far west as Mount Kaputar National Park near Narrabri. Moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest.	Yes
Grevillea shiressii					Central Coast LGA		Moderate	Vulnerable	Vulnerable	Known from two populations near Gosford, on tributaries of the lower Hawkesbury River north of Sydney (Mooney Mooney Creek and Mullet Creek). Both populations occur within the Gosford Local Government Area. There is also a naturalised population at Newcastle. Grows along creek banks in wet sclerophyll forest with a moist understorey in alluvial sandy or loamy soils. Flowers mainly late winter to Spring (July-December), with seed released at maturity in October. Flowers are bird pollinated and seeds are dispersed by ants. A fire sensitive obligate seeder that is highly susceptible to local extinction due to frequent fire, however, fire is likely to be relatively infrequent in the habitat of *G. shiressii*. Seed germination does occur in the absence of fire, however some physical disturbance is likely to promote seed germination.	No - not within the known populations
Haliaeetus leucogaster	White-bellied Sea-Eagle	(Breeding)	Other - Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines				High	Vulnerable	Not Listed	The White-bellied Sea-eagle is distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin. In New South Wales it is widespread along the east coast, and along all major inland rivers and waterways. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass. Feed mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals and carrion. Hunts its prey from a perch or whilst in flight (by circling slowly, or by sailing along 10–20 m above the shore). Prey is usually carried to a feeding platform or	No - no suitable breeding habitat on site

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										(if small) consumed in flight, but some items are eaten on the ground. May be solitary, or live in pairs or small family groups consisting of a pair of adults and dependent young. Typically lays two eggs between June and September with young birds remaining in the nest for 65-70 days.	
Haloragodendron lucasii			Other - Seepage zone or within 100 m		East of the Pacific Highway and South of Broken Bay		High	Endangered	Endangered	The known locations of this species are confined to a very narrow distribution on the north shore of Sydney. Associated with dry sclerophyll forest. Reported to grow in moist sandy loam soils in sheltered aspects, and on gentle slopes below cliff-lines near creeks in low open woodland. Associated with high soil moisture and relatively high soil-phosphorus levels. Highly clonal, which implies the true population size may be considerably smaller than expected. Flowering occurs from August to November with fruits appearing from October to December. Has demonstrated an ability to resprout from its rootstock.	Yes
Heleioporus australiacus	Giant Burrowing Frog						Moderate	Vulnerable	Vulnerable	The Giant Burrowing Frog is distributed in south eastern NSW and Victoria, and appears to exist as two distinct populations: a northern population largely confined to the sandstone geology of the Sydney Basin and extending as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. Individual frogs occupy a series of burrow sites, some of which are used repeatedly. The home ranges of both sexes appear to be non-overlapping suggesting exclusivity of non-breeding habitat. Home ranges are approximately 0.04 ha in size. Individuals move into the breeding site either immediately before or following heavy rain and occupy these sites for up to 10 days. Most individuals will not attempt to breed every year. The Giant Burrowing Frog has a generalist diet and studies to date indicate that they eat mainly invertebrates including ants, beetles, cockroaches, spiders, centipedes and scorpions. When breeding, frogs will call from open spaces, under vegetation or rocks or from within burrows in the creek bank. Males show strong territoriality at breeding sites. This species breeds mainly in autumn, but has been recorded calling throughout the year. Egg masses are foamy with an average of approximately 500-800 eggs and are laid in burrows	Yes

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										or under vegetation in small pools. After rains, tadpoles are washed into larger pools where they complete their development in ponds or ponded areas of the creekline. Tadpole development ranges from around 12 weeks duration to up to 12 months with late developing tadpoles overwintering and completing development when warmer temperatures return. Breeding habitat of this species is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water. This frog is a slow growing and long-lived species, living up to 10 years of age, possibly longer.	
Hibbertia procumbens	Spreading Guinea Flower				Central Coast LGA		High	Endangered	Not Listed	Within NSW, known from several locations only on the Central Coast in the Gosford and Wyong local government areas. These populations are at Bumble Hill near Yarramalong in Wyong LGA; Kulnura, Strickland State Forest, Mangrove Mountain, Somersby, Calga/Mt White and Peats Ridge in the Gosford LGA; and near Mogo Creek to the west of Mangrove Creek Dam. It has been recorded in four conservation reserves: Yengo, Popran and Brisbane Water National Parks and the non-production Strickland State Forest. Also occurs in Victoria and Tasmania, although investigation is required to verify that the disjunct NSW populations are the same species. Majority of known populations occur within Banksia ericifolia–Angophora hispida–Allocasuarina distyla scrub/heath on skeletal sandy soils. May also be found associated with 'hanging swamp' vegetation communities on sandy deposits. Flowers in summer. Is capable of resprouting following fire and has a persistent soil-stored seed bank.	No - not within known distribution
Hibbertia puberula							High	Endangered	Not Listed	Recent work on this species and its relatives have shown it to be widespread, but never common. It extends from Wollemi National Park south to Morton National Park and the south coast near Nowra. Early records of this species are from the Hawkesbury River area and Frenchs Forest in northern Sydney, South Coogee in eastern Sydney, the Hacking River area in southern Sydney, and the Blue Mountains. It favours low heath on sandy soils or rarely in clay, with or without rocks underneath. Flowering time is October to December, sometimes into January. Occurs on sandy soil often associated with sandstone, or on clay. Habitats are typically dry sclerophyll woodland communities, although heaths are also occupied. One of the recently (2012) described subspecies also favours upland swamps.	Yes

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Hibbertia spanantha	Julian's Hibbertia						High	Critically Endangered	Critically Endangered	Endemic to NSW where it is restricted to four known locations. Grows in forest with canopy species including *Eucalyptus pilularis, E. resinifera, Corymbia gummifera and Angophora costata*. The understorey is open with species of Poaceae, Orchidaceae, Fabaceae and Liliaceae. Flowering in October and November, but with an odd flower throughout the year. The soil is identified as a light clay occuring on a shale sandstone soil transition.	No - suitable habitat not present
Hieraaetus morphnoides	Little Eagle	(Breeding)	Other - Nest trees - live (occassionally dead) large old trees within vegetation)				Moderate	Vulnerable	Not Listed	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.	No - no breeding habitat on site
Hoplocephalus bungaroides	Broad-headed Snake	(Breeding)	Rocky areas - Including escapments, outcrops and pogodas within the Sydney Sandstone geologies				Very High	Endangered	Vulnerable	The Broad-headed Snake is largely confined to Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250 km of Sydney. Nocturnal. Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in crevices or hollows in large trees within 500m of escarpments in summer. Feeds mostly on geckos and small skinks; will also eat frogs and small mammals occasionally. Females produce four to 12 live young from January to March, which is a relatively low level of fecundity.	No - no suitable breeding habitat on site
Hygrocybe anomala var. ianthinomarginata			Other - creeks or drainage lines or within 500 m; Semi-permanent /ephemeral wet areas or within 500 m; Swamps or waterbodies				High	Vulnerable	Not Listed	Type locality, Lane Cove Bushland Park, Lane Cove Local Government Area. Other records from Royal and Blue Mountains NPs. Occurs in gallery warm temperate forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss. Does not produce above ground fruiting bodies	No - not within known locality

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
										(fungus) all year round. Fruiting bodies begin appearing mid May to mid July sometimes to August.	
Hygrocybe aurantipes			Other - creeks or drainage lines or within 500 m; Semi-permanent/ephemeral wet areas or within 500 m; Swamps or waterbodies				High	Vulnerable	Not Listed	Type locality, Lane Cove Bushland Park, Lane Cove Local Government Area. Other records from Blue Mountains National Park (Mt Wilson) and Hazelbrook. Occurs in gallery warm temperate forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss. Does not produce above ground fruiting bodies (fungus) all year round. Fruiting bodies begin appearing mid May to mid July sometimes to August.	No - not within known locality
Hygrocybe austropratensis			Other - creeks or drainage lines or within 500 m; Semi-permanent/ephemeral wet areas or within 500 m; Swamps or waterbodies				High	Endangered	Not Listed	Only know from type locality at Lane Cove Bushland Park, Lane Cove Local Government Area. Occurs in gallery warm temperate forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss. Does not produce above ground fruiting bodies (fungus) all year round. Fruiting bodies begin appearing mid May to mid July sometimes to August.	No - not within known locality
Hygrocybe collucera			Other - creeks or drainage lines or within 500 m; Semi-permanent/ephemeral wet areas or within 500 m; Swamps or waterbodies				High	Endangered	Not Listed	Only know from type locality at Lane Cove Bushland Park, Lane Cove Local Government Area. Occurs in gallery warm temperate forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss. Does not produce above ground fruiting bodies (fungus) all year round. Fruiting bodies begin appearing mid May to mid July sometimes to August.	No - not within known locality

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Hygrocybe griseoramosa			Other - creeks or drainage lines or within 500 m; Semi-permanent/ephemeral wet areas or within 500 m; Swamps or waterbodies				High	Endangered	Not Listed	Only know from type locality at Lane Cove Bushland Park, Lane Cove Local Government Area. Occurs in gallery warm temperate forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss. Does not produce above ground fruiting bodies (fungus) all year round. Fruiting bodies begin appearing mid May to mid July sometimes to August.	No - not within known locality
Hygrocybe lanecovensis			Other - creeks or drainage lines or within 500 m; Semi-permanent/ephemeral wet areas or within 500 m; Swamps or waterbodies				High	Endangered	Not Listed	Occurs in gallery warm temperate forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss. Does not produce above ground fruiting bodies (fungus) all year round. Fruiting bodies begin appearing mid May to mid July sometimes to August. Only know from type locality at Lane Cove Bushland Park, Lane Cove Local Government Area.	No - not within known locality
Hygrocybe reesiae			Other - creeks or drainage lines or within 500 m; Semi-permanent/ephemeral wet areas or within 500 m; Swamps or waterbodies				High	Endangered	Not Listed	Type locality, Lane cove Bushland Park, Lane Cove Local Government Area. Also recorded from Blue Mountains National Park in the Hazelbrook area. Also found in Tasmania. Occurs in gallery warm temperate forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss. Does not produce above ground fruiting bodies (fungus) all year round. Fruiting bodies begin appearing mid May to mid July sometimes to August.	No - not within known locality

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Hygrocybe rubronivea			Other - creeks or drainage lines or within 500 m; Semi-permanent/ephemeral wet areas or within 500 m; Swamps or waterbodies				High	Endangered	Not Listed	Known in a few locations including in Lane Cove Bushland Park and the Blue Mountains in NSW and in areas of south-east Queensland. However little information exists for populations outside Lane Cove Bushland Park. Occurs in gallery warm temperate forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss. Does not produce above ground fruiting bodies (fungus) all year round. Fruiting bodies begin appearing mid May to mid July sometimes to August.	No - not within known locality
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)		Other - Requires dense ground cover in a variety of habitats				High	Endangered	Endangered	The Southern Brown Bandicoot has a patchy distribution. It is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland. Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruiting) fungi. Their searches for food often create distinctive conical holes in the soil. Males have a home range of approximately 5-20 hectares whilst females forage over smaller areas of about 2-3 hectares. Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. Nests may be located under Grass trees Xanthorrhoea spp., blackberry bushes and other shrubs, or in rabbit burrows. The upper surface of the nest may be mixed with earth to waterproof the inside of the nest. Mating occurs any time of the year, usually following heavy rain. Two or three litters of 2-4 young may be produced annually. The gestation period of 11-12 days is the shortest known of any marsupial while young remarkably become independent around 60 days after being born.	Yes

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Kunzea rupestris			Rocky areas - Hawkesbury sandstone rock platforms or within 50m				High	Vulnerable	Vulnerable	Restricted, with most locations in the Maroota - Sackville - Glenorie area and one outlier in Ku-ring-gai Chase National Park, all within the Central Coast botanical subdivision of NSW. Currently known to exist in 20 populations, 6 of which are reserved. Grows in shallow depressions on large flat sandstone rock outcrops. Characteristically found in short to tall shrubland or heathland. Flowering occurs in spring. It has indehiscent fruits which resist soil entrapment and so may disperse many metres per week. Resprouts from the base after fire or mechanical damage. Seedlings have also been observed after fire.	Yes
Lasiopetalum joyceae							Moderate	Vulnerable	Vulnerable	Has a restricted range occurring on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. It is currently known from 34 sites between Berrilee and Duffys Forest. Seventeen of these are reserved. Grows in heath on sandstone.	No - no suitable breeding habitat on site
Lathamus discolor	Swift Parrot	(Breeding)	Other - As per mapped areas				Moderate	Endangered	Critically Endangered	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. Migrates to the Australian south-east mainland between February and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera,* Forest Red Gum *E. tereticornis,* Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Inland Grey Box *E. microcarpa*, Grey Box *E. moluccana*, Blackbutt *E. pilularis*, and Yellow Box *E. melliodora*. Return to some foraging sites on a cyclic basis depending on food availability. Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum *Eucalyptus globulus*.	No - not within key breeding habitat
Leptospermum deanei			Waterbodies or within 100m of freshwater or estuarine streams				High	Vulnerable	Vulnerable	Occurs in Hornsby, Warringah, Ku-ring-gai and Ryde LGAs. Woodland on lower hill slopes or near creeks. Sandy alluvial soil or sand over sandstone. Occurs in Riparian Scrub - e.g. *Tristaniopsis laurina, Baechea myrtifolia*; Woodland - e.g. *Eucalyptus haemstoma*; and Open Forest - e.g. *Angophora costata, Leptospermum trinervium, Banksia ericifolia*. Flowers October-November. Probably killed by fire.	Yes

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
Litoria aurea	Green and Golden Bell Frog		Semi-permanent/ephemeral wet areas; Within 1km of wet areas				High	Endangered	Vulnerable	Formerly distributed from the NSW north coast near Brunswick Heads, southwards along the NSW coast to Victoria where it extends into east Gippsland. Records from west to Bathurst, Tumut and the ACT region. Since 1990 there have been approximately 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. These locations occur over the species' former range, however they are widely separated and isolated. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast (one an island population). There is only one known population on the NSW Southern Tablelands. Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha spp*.) or spikerushes (*Eleocharis spp.).* Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet. Males call while floating in water and females produce a raft of eggs that initially float before settling to the bottom, often amongst vegetation. Tadpoles feed on algae and other plant-matter; adults eat mainly insects, but also other frogs. Preyed upon by various wading birds and snakes.	Yes
Litoria brevipalmata	Green-thighed Frog						Moderate	Vulnerable	Not Listed	Isolated localities along the coast and ranges from just north of Wollongong to south-east Queensland. Green-thighed Frogs occur in a range of habitats from rainforest and moist eucalypt forest to dry eucalypt forest and heath, typically in areas where surface water gathers after rain. It prefers wetter forests in the south of its range, but extends into drier forests in northern NSW and southern Queensland. Breeding occurs following heavy rainfall from spring to autumn, with larger temporary pools and flooded areas preferred. Frogs may aggregate around breeding sites and eggs are laid in loose clumps among waterplants, including water weeds. The larvae are free swimming. The frogs are thought to forage in leaf-litter.	Yes

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Lophoictinia isura	Square-tailed Kite	(Breeding)	Other - Nest Trees				Moderate	Vulnerable	Not Listed	The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage. Appears to occupy large hunting ranges of more than 100km2. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.	No - no suitable breeding habitat on site
Melaleuca biconvexa	Biconvex Paperbark						High	Vulnerable	Vulnerable	Biconvex Paperbark is only found in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Biconvex Paperbark generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. Flowering occurs over just 3-4 weeks in September and October. Resprouts following fire.	Yes
Melaleuca deanei	Deane's Paperbark						High	Vulnerable	Vulnerable	Deane's Paperbark occurs in two distinct areas, in the Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas respectively. There are also more isolated occurrences at Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone. Flowers appear in summer but seed production appears to be small and consequently the species exhibits a limited capacity to regenerate.	No - not within known distribution
Melaleuca groveana	Grove's Paperbark						High	Vulnerable	Not Listed	Widespread, scattered populations in coastal districts north of Yengo National Park to southeast Queensland. Also found as a disjunct population near Torrington on the northern tablelands. Grove's Paperbark grows in heath and shrubland, often in exposed sites, in low coastal hills, escarpment ranges and tablelands on outcropping granite, rhyolite and sandstone on rocky outcrops and cliffs.	Yes

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										It also occurs in dry shrubby open forest and woodlands.	
Micromyrtus blakelyi	Micromyrtus blakelyi		Other - Skeletal soil; Rocky areas, Hawkesbury sandstone rock platforms and outcrops or within 50m				Moderate	Vulnerable	Vulnerable	Restricted to areas near the Hawkesbury River, north of Sydney. Distribution extends from north of Maroota in the north, to Cowan in the south. All known populations occur within the Baulkham Hills and Hornsby local government areas. Typically occurs within heathlands in shallow sandy soil in cracks and depressions of sandstone rock platforms. Flowers in Spring from September to November and produces fruit (an indehiscent nut) October to November. Fire sensitive, with adults killed by fire and recruitment occurring from a soil seed bank. It is not known whether germination occurs in the absence of disturbance.	Yes
Miniopterus australis	Little Bent-winged Bat	(Breeding)	Caves - Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' observation type code 'E nest-roost' with numbers of individuals >500 or from the scientific literature				Very High	Vulnerable	Not Listed	East coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. In NSW the largest maternity colony is in close association with a large maternity colony of Eastern Bentwing-bats (*Miniopterus schreibersii*) and appears to depend on the large colony to provide the high temperatures needed to rear its young. Maternity colonies form in spring and birthing occurs in early summer. Males and juveniles disperse in summer. Only five nursery sites /maternity colonies are known in Australia.	No - no breeding habitat on site

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Miniopterus orianae oceanensis	Large Bent-winged Bat	(Breeding)	Caves - Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' observation type code 'E nest-roost' with numbers of individuals >500 or from the scientific literature				Very High	Vulnerable	Not Listed	Eastern Bentwing-bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. Hunt in forested areas, catching moths and other flying insects above the tree tops.	No - no breeding habitat on site
Myotis macropus	Southern Myotis		Hollow bearing trees - Within 200 m of riparian zone; Other - Bridges, caves or artificial structures within 200 m of riparian zone. Waterbodies - this include rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200m of the site				High	Vulnerable	Not Listed	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December.	Yes
Ninox connivens	Barking Owl	(Breeding)	Hollow bearing trees - Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground				High	Vulnerable	Not Listed	The Barking Owl is found throughout continental Australia except for the central arid regions. Although still common in parts of northern Australia, the species has declined greatly in southern Australia and now occurs in a wide but sparse distribution in NSW. Core populations exist on the western slopes and plains and in some northeast coastal and escarpment forests. Many populations crashed as woodland on fertile soils was cleared over the past century, leaving linear riparian strips of remnant trees as the last inhabitable areas. Surveys in 2001 demonstrated that the Pilliga Forest supported the largest population in southern Australia. The owls sometimes extend their home range into urban areas, hunting birds in garden trees and insects attracted to streetlights. Extensive wildfires in 2019-20 reduced habitat quality further, burnt many old, hollow-bearing trees needed as refuge by prey species and reduced the viability of some regional owl populations. Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able	No - no suitable breeding habitat on site

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
										to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey found on these fertile riparian soils. Roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as Acacia and Casuarina species. During nesting season, the male perches in a nearby tree overlooking the hollow entrance. Preferentially hunts small arboreal mammals such as Squirrel Gliders and Common Ringtail Possums, but when loss of tree hollows decreases these prey populations the owl becomes more reliant on birds, invertebrates and terrestrial mammals such as rodents and rabbits. Can catch bats and moths on the wing, but typically hunts by sallying from a tall perch. Requires very large permanent territories in most habitats due to sparse prey densities. Monogamous pairs hunt over as much as 6000 hectares, with 2000 hectares being more typical in NSW habitats. Two or three eggs are laid in hollows of large, old trees. Living eucalypts are preferred though dead trees are also used. Nest sites are used repeatedly over years by a pair, but they may switch sites if disturbed by predators (e.g. goannas). Nesting occurs during mid-winter and spring, being variable between pairs and among years. As a rule of thumb, laying occurs during August and fledging in November. The female incubates for 5 weeks, roosts outside the hollow when chicks are 4 weeks old, then fledging occurs 2-3 weeks later. Young are dependent on their parents for several months. Territorial pairs respond strongly to recordings of Barking Owl calls from up to 6 km away, though humans rarely hear this response farther than 1.5 km. Because disturbance reduces the pair's foraging time, and can pull the female off her eggs even on cold nights, recordings should not be broadcast unnecessarily nor during the nesting season.	
Ninox strenua	Powerful Owl	(Breeding)	Hollow bearing trees - Living or dead trees with hollow greater than 20cm diameter				High	Vulnerable	Not Listed	The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing. Now at low densities throughout most of its eastern range, rare along the Murray River and former inland populations may never recover. The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented	No - no suitable breeding habitat on site

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
										landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda,* Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species. The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider. There may be marked regional differences in the prey taken by Powerful Owls. For example in southern NSW, Ringtail Possum make up the bulk of prey in the lowland or coastal habitat. At higher elevations, such as the tableland forests, the Greater Glider may constitute almost all of the prey for a pair of Powerful Owls. Flying foxes are important prey in some areas; birds comprise about 10-50% of the diet depending on the availability of preferred mammals. As most prey species require hollows and a shrub layer, these are important habitat components for the owl. Pairs of Powerful Owls demonstrate high fidelity to a large territory, the size of which varies with habitat quality and thus prey densities. In good habitats a mere 400 can support a pair; where hollow trees and prey have been depleted the owls need up to 4000 ha. Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. While the female and young are in the nest hollow the male Powerful Owl roosts nearby (10-200 m) guarding them, often choosing a dense "grove" of trees that provide concealment from other birds that harass him. Powerful Owls are monogamous and mate for life. Nesting occurs from late autumn to mid-winter, but is slightly earlier in north-eastern NSW (late summer - mid autumn). Clutches consist of two dull white eggs and incubation lasts approximately 38 days.	

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Pandion cristatus	Eastern Osprey	(Breeding)	Other - Presence of stick-nests in living and dead trees (>15m) or artificial structures within 100m of a floodplain for nesting)				Moderate	Vulnerable	Not Listed	The Osprey has a global distribution with four subspecies previously recognised throughout its range. However, recent studies have identified that there are two species of Osprey - the Western Osprey (P. halietus) with three susbpecies occurring in Europe, Asia and the Americas and the Eastern Osprey (P. cristatus) occurring between Sulawesi (in Indonesia), Australia and New Caledonia. Eastern Ospreys are found right around the Australian coast line, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia. There are a handful of records from inland areas. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea. . Incubation of 2-3 eggs, usually by the female, is about 40 days. Female remains with young almost until they fly, usually after about nine weeks in the nest.	No - no suitable breeding habitat on site
Perameles nasuta - endangered population	Long-nosed Bandicoot, North Head				South of Addison Road Manly Headland, including Sydney Harbour National Park (north))		High	Endangered Population	Not Listed	Restricted to North Head in the Manly Local Government Area. Essentially a solitary animal that occupies a variety of habitats on North Head. Forages mainly at or after dusk, digging for invertebrates, fungi and tubers. The conical holes it leaves in the soil are often seen at the interface of naturally vegetated and areas of open grass around the Quarantine Station, former Defence Lands and Saint Patrick's Estate. Shelters during the day in a well-concealed nest based on a shallow hole lined with leaves and grass, sometimes under debris, sometimes hidden with soil and with the entrance closed for greater concealment. Mating takes place at night and may occur throughout the year in the Sydney Region, although there is a trough in breeding activity from late autumn (April) to mid-winter (June). Has a very high reproductive capacity. There are 8 teats in the pouch and litter sizes range from one to five but usually two to three. Birth takes place during the daylight hours after a gestation of only 12.5 days. The young are carried in the pouch for 50 to 54 days and are then left in the nest. When the young are about 50 days old the mother may mate again and produce another litter several days after the previous one has been weaned. In good years, females may produce up to 4 litters. Female bandicoots may begin breeding at about four months of age and males at about five months. Has been recorded living up to three years in captivity. Assumed to live for up to two to two and a half years in the wild. Monitoring of the North Head population	No - not within the geographic limitations

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										since 1997 has recorded some individuals living for up to three years.	
Persoonia hirsuta	Hairy Geebung						High	Endangered	Endangered	*Persoonia hirsuta* has a scattered distribution around Sydney. The species is distributed from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. *Persoonia hirsuta* has a large area of occurrence, but occurs in small populations, increasing the species' fragmentation in the landscape. The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. It is usually present as isolated individuals or very small populations. It is probably killed by fire (as other Persoonia species are) but will regenerate from seed.	Yes
Persoonia mollis subsp. maxima							High	Endangered	Endangered	Highly restricted, known from the Hornsby Heights-Mt Colah area north of Sydney in the Sydney Basin Bioregion. Occurs in three populations (described on a catchment basis) located over an approximate north-south range of 5.75 km and east-west distance of 7.5 km. Additional locations may exist outside the current distribution. Occurs in sheltered aspects of deep gullies or on the steep upper hillsides of narrow gullies on Hawkesbury Sandstone. These habitats support relatively moist, tall forest vegetation communities, often with warm temperate rainforest influences. Associated species: Smooth Barked Apple *Angophora costata,* Sydney Peppermint *Eucalyptus piperita*, Red Bloodwood *Corymbia gummifera*, Turpentine *Syncarpia glomulifera*, Coachwood *Ceratopetalum apetalum* and Black Wattle *Callicoma serratifolia*. Flowers late December – March. Flowers are likely to be pollinated predominantly by native bees. Self-pollination is usually unsuccessful. Long-lived, with the oldest individuals approximately 20 years of age. Age structure varies across the populations according to fire history, however, a large proportion of the population is reproductively immature. Reproductive maturity of individuals is unlikely to be reached until approximately 8 years, with peak flowering and fruiting unlikely to be reached until individuals are at least 12–15 years. The *P. mollis* complex have low seed germination rates. Persoonia seeds have a dormancy mechanism which is poorly understood and this species has not been successfully propagated from seed. Fire sensitive and usually killed by fire. Regeneration is from soil stored seed.	Yes

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Petaurus norfolcensis	Squirrel Glider						High	Endangered	Endangered	The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Live in family groups of a single adult male one or more adult females and offspring. Require abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.	Yes
Petaurus norfolcensis - endangered population	Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill				Barrenjoey Peninsula		High	Endangered	Endangered	Occurs in eastern Australia extending from north eastern Queensland through eastern NSW and down through northern and central Victoria. The endangered population is within the Pittwater Local Government Area on the Barrenjoey Peninsula, north of Bushrangers Hill.	No - not within the known geographic limitations
Phascolarctos cinereus	Koala	(Breeding)	Other - Areas identified via survey as important habitat (see comments))				High	Endangered	Endangered	The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In New South Wales, koala populations are found on the central and north coasts, southern highlands, southern and northern tablelands, Blue Mountains, southern coastal forests, with some smaller populations on the plains west of the Great Dividing Range. Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Inactive for most of the day, feeding and moving mostly at night. Spend most of their time in trees, but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size. Generally solitary, but have complex social hierarchies based on a dominant male with a territory overlapping several females and sub-ordinate males on the periphery. Females breed at two years of age and produce one young per year.	No - no areas identified via survey as important breeding habitat

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Phascolarctos cinereus - endangered population	Koala in the Pittwater Local Government Area				Pittwater LGA		High	Endangered	Endangered	Has a fragmented distribution throughout eastern Australia, from north-east Queensland to the Eyre Peninsula in South Australia, extending west of the Great Dividing Range where it mostly occurs along inland rivers. The endangered population occurs within the Pittwater Local Government Area, with most recent records occurring on the Barrenjoey Peninsula. Inhabits eucalypt forests and woodlands. Habitat suitability is influenced by the: size and species of trees present, soil nutrients, climate, rainfall and the size and disturbance history of the habitat patches. The Grey Gum (*Eucalyptus punctata*) is the most important food tree for this species in Pittwater. Other favoured food trees are the Scribbly Gum (*E. haemastoma*), Swamp Mahogany (*E. robusta*) and Snappy Gum (*E. racemosa*). Generally koalas can be expected to feed to a limited extent on all species of Eucalyptus, Corymbia and Angophora that they encounter in Pittwater. Key likely habitats within Pittwater Council are: Swamp Mahogany Forest, ecotone between Spotted Gum Forest & Hawkesbury Sandstone Open-Forest, Northern form of Coastal Sandstone Woodland at Whale Beach, Red Bloodwood - Scribbly Gum Woodland, Bilgola Plateau Forest and the Grey Ironbark - Grey Gum form of the Newport Bangalay Woodland.	Yes
Pommerhelix duralensis	Dural Land Snail		Other - Leaf litter and shed bark or within 50m of litter or bark|Rocky areas Rocks or within 50m of rocks|Fallen/standing dead timber including logs Including logs and bark or within 50m of logs or bark				High	Endangered	Endangered	The species is a shale-influenced-habitat specialist, which occurs in low densities along the western and northwest fringes of the Cumberland IBRA subregion `on shale-sandstone transitional landscapes. The species has a strong affinity for communities in the interface region between shale-derived and sandstone-derived soils, with forested habitats that have good native cover and woody debris. It favours sheltering under rocks or inside curled-up bark. It does not burrow nor climb. The species has also been observed resting in exposed areas, such as on exposed rock or leaf litter, however it will also shelter beneath leaves, rocks and light woody debris.	No - not within known distribution

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Potorous tridactylus	Long-nosed Potoroo		Other - Dense shrub layer or alternatively high canopy cover exceeding 70% (i.e. to capture populations inhabiting wet sclerophyll and rainforest))				High	Endangered	Endangered	The long-nosed potoroo is found on the south-eastern coast of Australia, from Queensland to eastern Victoria and Tasmania, including some of the Bass Strait islands. There are geographically isolated populations in western Victoria. In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range, with an annual rainfall exceeding 760 mm. Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. The fruit-bodies of hypogeous (underground-fruiting) fungi are a large component of the diet of the Long-nosed Potoroo. They also eat roots, tubers, insects and their larvae and other soft-bodied animals in the soil. Often digs small holes in the ground in a similar way to bandicoots. Mainly nocturnal, hiding by day in dense vegetation - however, during the winter months animals may forage during daylight hours. Individuals are mainly solitary, non-territorial and have home range sizes ranging between 2-5 ha. Breeding peaks typically occur in late winter to early summer and a single young is born per litter. Adults are capable of two reproductive bouts per annum.	Yes
Prostanthera junonis	Somersby Mintbush						High	Endangered	Endangered	Has a north-south range of approximately 19 km on the Somersby Plateau in the Gosford and Wyong local government areas. The species is restricted to the Somersby Plateau. It occurs on both the Somersby and Sydney Town soil landscapes on gently undulating country over weathered Hawkesbury sandstone within open forest/low woodland/open scrub. It occurs in both disturbed and undisturbed sites. The dominant flowering period for this species is October to mid-December depending on weather/site conditions. The plant is very difficult to identify outside of this time. While mature plants appear to be incapable of resprouting after fire, it may trigger seed germination.	Not - not within known distribution

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Pseudophryne australis	Red-crowned Toadlet						Moderate	Vulnerable	Not Listed	The Red-crowned Toadlet has a restricted distribution. It is confined to the Sydney Basin, from Pokolbin in the north, the Nowra area to the south, and west to Mt Victoria in the Blue Mountains. Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters. Red-crowned Toadlets have not been recorded breeding in waters that are even mildly polluted or with a pH outside the range 5.5 to 6.5. Eggs are laid in moist leaf litter, from where they are washed by heavy rain; a large proportion of the development of the tadpoles takes place in the egg. Disperses outside the breeding period, when they are found under rocks and logs on sandstone ridges and forage amongst leaf-litter. Red-crowned Toadlets are quite a localised species that appear to be largely restricted to the immediate vicinity of suitable breeding habitat. Red-crowned Toadlets are usually found as small colonies scattered along ridges coinciding with the positions of suitable refuges near breeding sites. Due to this tendency for discrete populations to concentrate at particular sites, a relatively small localised disturbance may have a significant impact on a local population if it occurs on a favoured breeding or refuge site.	Yes
Pteropus poliocephalus	Grey-headed Flying-fox	(Breeding)	Other - Breeding camps				High	Vulnerable	Vulnerable	Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young. Annual mating commences in January and conception occurs in April or May; a single young is born in October or November. Site fidelity to camps is high; some camps have been used for over a century. Can travel up to 50 km from the camp to forage;	No - no breeding camps on site

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
										commuting distances are more often <20 km. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops.	
Rhodamnia rubescens	Scrub Turpentine						High	Vulnerable	Vulnerable	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of *R. rubescens* typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. This species is characterised as highly to extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.	Yes
Rhodomyrtus psidioides	Native Guava						High	Vulnerable	Vulnerable	Occurs from Broken Bay, approximately 90 km north of Sydney, New South Wales, to Maryborough in Queensland. Populations are typically restricted to coastal and sub-coastal areas of low elevation however the species does occur up to c. 120 km inland in the Hunter and Clarence River catchments and along the Border Ranges in NSW. Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines. This species is characterised being extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.	Yes
Syzygium paniculatum	Magenta Lilly Pilly						High	Vulnerable	Vulnerable	The Magenta Lilly Pilly is found only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	Yes
Tetratheca glandulosa							High	Vulnerable	Vulnerable	Restricted to the following Local Government Areas: Baulkham Hills, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Pittwater, Ryde, Warringah, and Wyong. There are approximately 150 populations of this plant ranging from Sampons Pass (Yengo NP) in the north to West Pymble (Lane Cove NP) in the south. The eastern limit is at Ingleside (Pittwater LGA) and the western limit is at East Kurrajong (Wollemi NP). There are historical collections of this species south to Manly, Willoughby and Mosman, however these populations are now extinct. The current north-south range is approximately 65km. Associated with shale-sandstone transition habitat	Yes

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
										where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge. Topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey/sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops. Vegetation structure varies from heaths and scrub to woodlands/open woodlands, and open forest. Vegetation communities correspond broadly to Benson & Howell's Sydney Sandstone Ridgetop Woodland (Map Unit 10ar). Common woodland tree species include: *Corymbia gummifera, C. eximia, Eucalyptus haemastoma, E. punctata, E. racemosa,* and/or *E. sparsifolia,* with an understorey dominated by species from the families Proteaceae, Fabaceae, and Epacridaceae. Flowers July-November however residual flowers may persist until late December. Flowering influenced by seasonal weather conditions and/or the microclimate effects (eg. exposure) of each particular site. The age of individual plants is difficult to determine and the life span of the plant is unknown. Life expectancy is approximately six to ten years, however, based on field investigations which indicate that the plant resprouts from a woody root following fire, this may be an underestimate. The breeding system for this species is poorly known. In comparison to a similar species, *Tetratheca juncea*, it is expected that this plant is unable to self-pollinate due to the physical characteristics of the plant's reproductive parts, and that a pollen vector (possibly a species of native bee) is required for successful pollination. Seedbank dynamics (fecundity, viability, dispersal, longevity, dormancy etc) for this species are poorly known. Juveniles appear to be uncommon within any given population, with the majority of plants usually consisting of resprouting adults. Resprouts from a woody root following fire, however the role fire plays in seed germination and persistence of the species is unclear. In a similar species, *Tetratheca hirsuta,* it has been shown that exposure of the seed to cold smoke and/or smoked water derived from burnt native vegetation promoted germination. Field observations following fire indicate that the plant is likely to be clonal. Tetratheca species are reported to be readily propagated by cuttings, however the long term survival of these plants is poorly known.	

Scientific Name	Common Name	Habitat Type	Habitat Constraints	Habitat Degraded	Geographic Limitations	Species is vagrant	Sensitivity to gain class	BC Status	EPBC Status	Habitat Description	Confirmed Candidate Species
Tyto novaehollandiae	Masked Owl	(Breeding)	Hollow bearing trees - Living or dead trees with hollows greater than 20cm diameter				High	Vulnerable	Vulnerable	Extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its distribution. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	No - no suitable breeding habitat present on site
Wahlenbergia multicaulis - endangered population	Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield				Local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield		High	Vulnerable	Vulnerable	There are 13 known sites, two of which are in northern Sydney (Thornleigh and Mt Ku-Ring-Gai) with the remainder in western Sydney (Rookwood, Chullora, Bass Hill, Bankstown, Georges Hall, Campsie, South Granville and Greenacre). There are likely to be more sites than those listed here. In Western Sydney most sites are closely aligned with the Villawood Soil Series, which is a poorly drained, yellow podsolic extensively permeated with fine, concretionary ironstone (laterite). However, the sites in Hornsby LGA are on the 'Hawkesbury' soil landscape. Found in disturbed sites and grows in a variety of habitats including forest, woodland, scrub, grassland and the edges of watercourses and wetlands. Typically occurs in damp, disturbed sites (with natural or human disturbance of various forms), typically amongst other herbs rather than in the open. In Hornsby LGA it occurs in or adjacent to sandstone gully forest. In Western Sydney it is found in remnants of Cooks River/ Castlereagh Ironbark Forest. Usually flowers throughout the year, although a late spring/early summer peak has been observed at some locations Creek. Usually a perennial, particularly in protected situations which provide greater protection during the summer months. However, in more exposed situations, the species may be more annual in its life cycle due to exposure and/or lack of soil moisture. Responds favourably to disturbance of soil in some situations with high exposure to sunlight. However, too much disturbance can eventually exhaust the seedbank and lead to local extinctions.	No - not within the listed LGAs

4.3 Targeted Threatened Species Surveys

A targeted survey was undertaken for the candidate species credit species. This was conducted under Total Earth Care's Scientific Licence and Animal Research Authority Licence. Detailed descriptions of the survey methods used is provided in the following sections.

4.3.1 Threatened Flora Survey

Targeted survey for the candidate species, which were identified as requiring survey (Table 12), was undertaken over the development site.

Threatened flora likely to occur within the locality were surveyed using the NSW Guide to Surveying Threatened Plants (OEH 2016b), as well as the most recent scientific research for that particular species. Targeted searches for threatened plant species according to the "random meander" method (Cropper 1993). If a potential threatened species was found and could not be identified using diagnostic details, a specimen would be collected and sent to the Royal Botanic Gardens in accordance with their protocols. The location of all threatened flora species identified on site were marked with a GPS. Population size and extent were also collected.

Native and exotic plant species were identified according to Field Guide to the Native Plants of Sydney (Robinson, 2003), Weeds of the south-east: an identification guide for Australia (Richardson et al. 2016) and PlantNET (PlantNET 2019) with reference to recent taxonomic changes.

The survey included identification of Key Threatening Processes as listed under the *BC Act 2016* or *EPBC Act 1999* that are in operation that are affecting, or have potential to affect the flora of the site. Any "weed infestations" found during the survey were recorded using a hand held GPS. Weed infestations are defined as:

- Areas where weeds make up > 80% percentage foliage cover;
- Weeds of National Significance (WONs); and
- Weeds are weeds listed under the Biosecurity Act 2015.

4.3.2 Threatened Fauna Survey

The fauna survey was designed based on results from the desktop study and local knowledge of the area. All threatened species (and their habitat) known to occur within the locality were targeted during the fauna survey. Prior to planning the survey, each threatened species was researched to ensure the most up-to-date and effective survey method was used. The locations of threatened species, if recorded, were taken using a hand-held GPS unit and included in accompanying maps and data tables.

The survey methods were in accordance with the *Working Draft Threatened Biodiversity Survey and Assessment Guidelines* (DECC 2004). See Table 13 for methods used for each fauna taxa group at the site.

In general the fauna survey included:

- Identifying fauna habitats, assessing their condition and assessing their value to threatened fauna species.
- Incidental observations of animal activity and searches for indirect evidence of fauna (such as scats, nests, burrows, hollows, tracks, scratches and diggings).
- Survey for avifauna (dawn chorus) and amphibians involving visual detection and aural recognition of bird and frog calls, as well as call playback for targeted threatened species.
- Spotlighting nocturnal searches.
- Feral fauna surveyed using a variety of survey techniques including spotlighting and indirect evidence.
- As well as the requirement to record all hollow-bearing trees within BAM plots, hollow-bearing trees were searched for during other survey activities. Their location was recorded using a hand-held GPS and any notable characteristics recorded. Any that were deemed to be potential threatened fauna breeding habitat were mapped.
- Identification of Key Threatening Processes as listed under the BC Act 2016 and the EPBC Act 1999 that are in operation that are affecting, or have potential to affect the fauna of the site.

In consideration of the survey requirements of the threatened candidate fauna species, the following methods were utilised:

Table 13. Threatened Fauna Survey Methods (DECC 2004)

Taxa Group	Time of day	Survey Methods	Recommended duration (per stratification unit)	Time of year
Amphibian	Diurnal	Systematic day habitat search	1 hour	Varies according to the seasonal peak of activity of target species
Avifauna	Diurnal	Area search	<1ha (200m x 500m) 20-minute search is the most common method (Loyn 1986)	All year
	Nocturnal	Day habitat search	Search habitat for pellets, and likely hollows.	
		Spotlighting	By foot or from a vehicle driven in first gear.	
Avifauna (migratory)	Diurnal	Area search	<1ha (200m x 500m) 20-minute search is the most common method (Loyn 1986)	During migratory season
Mammals (excluding microbats)	Diurnal	Active search	30 minutes active search for tree hollows, nests, scats, tracks and scratches	All year
		Collection of predator scats	Opportunistic collection of predator scats for hair analysis	
		Track search	1km of track search with emphasis on where substrate is soft	
	Nocturnal	Spotlighting on foot	2 x 1 hour and 1km up to 200 hectares of stratification unit, walking at approximately 1km per hour	
		Remote camera trap	4 x camera traps baited for a minimum of 5 nights.	
Mammals (Bats)	Diurnal	Day habitat search	Search for bat excreta at or near potential habitats	All year
	Nocturnal	Spotlighting and transect walking	For targeted survey near likely food resources: 2 x 1 hour spotlighting on two separate nights	
		Ultrasonic call recording	Two sound activated recording devices utilised for the entire night (a minimum of four hours), starting at dusk for two nights	

4.3.3 Targeted Survey Effort

The targeted surveys were conducted by four (4) of Total Earth Care's Ecologists over fifty-four (54) person-hours between February, March and April 2020. The targeted surveys also included data recorded from the placement of two (2) ultrasonic bat recording devices (Anabat) over five (5) nights in April 2020 and the placement of four (4) camera traps over eighteen (18) days and nights in March and April 2020.

Table 14. Targeted Survey Effort

Survey Date	Effort	Weather	Survey Methods
19/02/2020	Two (2) Ecologists for 3 hours each 7:45am – 10:15pm	Light winds, storm the previous night, 22°C	*Fauna survey* – Diurnal, including: - *Habitat Assessment* – Potential habitats for identified threatened species. - *Diurnal mammals* – Active search for tree hollows, nests, scats, tracks and scratches. - *Amphibians* - Frog aural detection, and habitat suitability search. - *Bird Species* – Direct observation during early morning; recording of bird calls; and call-back. Search considered potential roosting and nesting habitat.
19/03/2020	Two (2) Ecologists for 8.5 hours each 7:00am – 4:00pm	Clear and sunny, 18°C-30°C	*Floristic survey* – 'Random meander' & target search for threatened species across study area. Due to the small size of the subject area, a full search was conducted for each of the candidate threatened species. *Fauna survey* – Diurnal, including: - *Habitat Assessment* – Potential habitats for identified threatened species. - *Diurnal mammals* – Active search for tree hollows, nests, scats, tracks and scratches. - *Amphibians* - Frog aural detection, and habitat suitability search. - *Bird Species* – Direct observation during early morning and afternoon; recording of bird calls; and call-back. Search considered potential roosting and nesting habitat.
26/03/20	Two (2) Ecologists for 4 hours each 5:30pm – 9:30pm	Overcast, 18mm rain (BOM 2020b)	*Fauna survey* – Nocturnal, including: - *Habitat Assessment* – Potential habitats for identified threatened species. - *Bird Species* – Direct observation during afternoon and evening; recording of bird calls; and call-back. Search considered potential roosting and nesting habitat. - *Nocturnal mammals* – Active search for tree hollows, nests, scats, tracks and scratches. Nocturnal spotlighting and call playback. See Map 5 for call playback locations. - *Amphibians* - Frog aural detection (if any), and habitat suitability search.
27/03/2020	Two (2) Ecologists for 6 hours each	Sunny, 20°C- 24°C	*Floristic survey* – 'Random meander' & target search for threatened species across study area. Due to the small size of the subject area, a full search was conducted for each of the candidate threatened species.

Survey Date	Effort	Weather	Survey Methods
	7:00am – 1:00pm		*Fauna survey* – Diurnal, including: - *Diurnal mammals* – Active search for tree hollows, nests, scats, tracks and scratches. - *Bird Species* – Direct observation during early morning and afternoon; recording of bird calls; and call-back. Search considered potential roosting and nesting habitat.
29/03/2020	Two (2) ecologists for 3 hours each 6:30pm – 9:30pm	Overcast, 13.4mm rain during the day (BOM 2020b), 19°C	*Fauna survey* – Nocturnal, including: - *Bird Species* – Direct observation during afternoon and evening; recording of bird calls; and call-back. Search considered potential roosting and nesting habitat. - *Nocturnal mammals* – Active search for tree hollows, nests, scats, tracks and scratches. Nocturnal spotlighting and call playback. See Map 5 for call playback locations. - *Amphibians* - Frog aural detection (if any), and habitat suitability search.
15/04/2020	Two (2) ecologists for 2.5 hours each 6:00am – 8:30am	Clear, 16°C	*Fauna survey* – Diurnal, including: - *Diurnal mammals* – Active search for tree hollows, nests, scats, tracks and scratches. - *Bird Species* – Direct observation during early morning and afternoon; recording of bird calls; and call-back. Search considered potential roosting and nesting habitat.

4.3.4 Targeted Survey Limitations

The flora and fauna field survey was based on the recommendations of Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities, Working Draft (DECC 2004).

As stated by the DECC (2004), 'The absence of a species from survey data does not necessarily mean it does not inhabit the survey area. It may simply mean that the species was not detected at that time with the survey method adopted and the prevailing seasonal or climatic conditions.' As such, the relative brevity of the survey and its timing mean that the full spectrum of fauna species and ecological processes likely to occur on the site cannot be fully quantified or described in this report. These limitations have been partly addressed by identifying potential habitats for fauna species and assessing the potential for these species to occur on the site based on previous records, the type and condition of habitats present, the land use throughout the subject site, surrounds and the landscape context.

NSW has been experiencing drought conditions since approximately mid-2017 (DPI 2020) with lower than average rainfall across Greater Sydney in 2019 (BOM 2020). Rainfall had occurred just prior to the vegetation surveys. Vegetation communities within the Sydney Basin typically receive upwards of 900mm of annual rainfall (OEH 2016b) and with the current drought, species which may normally be present, may be dormant in the seedbank. As a result species which may be present, may not have been detected at the time of the survey. Similarly, species which may be present at certain times of the year, such as orchids, may not have been present during the February to March surveys.

When reviewing maps please note that the hand-held GPS equipment used is only accurate to 3 metres.

4.4 Targeted Survey Results

4.4.1 Flora Results

A total of one hundred and twenty-three (123) plant species were recorded during the flora survey. The survey identified ninety-three (93) occurring native species, and thirty (30) introduced species. See Appendix E for the full flora inventory.

Thirteen (13) protected species under the BC Act 2016 were identified on site - Hairpin Banksia (*Banksia spinulosa*), Sydney Boronia (*Boronia ledifolia*), *Boronia pinnata,* Thick Twist Rush (*Caustis pentandra*), Rough Treefern (*Cyathea australis*), Green Midge Orchid (*Genoplesium pumilum*), Tick Bush (*Kunzea ambigua*), *Kunzea capitata,* Crinkle Bush (*Lomatia silaifolia*), Broad-leaved Geebung (*Persoonia levis*), Conesticks (*Petrophile pulchella*), *Xanthorrhoea minor* and *Xanthorrhoea spp.* Of the surveyed candidate threatened species (Table 15), none were identified on site, however some cryptic species including Leafless Tongue Orchid (*Cryptostylis hunteriana*), *Hibbertia puberula* and were not surveyed within the flowering season therefore presence or absence cannot be confirmed.

Table 15. Flora Species Credit Species Survey Results

Scientific Name	Common Name	Targeted Survey Guidelines Met	Species Detected	Veg Zone & Value	Biodiversity Risk	Biodiversity Risk Rating
Acacia bynoeana	Bynoe's Wattle	Yes	No		High	2
Acacia terminalis subsp. terminalis	Sunshine Wattle	Survey was conducted outside of listed survey time (May to July), however no Acacia terminalis was located on site - species is obvious	No		High	2
Allocasuarina portuensis	Nielsen Park She-oak	Yes	No		Very High	3
Callistemon linearifolius	Netted Bottle Brush	Survey was conducted outside of listed survey time (October to January). Although flower is necessary to confirm ID, no similar species occur on site and species is obvious	No		Moderate	1.5

Scientific Name	Common Name	Targeted Survey Guidelines Met	Species Detected	Veg Zone & Value	Biodiversity Risk	Biodiversity Risk Rating
Cryptostylis hunteriana	Leafless Tongue Orchid	Survey was conducted outside of listed survey time (November to January) therefore presence must be assumed	Assumed Present	1824 Poor 0.29 ha	Moderate	1.5
				1824 Good 0.34 ha		
				1783 Good 0.31 ha		
				1250 Good 0.56 ha		
				1250 Moderate 0.16 ha		
Darwinia biflora		Yes	No		High	2
Darwinia glaucophylla		Yes	No		Moderate	1.5
Darwinia peduncularis		Yes	No		Very High	3
Eucalyptus camfieldii	Camfield's Stringybark	Yes	No		High	2
Genoplesium baueri	Bauer's Midge Orchid	Yes	No		Very High	3
Grammitis stenophylla	Narrow-leaf Finger Fern	Yes	No		High	2
Haloragoden dron lucasii		Yes	No		Very High	3
Hibbertia puberula		Survey was conducted outside of listed survey time (October to December), therefore presence must be assumed.	Assumed Present	1824 poor 0.29 ha	High	2
				1824 good 0.34 ha		
				1783 good 0.31 ha		
				1250 good 0.56 ha		
				1250 moderate 0.16 ha		
Kunzea rupestris		Yes	No		High	2

Scientific Name	Common Name	Targeted Survey Guidelines Met	Species Detected	Veg Zone & Value	Biodiversity Risk	Biodiversity Risk Rating
Leptospermum deanei		Survey was conducted outside of listed survey time (October to November), however species is obvious and no similar species occur on site.	No		High	2
Melaleuca biconvexa	Biconvex Paperbark	Yes	No		High	2
Melaleuca groveana	Grove's Paperbark	Yes	No		High	2
Micromyrtus blakelyi		Yes	No		Moderate	1.5
Persoonia hirsuta	Hairy Geebung	Yes	No		Very High	3
Persoonia mollis subsp. maxima		Yes	No		High	2
Rhodamnia rubescens	Scrub Turpentine	Yes	No		Very High	3
Rhodomyrtus psidioides	Native Guava	Yes	No		Very High	4
Syzygium paniculatum	Magenta Lilly Pilly	Yes	No		High	2
Tetratheca glandulosa		Survey was conducted outside of listed survey time (August to November), and flowering is climatically influenced, therefore presence must be assumed.	Assumed Present		High	2

4.4.1.1 Weed Management under the Biosecurity Act 2015

The NSW *Biosecurity Act 2015*, repealed the NSW *Noxious Weeds Act 1993* on the 1st of July 2017.

The purpose of the NSW *Biosecurity Act 2015* is to provide framework for risk-based prevention, elimination, and minimisation of biosecurity risks. These include pests, diseases, contaminants, non-indigenous animals, bees, weeds and other biosecurity matter. One of the main objectives of the *Biosecurity Act 2015* is to promote biosecurity issues as a shared responsibility between government, industry, and communities, i.e. private and public land managers have the same obligations under the Act. Local Council is the control authority who enforces this Act. A State Weeds Committee has been established, as well as eleven (11) Regional Weeds Committees who will provide guidance and facilitate community and stake holder input into weed management.

Under the *Biosecurity Act 2015*, the definition of weed is a plant that is a pest, and the definition of a pest is a plant or animal (other than a human) that has an adverse effect on, or is suspected of having an adverse effect on, the environment, the economy or the community.

Schedule 1 describes the special provisions relating to weeds. Under this Schedule, land occupiers have a duty to:

- control weeds on roads which bound their occupied land;
- control aquatic weeds along a watercourse, river, or inland water which bound their occupied land; and
- control weeds on land extended from their occupied land if that land is an irrigation area forming any part of a public road, public reserve or public channel, or watercourse, river or inland water.

Regional Strategic Weed Management Plans have been developed which describe the land occupier's expectations for managing weeds and form the basis for an enforceable general biosecurity duty.

Of the thirty-two (32) introduced species, three (3) species, Asparagus Fern (*Asparagus aethiopicus*), Bridal Creeper (*Asparagus asparagoides*) and Lantana (*Lantana camara*) are listed as Weeds of National Significance (WONS). Four (4) of the weed species identified; Bridal Creeper (*Asparagus asparagoides*), Lantana (*Lantana camara*) and Blackberry (*Rubus fruticosus agg.*), are listed as Priority Weeds within Greater Sydney Regional Strategic Weed Management Plan 2017-2022 (LLS 2019). The land occupier's obligations under the Biosecurity Act are described in Appendix F. All weed species which require management under the NSW *Biosecurity Act 2015* are listed in Appendix F along with category of management and recommended treatment methods.

4.4.2 Fauna Results

A total of fifty-four (54) vertebrate fauna species were recorded during the current field survey of which thirty-one (31) were native birds, six (6) were native mammals, ten (10) were microchiropteran bat (microbat) species, three (3) were amphibians, one (1) was a reptile and five (5) were exotic. Of the identified species, six (6) are listed as Vulnerable under the BC Act and two (2) of these are listed as vulnerable under the EPBC Act. Two (2) additional threatened species were identified in a 2018 survey by TEC. Threatened fauna species identified from both surveys are:

- Eastern Pygmy Possum (*Cercartetus nanus*) Vulnerable under the BC Act,
- Large-eared Pied Bat (*Chalinolobus dwyeri*) Vulnerable under the BC Act and EPBC Act,
- Square-tailed Kite (*Lophoictinia isura*) Vulnerable under the BC Act,
- Powerful Owl (*Ninox strenua*) Vulnerable under the BC Act,
- Grey-headed Flying-fox (*Pteropus poliocephalus*) Vulnerable under the BC Act and EPBC Act,
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*) Vulnerable under the BC Act,
- Red-crowned Toadlet (*Pseudophryne australis*), Vulnerable under the BC Act, and
- Little Bent-winged Bat (*Miniopterus australis*) Vulnerable under the BC Act.

The majority of confirmed fauna species recorded on the subject site are generally typical of urban areas, urban fringes and adjoining natural areas within the Sydney Basin Bioregion and are widespread in distribution and common to abundant within their ranges. Many of these species are Australian species who are highly successful in outcompeting less common natives.

4.4.2.1 Birds

A Square-tailed Kite (*Lophoictinia isura*), Vulnerable under the BC Act, was observed during the previous 2018 surveys. Foraging habitat for this species is predicted by the BAM calculator (Table 11). A Powerful Owl (*Ninox strenua*), Vulnerable under the BC Act was also heard calling and observed on site during a nocturnal survey on 26th March 2020. Suitable breeding habitat for this species is not present on site and so the species is not a species credit species (Table 12), however foraging habitat is predicted by the BAM calculator (Table 11). A number of nectarivorous bird species were observed foraging and roosting on site. Honeyeaters including the White-cheeked Honeyeater (*Phylidonyris niger*) and Eastern Spinebill (*Acanthorhynchus tenuirostris*) were abundant on site. Territorial and dominant native species found onsite include Rainbow Lorikeets (*Trichoglossus haematodus*) and Noisy Miners (*Manorina melanocephala*).

4.4.2.2 Mammals

The Common Brushtail Possum (*Trichosurus vulpecula*), Common Ringtail Possum *(Pseudocheirus peregrinus*), Sugar Glider (*Petaurus breviceps*) and Long-nosed Bandicoot (*Perameles nasuta*) were observed on site, as well as pest species, Black Rat (*Rattus rattus*) and Rabbit (*Oryctolagus cuniculus*), which are prey species for predatory birds. The Grey-headed Flying-fox (*Pteropus poliocephalus*), which is listed as Vulnerable under the BC Act and EPBC Act was observed foraging on site on multiple survey nights. This species is a dual credit species with foraging habitat being predicted as an Ecosystem Credit Species (Table 11) and breeding habitat being predicted as a Species Credit Species by the BAM calculator (Table 12). A Flying-fox camp is not present on site and so the Grey-headed Flying-fox (*Pteropus poliocephalus*) was excluded as a Species Credit Species (Table 12). Previous surveys in 2018 were found to have a likely sighting of an Eastern Pygmy Possum (*Cercartetus nanus*), vulnerable under the BC Act. This was observed on a motion camera set-up approximately 30m west of the subject site in the neighbouring Sydney Water Easement (See Figure 16 below). This species is a species credit species predicted by the BAM calculator (Table 12).

Figure 16. Image of Eastern Pygmy Possum entering a tree hollow

4.4.2.3 Amphibians

Three (3) amphibians were heard calling on site after rain. Calls were confirmed to belong to Common Eastern Froglet (*Crinia signifera*), Striped Marsh Frog (*Limnodynastes peronii*) and the Red-crowned Toadlet (*Pseudophryne australis*), Vulnerable under the BC Act. The Red-crowned Toadlet was heard calling along the man-made drainage lines, roadside table drain along the mown grass area, and within ephemeral pools created by waterflow down the pathway in the south and west of the site. The Red-crowned Toadlet is candidate species in the BAM (Table 12) and is known to inhabit periodically wet drainage lines and ephemeral pools in the vicinity. Likely nesting sites were not noted on the subject site however both vegetation communities subject to clearing were considered foraging habitat for this species.

4.4.2.4 Microchiropteran bats

Results from the Microbat Call Identification Report revealed one hundred and seventy-eight (178) positively identified microbat calls from seven (7) species and sixty-six (66) calls potentially belonging to three (3) other species. Of the ten (10) microbat species, three (3) are listed as vulnerable under the BC Act and one (1) is listed as Vulnerable under the EPBC Act. Of the confirmed microbat species, the Large-eared Pied Bat (*Chalinolobus dwyeri*), Vulnerable under the BC Act and EPBC Act, is listed as a candidate species under the BAM (Table 12), the Large Bent-winged Bat (*Miniopterus orianae oceanensis*), Vulnerable under the BC Act, and Little Bent-winged Bat (*Miniopterus australis*), Vulnerable under the BC Act, are listed as predicted species under the BAM (Table 11), and are also listed as candidate species, however no breeding habitat occurs on site. Suitable foraging habitat for these microbat species includes all vegetation zones. See Map 8 for the threatened species polygons.

Table 16. Fauna Species Credit Species Survey Results

Scientific Name	Common Name	Targeted Survey Guidelines Met	Species Detected	Veg Zone & Value	Biodiversity Risk	Biodiversity Risk Rating
Cercartetus nanus	Eastern Pygmy-possum	Yes	Assumed Present	1824 poor 0.29 ha	High	2
				1824 good 0.34 ha		
				1783 good 0.31 ha		
				1250 good 0.56 ha		
				1250 moderate 0.16 ha		
Chalinolobus dwyeri	Large-eared Pied Bat	Yes - Survey was conducted outside of listed survey time (Novermber to January), however species was still detected on site	Yes	1824 poor 0.29 ha	Very High	3
				1824 good 0.34 ha		
				1783 good 0.31 ha		
				1250 good 0.56 ha		
				1250 moderate 0.16 ha		
				1231 (planted) poor 0.17 ha		
				661 (planted poor) 0.19 ha		
Heleioporus australiacus	Giant Burrowing Frog	Yes	No		Moderate	1.5
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	Yes	No		High	2
Litoria aurea	Green and Golden Bell Frog	Yes	No		High	2

Scientific Name	Common Name	Targeted Survey Guidelines Met	Species Detected	Veg Zone & Value	Biodiversity Risk	Biodiversity Risk Rating
Litoria brevipalmata	Green-thighed Frog	Yes	No		Moderate	1.5
Myotis macropus	Southern Myotis	Yes	No		High	2
Petaurus norfolcensis	Squirrel Glider	Yes	No		High	2
Phascolarctos cinereus - endangered population	Koala in the Pittwater Local Government Area	Yes	No		High	2
Potorous tridactylus	Long-nosed Potoroo	Yes	No		High	2
Pseudophryne australis	Red-crowned Toadlet	Yes	Yes	1824 good 0.0129 ha	Moderate	1.5
				1783 good 0.0141 ha		
				1250 good 0.103 ha		
				661 (planted) poor 0.0534 ha		
				1250 moderate 0.027 ha		

4.4.2.5 Threatened Fauna Species Habitat Evaluation

The site consists of remnant bushland in the west and south, planted native and exotic vegetation and mown lawns in the centre and has been partially developed by the past lessee, with and existing Aged Care Facility located on the east of the site. The northern boundary adjoins a Sydney Water reticulation pipe and bushland easement whilst the western and southern boundary is contiguous with the Manly Warringah War Memorial Park, a 375ha passive and active recreational bushland park. A sealed road has been built on cut and filled soil through the centre of the site. Three (3) drainage lines have been excavated into solid rock which create ephemeral creeks of which one (1) leads into beginning of Curl Curl Creek. Habitat features which are present within the site or in close proximity are summarised in Table 17 below.

Table 17. Fauna Habitat Types and Resources of the Subject Site

Habitat	Presence	Habitat Value for Threatened Species
Cleared areas	Lawns and gardens on eastern half of the site	Potential foraging sites for ecological generalists and predators such as

Habitat	Presence	Habitat Value for Threatened Species
		Powerful Owls. Unlikely to support breeding habitat for threatened species.
	Access roads and pathways	Foraging and flyways for threatened or protected microchiropteran bat species.
Tree Canopy	Continuous and broken canopy of native and exotic trees	Foraging, nesting, roosting and sheltering for common protected small, medium and large birds, reptiles and common arboreal mammals. Large stags and emergent trees not present for raptor nesting sites in bushland areas. No large stick nests were observed on site, however one old small birds nest was located.
Ground Cover	Understorey of native and exotic small trees and shrubs	Foraging, nesting, roosting and sheltering for common protected small and medium birds, reptiles and common arboreal mammals. Three (3) Ringtail Possum dreys were observed on site, of which are key food species for the Powerful Owl.
	Limited low dense shrub layer	Limited shelter and breeding sites for Brown bandicoots.
Leaf Litter	Present in much of remnant bushland	Shelter for Red-crowned Toadlet and other amphibians and reptiles.
Hollows	Limited small hollows on site. Large hollows not observed on site.	Nesting sites for arboreal mammals such as gliders and Pygmy Possums, and small birds. No nesting hollows for larger predatory birds such as the Powerful Owl and Barking Owl, or larger threatened birds such as the Gang-gang Cockatoo and Glossy Black-Cockatoo.
Nectar Sources	Good density of nectar bearing species including Eucalypt species and in heath areas such as banksia and callistemon.	Food source for birds and mammals including gliders, Regent Honey Eaters, Little Lorikeets, Flying-foxes and Pygmy Possums and Grey-headed Flying-fox.
Casuarinas	*Allocasuarina dystyla* common on site	Food source for Glossy Black Cockatoos
Aquatic Habitat	Walking tracks and three (3) drainage lines provides an ephemeral aquatic habitat after rain.	Potential habitat for threatened Red-Crowned Toadlets and other amphibians.
Termite Mounds	Not found onsite	Lack of breeding sites for Rosenberg's goanna.
Rocks and Crevices	Occasional crevices in sandstone and low laying rocky outcrops.	Reptile shelter habitat present but no suitable habitat for the Broad-headed Snake. Rocky outcrops on site contain

Habitat	Presence	Habitat Value for Threatened Species
		minimal crevices, are south facing and highly sheltered by canopy species. No larger overhangs or caves for microbat roosting. One small overhang west of the site boundary is present, however was observed to become an ephemeral waterfall after rain therefore not suitable for microbat roosting.
Human Made Structure	Three (3) man-made nest boxes occur on site**.**	Nesting sites for arboreal mammals such as gliders and Pygmy Possums, and birds. One (1) of the larger nest boxes was observed to be in use or recently used due to the presence of nesting material. Most likely being used by a Brushtail Possum or Ringtail Possum. See Figure 17. The other two (2) nest boxes displayed no evidence of recent use.
	Buildings and shed on site.	Man-made structures such as sheds and buildings may provide roosting habitat for microbat species and some bird species. No evidence of the buildings being used for roosting was observed on site.

Figure 17. Recently used nest box.

Title: **Threatened Species Polygon**

Map No: 8
Site: William Charlton Village
Client: Allambie Heights Village
Date: May 2020
Project No: C11661
Author: G Barron

Study Area
Subject Site
Pipeline
Drainage lines and 10m buffer

Threatened Species Polygon

Eastern Pygmy-possum, Cryptostylis hunteriana, Hibbertia puberula & Tetratheca glandulosa
Red-crowned Toadlet
Large-eared Pied Bat

IBRA Bioregion: Sydney Basin (SYB)
IBRA Sub-region: Pittwater (SYB07)

0 15 30 60 Meters

N

Data Source:
Total Earth Care
Nearmap

total earth care

Tel: 02 9913 1432 Fax: 02 9913 1434

STAGE 2: IMPACT ASSESSMENT (BIODIVERSITY VALUES)

5 AVOID AND MINIMISE IMPACTS

This section identifies the potential impacts of the proposed development on the biodiversity values of the study area. It includes measures which have already been taken and additional recommendations and mitigation measures to further avoid and minimise impacts on biodiversity within and adjacent to the subject site.

5.1 Actions to Avoid and Minimise Projects Impacts

5.1.1 Site Selection and Planning

The proposed plans (Appendix A) have been designed to largely avoid impacts to biodiversity through positioning works solely in the eastern section of the lot, in vegetation zones which are planted, have previously been cleared, or are in poor condition (PCTs 1231 and 661). Some of the planted native trees in this area can be retained in the proposal.

A DA was previously lodged with Council which was denied. Since then, the Communal Building has been moved further east, which reduces the impact on the bushland to the west, as the APZ requirements can now be met with reduced clearing of the remnant bushland.

The previously cut central drainage line running from north to south has created a boundary between the areas of disturbed lawn and the bushland zones, which remain in good condition. This may be because the drainage line has contained the areas which are accessible to be mown and it has prevented the infiltration of surface run-off from the managed lawns. The footprint of the development is largely bounded by this drainage channel.

5.2 Assessment of Unavoidable Direct and Indirect Impacts

5.2.1 Unavoidable Impacts During Construction

Construction activities will include:

- Construction of three (3) new buildings and associated landscaping;
- Installation of two (2) new parking areas, and modifications to an existing parking area;
- Construction of a new access road running north to south immediately west of the new Building B;
- Construction of a bushfire emergency exit with reinforced turf; and
- Drainage channel will be modified with a sandstone wall near the northern boundary.

Direct impacts expected to occur during the construction phase will include:

- Clearing of 0.56 ha of native vegetation (some of these areas include weed species and planted exotics but also contain native flora); and
- 0.12 ha will be managed as an Outer Protection Areas (OPA) and will require additional clearing to meet the criteria set out by the Planning for Bushfire Protection (NSW RFS 2019) document.

5.2.2 Unavoidable Impacts During Operation

The impacts arising from the short and long term operation of the proposed development are expected to include:

- Increased use by residents;
- Increased run off from additional hard surfaces which are likely to increase flow rates in the drainage channels and downstream from the site;
- Increased nutrient run off from landscaped areas; and
- Introduction of additional artificial light from the use of the buildings.

Other operational impacts are discussed within the indirect impacts section below (Section 5.2.4). A summary of mitigation measures is provided in Section 5.2.6.

5.2.3 Direct Impacts

Potential direct impacts of the proposal which require offsetting are outline in Table 18 below.

Table 18. Assessment of Direct Impacts

Type of Impact	Direct Impacts
Vegetation clearing	Direct impacts on the intact bushland have been minimised through appropriate placement of buildings. A total area of approximately 0.56 ha of native vegetation will be cleared. The OPA requires additional clearing of approximately 0.12ha of moderate and good condition PCT 1250. This area will be managed as per the criteria outlined in the Planning for Bushfire Protection (NSW RFS 2019) document. The ground and shrub layer will require regular clearing and the canopy species must be thinned to 30% cover. The majority of the intact remnant bushland in the western section of the site will not be directly impacted as part of the proposal. Duration/timing: Permanent Frequency: Once, at commencement of works, and regular management of the OPA zone to maintain a reduction in fuel loads. Extent: - Loss of 0.22 ha PCT 1824 Poor condition - Loss of 0.06 ha PCT 1250 Good condition to be managed as an OPA - Loss of 0.04 ha PCT 1250 Moderate condition for landscaping and 0.06 ha of PCT 1250 Moderate condition to be managed as an OPA - Loss of 0.13 ha PCT 1231 (Planted) Poor condition - Loss of 0.17 ha PCT 661 (Planted) Poor condition
Loss of potential foraging habitat for threatened fauna species	Eight (8) threatened fauna species were observed using the site during the previous and current surveys. The site only provides suitable breeding habitat for the Red-crowned Toadlet. This is detailed below. Habitat for the Eastern-pygmy Possum includes the abundant Banksia species which are present on site. This species is less likely to utilise the disturbed edges of the bushland to the east, and therefore will have limited habitat removed. The Powerful Owl likely utilises the majority of the site for foraging due to the abundance of prey species present. There will be a loss of some mature Eucalypts, which may be used for roosting, and denser vegetation which is utilised by their prey species. The site will form part of a large foraging home range for the Grey-headed Flying-fox who feed on the flowering Eucalypts and Banksias. Planted Eucalypts and some of the eastern extent of the bushland will be lost, as well as some Banksias amongst the patches of native vegetation to be cleared. Threatened microbat species: the Large Bent-winged Bat, Little Bent-winged Bat and the Large-eared Pied Bat will likely use the entire site for foraging, including both the vegetated and open areas. These microbats may roost in decorticating bark or small hollows on site. Duration/timing: Permanent Frequency: Once, at commencement of works, and regular management of the OPA zone to maintain a reduction in fuel loads. Extent: Based on the area of the species polygons for the species credit species which will be impacted by the proposal:

Type of Impact	Direct Impacts
	- Loss of 0.38 ha of Eastern Pygmy Possum (*Cercartetus nanus*) foraging habitat - Loss of 0.68 ha Large-eared Pied Bat (*Chalinolobus dwyeri*) foraging habitat - Loss of 0.38 ha Red-crowned Toadlet (*Pseudophryne australis*) foraging habitat The following species are predicted ecosystem credit species under the BAM and mobile species who utilise most of the site and as such will see a loss of foraging habitat from the clearing of 0.56 ha of native vegetation and the managed of 0.12 ha as an OPA: - Square-tailed Kite (*Lophoictinia isura*); - Powerful Owl (*Ninox strenua*); - Grey-headed Flying-fox (*Pteropus poliocephalus*); - Large Bent-winged Bat (*Miniopterus orianae oceanensis*); and - Little Bent-winged Bat (*Miniopterus australis*).
Loss of potential breeding habitat for threatened species	The Red-crowned Toadlet is the only threatened fauna species determined to have breeding habitat on site. The Red-crowned Toadlet was observed using cleared track edges and a grass swale adjacent to an existing parking area, and therefore is considered to be associated with non-native vegetation for habitat, however, they do not rely upon it. The grass swale habitat for the Red-crowned Toadlet will be entirely removed as a result of the proposal. This species is known to breed in gutters with thick debris similar to this site (DPIE 2017).The species is known to be quite localised and restricted to the immediate vicinity of breeding habitat, where they occur in small colonies. Therefore, the removal of this entire section of habitat could have a substantial impact on a population if this is a favoured breeding or refuge site (DPIE 2017). The proposal is not expected to impact on Red-crowned Toadlet breeding habitat in the western portion of the site. Duration/timing: Permanent Frequency: Once, at commencement of works. Extent: - Loss of 0.07 ha Red-crowned Toadlet (*Pseudophryne australis*) breeding habitat
Loss of potential habitat for threatened flora species	No threatened flora were identified on site. The Leafless Tongue-orchid (*Cryptostylis hunteriana*), *Hibbertia puberula* and *Tetratheca glandulosa* were determined to be species credit species due to the presence of suitable habitat on site and as they are cryptic species, which were surveyed outside of their flowering periods. As the species have potential to occur on the site, the potential habitat loss for these species has been determined below. Duration/timing: Permanent Frequency: Once, at commencement of works, and regular management of the OPA zone to maintain a reduction in fuel loads. Extent: Based on the area of the species polygons for the species credit species which will be impacted by the proposal: - Loss of 0.38 ha of Leafless Tongue-orchid (*Cryptostylis hunteriana*) potential habitat

Type of Impact	Direct Impacts
	- Loss of 0.38 ha *Hibbertia puberula* potential habitat - Loss of 0.38 ha *Tetratheca glandulosa* potential habitat

5.2.4 Indirect impacts

Potential indirect impacts of the proposal upon biodiversity values of the site and the surrounding habitat are outline in Table 19 below.

Table 19. Assessment of Indirect Impacts

Type of Impact	Indirect Impacts
Inadvertent impacts on adjacent habitat or vegetation	The potential change in hydrology and water quality as described in the prescribed impacts (Section 5.2.5 below) may have an indirect impact on the vegetation to the south-west of the development footprint, which could reduce water quality, increase nutrients available to downslope vegetation and potentially increase weed presence. A bio-filtration zone and pond are proposed at the south-west corner of the development footprint to improve water quality of the run-off from the site. This may help to reduce nutrient content of run-off and provide frog habitat. Duration/timing: Permanent Frequency: Ongoing after construction Extent: Vegetation south-west and downslope from the development foot print.
Reduced viability of adjacent habitat due to edge effects	It is not expected that there will be any substantial reduction in the viability of adjacent habitat due to edge effects in areas surrounding the site from this proposal. The eastern edges of the bushland will be cleared which means the edge effects are likely to shift slightly west to the new edges, however they are not expected to increase. If managed correctly, commencing at the clearing stage, they could be prevented or restricted. The increase in foot traffic within the site may increase the intensity of the edge effects if not managed correctly. Proposed informal pathways into the bushland shown on the Landscape Plan (Appendix B), should be removed. The remaining bushland is in good condition and expected to be resilient against weed infestations and other edge effects. Duration/timing: Permanent Frequency: During and ongoing after construction Intensity/Extent: eastern edges of the bushland being retained.
Reduced viability of adjacent habitat due to noise, dust or light spill	There may be a small reduction in the viability of adjacent habitat to the west due to noise, dust or light spill on areas surrounding the site, mostly during the construction phase. Noise from machinery can be expected to be generated as part of the construction. Noise is only expected during normal working hours (7am to 5pm) within the construction period and therefore unlikely to impact on nocturnal species including the Grey-headed Flying-fox and microbats which may forage at night. There may be increased noise as a result of an increase in resident numbers and residents using the landscaped areas during the operational phase. The site is already prone to noises from traffic, carpark use and other associated noises from the current use of the existing facility. The fauna species utilising the site and surrounding areas are mostly urban species that are tolerant of these noises. The surrounding site already contains street lights and building lights. Some dust generation can be expected during the construction phase of the proposed development. The dust generation is expected to be low and not impact the viability of adjacent or on site habitat. Duration/timing: Short term only during work hours (7am to 5pm). Frequency: During construction, minor lighting ongoing during operation

Type of Impact	Indirect Impacts
	Intensity/Extent: Noise – Medium Dust – Low, eastern portion of site Light spill – Low, from eastern portion of the site.
Transport of weeds and pathogens from the site to adjacent vegetation	The site and surrounding vegetation are already at risk of weeds and pathogens being transported to the site by members of the public and residents accessing these areas. The foot traffic may increase with the elevated number of residents. However, the impact is expected to be minor as most pedestrians stick to the access road and cleared track, which reduces the risk of introducing weeds and pathogens. The surrounding hard surfaces reduce the risk of members of the public transporting any weeds and pathogens to the site during the operational phase. The proposed construction, earthworks and landscaping could increase the risk of spreading weeds and pathogens, if staff and machinery move between sites and surrounding vegetation during the construction phase. Hygiene protocols must be followed. Example Phytophthora Hygeine Protocols are provided in Appendix O. Duration/timing: During construction and operational phases Frequency: Ongoing Intensity/Extent: Low
Increased risk of starvation, exposure and loss of shade or shelter	The shrub and ground layer will be lost in approximately 0.12 ha of the site in association with the creation of the OPA. As most of the canopy will be retained, no species which rely on the canopy in this area and surrounds are likely to be placed at increased risk of starvation, exposure and loss of shade or shelter. The loss of shrub and ground layer as habitat is unlikely to have any impact on adjacent habitat. The other areas of native vegetation to be impacted include areas which consist of scattered planted trees or areas which are in poor condition or already fragmented within the disturbed areas. The loss of these areas of vegetation is unlikely to result in an increased risk of starvation, exposure and loss of shade or shelter. The intact vegetation being retained may suffer some exposure where the eastern edges are cleared and may suffer some edge effects including weed encroachment. Duration/timing: Permanent Frequency: Ongoing Intensity/Extent: Low, most at intact vegetation edges.
Loss of breeding habitats	The study area contains breeding habitat for common urban avian and mammals species, including Ringtail Possums. No hollows will be lost, however Ringtail Possum dreys were observed in the vegetation directly to the north of the development footprint along the northern boundary. The Red-crowned Toadlet was observed using cleared track edges and a grass swale adjacent to an existing parking area and therefore is considered to be associated with non-native vegetation for habitat, however, they do not rely upon it. The grass swale habitat for the Red-crowned Toadlet will be entirely removed as a result of the proposal. This species is known to breed in gutters with thick debris similar to this site (DPIE 2017).The species is known to be quite localised and restricted to the immediate vicinity of breeding habitat where they occur in small colonies. Therefore, the removal of this entire habitat can have a substantial impact on a population if this is a favoured breeding or refuge site (DPIE 2017). The proposal is not expected to impact on Red-crowned Toadlet breeding habitat in the western portion of the site.

Type of Impact	Indirect Impacts
	Duration/timing: Permanent Frequency: Once during the construction phase. Intensity/Extent: High negative to the Red-crowned Toadlet. Low for other species.
Trampling of threatened flora species	No threatened flora were observed on site. The landscape plan shows formal footpaths ending abruptly at bushland edges which could encourage pedestrians to trample areas of bushland and create informal tracks. These footpaths should be finished in a way so as not to direct the user into the bush. Currently the bushland at the western portion of the site can be accessed by the public and residents, however there is very little signs of flora being trampled. It is expected most pedestrians are utilising the existing road and cleared track. This is not expected to change, provided that the formal footpaths are not directed into the bush. Duration/timing: Permanent Frequency: During construction and ongoing Intensity/Extent: Low if mitigated correctly.
Inhibition of nitrogen fixation and increased soil salinity	It is not expected that any inhibition of nitrogen fixation or increased soil salinity will occur as a result of the proposal. Due to the clearing in the OPA and removal of some areas of native vegetation, it is possible that nitrogen fixation will be reduced due to the removal of the ground and shrub layer, thereby reducing the available organic matter for bacteria to break down. The loss of plants including Acacia species, which typically have a symbiotic relationship with nitrogen fixing bacteria, may result in reduced nitrogen fixation (Goh 1987; Specht and Specht 1999). Duration/timing: Permanent Frequency: During construction and ongoing Intensity/Extent: 0.68 ha approximately based on vegetation clearing and clearing required for the OPA.
Fertiliser drift	It is unlikely the site or surrounding area would be at risk of an increase in wood collection as a result of the proposal. It was noted during the site surveys many members of the public were using the access road on foot to link them between Allambie Rd and bush tracks at the western end of the site. The formalisation of the proposed development area may reduce the number of members of the public accessing the property, thereby reducing the risk of wood collection which is already low.
Rubbish dumping	No rubbish dumping was evident on site and the risk of rubbish dumping is not expected to increase due to the proposed development. The bushland can only be accessed by vehicle though the private access road, which is only used by staff and residents. The formalisation of the proposed development area would most likely deter any potential rubbish dumpers accessing the site.
Wood collection	It is unlikely the site or surrounding area would be at risk of an increase in wood collection as a result of the proposal. It was noted during the site surveys many members of the public were using the access road on foot to link them between Allambie Rd and bush tracks at the western end of the site. The formalisation of the proposed development area may reduce the

Type of Impact	Indirect Impacts
	number of members of the public accessing the property, thereby reducing the risk of wood collection, which is already low.
Bush rock removal and disturbance	Two (2) areas of bush rock are located just outside the works area but are to be retained. One (1) falls in the area to be managed as an OPA. The vegetation around the bush rock areas may be removed but the bushrock is unlikely to be impacted. Both areas do not provide microbat habitat and have limited crevices and therefore provide limited habitat to reptile species. Other areas of bush rock in the bushland to the west are not expected to be impacted. Duration/timing: Permanent Frequency: Ongoing during operation Intensity/Extent: Two (2) areas near the works area, one (1) is in the OPA area.
Increase in predatory species populations	The site and surrounding areas are already heavily urbanised and likely to be subject to a number of predatory species using the area. The increased foot traffic expected during the operational period, could cause an increase in food scraps left in the area, which may lead to an increase in foxes using the site. Duration/timing: Permanent Frequency: Ongoing during operation Intensity/Extent: Entire site
Increase in pest animal populations	The site and surrounding areas are already heavily urbanised and likely to be subject to a number of pest species using the area. The increased foot traffic expected from using the landscaped areas during operation could cause an increase in food scraps left in the area, which may lead to an increase in rats and foxes using the site. Duration/timing: Permanent Frequency: Ongoing during operation Intensity/Extent: Entire site, low impact.
Increased risk of fire	An increased risk of fire is not expected as a result of the proposal. The fire risk will be reduced due to the increase in hard surfaces associated with the proposed development and the reduction in available fuel load as a result of the removal of the ground and shrub layers and the thinning of the canopy in the OPA.
Disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	N/A – no shorebirds are expected to use the site.

5.2.5 Prescribed Biodiversity Impacts

Table 20. Assessment of Prescribed Impacts

Prescribed Impact Type	Assessment Details
Impacts of development on the habitat of threatened species or ecological communities associated with karst, caves, crevices, cliffs and other features of geological significance.	No karst, crevices or cliffs are located on the subject site. The site does contain some sandstone rocky outcrops, however crevices are sparse throughout the site. Most of the rocky outcrops are in the western half of the lot which will not be directly impacted. Two (2) rock outcrops are on the boundary of the works. One (1) of these falls in the area to be managed as an OPA. These do not provide roosting habitat to microbats and provide limited habitat to reptile species. However, they are not expected to be impact by the proposal.
Impacts of development on the habitat of threatened species or ecological communities associated with rocks.	Threatened microbats detected on site can be considered to be associated with rocks as some species will use rock crevices for roosting. However, the rock outcrops on site are low to the ground with limited crevices and are not considered suitable for microbats.
Impacts of development on the habitat of threatened species or ecological communities associated with human made structures.	Threatened microbats detected on site can be considered to be associated with human made structures as some species will roost in small cavities in buildings, bridges and culverts. A large Colourbond shed will be removed as part of the proposal, however no evidence of use by microbats was evident. There is a culvert under the existing road which will not be directly impacted. No evidence of microbats roosting in the culvert was observed.
Impacts of development on the habitat of threatened species or ecological communities associated with non-native vegetation.	Non-native vegetation was recorded in the form of invasive weed species, managed exotic lawns and planted exotic ornamental species. The Red-crowned Toadlet was observed using cleared track edges and a grass swale adjacent to an existing parking area and therefore is considered to be associated with non-native vegetation for habitat, however, they do not rely upon it. The grass swale habitat for the Red-crowned Toadlet will be entirely removed as a result of the proposal. This species is known to breed in gutters in thick debris similar to this site (DPIE 2017). Grey-headed flying-fox are known to feed on non-native vegetation, however their main food source on the site are flowering Eucalypt and Banksia species. The Grey-headed flying-fox was observed feeding on these during the nocturnal surveys. Therefore, the removal of non-native vegetation is unlikely to impact this species.
Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range.	The habitat on the site for threatened species is on the western portion of the site which directly connects with the large expanse of bushland which forms the Manly Dam Reserve. The proposed development is mostly contained to the eastern end of the site and will not alter the connectivity of threatened species habitat that facilitates the movement of those species across their range.
Impacts of the development on movement of threatened species that maintains their life cycle.	As described above the proposed development is mostly contained to the eastern end of the site on land which has previously been disturbed and is not considered important to the movement of threatened species that maintains their life cycle.
Impacts of development on water quality, water bodies and hydrological processes that	The proposal may impact on the water quality of the three (3) drainage lines to the east with increased surface run-off from an increase in hard surfaces. Additional landscaped garden areas

Prescribed Impact Type	Assessment Details
sustain threatened species and threatened ecological communities (including subsidence or upsidence resulting from underground mining or other development).	may lead to an increase in nutrient run-off from fertilisers. However, down slope and to the south of the lot a biofiltration and retention pond is proposed which will may help to reduce impacts on water quality. Red-crowned Toadlets have not been recorded breeding in waters that are even mildly polluted or with a pH outside the range 5.5 to 6.5 (DPIE 2017). However, the Red-crowned Toadlet habitat in the development area is expected to be lost altogether. The habitat at the western portion of the site is unlikely to be impacted by water quality changes as a result of the proposed development, due to being further from the works area.
Impacts of wind turbine strikes on protected animals.	N/A – No wind turbines will be installed as part of the proposal.
Impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC.	The site already contains an access road through the entire length of the site. The access road will be extended in a northerly direction perpendicular from the existing access road and a bushfire emergency access road will be installed. It is unlikely that this will significantly increase the risk of vehicle strikes to threatened species which is already low. The new access road is not within habitat important to the threatened species and is unlikely to increase the risk of vehicle strike significantly.

5.2.6 Summary of Measures to Avoid, Minimise and Mitigate Impacts

Table 21 below includes measures to be implemented to avoid, minimise and mitigate the direct and indirect impacts discussed above.

Table 21. Summary of Mitigation Measures

Action	Outcome	Timing	Responsibility
BEFORE CONSTRUCTION			
A pre-clearance survey of the impact area. If an animal is identified during the survey and is at risk, works should not commence until the animal has been rescued and safely relocated. If the animal is injured a qualified carer should be contacted by either ringing Sydney Metro Wildlife on 02 9413 4300 or WIRES on 1300 094 737.	Prevent loss of individuals and populations that may be present on the site.	Prior to commencement of works.	Site Manager and ecologist
Erosion and sediment control must be detailed in an Erosion and Sediment Management Plan, including types of control, method of installation, locations, maintenance regime, responsibilities, and stockpile storage. These may include, but are not limited to, silt fencing, vehicle shake-down, floating silt boom, and	Avoid spread of sediment into retained vegetation at the southern end of the site.	Prior to commencement of works.	Site Manager

Action	Outcome	Timing	Responsibility
stabilisation access for machinery.			
Site induction to include "no-go" areas, site hygiene and threatened species including flora species; *Cryptostylis hunteriana,* *Hibbertia puberula* and *Tetratheca glandulosa,* and fauna species; Eastern Pygmy Possum, Large-eared Pied Bat, Square-tailed Kite, Powerful Owl, Grey-headed Flying-fox, Large Bent-winged Bat, Little Bent-winged Bat and Red-crowned Toadlet.	Staff awareness of the importance of avoiding pathogen and weed introduction or spread into the bushland being retained. Awareness and identification of threatened species which may be present on site.	Prior to commencement of works.	Site Manager
Installation of "no-go" zones and signage. Delineation must allow for passage of native fauna. See Map 9.	Protection of habitat for threatened species and the areas of bushland to be retained.	Prior to commencement of works.	Site Manager and Ecologist
Erosion and sediment controls should be implemented and maintained as per the Erosions and Sediment Management Plan.	Avoid spread of sediment into areas of retained vegetation.	Prior to commencement of works.	Site Manager
Stormwater overland flow management and minimisation plans should be implemented and maintained including the integration of a Water Sensitive Urban Design (WSUD) as per the Waterway Impact Statement (WIS) supplied by Total Earth Care in February 2020.	Minimise the impacts of the altered hydrology due to the works. Prevent the hydrological spread of weeds. Prevent degradation of downstream aquatic habitats.	Prior to commencement of works.	Site Manager
Installation of tree protection zones.	Prevent damage to trees which are being retained.	Prior to commencement of works.	Site Manager
Establish stock pile and storage areas within carpark for machinery and material. Disturbance of soils on the site should be limited to the areas of proposed work. Activities such as stock piling of soils or substrates should not extend into adjacent native vegetation or rock outcrops.	Protection of threatened species habitat and bushland to be retained.	Prior to commencement of works.	Site Manager

Action	Outcome	Timing	Responsibility
Establish wash down/hygiene areas within carpark. Appropriate cleaning protocols must be followed to minimise the introduction of new weeds and potential pathogens.	Prevention of introduction or spread of weeds and pathogens to site.	Prior to commencement of works.	Site Manager
Landscape planning is to include the use of native flowering species representative of the indigenous PCTs on site (1250, 1783 and 1824) particularly Grey-headed Flying-fox feed trees and winter flowering species such as *Banksia integrifolia, Banksia serrata, Corymbia gummifera* and *Eucalyptus pilularis* (Eby & Law 2008).	Replace the loss of foraging habitat for threatened species within the impact zone.	Incorporate into landscape planning.	Site Manager, Landscape architect and landscape contractors
DURING CONSTRUCTION			
Contractors are expected to follow strict Phytophthora hygiene, and vegetation removal protocols (see Appendix O).	Prevention of introduction or spread Phytophthora, other pathogens or weeds to site.	During construction phase.	Site Manager and contractors
TPZs and the SRZs should be maintained for trees within proximity of the work zones.	Protection of the retained trees.	During construction phase.	Site Manager and contractors
During any works, if any fauna are identified and require rescue, a qualified Ecologist, or fauna rescue volunteer, is to be notified. Works should not continue until the animal has been rescued. Call either Sydney Metro Wildlife on 02 9413 4300 or WIRES on 1300 094 737.	Prevent loss of native fauna	During construction phase.	Site Manager and contractors
Clearance supervision. During tree clearing works, a qualified ecologist should be on present on site. If an animal is identified and at risk during construction, works should not continue until the animal has been rescued. If the animal is injured a qualified carer should be contacted by either ringing Sydney Metro Wildlife on 02 9413 4300 or WIRES on 1300 094 737.	Prevent loss of native fauna	During construction phase.	Site Manager and Ecologist

Action	Outcome	Timing	Responsibility
Any logs being removed from impact areas should be placed, under the direction of an Ecologist, in the retained vegetation at the western end of the site to create habitat.	Habitat retention	During site preparation and construction phase.	Site Manager and Ecologist
Areas which are marked and flagged off as “no-go” zones should be maintained during construction.	Protection of habitat for threatened species, environmentally sensitive areas and bushland to be retained.	During construction phase.	Site Manager and Contractors
AFTER CONSTRUCTION			
Maintenance of storm water and drainage lines, and bio-filtration areas.	Prevent blockage of drains that may cause a build-up or inundation of water into vegetated areas during high rainfall events. Maintaining the quality of habitat for threatened species potentially present on site such as the Red-crowned Toadlet.	Every 6 months	Bush Regeneration contractor
Maintain areas of retained bushland through ongoing weed control across the whole subject site through the use of a Biodiversity Management Plan (BMP) to improve and prevent any other changes to the vegetation. A BMP was provided by Total Earth Care in February 2020.	Maintain and improve quality of retained vegetation across the whole site.	Every 6 months	Council and Bush Regeneration contractor

Title: Vegetation to be Removed and No-Go Zones

Map No: 9
Site: William Charlton Village
Client: Allambie Heights Village
Date: May 2020
Project No: C11661
Author: G Barron

- No-Go Zone
- Subject Site
- Pipeline
- Area to be managed as Outer Protection Zone (OPA)
- Edge of Landscaping

Vegetation to be Removed

- Exotic
- PCT 1231 - Planted Poor
- PCT 661 - Planted Poor
- PCT 1250 - Good Condition
- PCT 1250 - Moderate Condition
- PCT 1824 - Poor Condion

IBRA Bioregion: Sydney Basin (SYB)
IBRA Sub-region: Pittwater (SYB07)

0 15 30 60 Meters

N

Data Source:
Total Earth Care
Nearmap

Tel: 02 9913 1432 Fax: 02 9913 1434

total earth care

6 IMPACT SUMMARY

6.1 Identification and an Assessment of the Impacts which are Potential Serious and Irreversible Impacts (SAII)

Large-eared Pied Bat (*Chalinolobus dwyeri)* which is listed as Vulnerable under the BC Act and EPBC Act was recorded on site during the current survey. The presence of breeding habitat and breeding individuals for this species is listed as a potential SAII (DPIE 2018). Potential breeding habitat is described as areas within 100m of rocky areas which contain caves, rock overhangs, crevices, cliffs, escarpments, old mines, tunnels, culverts and derelict concrete buildings (DPIE 2020b). The National recovery plan for the Large-eared Pied Bat *Chalinolobus dwyeri* states that "*the structure of maternity roosts appears to be very specific (arch caves with dome roofs). Caves need to be high and deep enough to allow juvenile bats to learn to fly safely inside and have indentations in the roof."* (DERM 2011). Suitable breeding habitat was not observed on site or within 100m. There is a culvert under the existing road which will not be directly impacted and there was no evidence of microbats roosting in the culvert. Similarly, the rock outcrops on site are low to the ground with limited crevices and are not considered suitable for microbats. Therefore SAII will not occur.

No other species, populations or ecological communities assessed as present on the site or likely to utilise the site, are listed as a threatened entity at risk of SAII, nor are they considered to be at risk of a serious and irreversible impact following the principles for determining a SAII.

The principles for determining a SAII are stated in the BC Regulation 2017 and must be used to identify impacts. An impact is considered SAII if it:

1. Will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or
2. Will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size, or
3. Impact on the habitat of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution, or
4. Impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.

6.2 Impacts Requiring Offset

The following impacts require offset under the BAM.

- Direct and indirect impacts to the following vegetation zones:
    - 0.29 of PCT 1824 poor condition
    - 0.34 of PCT 1824 good condition
    - 0.31 of PCT 1783 good condition
    - 0.56 of PCT 1250 good condition
    - 0.16 of PCT 1250 moderate condition
    - 0.19 of PCT 661 (planted) poor condition
    - 0.17 of PCT 1231 (planted) poor condition
- The loss of approximately 0.38 ha of vegetation which provides potential habitat for Eastern Pygmy-possum (*Cercartetus nanus*), Leafless Tongue Orchid (*Cryptostylis hunteriana*), *Hibbertia puberula* and *Tetratheca glandulosa*.
- The loss of approximately 0.68 ha of vegetation which provides potential habitat for Large-eared Pied Bat (*Chalinolobus dwyeri*).

See Map 10 for the areas requiring offset. The changes in vegetation integrity scores are discussed in Section 7 of this report.

6.3 Impacts Not Requiring Offset

Section 10.3.2.1 of the BAM states that "the assessor is required to determine an offset for the impacts of development, clearing or impacts from the conferral of biodiversity certification on the habitat of threatened species assessed for ecosystem credits and associated with a PCT in a vegetation zone with a vegetation integrity score ≥17."The vegetation integrity scores for every zone present within the site were above seventeen (17) and so were input into the BAM calculator. There is no change in the vegetation integrity scores for the good condition areas of PCT 1824 good condition and PCT 1783 as

no vegetation is being removed. As a result the BAM calculator generated no species credits for any of the listed species credit species (Eastern Pygmy-possum (*Cercartetus nanus*), Large-eared Pied Bat (*Chalinolobus dwyeri*), Leafless Tongue Orchid (*Cryptostylis hunteriana*), *Hibbertia puberula* and *Tetratheca glandulosa* for these zones. In addition species credits were not generated by the BAM calculator for the loss of any potential habitat for the Red-crowned Toadlet (*Pseudophryne australis*).

6.4 Areas Not Requiring Assessment

The areas of the existing building and parking areas at the eastern end of the lot did not require assessment under the BAM as no native vegetation is present (Map 12).

Title: Impacts Requiring Offset

Map No: 10
Site: William Charlton Village
Client: Allambie Heights Village
Date: May 2020
Project No: C11661
Author: G Barron

Subject Site

Impacts Requiring Offset - Vegetation Zones

- PCT 1231 - Planted Poor
- PCT 661 - Planted Poor
- PCT 1250 - Good Condition
- PCT 1250 - Moderate Condition
- PCT 1783 - Good Condition
- PCT 1824 - Good Condition
- PCT 1824 - Poor Condion

Threatened Species Polygon

- Eastern Pygmy-possum, Cryptostylis hunteriana, Hibbertia puberula & Tetratheca glandulosa
- Large-eared Pied Bat

IBRA Bioregion: Sydney Basin (SYB)
IBRA Sub-region: Pittwater (SYB07)

0 15 30 60 Meters

N

Data Source:
Total Earth Care
Nearmap

total earth care

Tel: 02 9913 1432 Fax: 02 9913 1434

Title: **Impacts Not Requiring Offset**

Map No: 11
Site: William Charlton Village
Client: Allambie Heights Village
Date: May 2020
Project No: C11661
Author: G Barron

Study Area
Subject Site
Pipeline
Drainage lines and 10m buffer

Impacts Not Requiring Offset - Threatened Species Polygon

Red-crowned Toadlet
Eastern Pygmy-possum, Cryptostylis hunteriana, Hibbertia puberula & Tetratheca glandulosa
Large-eared Pied Bat

IBRA Bioregion: Sydney Basin (SYB)
IBRA Sub-region: Pittwater (SYB07)

0 15 30 60 Meters

N

Data Source:
Total Earth Care
Nearmap

total earth care

Tel: 02 9913 1432 Fax: 02 9913 1434

Title: **Areas Not Requiring Assessment**

Map No: 12
Site: William Charlton Village
Client: Allambie Heights Village
Date: May 2020
Project No: C11661
Author: G Barron

Subject Site

Pipeline

Drainage lines and 10m buffer

Area Not Requiring Assessment

IBRA Bioregion: Sydney Basin (SYB)
IBRA Sub-region: Pittwater (SYB07)

0 15 30 60 Meters

N

Data Source:
Total Earth Care
Nearmap

total earth care

Tel: 02 9913 1432 Fax: 02 9913 1434

7 BIODIVERSITY CREDITS

The BAM measures the impacts of a development through biodiversity credits which are split into ecosystem credits and species credits. The BAM (OEH 2017) defines these as follows:

"Ecosystem credits measure the offset requirement for impacts on TECs, threatened species habitat for species that can be reliably predicted to occur with a PCT and other PCTs generally. Species credits measure the offset requirement for impacts on individual threatened species or their area of habitat."

The number of biodiversity credits required is calculated through the BAM credit calculator. To calculate the ecosystem credits the calculator takes into account the area of the vegetation zones, the current vegetation integrity score of each zone, the future vegetation integrity scores following the proposed development and the biodiversity risk weighting of the vegetation zones. Future vegetation integrity scores are generated by the BAM calculator which calculates the geometric mean of the future composition, structure and function scores (Equation 17 of the BAM (OEH 2017)). Future vegetation integrity scores were calculated based on the percentage of vegetation to be removed for each respective vegetation zone.

The species credits are calculated through the consideration of the condition of the current flora or fauna habitat within the species polygon, the area of the habitat within the species polygon and the biodiversity risk weighting of the species as set out in the Threatened Biodiversity Data Collection.

The biodiversity credits required for the proposed development are outlined in Table 22 and Table 23. The Credit Summary Report generated by the BAM calculator is provided in Appendix K.

The Like for Like Biodiversity Credit Report generated by the BAM calculator is provided in Appendix L and the Variation Options Biodiversity Credit Report is provided in Appendix M.

Table 22. Ecosystem Credits for the Proposed Development

NSW PCT No.	Veg Zone	Current Vegetation Integrity Score	Future Vegetation Integrity Score	Vegetation Integrity Loss	Ecosystem Credits
1824	1824 Poor	52	5.7	46.3	5
1824	1824 Good	85.9	85.9	0	1
1783	1783 Good	49.9	49.9	0	1
1250	1250 Good	58.8	55.8	3	1
1250	1250 Moderate	27.7	9.8	17.9	1
661	661 (Planted) Poor	23.3	0	23.3	2
1231	1231 (Planted) Poor	26.9	1	25.9	2

Table 23. Species Credits for the Proposed Development

Vegetation Zone	Area (ha)	Species Credits
Eastern Pygmy-possum (*Cercartetus nanus*)		
1824 Poor	0.29	7
1824 Good	0.34	0
1783 Good	0.31	0
1250 Good	0.56	1
1250 Moderate	0.16	1
Large-eared Pied Bat (*Chalinolobus dwyeri*)		
1824 Poor	0.29	10
1824 Good	0.34	0

Vegetation Zone	Area (ha)	Species Credits
1783 Good	0.31	0
1250 Good	0.56	1
1250 Moderate	0.16	2
661 Planted Poor	0.19	3
1231 Planted Poor	0.17	3
Leafless Tongue Orchid (*Cryptostylis hunteriana*)		
1824 Poor	0.29	5
1824 Good	0.34	0
1783 Good	0.31	0
1250 Good	0.56	1
1250 Moderate	0.16	1
Hibbertia puberula		
1824 Poor	0.29	7
1824 Good	0.34	0
1783 Good	0.31	0
1250 Good	0.56	1
1250 Moderate	0.16	1
Red-crowned Toadlet (*Pseudophryne australis*)		
1824 Good	0.01	0
1783 Good	0.01	0
1250 Good	0.13	0
1250 Moderate	0.027	0
661 Planted Poor	0.05	0
Tetratheca glandulosa		
1824 Poor	0.29	7
1824 Good	0.34	0
1783 Good	0.31	0
1250 Good	0.56	1
1250 Moderate	0.16	1
	Total	**44**

The biodiversity offset costs for the impact have been provided in Appendix N. These were calculated on the 19th May 2020.

8 CONCLUSION

This report has assessed the proposed independent living development at William Charlton Village, 181 Allambie Road, Allambie Heights, NSW 2100 (Lot 2615 DP 752038). The native vegetation survey determined that the site contains a total of 2.02 ha of five (5) PCTs. Two (2) of these are PCTs made up of planted native trees and a mix of fragmented understory of native and exotic shrubs and mostly exotic grasses. No Threatened Ecological Communities (TECs) were determined to be present on site. Seven (7) condition zones were determined from the five (5) PCTs. Of these, mostly the poor condition zones will be removed as a result of the proposal with an area 0.12 ha of moderate condition vegetation being partially clearer for an Outer Protection Area. The proposed development design was largely sited to avoid impacts on areas of good condition vegetation, where possible.

Eight (8) threatened fauna species have been identified on site during previous and the current surveys, of which three (3) are species credit species. These are: Eastern Pygmy-possum (*Cercartetus nanus*), Large-eared Pied Bat (*Chalinolobus dwyeri*) and Red-crowned Toadlet (*Pseudophryne australis*). Three (3) cryptic threatened flora species were also assumed to be present as the surveys were conducted outside of their flowering periods. These are: Leafless Tongue Orchid (*Cryptostylis hunteriana*), Hibbertia puberula and Tetratheca glandulosa.

Large-eared Pied Bat (Chalinolobus dwyeri) which is listed as Vulnerable under the BC Act and EPBC Act was recorded on site during the current survey. The presence of breeding habitat and breeding indiviudals for this species is listed as a potential SAII (DPIE 2018). Potential breeding habitat is described as areas within 100m of rocky areas which contain caves, rock overhangs, crevices, cliffs, escarpments, old mines, tunnels, culverts and derelict concrete buildings (DPIE 2020b). The National recovery plan for the Large-eared Pied Bat *Chalinolobus dwyeri* states that "*the structure of maternity roosts appears to be very specific (arch caves with dome roofs). Caves need to be high and deep enough to allow juvenile bats to learn to fly safely inside and have indentations in the roof."* (DERM 2011). Suitable breeding habitat was not observed on site or within 100m and so SAII will not occur.

No other species, populations or ecological communities assessed as present on the site or likely to utilise the site, are listed as a threatened entity at risk of SAII, nor are they considered to be at risk of a serious and irreversible impact following the principles for determining a SAII.

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Appendix A. Proposed Plans

AMENDMENTS

ISSUE	DESCRIPTION	APPROVED	DATE
1	AUTHORITY APPROVAL	MR	19/12/19

FRED HUTLEY VILLAGE

ARNHEM ROAD

2 D.P.91527

BOUNDARY 212.285m

LIMIT OF APZ AS ASSESSED BY BUSHFIRE CONSULTANT TBC

PROPOSED COMBINED WASTE ENCLOSURE

BOUNDARY 102.68m

EXISTING BUSHLAND

BUSHFIRE EMERGENCY EXIT

WILLIAM CHARLTON VILLAGE CAR PARK

BUILDING A INDEPENDENT LIVING UNITS

5865 SETBACK TO WCV

EXISTING ROAD

EXISTING INDEPENDENT LIVING APARTMENTS 2 STOREY BUILDING

EXISTING WILIAM CHARLTON VILLAGE CAR PARK

14075 SETBACK TO WCV

EXISTING ROTUNDA 1 STOREY BUILDING

VISITOR PARKING

BUILDING B INDEPENDENT LIVING UNITS

RADIUS 85 M BUSHFIRE ZONE RADIAL SETBACK

LINEAR 85 M BUSHFIRE ZONE LINEAR SETBACK

TERRACE

COMMUNAL BUILDING

EXISTING ROAD

18638 SETBACK TO WCV

VISITOR PARKING

EXISTING INDEPENDENT LIVING APARTMENTS 2 STOREY BUILDING

30000

BOUNDARY 331.6m

MARTIN LUTHER LANE

SITE ENTRY

PROPOSED SUBSTATION

MAINTENANCE SHED

LETTERBOXES LOCATED IN LOW ENTRY SIGNAGE WALL UNDER COVER

BUS STOP

EXISTING VEHICLE ENTRY / EXIT

ALLAMBIE ROAD

ALLAMBIE

BOUNDARY 63.66m

EXISTING VEHICLE ENTRY / EXIT

BUS STOP

BOUNDARY 31.31m

ZONE OF EASEMENT

EXISTING ENTRY/EXIT

BOUNDARY 45.72m

MORTAIN AVE

ROAD

MARTIN LUTHER PLACE

ALLAMBIE HEIGHTS VILLAGE

MARTIN LUTHER PLACE

DRAWING KEY:

- SITE BOUNDARY
- PROJECT BOUNDARY
- 25m / 50m OFFSET FROM APZ LINE AS ASSESSED BY BUSHFIRE CONSULTANT, DASHED RED.
- APZ LINE AS ASSESSED BY BUSHFIRE CONSULTANT DASHED BLUE
- SITE VIEWS
- EXISTING ACCESS TO SITE
- MAIN SITE ENTRY
- EXISTING RETAINED BUILDING
- EXISTING RETAINED TREE
- TREE PROTECTION ZONE, REFER ARBORIST REPORT
- PROPOSED TREE, REFER LANDSCAPE PLAN

THIS DRAWING ISSUE HAS BEEN REVIEWED FOR

AUTHORITY APPROVAL

APPROVED BY: MR
CHECKED BY: GA

CLIENT
ALLAMBIE HEIGHTS VILLAGE

DRAWING
SITE PLAN

DATE	SCALE @ A1	DRAWN
09/03/18	1 : 500	SF

PROJECT No.	DISCP.	DRAWING No.	ISSUE
2017019	A	DA-011	1

PROJECT
2017019 - ALLAMBIE HEIGHTS

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteeece.com
Jackson Teece Chesterman Willis Pty Ltd
Trading as Jackson Teece
ABN 15 089 837 290

JACKSON TEECE

Appendix B. Proposed Landscape Plans

RFS Alternate Emergency Exit
Reinforced turf shall provide an alternate exit for emergency vehicles

Swale
Sandstone wall to form edge of catch drain to direct water

Carpark
Existing carpark shall be modified to include a truck turning head and a bin store. Existing carpark numbers have been retained

Sculptural Feature
A sculptural feature to be placed close to the central axis of the driveway.

Western Landscape
Large open lawns and curved stonewalls provide a break in the vegetation and allow for better bush fire control. A shade structure will provide shade and will accommodate an informal outdoor seating area.

Clothes Lines
New fold down clothes lines affixed to new palisade fence

On-Structure Courtyard
The paved areas are delineated by teardrop shaped lawns and raised garden beds, providing ample outdoor seating spaces.

Private courtyards for the lower units will have a mix of pavement and garden, creating a versatile and easily maintained landscape.

Palm planting in the basement will be revealed through a void in the upper terrace.

Boundary Hedge and Fencing
1.8m high palisade fence and a dense hedge shall provide a softened screen to the adjacent buildings.

Retention of Existing Tree
Levels around this existing tree are to be retained and protected.

Accessible Pathway
An accessible pathway joins the public road to the lower carpark level. The configuration allows the retention of three existing trees.

Services
Area designated for services (including water meter, gas meter, electrical switch board, etc) and maintenance shed.

Letterboxes
3 rows of 8 letter boxes to be recessed into sandstone block wall. Lightweight and slim line roof cover provided over.

Decorative Pond
Decorative pond located at the lowest point of the site provides habitat and water quality. Accessible ramps lead residents through a pleasant walk down to a seating area overlooking the surrounding bush land and pond. Two separate terraced reed beds to the east of the pond will act as bio-filtration zones, treating water and providing habitat spaces.

Informal naturalistic sandstone rocks to surround and retain the informal bio-filtration reed bed.

Community Building Landscape
The activity terrace encourages residents and visitors to gather together and enjoy the views to the wider landscape. A southern raised planter will provide screening to the neighbouring property. An irrigation tank and OSD tank are accommodated under the terrace.

Entrance
Sandstone block entry and signage wall on each side of the internal driveway. Internal driveway to be realigned to create a more appropriate transition to the existing driveway.

0 5 10 25m

arterra

ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 **F** 02 9957 3977 **W** ARTERRA.COM.AU

Legend

- Boundary
- Building Outline
- Building Above
- Building Below
- Existing Creek Line
- Existing Tree Retained (Extent of canopy as verified by site measure)
- T01 Nominal Tree Protection Zone (TPZ) Tree ID Numbers (Retained)
- Proposed Tree
- Garden
- Bio-filtration Zone
- Turf
- Pavement - Standard Grey Concrete
- Pavement -Tile
- Pavement - Decomposed Granite
- Pavement - Gravel
- Retaining Wall - Blockwork
- Retaining Wall - Dry Stacked Stone Wall
- Retaining Wall - Gabion
- Informal Sandstone Boulders
- Clothesline
- Bench Seat
- Overland Flow Path
- Sculptural Features/ Planter

REVISION	DESCRIPTION	CHKD	DATE
P1	For Rural Fire Service Review	RWS	24/10/19

PROJECT & CLIENT
Allambie Heights Village - Project 2
Allambie Heights Village Ltd.

Project No : 18.11
Designed : CLB
Drawn : CLB
North Scale : 1:250@A1/1:500@A3

DRAWING TITLE
Landscape Concept Plan

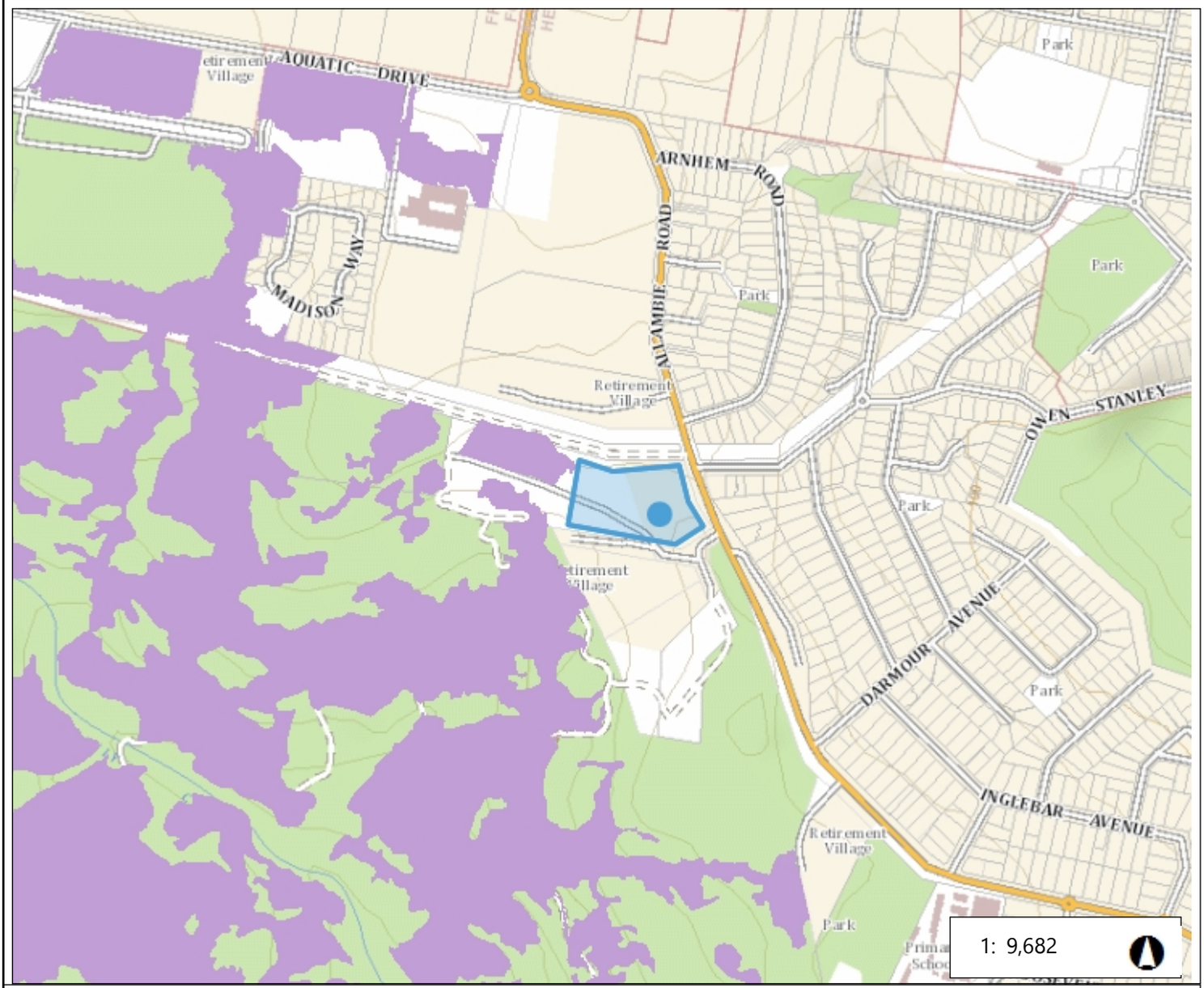
DRAWING NUMBER L-SD-01

REVISION P1

Plotted at : 5:27 pm 24/10/19

Appendix C. Biodiversity Offset Scheme Entry Threshold Map and Report

Biodiversity Offset Scheme (BOS) Entry Threshold Map



491.8 0 245.91 491.8 Metres

WGS_1984_Web_Mercator_Auxiliary_Sphere

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Legend

- Biodiversity Values that have been mapped for more than 90 days
- Biodiversity Values added within last 90 days

Notes

Biodiversity Values Map and Threshold Report

Results Summary

Date of Calculation	18/05/2020 8:29 PM		**BDAR Required***
Total Digitised Area	1.39	ha	
Minimum Lot Size Method	LEP		
Minimum Lot Size	0.06	ha	
Area Clearing Threshold	0.25	ha	
Area clearing trigger Area of native vegetation cleared	Unknown #		Unknown #
Biodiversity values map trigger Impact on biodiversity values map(not including values added within the last 90 days)?	no		no
Date of the 90 day Expiry	N/A		

*If BDAR required has:

- at least one 'Yes': you have exceeded the BOS threshold. You are now required to submit a Biodiversity Development Assessment Report with your development application. Go to https://customer.lmbc.nsw.gov.au/assessment/AccreditedAssessor to access a list of assessors who are accredited to apply the Biodiversity Assessment Method and write a Biodiversity Development Assessment Report
- 'No': you have not exceeded the BOS threshold. You may still require a permit from local council. Review the development control plan and consult with council. You may still be required to assess whether the development is '"likely to significantly affect threatened species' as determined under the test in s. 7.3 of the Biodiversity Conservation Act 2016. You may still be required to review the area where no vegetation mapping is available.

Where the area of impact occurs on land with no vegetation mapping available, the tool cannot determine the area of native vegetation cleared and if this exceeds the Area Threshold. You will need to work out the area of native vegetation cleared - refer to the BOSET user guide for how to do this.

On and after the 90 day expiry date a BDAR will be required.

Disclaimer

This results summary and map can be used as guidance material only. This results summary and map is not guaranteed to be free from error or omission. The State of NSW and Office of Environment and Heritage and its employees disclaim liability for any act done on the information in the results summary or map and any consequences of such acts or omissions. It remains the responsibility of the proponent to ensure that their development application complies will all aspects of the Biodiversity Conservation Act 2016.

The mapping provided in this tool has been done with the best available mapping and knowledge of species habitat requirements. This map is valid for a period of 30 days from the date of calculation (above).

Acknowledgement

I as the applicant for this development, submit that I have correctly depicted the area that will be impacted or likely to be impacted as a result of the proposed development.

Signature_____ Date:18/05/2020 08:29 PM

Appendix D. BAM Plot Field Data Sheets

Start WP 066 End WP 067 GPS 1021

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

BAM Site – Field Survey Form

Site Sheet no: 1 of 2

		Survey Name	Zone ID	Recorders			
Date	19/3/20	C1166 1	PCT 1824 – POOR	WT + CT			
Zone	Datum	Plot ID	1	Plot dimensions	50 x 20	Photo #	
56	GDA						
Easting	Northing	IBRA region	Sydney Basin	Midline bearing from 0 m	95° East		
337383	6262043						
Vegetation Class		Sydney Coastal Heaths				Confidence: H M L	
Plant Community Type		1824 – Poor		EEC:		Confidence: H M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth form group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm	4	0
20 – 29 cm	9	0
10 – 19 cm	4	0
5 – 9 cm		
< 5 cm		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	17	

Counts apply when the **number of tree stems** within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300..). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.**

For **hollows**, count only the presence of a stem containing hollows. For a **multi-stemmed tree**, only the largest stem is included in the count/estimate. **Stems may be dead and may be shrubs.**

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	5 0 0 1 5	1 0 0 0 0	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	2.2	0.25	0	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			approx. 25% of 20x20 cleared + managed grass
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			high density of weeds + urban exotics
Other			drainage line down centre of plot

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

'400 m² plot: Sheet 1 of 1	Survey Name	Plot Identifier	Recorders
Date 19/03/20	CH661	1	William Thurston + GT

GF Code	*Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable*	N, E or HTE	Cover	Abund	stratum	voucher
	1 Pittosporum undulatum		2	5		
	2 Banksia ericifolia.		6	4		
	3 Oplismenus aemulus.		0.5	80		
	4 Ageratina adenophora		1	20		
	5 Callistemon linearis		1	3		
	6 Entolasia stricta		0.1	5		
	7 Dianella caerulea		1	10		
	8 Lantana camara		5	16		
	9 Lonicera japon.ca.		1	40		
	10 Acacia longifolia		1	50		
	11 Ligustrum sinense		1	10		
	12 Imperata cylindrica		2	20		
	13 petrophile pulchella.		0.1	1		
	14 Kunzea ambigua		40	30		
	15 Asparagus aethiopicus	X	15	100		
	16 Paspalidium distans.	X	0.1	1		
	17 Microlaena stipoides		0.2	60		
	18 Paspalum dilatatum.		0.1	10		
	19 Pospalum quadrifarium.		10	40		
	20 Hakea gibbosa.		0.1	2		
	21 Solanum Mauritianum.		0.1	2		
	22 Dichondra repens		0.1	60		
	23 Centella asiatica.		0.1	60		
	24 Acacia parramattensis.		0.2	4		
	25 Eragrostis curvula.		2	25		
	26 Eragrostis brownii		0.1	10		
	27 Senna pendula		0.5	10		
	28 Ehrharta erecta.		0.1	5		
	29 Commelina cyanea.		0.1	2		
	30 Setaria parviflora.		0.1	30		
	31 Andropogon virginicus.		0.1	15		
	32 Stenotaphrum secundatum		5	100		
	33 Watsonia meriana.		0.1	1		
	34 Gleichenia dicarpa.		5	50		
	35					
	36					
	37					
	38					
	39					
	40					

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Start WP 080

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BAM Site – Field Survey Form

Site Sheet no: 1 of 2

		Survey Name	Zone ID	Recorders			
Date	19/03/20	C11661	PCT1824_Good	WT + GT			
Zone	Datum	Plot ID	2	Plot dimensions	50x20	Photo #	
56	GDA						
Easting	Northing	IBRA region	Sydney Basin	Midline bearing from 0 m	20° N	Magnetic °	
337313	6263016						
Vegetation Class		Sydney Coastal Heaths				Confidence: H M L	
Plant Community Type		1824 – Good		EEC:		Confidence: H M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth form group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm	1	
30 – 49 cm	11	
20 – 29 cm	10	
10 – 19 cm	33	
5 – 9 cm	19	
< 5 cm	14	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	5	fully above

Counts apply when the **number of tree stems** within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.**

For **hollows**, count only the presence of a stem containing hollows. For a **multi-stemmed tree**, only the largest stem is included in the count/estimate. **Stems may be dead and may be shrubs.**

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	10 50 10 50 15	5 0 0 0 0	0 0 0 0 0	10 0 0 0 0
Average of the 5 subplots	27	1	0	2

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			Previously understorey
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			Weed free
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet 1 of 2	Survey Name	Plot Identifier	Recorders
Date 9_/03/20	C11661	2	William Thurston + CT

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
	1 Kunzia Ambigua		50	400		
	2 Kunzia Capitata		0.2	30		
	3 Angophora hispida.		0.5	2		
	4 Hakea teretifolia		1	6		
	5 Hakea gibbosa		0.5	15		
	6 Epacris pulchella		0.5	30		
	7 Epacris microphylla		0.5	100		
	8 Micromyrtus Ciliata.		0.5	200		
	9 Baueria rubioides.					
	10 Corymbia gummifera		20	20		
	11 Hibbertia aspera		0.1	4		
	12 Petrophile pulchella		0.1	60		
	13 Stylidium lineare.		0.1	10		
	14 Leptospermum squarrosum		20	200		
	15 Leptospermum trinervium		0.1	5		
	16 Caustis pentandra		20	400		
	17 Lamberta formosa		0.2	10		
	18 Pultenaea tuberculata.		0.1	1		
	19 Drosera auriculata		0.1	40		
	20 Drosera peltata.		0.1	40		
	21 Platysace linearifolia		~~200~~	~~200~~	5	50
	22 Banksia ericifolia		10	5		
	23 Banksia oblongifolia		2	4		
	24 Xanthorrhoea minor		1	6		
	25 Hemigenia purpurea		0.1	1		
	26 Woollsia pungens.		0.1	50		
	27 Actinotus minor		0.1	50		
	28 Lepidosperma laterale.		20	100		
	29 Lepidosperma concavum		0.2	10		
	30 Grevillea speciosa.		0.1	10		
	31 Genoschesium pumilum.		0.1	1		
	32 Allocasuarina distyla.		0.5.	2		
	33 Prolaste stricta		0.1	10.		
	34 Dampiera stricta		0.1	20		
	35					
	36					
	37					
	38					
	39					
	40					

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

GPS Start WP082

Plot 3 Sheet 2 (16)

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BAM Site – Field Survey Form

Site Sheet no: 1 of 2

		Survey Name	Zone ID	Recorders			
Date	19/03/20	C1166 1	PCT 1783 - good	WT + CT			
Zone	Datum	Plot ID	3	Plot dimensions	50x20	Photo #	
56	GDA						
Easting	Northing	IBRA region	Sydney Basin (in m)	Midline bearing from 0 m	285°	Magnetic	
337295	6263053						
Vegetation Class		Sydney Coastal Dry Sclerophyll Forest				Confidence: H M L	
Plant Community Type		1783 - Good		EEC:		Confidence: H M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth form group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm	𝍸 𝍸 ||||	
20 – 29 cm	𝍸 𝍸 𝍸 𝍸 𝍸 |	
10 – 19 cm	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	
5 – 9 cm	𝍸 𝍸 𝍸 𝍸 𝍸 |	
< 5 cm	𝍸 𝍸 𝍸	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	𝍸 𝍸	Tally sp.: e

Counts apply when the **number of tree stems** within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.**

For **hollows**, count only the presence of a stem containing hollows. For a **multi-stemmed tree**, only the largest stem is included in the count/estimate. **Stems may be dead and may be shrubs.**

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	30 80 50 25 60	0 0 10 0 0	0 0 0 0 0	0 0 0 5 0
Average of the 5 subplots	42	2	0	1

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet 2 of 2	Survey Name	Plot Identifier	Recorders
Date 14/03/20	C11661	3	WT + GT

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
	1 Corymbia gummifera		10	15		
	2 Eucalyptus haemastoma		5	2		
	3 Eucalyptus Capitellata.		20	7		
	4 Eucalyptus Siebers		2	2		
	5 Persoonia levis.		1	3		
	6 Leptospermum polygalifolium		5	15		
	7 Leptospermum Squarrosum		5	15		
	8 Kunzea ambigua		2	10		
	9 Banksia serrata		5	16		
	10 Banksia oblongifolia.		1	5		
	11 Banksia spinulosa.		1	10		
	12 pultenaea tuberculata.		0.1	2		
	13 Hakea teretifolia.		2	6		
	14 Hakea gibbosa.		2	5		
	15 Banksia ericifolia		3	10		
	16 Actinotus minor		0.1	20		
	17 Lepidosperma laterale.		2	40		
	18 Dampiera stricta.		0.1	20		
	19 Lindsaea linearis.		0.1	30		
	20 Lambertia formosa		0.1	2		
	21 Callistemon rigidus.		0.1	1		
	22 Anisopogon avenaceus.		2	20		
	23 Entolasia stricta.		0.1	20		
	24 Eleocharis gracilis.		0.1	20		
	25 Angophora hispida.		0.5	3		
	26 Boronia pinnata.		0.1	2		
	27 Cassytha glabella		0.1	2		
	28 Boronia ledifolia.		0.1	10		
	29 platysace linearifolia.		0.2	20		
	30 Epacris pulchella		0.1	10		
	31 Lomandra obliqua.		1	80		
	32 Lomandra glauca		0.1	10		
	33 Cyathochaeta diandra		0.2	20.		
	34 Drosera auriculata		0.1	10.		
	35					
	36					
	37					
	38					
	39					
	40					

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no: 1 of 2

Survey Name	Zone ID	Recorders
C11661	PCT1250-good	WT + CT

Date	19/08/20	Plot ID	5 4	Plot dimensions	50x20	Photo #
Zone 56	Datum GDA	IBRA region	Sydney Basin	Midline bearing from 0 m	100°	Magnetic °
Easting 337239	Northing 6262983					

Vegetation Class	Sydney Coastal Dry Sclerophyll Forest		Confidence: H M L
Plant Community Type	1250 – Good	EEC:	Confidence: H M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth form group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm	𝍸	0
20 – 29 cm	𝍸 𝍸 |	0
10 – 19 cm	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	0
5 – 9 cm	𝍸 𝍸 𝍸 |	0
< 5 cm	𝍸 |	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	|||| fully counted	

Counts apply when the **number of tree stems** within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.**

For **hollows**, count only the presence of a stem containing hollows. For a **multi-stemmed tree**, only the largest stem is included in the count/estimate. **Stems may be dead and may be shrubs.**

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	80	40	20	10	30	10	0	10	0	0	0	0	0	0	0	0	0	60	70	0
Average of the 5 subplots	36					4					0					26				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

'400 m² plot: Sheet 2 of 2	Survey Name	Plot Identifier	Recorders
Date 19/03/20	C11661	~~Eg~~ 4	S (WT) + CT

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
	1 Banksia serrata		3	10		
	2 Banksia ericifolia		5	20		
	3 Banksia OB longifolia.		0.1	1		
	4 Corymbia gummifera.		10	20		
	5 Eucalyptus haemastoma		1	1		
	6 Eucalyptus sieberi.		5	2		
	7 Hakea gibbosa.		10	15		
	8 Leptospermum polygalifolium		30	50		
	9 Leptospermum squarrosum		1	10		
	10 Caesia Sylgnum		1	10		
	11 Boronia ledifolia.		0.1	2		
	12 Daysacc linearifolia		0.1	5		
	13 Epacris longiflora		0.1	10		
	14 Lomandra longifolia		5	40.		
	15 Lomandra obliqua.		0.1	50		
	16 Micromyrtus ciliata.		0.2	50.		
	17 Hibbertia aspera		0.1	1		
	18 Smilax glycicphylla		0.1	3		
	19 Lomatia silaifolia		0.5	15		
	20 Caustis pentandra		0.5	50		
	21 Anisopogon avenaceus.		~~Xtr~~	~~Xoo~~	25	300
	22 Acacia longifolia.		0.1	2		
	23 Gahnia sp.		0.5	15		
	24 ~~Lepidosperma~~ Petrophile pulchella		0.1	4		
	25 Allocasuarina distyla		4	5		
	26 Dianella caerulea		0.1	5		
	27 Dampiera stricta		0.1	5		
	28 Entolasia stricta		1	100		
	29 Bauera rubioides		0.5	20		
	30 Actinotus minor		0.2	30		
	31 Lepidosperma laterale		2	30		
	32 Billardiera scandens		0.1	2		
	33 Cyathochaeta diandra		0.5	50		
	34 Entolasia marginata		0.1	20		
	35 Scaevola ramosissima.		0.1	3		
	36					
	37					
	38					
	39					
	40					

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

GPS 1020
Start 660
End 661

BAM Site – Field Survey Form

Site Sheet no: 1 of 2

		Survey Name	Zone ID	Recorders			
Date	27/3/20	C11661	PCT-661_poor.	AT + JB			
Zone	Datum	Plot ID	5	Plot dimensions	50 x 20	Photo #	
56	GDA						
Easting	Northing	IBRA region	Sydney Basin	Midline bearing from 0 m	115° E	Magnetic °	
337372	6263002						
Vegetation Class		North Coast Wet Sclerophyll Forest				Confidence: H M L	
Plant Community Type		661 – (planted) poor		EEC:		Confidence: H M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth form group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	II	
50 – 79 cm	II	
30 – 49 cm	IIII	
20 – 29 cm		
10 – 19 cm		
5 – 9 cm		
< 5 cm		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0	Tally space

Counts apply when the **number of tree stems** within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.**

For **hollows**, count only the presence of a stem containing hollows. For a **multi-stemmed tree**, only the largest stem is included in the count/estimate. **Stems may be dead and may be shrubs.**

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	1 5 1 1 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			Mostly cleared managed lawn with canopy species
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet 2 of 2	Survey Name	Plot Identifier	Recorders
Date 27.03.20	C11661	5	Cullum Teear + Tara Borchers

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
	1 Eucalyptus botryoides		60	3		
	2 Acacia longifolia		0.1	4		
	3 Microlaena stipoides.		0.1	20		
	4 Stenotaphrum secundatum		95	1000		
	5 Pennisetum clandestinum		1	1000		
	6 Paspalum dilatatum		3	50		
	7 Glochidion ferdinandi		0.02	3		
	8 Dianella caerula var. caerula		0.1	15		
	9 Oxalis corniculata		0.1	10		
	10 Anagallis arvensis		0.1	10		
	11 Senna pendula var. glabrata		0.1	3		
	12 Ehrharta erecta		4	100		
	13 Cynodon dactylon		1	40		
	14 Taraxacum officinale		0.1	10		
	15 Musa spp.		0.2	9		
	16 Hydrocotyle bonariensis		0.1	20		
	17 Lobelia anceps		0.1	10		
	18 Centella asiatica		0.1	40		
	19 Dichondra repens		0.1	2		
	20 Eucalyptus robusta					
	21					
	22					
	23					
	24					
	25					
	26					
	27					
	28					
	29					
	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

659
extra corner

GPS 1020

WP Start 657 End 658

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BAM Site – Field Survey Form

Site Sheet no: 1 of 2

		Survey Name	Zone ID	Recorders			
Date	27/3/12	C11661	PCT1231-poor	Gillian Tozer + Tara Boreham			
Zone	Datum	Plot ID	6	Plot dimensions	See diagram	Photo #	
56	GDA						
Easting	Northing	IBRA region	Sydney Basin	Midline bearing from 0 m	345° N	Magnetic °	
337451	6266979						
Vegetation Class		Coastal Swamp Forest				Confidence: H M L	
Plant Community Type		1231 (planted) poor		EEC:		Confidence: H M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth form group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	II	
50 – 79 cm	I	
30 – 49 cm	IIII	
20 – 29 cm	II	
10 – 19 cm	I	
5 – 9 cm		
< 5 cm		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	III	fully scored

Counts apply when the **number of tree stems** within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.**

For **hollows**, count only the presence of a stem containing hollows. For a **multi-stemmed tree**, only the largest stem is included in the count/estimate. **Stems may be dead and may be shrubs.**

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	5 10 90 5 2	0 0 0 0 0	0 0 0 60 0	0 0 0 0 0
Average of the 5 subplots	18.4%	0	0	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 27/03/20	C11661	6	Gillian Teear + Tara Bareham

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
	1 Eucalyptus saligna		15	1		
	2 Strelitzia reginae		0.5	2		
	3 Ehrharta erecta		1	1000		
	4 Microlaena stipoides		4	1000		
	5 Solanum nigrum		0.1	2		
	6 Paspalum quadrifarium		1	7		
	7 Stenotaphrum secundatum		70	1000		
	8 Oxalis latifolia		0.1	10		
	9 Wisteria sp.		2	1		
	10 Ligustrum lucidium		2	1		
	11 Dichondra repens		0.1	100		
	12 Juncus usitatus		1	50		
	13 Lantana camara		2	2		
	14 Paspalum dilatatum		1	30		
	15 Nephrolepsis cordifolia		1	10		
	16 Oplismenus aemulus		0.1	5		
	17 Paspalidium distans		1	40		
	18					
	19					
	20					
	21					
	22					
	23					
	24					
	25					
	26					
	27					
	28					
	29					
	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

GPS 1020
Start WP 653 End 656

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BAM Site – Field Survey Form

Site Sheet no: 1 of 3

		Survey Name	Zone ID	Recorders			
Date	27/3/20	C11661	PCT1250-mod	GT + TB			
Zone	Datum	Plot ID	~~8~~ 7	Plot dimensions	50 x 20	Photo #	
Easting	Northing	IBRA region	Sydney Basin	Midline bearing from 0 m	166° S	Magnetic °	
337305	6263003						
Vegetation Class		North Coast Wet Sclerophyll Forest.				Confidence: H M L	
Plant Community Type		1250 - moderate		EEC:		Confidence: H M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth form group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm	1	
30 – 49 cm	II	
20 – 29 cm	IIII IIII I	
10 – 19 cm	IIII II	
5 – 9 cm	III	
< 5 cm		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	IIII IIII III	Fully shade

Counts apply when the **number of tree stems** within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.**

For **hollows**, count only the presence of a stem containing hollows. For a **multi-stemmed tree**, only the largest stem is included in the count/estimate. **Stems may be dead and may be shrubs.**

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	5 60 75 50 85	60 0 0 0 10	1 0 0 0 0	20 0 0 0 0
Average of the 5 subplots				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			WP 654 - NW corner
Cultivation (inc. pasture)			WP 655 NE corner
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet 2 of 3	Survey Name	Plot Identifier	Recorders
Date 22/3/20	GT + TB	7	Gillian Teear + Tara Borchan

GF Code		Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
	1	Pittosporum undulatum		2%	~~8~~		
	2	Allocasuarina diminuta		2%	3		
	3	Banksia ericifolia		3%	4		
	4	Eucalyptus punctata		6%	2		
	5	Kunzea ambigua		3%	30		
	6	Banksia serrata		2%	3		
	7	Persoonia levis		1%	1		
	8	Acacia longifolia		1%	7		
	9	Lantana camara		8%	200		
	10	Senna pendula		3%	20		
	11	~~Cooperi~~ Cyathea australis	2%	~~2%~~ 2%	~~3~~ 3		
	12	Paspalum quadrifarium		10%	100		
	13	Ehrharta erecta		1%	50		
	14	Panic grass		0.1%	20		
	15	Hakea gibbosa		~~0.2%~~ 2%	~~1~~ 2		
	16	Pteridium esculentum		30%	200		
	17	Eragrostis ~~elongata~~ brownii		0.2%	100		
	18	Entolasia stricta		~~1%~~ 1%	~~1~~ 100		
	19	~~Empodisma minus~~ Baloskion gracile		0.2%	20		
	20	Dodonaea triquetra		0.5%	20		
	21	Hakea sericea		1%	1		
	22	~~Leucopogon~~					
	23	Conocarpus tenuiodes		0.5%	15		
~~dt~~	24	~~Eucalyptus camaldulensis~~					
	25	Callicoma serratifolia		0.1%	1		
	26	Lindsaea linearis		0.1%	30		
	27	Ageratina adenophora		1%	20		
	28	Microlaena stipoides		0.1%	20		
	29	Dianella caerulea var caerulea		0.5%	20		
	30	Lomandra longifolia		1%	6		
	31	~~Ag~~ Ligustrum sinensis		0.3%	8		
	32	Imperata cylindrica		2%	50		
	33	Ochna serrulata		0.02%	2		
	34	Grevillea sericea		0.5%	3		
	35	Rubus fruticosus aggregate		0.5%	3		
	36	Xanthorrea		2%	5		
	37	Zantedeschia aethiopica			~~3~~ 1		
	38	Epacris pulchella		0.1%	2		
	39	~~Xan~~ Anthosia tridentata		0.1%	3		
	40	Omalanthus populifolius		0.1%	6		

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

400 m² plot: Sheet 2 of 2	Survey Name	Plot Identifier	Recorders
Date 27/03/20	C11661	7	Gillian Teear + Tara Boreham

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
	1 Lepidosperma laterale		0.5%	15		
	2 Oplismenus aemulus		0.1%	20		
	3 Cyperus eragrostis		1%	5		
	4 Solanum mauritianum		0.1	1		
	5 Setaria parvila		0.5%	20		
	6 Callistemon linearis		0.1%	2		
	7 Andropogon virginicus		0.1%	10		
	8					
	9					
	10					
	11					
	12					
	13					
	14					
	15					
	16					
	17					
	18					
	19					
	20					
	21					
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	30					
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	32					
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	34					
	35					
	36					
	37					
	38					
	39					
	40					

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Appendix E. Flora Inventory

Family	Scientific Name	Common Name	Exotic	BC Status	EPBC Status
Apiaceae	*Actinotus minor*	Lesser Flannel Flower			
Apiaceae	*Centella asiatica*	Indian Pennywort			
Apiaceae	*Hydrocotyle bonariensis*		*		
Apiaceae	*Platysace linearifolia*				
Apiaceae	*Xanthosia tridentata*	Rock Xanthosia			
Araceae	*Zantedeschia aethiopica*	Arum Lily	*		
Asparagaceae	*Asparagus aethiopicus*	Asparagus Fern	*		
Asteraceae	*Ageratina adenophora*	Crofton Weed	*		
Asteraceae	*Taraxacum officinale*	Dandelion	*		
Campanulaceae	*Lobelia anceps*				
Caprifoliaceae	*Lonicera japonica*	Japanese Honeysuckle	*		
Casuarinaceae	*Allocasuarina distyla*				
Commelinaceae	*Commelina cyanea*	Native Wandering Jew			
Convolvulaceae	*Dichondra repens*	Kidney Weed			
Cunoniaceae	*Bauera rubioides*	River Rose			
Cunoniaceae	*Callicoma serratifolia*	Black Wattle			
Cyatheaceae	*Cyathea australis*	Rough Treefern		P	
Cyperaceae	*Caustis pentandra*	Thick Twist Rush		P	
Cyperaceae	*Cyathochaeta diandra*				
Cyperaceae	*Eleocharis gracilis*				
Cyperaceae	*Gahnia spp.*				
Cyperaceae	*Lepidosperma concavum*				
Cyperaceae	*Lepidosperma laterale*				
Davalliaceae	*Nephrolepis cordifolia*	Fishbone Fern	*		
Dennstaedtiaceae	*Pteridium esculentum*	Bracken			
Dilleniaceae	*Hibbertia aspera*	Rough Guinea Flower			
Droseraceae	*Drosera auriculata*				
Droseraceae	*Drosera peltata*	A Sundew			

Family	Scientific Name	Common Name	Exotic	BC Status	EPBC Status
Ericaceae	*Epacris longiflora*	Fuchsia Heath			
Ericaceae	*Epacris microphylla*	Coral Heath			
Ericaceae	*Epacris pulchella*	Wallum Heath			
Ericaceae	*Woollsia pungens*				
Euphorbiaceae	*Homalanthus populifolius*				
Fabaceae (Caesalpinioideae)	*Senna pendula var. glabrata*		*		
Fabaceae (Faboideae)	*Pultenaea tuberculata*				
Fabaceae (Faboideae)	*Wisteria sinensis*	Chinese wisteria	*		
Fabaceae (Mimosoideae)	*Acacia longifolia*				
Fabaceae (Mimosoideae)	*Acacia parramattensis*	Parramatta Wattle			
Gleicheniaceae	*Gleichenia dicarpa*	Pouched Coral Fern			
Goodeniaceae	*Dampiera stricta*				
Goodeniaceae	*Scaevola ramosissima*	Purple Fan-flower			
Haloragaceae	*Gonocarpus teucrioides*	Germander Raspwort			
Iridaceae	*Watsonia meriana*		*		
Juncaceae	*Juncus usitatus*				
Lamiaceae	*Hemigenia purpurea*				
Lauraceae	*Cassytha glabella*				
Lindsaeaceae	*Lindsaea linearis*	Screw Fern			
Lomandraceae	*Lomandra glauca*	Pale Mat-rush			
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush			
Lomandraceae	*Lomandra obliqua*				
Musaceae	*Musa spp.*	Banana	*		
Myrtaceae	*Angophora hispida*	Dwarf Apple			
Myrtaceae	*Callistemon linearis*				
Myrtaceae	*Callistemon rigidus*	Stiff Bottlebrush			
Myrtaceae	*Corymbia gummifera*	Red Bloodwood			
Myrtaceae	*Eucalyptus botryoides*	Bangalay			
Myrtaceae	*Eucalyptus capitellata*	Brown Stringybark			

Family	Scientific Name	Common Name	Exotic	BC Status	EPBC Status
Myrtaceae	*Eucalyptus haemastoma*	Broad-leaved Scribbly Gum			
Myrtaceae	*Eucalyptus punctata*	Grey Gum			
Myrtaceae	*Eucalyptus robusta*	Swamp Mahogany			
Myrtaceae	*Eucalyptus saligna*	Sydney Blue Gum			
Myrtaceae	*Eucalyptus sieberi*	Silvertop Ash			
Myrtaceae	*Kunzea ambigua*	Tick Bush		P	
Myrtaceae	*Kunzea capitata*			P	
Myrtaceae	*Leptospermum polygalifolium*				
Myrtaceae	*Leptospermum squarrosum*				
Myrtaceae	*Leptospermum trinervium*	Slender Tea-tree			
Myrtaceae	*Micromyrtus ciliata*	Fringed Heath-myrtle			
Ochnaceae	*Ochna serrulata*	Mickey Mouse Plant	*		
Oleaceae	*Ligustrum lucidum*	Large-leaved Privet	*		
Oleaceae	*Ligustrum sinense*	Small-leaved Privet	*		
Orchidaceae	*Genoplesium pumilum*	Green Midge Orchid		P	
Oxalidaceae	*Oxalis corniculata*	Creeping Oxalis	*		
Oxalidaceae	*Oxalis latifolia*		*		
Phormiaceae	*Dianella caerulea*	Blue Flax-lily			
Phyllanthaceae	*Glochidion ferdinandi*	Cheese Tree			
Pittosporaceae	*Billardiera scandens*	Hairy Apple Berry			
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum			
Poaceae	*Andropogon virginicus*	Whisky Grass	*		
Poaceae	*Anisopogon avenaceus*	Oat Speargrass			
Poaceae	*Cynodon dactylon*	Common Couch			
Poaceae	*Ehrharta erecta*	Panic Veldtgrass	*		
Poaceae	*Entolasia marginata*	Bordered Panic			
Poaceae	*Entolasia stricta*	Wiry Panic			
Poaceae	*Eragrostis brownii*	Brown's Lovegrass			
Poaceae	*Eragrostis curvula*	African Lovegrass	*		
Poaceae	*Imperata cylindrica*	Blady Grass			
Poaceae	*Microlaena stipoides*	Weeping Grass			

Family	Scientific Name	Common Name	Exotic	BC Status	EPBC Status
Poaceae	*Oplismenus aemulus*				
Poaceae	*Paspalidium distans*				
Poaceae	*Paspalum dilatatum*	Paspalum	*		
Poaceae	*Paspalum quadrifarium*	Tussock Paspalum	*		
Poaceae	*Pennisetum clandestinus*	Kikuyu Grass	*		
Poaceae	*Setaria parviflora*		*		
Poaceae	*Stenotaphrum secundatum*	Buffalo Grass	*		
Primulaceae	*Anagallis arvensis*	Scarlet pimpernel	*		
Proteaceae	*Banksia ericifolia*	Heath-leaved Banksia			
Proteaceae	*Banksia oblongifolia*	Fern-leaved Banksia			
Proteaceae	*Banksia serrata*	Old-man Banksia			
Proteaceae	*Banksia spinulosa*	Hairpin Banksia		P	
Proteaceae	*Grevillea sericea*	Pink Spider Flower			
Proteaceae	*Grevillea speciosa*	Red Spider Flower			
Proteaceae	*Hakea gibbosa*				
Proteaceae	*Hakea sericea*	Needlebush			
Proteaceae	*Hakea teretifolia*	Needlebush			
Proteaceae	*Lambertia formosa*	Mountain Devil			
Proteaceae	*Lomatia silaifolia*	Crinkle Bush		P	
Proteaceae	*Persoonia levis*	Broad-leaved Geebung		P	
Proteaceae	*Petrophile pulchella*	Conesticks		P	
Rosaceae	*Rubus fruticosus sp. agg.*	Blackberry complex	*		
Rutaceae	*Boronia ledifolia*	Sydney Boronia		P	
Rutaceae	*Boronia pinnata*			P	
Salicaceae	*Populus deltoides*		*		
Sapindaceae	*Dodonaea triquetra*	Large-leaf Hop-bush			
Selaginellaceae	*Selaginella uliginosa*	Swamp Selaginella			
Smilacaceae	*Smilax glyciphylla*	Sweet Sarsparilla			
Solanaceae	*Solanum mauritianum*	Wild Tobacco Bush	*		
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	*		
Strelitziaceae	*Strelitzia reginae*		*		

Family	Scientific Name	Common Name	Exotic	BC Status	EPBC Status
Stylidiaceae	*Stylidium lineare*	Narrow-leaved Triggerplant			
Verbenaceae	*Lantana camara*	Lantana	*		
Xanthorrhoeaceae	*Xanthorrhoea minor*			P	
Xanthorrhoeaceae	*Xanthorrhoea sp*			P	

BC Status: P – Protected

Appendix F. Weed Species listed as a Biosecurity Risk

Table 24. Categories of Management under the Greater Sydney Regional Strategic Weed Management Plan 2017-2022 under the *NSW Biosecurity Act 2015*

Category	Management Action
Prevention (Prevent)	To prevent the weed species arriving and establishing in the Region.
Eradication (Eliminate)	To permanently remove the species and its propagules from the Region, OR to destroy infestations to reduce the extent of the weed in the region with the aim of local eradication.
Containment (Minimise)	To prevent the ongoing spread of the species in all or part of the Region.
Asset Protection (Manage)	To prevent the spread of weeds to key sites/ assets of high economic, environmental and social value, or to reduce their impact on these sites if spread.
GBD (General Biosecurity Duty)	All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable."
RRM (Regional Recommended Measure)	Specific details for each species included in table.
PoD (Prohibition on Dealings)	Must not be imported into the State or sold.
B Zone (Biosecurity Zone)	Specific details for each species included in table.
PM (Prohibited Matter)	A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries.

Table 25. Weeds under the Biosecurity Act recorded within the subject site listed as State or Regional Priority Weeds in the Greater Sydney Regional Strategic Weed Management Plan 2017-2022

Common Name	Botanical Name	WONS	State Priority Weed- Mgmt. Actions	Regional Priority Weeds- Mgmt. Actions	Other Regional Weeds- Asset/value at risk	Weeding Technique	Herbicide Application	Herbicide Group	Ratio
Crofton Weed	*Ageratina adenophora*				Environment, Agriculture	Hand removal, brush cut and foliar sprayed with Glyphosate	Glyphosate 360g/L	M	1/100
Scarlet Pimpernel	*Anagallis arvensis*					Hand removal, spot spraying with Glyphosate.	Glyphosate 360g/L	M	1/100
Whisky Grass	*Andropogon virginicus*				Environment	Remove seed and crown out with knife or spot spray	Glyphosate 360g/L	M	1/101
Asparagus Fern	*Asparagus aethiopicus*	Yes				Small single specimens to be crowned or Sprayed with Glyphosate/metsulfuron methyl	Glyphosate 360g/L & Metsulfuron -Methyl 600 g/kg	M & B	1/100 & 1g/10 L
Bridal Creeper	*Asparagus asparagoides*	Yes				Small single specimens to be crowned or Sprayed with Glyphosate/metsulfuron methyl.	Glyphosate 360g/L & Metsulfuron -Methyl 600 g/kg	M & B	1/100 & 1g/10 L
Panic Veldgrass	*Ehrharta erecta*					Foliar spraying with Glyphosate	Glyphosate 360g/L	M	1/100
African Lovegrass	*Eragrostis curvula*				Environment	Hand pulled or brush cut and foliar sprayed with Glyphosate	Glyphosate 360g/L	M	1/100
Pennywort	*Hydrocotyle bonariensis*					Hand pulled or spot sprayed with Dicamba			
Lantana	*Lantana camara*	Yes	Asset Protection			Cut and paint, sprayed or splattered with Glyphosate	Glyphosate 360g/L	M	Neat
Large Leaf Privet	*Ligustrum lucidum*					<80mm cut & painted; >80mm will be drilled/frilled with neat Glyphosate	Glyphosate 360g/L	M	Neat

Common Name	Botanical Name	WONS	State Priority Weed-Mgmt. Actions	Regional Priority Weeds-Mgmt. Actions	Other Regional Weeds-Asset/value at risk	Weeding Technique	Herbicide Application	Herbicide Group	Ratio
Small Leaf Privet	*Ligustrum sinense*					<80mm cut & painted; >80mm will be drilled/frilled with neat Glyphosate	Glyphosate 360g/L	M	Neat
Japanese Honeysuckle	*Lonicera japonica*				Environment	Scrape & painted with Glyphosate	Glyphosate 360g/L	M	Neat
Ochna	*Ochna serrulata*				Environment	Double side scrape and paint all stems to 75% coverage.	Glyphosate 360g/L	M	Neat
Paspalum	*Paspalum sp.*					Foliar spraying with Glyphosate	Glyphosate 360g/L	M	1/100
Tussock Paspalum, Blue Grass	*Paspalum quadrifarium*				Environment	Hand pulled or brush cut and foliar sprayed with Glyphosate	Glyphosate 360g/L	M	1/50
Kikuyu	*Pennisetum clandestinum*				Environment	Foliar spraying with Glyphosate	Glyphosate 360g/L	M	1/100
Poplar	*Populus sp.*					Small individuals cut and painted with neat Glyphosate. Stem inject with neat Glyphosate for mature trees.		M	
Blackberry	*Rubus fruticosus agg. (Blackberry except the varietals Chester Thornless, Dirksen Thornless, Loch Ness, Silvan, Black Satin, Murrindindi, Smooth Stem, Thornfree and Chehalem)*		Asset Protection			Brush cut, crowned and scraped & painted with neat Glyphosate	Glyphosate 360g/L	M	Neat
Senna / Cassia	*Senna pendula*				Environment	Small individuals hand removed, larger plants cut and painted with neat Glyphosate	Glyphosate 360g/L	M	Neat

Common Name	Botanical Name	WONS	State Priority Weed-Mgmt. Actions	Regional Priority Weeds-Mgmt. Actions	Other Regional Weeds-Asset/value at risk	Weeding Technique	Herbicide Application	Herbicide Group	Ratio
Pigeon Grass	*Setaria parviflora*					Foliar spraying with Glyphosate, hand pulled and brush cut	Glyphosate 360g/L	M	1/100
Tobacco Bush/ Wild Tobacco	*Solanum mauritianum*				Environment, Agriculture	Cut & paint with Glyphosate	Glyphosate 360g/L	M	Neat
Blackberry Night Shade	*Solanum nigrum*					Foliar spraying with Glyphosate, hand pulled and brush cut	Glyphosate 360g/L	M	1/100
Watsonia	*Watsonia meriana*				Environment	Hand removal of plant and corms if soil conditions suit. Foliar spraying with diluted Glyphosate. Painting with neat Glyphosate.	Glyphosate 360g/L	M	1/100 & Neat
Arum Lily	*Zantedeschia aethiopica*				Human health, Environment	Physical removal of whole plant and rhizome or cut and paint with Neat Glyphosate	Glyphosate 360g/L	M	Neat

Appendix G. Fauna Inventory

Class	Family	Scientific Name	Common Name	Exotic	BC Status	EPBC Status	Observation Type
Amphibia	Myobatrachidae	Crinia signifera	Common Eastern Froglet		P		OW
		Limnodynastes peronii	Brown-striped Frog		P		W
		Pseudophryne australis	Red-crowned Toadlet		V,P		W
Aves	Meliphagidae	Acanthorhynchus tenuirostris	Eastern Spinebill		P		W
	Accipitridae	Accipiter fasciatus	Brown Goshawk		P		O
	Megapodiidae	Alectura lathami	Australian Brush-turkey		P		O
		Anthochaera carunculata	Red Wattlebird		P		O
		Anthochaera chrysoptera	Little Wattlebird		P		O
	Cacatuidae	Cacatua galerita	Sulphur-crested Cockatoo		P		O
		Calyptorhynchus funereus	Yellow-tailed Black-Cockatoo		P		O
	Columbidae	Columba livia	Rock Dove	*			O
	Campephagidae	Coracina novaehollandiae	Black-faced Cuckoo-shrike		P		O
	Corvidae	Corvus coronoides	Australian Raven		P		W
	Artamidae	Cracticus tibicen	Australian Magpie		P		OW
	Alcedinidae	Dacelo novaeguineae	Laughing Kookaburra		P		O
	Petroicidae	Eopsaltria australis	Eastern Yellow Robin		P		O
	Psittacidae	Glossopsitta concinna	Musk Lorikeet		P		OW
	Monarchidae	Grallina cyanoleuca	Magpie-lark		P		OW
	Hirundinidae	Hirundo neoxena	Welcome Swallow		P		O
	Maluridae	Malurus cyaneus	Superb Fairy-wren		P		W
	Meliphagidae	Manorina melanocephala	Noisy Miner		P		OW

Class	Family	Scientific Name	Common Name	Exotic	BC Status	EPBC Status	Observation Type
	Meliphagidae	Meliphaga lewinii	Lewin's Honeyeater		P		OW
	Estrildidae	Neochmia temporalis	Red-browed Finch		P		OW
	Strigidae	Ninox strenua	Powerful Owl		V,P,3		OW
	Pachycephalidae	Pachycephala pectoralis	Golden Whistler		P		OW
	Pardalotidae	Pardalotus punctatus	Spotted Pardalote		P		OW
	Meliphagidae	Phylidonyris niger	White-cheeked Honeyeater		P		O
		Phylidonyris novaehollandiae	New Holland Honeyeater		P		O
	Podargidae	Podargus strigoides	Tawny Frogmouth		P		O
	Psophodidae	Psophodes olivaceus	Eastern Whipbird		P		O
	Pycnonotidae	Pycnonotus jocosus	Red-whiskered Bulbul	*			OW
	Rhipiduridae	Rhipidura leucophrys	Willie Wagtail		P		O
	Psittacidae	Trichoglossus chlorolepidotus	Scaly-breasted Lorikeet		P		OW
		Trichoglossus haematodus	Rainbow Lorikeet		P		O
	Charadriidae	Vanellus miles	Masked Lapwing		P		OW
	Timaliidae	Zosterops lateralis	Silvereye		P		OW
Mammalia	Leporidae	Oryctolagus cuniculus	Rabbit	*			O
	Perameliidae	Perameles nasuta	Long-nosed Bandicoot		P		O
	Petauridae	Petaurus breviceps	Sugar Glider		P		O
	Pseudocheiridae	Pseudocheirus peregrinus	Common Ringtail Possum		P		O
	Pteropodidae	Pteropus poliocephalus	Grey-headed Flying-fox		V,P	V	O
	Muridae	Rattus rattus	Black Rat	*			O
	Phalangeridae	Trichosurus vulpecula	Common Brushtail Possum		P		O
	Canidae	Vulpes vulpes	Fox	*			O

Class	Family	Scientific Name	Common Name	Exotic	BC Status	EPBC Status	Observation Type
	Macropodidae	Wallabia bicolor	Swamp Wallaby		P		O
Mammalia (Microbat)	Molossidae	Austronomus australis	White-striped Freetail-bat		P		AR
	Vespertilionidae	Chalinolobus dwyeri	Large-eared Pied Bat		V,P	V	AR
		Chalinolobus gouldii	Gould's Wattled Bat		P		AR
		Chalinolobus morio	Chocolate Wattled Bat		P		AR
	Miniopteridae	Miniopterus australis	Little Bent-winged Bat		V,P		AR
		Miniopterus orianae oceanensis	Large Bent-winged Bat		V		AR
	Molossidae	Mormopterus planiceps	Little Mastiff-bat		P		AR
		Mormopterus ridei	Eastern Free-tailed Bat		P		AR
	Vespertilionidae	Vespadelus regulus	Southern Forest Bat		P		AR
		Vespadelus vulturnus	Little Forest Bat		P		AR
Reptilia	Agamidae	Intellagama lesueurii	Eastern Water Dragon		P		O

BC Status: P – Protected, V – Vulnerable
EPBC Status: V – Vulnerable
Observation Type: O – Observed, W – Heard, AR – Acoustic Recording

Appendix H. Vegetation Zones Report

BAM Vegetation Zones Report

Proposal Details

Assessment Id
00020246/BAAS18019/20/00020265

Assessment name
Allambie Heights Village

BAM data last updated *
05/05/2020

Assessor Name

Report Created
19/05/2020

BAM Data version *
26

Assessor Number

Assessment Type
Part 4 Developments (General)

BAM Case Status
Open

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

Assessment Revision
0

Date Finalised
To be finalised

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	1824_Poor	1824-Coastal sandstone Heath-Mallee	Poor	0.29	1	
2	1824_Good	1824-Coastal sandstone Heath-Mallee	Good	0.34	1	
3	1783_Good	1783-Sydney North exposed sandstone woodland	Good	0.31	1	

4	1250_Good	1250-Coastal sandstone gully forest	Good	0.56	1	
5	661_Planted_Poor	661-Coastal sand littoral forest	Planted_Poor	0.19	1	
6	1231_Planted_Poor	1231-Coastal sand Swamp Mahogany forest	Planted_Poor	0.17	1	
7	1250_Moderate	1250-Coastal sandstone gully forest	Moderate	0.16	1	

Appendix I. Predicted Species Report

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00020246/BAAS18019/20/00020265	Allambie Heights Village	05/05/2020
Assessor Name	Report Created	BAM Data version *
	19/05/2020	26
Assessor Number	Assessment Type	BAM Case Status
	Part 4 Developments (General)	Open
	Assessment Revision	Date Finalised
	0	To be finalised

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

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

Common Name	Scientific Name	Vegetation Types(s)
Australasian Bittern	Botaurus poiciloptilus	1231-Coastal sand Swamp Mahogany forest
Barking Owl	Ninox connivens	1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		1231-Coastal sand Swamp Mahogany forest
Black Bittern	Ixobrychus flavicollis	1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	1783-Sydney North exposed sandstone woodland
Broad-headed Snake	Hoplocephalus bungaroides	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
Dusky Woodswallow	Artamus cyanopterus cyanopterus	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest

Dusky Woodswallow	Artamus cyanopterus cyanopterus	1231-Coastal sand Swamp Mahogany forest
Eastern Chestnut Mouse	Pseudomys gracilicaudatus	1231-Coastal sand Swamp Mahogany forest
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Eastern False Pipistrelle	Falsistrellus tasmaniensis	1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Eastern Osprey	Pandion cristatus	1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Flame Robin	Petroica phoenicea	1824-Coastal sandstone Heath-Mallee
		1250-Coastal sandstone gully forest
Gang-gang Cockatoo	Callocephalon fimbriatum	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Glossy Black-Cockatoo	Calyptorhynchus lathami	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Golden-tipped Bat	Phoniscus papuensis	1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Greater Broad-nosed Bat	Scoteanax rueppellii	1824-Coastal sandstone Heath-Mallee
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest

Grey-headed Flying-fox	Pteropus poliocephalus	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Koala	Phascolarctos cinereus	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Large Bent-winged Bat	Miniopterus orianae oceanensis	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Little Bent-winged Bat	Miniopterus australis	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Little Eagle	Hieraaetus morphnoides	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Little Lorikeet	Glossopsitta pusilla	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Masked Owl	Tyto novaehollandiae	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest

Powerful Owl	Ninox strenua	1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Regent Honeyeater	Anthochaera phrygia	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Rose-crowned Fruit-Dove	Ptilinopus regina	661-Coastal sand littoral forest
Rosenberg's Goanna	Varanus rosenbergi	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Scarlet Robin	Petroica boodang	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
Spotted Harrier	Circus assimilis	1824-Coastal sandstone Heath-Mallee
Spotted-tailed Quoll	Dasyurus maculatus	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Square-tailed Kite	Lophoictinia isura	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		1231-Coastal sand Swamp Mahogany forest
Superb Fruit-Dove	Ptilinopus superbus	661-Coastal sand littoral forest
Swift Parrot	Lathamus discolor	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest

Turquoise Parrot	Neophema pulchella	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
Varied Sittella	Daphoenositta chrysoptera	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
White-bellied Sea-Eagle	Haliaeetus leucogaster	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		1231-Coastal sand Swamp Mahogany forest
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest

Threatened species not within the area of these PCT's

Common Name	Scientific Name	Vegetation Types(s)
Yellow-bellied Glider	Petaurus australis	1250-Coastal sandstone gully forest
		1231-Coastal sand Swamp Mahogany forest

Appendix J. Candidate Species Report

BAM Candidate Species Report

Proposal Details

Assessment Id 00020246/BAAS18019/20/00020265	Proposal Name Allambie Heights Village	BAM data last updated * 05/05/2020
Assessor Name	Report Created 19/05/2020	BAM Data version * 26
Assessor Number	Assessment Type Part 4 Developments (General)	BAM Case Status Open
	Assessment Revision 0	Date Finalised To be finalised

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

List of Species Requiring Survey

Name	Presence	Survey Months
Acacia bynoeana Bynoe's Wattle	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Acacia terminalis subsp. terminalis Sunshine Wattle	No (surveyed) *Survey months are outside of the months specified in Bionet.	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Allocasuarina portuensis Nielsen Park She-oak	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Eucalyptus camfieldii Camfield's Stringybark	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Callistemon linearifolius Netted Bottle Brush	No (surveyed) *Survey months are outside of the months specified in Bionet.	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Haloragodendron lucasii Haloragodendron lucasii	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Heleioporus australiacus Giant Burrowing Frog	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Cercartetus nanus Eastern Pygmy-possum	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Hibbertia puberula Hibbertia puberula	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern)	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Chalinolobus dwyeri Large-eared Pied Bat	Yes (surveyed) *Survey months are outside of the months specified in Bionet.	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Cryptostylis hunteriana Leafless Tongue Orchid	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Darwinia biflora Darwinia biflora	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Darwinia glaucophylla Darwinia glaucophylla	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Darwinia peduncularis Darwinia peduncularis	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Grammitis stenophylla Narrow-leaf Finger Fern	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Kunzea rupestris Kunzea rupestris	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Leptospermum deanei Leptospermum deanei	No (surveyed) *Survey months are outside of the months specified in Bionet.	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Litoria aurea Green and Golden Bell Frog	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Litoria brevipalmata Green-thighed Frog	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Melaleuca biconvexa Biconvex Paperbark	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Melaleuca groveana Grove's Paperbark	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Micromyrtus blakelyi Micromyrtus blakelyi	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Myotis macropus Southern Myotis	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Persoonia hirsuta Hairy Geebung	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Persoonia mollis subsp. maxima Persoonia mollis subsp. maxima	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Petaurus norfolcensis Squirrel Glider	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Potorous tridactylus Long-nosed Potoroo	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Pseudophryne australis Red-crowned Toadlet	Yes (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Syzygium paniculatum Magenta Lilly Pilly	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Tetratheca glandulosa Tetratheca glandulosa	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Genoplesium baueri Bauer's Midge Orchid	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Phascolarctos cinereus - endangered population Koala in the Pittwater Local Government Area	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Rhodamnia rubescens Scrub Turpentine	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Rhodomyrtus psidioides Native Guava	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

List of Species Not On Site

Name
Ancistrachne maidenii Ancistrachne maidenii
Asterolasia elegans Asterolasia elegans
Astrotricha crassifolia Thick-leaf Star-hair
Caladenia tessellata Thick Lip Spider Orchid

Calyptorhynchus lathami Glossy Black-Cockatoo
Camarophyllopsis kearneyi Camarophyllopsis kearneyi
Hibbertia procumbens Spreading Guinea Flower
Genoplesium plumosum Tallong Midge Orchid
Grevillea shiressii Grevillea shiressii
Hoplocephalus bungaroides Broad-headed Snake
Hygrocybe anomala var. ianthinomarginata Hygrocybe anomala var. ianthinomarginata
Hygrocybe aurantipes Hygrocybe aurantipes
Hygrocybe austropratensis Hygrocybe austropratensis
Hygrocybe collucera Hygrocybe collucera
Hygrocybe griseoramosa Hygrocybe griseoramosa
Hygrocybe lanecovensis Hygrocybe lanecovensis
Hygrocybe reesiae Hygrocybe reesiae
Lasiopetalum joyceae Lasiopetalum joyceae
Lathamus discolor Swift Parrot
Lophoictinia isura Square-tailed Kite
Melaleuca deanei Deane's Paperbark
Miniopterus australis Little Bent-winged Bat
Miniopterus orianae oceanensis Large Bent-winged Bat
Ninox connivens Barking Owl
Ninox strenua Powerful Owl
Pandion cristatus Eastern Osprey
Phascolarctos cinereus Koala
Prostanthera junonis Somersby Mintbush
Pteropus poliocephalus Grey-headed Flying-fox
Tyto novaehollandiae Masked Owl
Anthochaera phrygia Regent Honeyeater
Hygrocybe rubronivea Hygrocybe rubronivea

Callocephalon fimbriatum Gang-gang Cockatoo
Diuris bracteata Diuris bracteata
Hieraaetus morphnoides Little Eagle
Wahlenbergia multicaulis - endangered population Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield
Hibbertia spanantha Julian's Hibbertia
Pommerhelix duralensis Dural Land Snail
Haliaeetus leucogaster White-bellied Sea-Eagle
Acacia prominens - endangered population Gosford Wattle, Hurstville and Kogarah Local Government Areas
Callocephalon fimbriatum - endangered population Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas
Perameles nasuta - endangered population Long-nosed Bandicoot, North Head
Petaurus norfolcensis - endangered population Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill

Appendix K. Credit Summary Report

BAM Credit Summary Report

Proposal Details

Assessment Id
00020246/BAAS18019/20/00020265

Proposal Name
Allambie Heights Village

BAM data last updated *
05/05/2020

Assessor Name

Report Created
19/05/2020

BAM Data version *
26

Assessor Number

BAM Case Status
Open

Date Finalised
To be finalised

Assessment Revision
0

Assessment Type
Part 4 Developments (General)

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

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

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Coastal sand littoral forest								
5	661_Planted_Poor	23.3	0.2	0.25	High Sensitivity to Potential Gain	1.75		2
							Subtotal	**2**

Coastal sand Swamp Mahogany forest								
6	1231_Planted_Poor	25.9	0.2	0.25	High Sensitivity to Potential Gain	1.75		2
							Subtotal	**2**
Coastal sandstone gully forest								
4	1250_Good	3.0	0.6	0.25	High Sensitivity to Potential Gain	1.50		1
7	1250_Moderate	17.9	0.2	0.25	High Sensitivity to Potential Gain	1.50		1
							Subtotal	**2**
Coastal sandstone Heath-Mallee								
1	1824_Poor	46.3	0.3	0.25	High Sensitivity to Potential Gain	1.50		5
2	1824_Good	0.0	0.3	0.25	High Sensitivity to Potential Gain	1.50		1
							Subtotal	**6**
Sydney North exposed sandstone woodland								
3	1783_Good	0.0	0.3	0.25	High Sensitivity to Potential Gain	1.50		1
							Subtotal	**1**
							Total	**13**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Potential SAII	Species credits
Cercartetus nanus / Eastern Pygmy-possum (Fauna)						
1824_Poor	46.3	0.29	0.25	2	False	7

1824_Good	0.0	0.34	0.25	2	False	0
1783_Good	0.0	0.31	0.25	2	False	0
1250_Good	3.0	0.56	0.25	2	False	1
1250_Moderate	17.9	0.16	0.25	2	False	1
					Subtotal	**9**
Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)						
1824_Poor	46.3	0.29	0.25	3	True	10
1824_Good	0.0	0.34	0.25	3	True	0
1783_Good	0.0	0.31	0.25	3	True	0
1250_Good	3.0	0.56	0.25	3	True	1
661_Planted_Poor	23.3	0.19	0.25	3	True	3
1231_Planted_Poor	25.9	0.17	0.25	3	True	3
1250_Moderate	17.9	0.16	0.25	3	True	2
					Subtotal	**19**
Cryptostylis hunteriana / Leafless Tongue Orchid (Flora)						
1824_Poor	46.3	0.29	0.25	1.5	False	5
1824_Good	0.0	0.34	0.25	1.5	False	0
1783_Good	0.0	0.31	0.25	1.5	False	0
1250_Good	3.0	0.56	0.25	1.5	False	1
1250_Moderate	17.9	0.16	0.25	1.5	False	1
					Subtotal	**7**

Hibbertia puberula / Hibbertia puberula (Flora)						
1824_Poor	46.3	0.29	0.25	2	False	7
1824_Good	0.0	0.34	0.25	2	False	0
1783_Good	0.0	0.31	0.25	2	False	0
1250_Good	3.0	0.56	0.25	2	False	1
1250_Moderate	17.9	0.16	0.25	2	False	1
					Subtotal	**9**
Pseudophryne australis / Red-crowned Toadlet (Fauna)						
1824_Good	0.0	0.01	0.25	1.5	False	0
1783_Good	0.0	0.01	0.25	1.5	False	0
1250_Good	3.0	0.13	0.25	1.5	False	0
661_Planted_Poor	23.3	0.05	0.25	1.5	False	0
1250_Moderate	17.9	0.03	0.25	1.5	False	0
					Subtotal	**0**
Tetratheca glandulosa / Tetratheca glandulosa (Flora)						
1824_Poor	46.3	0.29	0.25	2	False	7
1824_Good	0.0	0.34	0.25	2	False	0
1783_Good	0.0	0.31	0.25	2	False	0
1250_Good	3.0	0.56	0.25	2	False	1
1250_Moderate	17.9	0.16	0.25	2	False	1
					Subtotal	**9**

Appendix L. Biodiversity Credit Report (Like for Like)

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00020246/BAAS18019/20/00020265

Proposal Name
Allambie Heights Village

BAM data last updated *
05/05/2020

Assessor Name

Assessor Number

BAM Data version *
26

Proponent Names

Report Created
19/05/2020

BAM Case Status
Open

Assessment Revision
0

Assessment Type
Part 4 Developments (General)

Date Finalised
To be finalised

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

Potential Serious and Irreversible Impacts

Nil

Species
Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat

Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Predicted Threatened Species Not On Site

Name
Petaurus australis / Yellow-bellied Glider

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	Number of credits to be retired
1824-Coastal sandstone Heath-Mallee	Not a TEC	0.6	6.00
1783-Sydney North exposed sandstone woodland	Not a TEC	0.3	1.00
1250-Coastal sandstone gully forest	Not a TEC	0.7	2.00
661-Coastal sand littoral forest	Not a TEC	0.2	2.00
1231-Coastal sand Swamp Mahogany forest	Not a TEC	0.2	2.00

661-Coastal sand littoral forest	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region

	North Coast Wet Sclerophyll Forests This includes PCT's: 661, 686, 694, 1217, 1237, 1244, 1285, 1504, 1841, 1843, 1915	North Coast Wet Sclerophyll Forests >=50% and <70%	Yes	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1231-Coastal sand Swamp Mahogany forest	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region
	Coastal Swamp Forests This includes PCT's: 839, 1064, 1227, 1230, 1231, 1232, 1716, 1717, 1718, 1719, 1723, 1730, 1731, 1795, 1798	Coastal Swamp Forests >=50% and <70%	Yes	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1250-Coastal sandstone gully forest	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region

	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	Yes	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1783-Sydney North exposed sandstone woodland	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region
	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	No	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1824-Coastal sandstone Heath-Mallee	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region

	Sydney Coastal Heaths This includes PCT's: 772, 881, 882, 1134, 1143, 1641, 1822, 1823, 1824, 1826	Sydney Coastal Heaths <50%	Yes	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Area	Credits
Cercartetus nanus / Eastern Pygmy-possum	1.7	9.00
Chalinolobus dwyeri / Large-eared Pied Bat	2.0	19.00
Cryptostylis hunteriana / Leafless Tongue Orchid	1.7	7.00
Hibbertia puberula / Hibbertia puberula	1.7	9.00
Pseudophryne australis / Red-crowned Toadlet	0.2	0.00
Tetratheca glandulosa / Tetratheca glandulosa	1.7	9.00

Cercartetus nanus/ Eastern Pygmy-possum	1250_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Cercartetus nanus/Eastern Pygmy-possum	Any in NSW

Cercartetus nanus/ Eastern Pygmy-possum	1250_Good	
	1250_Moderate	**Like-for-like credit retirement options**
		Spp / IBRA region
		Cercartetus nanus/Eastern Pygmy-possum / Any in NSW
	1783_Good	**Like-for-like credit retirement options**
		Spp / IBRA region
		Cercartetus nanus/Eastern Pygmy-possum / Any in NSW
	1824_Good	**Like-for-like credit retirement options**
		Spp / IBRA region
		Cercartetus nanus/Eastern Pygmy-possum / Any in NSW

Cercartetus nanus/ Eastern Pygmy-possum	1824_Poor	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Cercartetus nanus/Eastern Pygmy-possum	Any in NSW
Chalinolobus dwyeri/ Large-eared Pied Bat	1231_Planted_Poor	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW
	1250_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW
	1250_Moderate	**Like-for-like credit retirement options**	
		Spp	IBRA region

		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW
	1783_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW
	1824_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW
	1824_Poor	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW

	661_Planted_Poor	**Like-for-like credit retirement options**
		Spp / IBRA region
		Chalinolobus dwyeri/Large-eared Pied Bat / Any in NSW
Cryptostylis hunteriana/ Leafless Tongue Orchid	1250_Good	**Like-for-like credit retirement options**
		Spp / IBRA region
		Cryptostylis hunteriana/Leafless Tongue Orchid / Any in NSW
	1250_Moderate	**Like-for-like credit retirement options**
		Spp / IBRA region
		Cryptostylis hunteriana/Leafless Tongue Orchid / Any in NSW
	1783_Good	**Like-for-like credit retirement options**
		Spp / IBRA region

		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW
	1824_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW
	1824_Poor	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW
Hibbertia puberula/ Hibbertia puberula	1250_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Hibbertia puberula/Hibbertia puberula	Any in NSW

Hibbertia puberula/ Hibbertia puberula	1250_Good		
	1250_Moderate	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Hibbertia puberula/Hibbertia puberula	Any in NSW
	1783_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Hibbertia puberula/Hibbertia puberula	Any in NSW
	1824_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Hibbertia puberula/Hibbertia puberula	Any in NSW
	1824_Poor	**Like-for-like credit retirement options**	

		Spp	IBRA region
		Hibbertia puberula/Hibbertia puberula	Any in NSW
Pseudophryne australis/ Red-crowned Toadlet	1250_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW
	1250_Moderate	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW
	1783_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW

Pseudophryne australis/ Red-crowned Toadlet	1783_Good	
	1824_Good	**Like-for-like credit retirement options**
		Spp / IBRA region
		Pseudophryne australis/Red-crowned Toadlet / Any in NSW
	661_Planted_Poor	**Like-for-like credit retirement options**
		Spp / IBRA region
		Pseudophryne australis/Red-crowned Toadlet / Any in NSW
Tetratheca glandulosa/ Tetratheca glandulosa	1250_Good	**Like-for-like credit retirement options**
		Spp / IBRA region
		Tetratheca glandulosa/Tetratheca glandulosa / Any in NSW

Tetratheca glandulosa/ Tetratheca glandulosa	1250_Moderate	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW
	1783_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW
	1824_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW
	1824_Poor	**Like-for-like credit retirement options**	
		Spp	IBRA region

		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW

Appendix M. Biodiversity Credit Report (Variation Options)

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00020246/BAAS18019/20/00020265	Allambie Heights Village	05/05/2020
Assessor Name	Assessor Number	BAM Data version *
		26
Proponent Name(s)	Report Created	BAM Case Status
	19/05/2020	Open
Assessment Revision	Assessment Type	Date Finalised
0	Part 4 Developments (General)	To be finalised

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

Potential Serious and Irreversible Impacts

Nil

Species
Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat

Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Predicted Threatened Species Not On Site

Name
Petaurus australis / Yellow-bellied Glider

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	Number of credits to be retired
1824-Coastal sandstone Heath-Mallee	Not a TEC	0.6	6.00
1783-Sydney North exposed sandstone woodland	Not a TEC	0.3	1.00
1250-Coastal sandstone gully forest	Not a TEC	0.7	2.00
661-Coastal sand littoral forest	Not a TEC	0.2	2.00
1231-Coastal sand Swamp Mahogany forest	Not a TEC	0.2	2.00

661-Coastal sand littoral forest	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region

	North Coast Wet Sclerophyll Forests This includes PCT's: 661, 686, 694, 1217, 1237, 1244, 1285, 1504, 1841, 1843, 1915	North Coast Wet Sclerophyll Forests >=50% and <70%	Yes	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options			
	Formation	Trading group	HBT	IBRA region
	Wet Sclerophyll Forests (Shrubby sub-formation)	Tier 6 or higher	Yes (including artificial)	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1231-Coastal sand Swamp Mahogany forest	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region
	Coastal Swamp Forests This includes PCT's: 839, 1064, 1227, 1230, 1231, 1232, 1716, 1717, 1718, 1719, 1723, 1730, 1731, 1795, 1798	Coastal Swamp Forests >=50% and <70%	Yes	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options			
	Formation	Trading group	HBT	IBRA region

	Forested Wetlands	Tier 6 or higher	Yes (including artificial)	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1250-Coastal sandstone gully forest	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region
	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	Yes	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options			
	Formation	Trading group	HBT	IBRA region
	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 7 or higher	Yes (including artificial)	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1783-Sydney North exposed sandstone woodland	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region

	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	No	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options			
	Formation	Trading group	HBT	IBRA region
	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 7 or higher	No	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1824-Coastal sandstone Heath-Mallee	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region
	Sydney Coastal Heaths This includes PCT's: 772, 881, 882, 1134, 1143, 1641, 1822, 1823, 1824, 1826	Sydney Coastal Heaths <50%	Yes	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options			
	Formation	Trading group	HBT	IBRA region

	Heathlands	Tier 7 or higher	Yes (including artificial)	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Area	Credits
Cercartetus nanus / Eastern Pygmy-possum	1.7	9.00
Chalinolobus dwyeri / Large-eared Pied Bat	2.0	19.00
Cryptostylis hunteriana / Leafless Tongue Orchid	1.7	7.00
Hibbertia puberula / Hibbertia puberula	1.7	9.00
Pseudophryne australis / Red-crowned Toadlet	0.2	0.00
Tetratheca glandulosa / Tetratheca glandulosa	1.7	9.00

Cercartetus nanus/ Eastern Pygmy-possum	1250_Good	**Like-for-like options**		
		Spp	IBRA region	
		Cercartetus nanus/Eastern Pygmy-possum	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1250_Moderate	**Like-for-like options**		
		Spp	IBRA region	
		Cercartetus nanus/Eastern Pygmy-possum	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1783_Good	**Like-for-like options**		
		Spp	IBRA region	
		Cercartetus nanus/Eastern Pygmy-possum	Any in NSW	

		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Good	**Like-for-like options**		
		Spp	IBRA region	
		Cercartetus nanus/Eastern Pygmy-possum	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Poor	**Like-for-like options**		
		Spp	IBRA region	
		Cercartetus nanus/Eastern Pygmy-possum	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Chalinolobus dwyeri/ Large-eared Pied Bat	1231_Planted_Poor	**Like-for-like options**		
		Spp	IBRA region	
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	

<table>
<tr><td rowspan="6">Chalinolobus dwyeri/ Large-eared Pied Bat</td><td rowspan="3">1231_Planted_Poor</td><td colspan="3">Variation options</td></tr>
<tr><td>Kingdom</td><td>Any species with same or higher category of listing under Part 4 of the BC Act shown below</td><td>IBRA region</td></tr>
<tr><td>Fauna</td><td>Vulnerable</td><td>Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.
or
Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</td></tr>
<tr><td rowspan="5">1250_Good</td><td colspan="3">Like-for-like options</td></tr>
<tr><td colspan="2">Spp</td><td>IBRA region</td></tr>
<tr><td colspan="2">Chalinolobus dwyeri/Large-eared Pied Bat</td><td>Any in NSW</td></tr>
<tr><td colspan="3">Variation options</td></tr>
<tr><td>Kingdom</td><td>Any species with same or higher category of listing under Part 4 of the BC Act shown below</td><td>IBRA region</td></tr>
</table>

		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1250_Moderate	**Like-for-like options**		
		Spp	IBRA region	
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1783_Good	**Like-for-like options**		
		Spp	IBRA region	
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	

		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Good	**Like-for-like options**		
		Spp	IBRA region	
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Poor	**Like-for-like options**		
		Spp	IBRA region	
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	661_Planted_Poor	**Like-for-like options**		
		Spp	IBRA region	
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	

		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Cryptostylis hunteriana/ Leafless Tongue Orchid	1250_Good	**Like-for-like options**		
		Spp	IBRA region	
		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1250_Moderate	**Like-for-like options**		
		Spp	IBRA region	
		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1783_Good	**Like-for-like options**		
		Spp	IBRA region	
		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW	

		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Good	**Like-for-like options**		
		Spp	IBRA region	
		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Poor	**Like-for-like options**		
		Spp	IBRA region	
		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Hibbertia puberula/ Hibbertia puberula	1250_Good	**Like-for-like options**		
		Spp	IBRA region	
		Hibbertia puberula/Hibbertia puberula	Any in NSW	

Hibbertia puberula/ Hibbertia puberula	1250_Good	**Variation options**		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Endangered	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1250_Moderate	**Like-for-like options**		
		Spp	IBRA region	
		Hibbertia puberula/Hibbertia puberula	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Flora	Endangered	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1783_Good	**Like-for-like options**		
		Spp	IBRA region	
		Hibbertia puberula/Hibbertia puberula	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Endangered	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Good	**Like-for-like options**		
		Spp	IBRA region	
		Hibbertia puberula/Hibbertia puberula	Any in NSW	

		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Endangered	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Poor	**Like-for-like options**		
		Spp	IBRA region	
		Hibbertia puberula/Hibbertia puberula	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Flora	Endangered	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Pseudophryne australis/ Red-crowned Toadlet	1250_Good	**Like-for-like options**		
		Spp	IBRA region	
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1250_Moderate	**Like-for-like options**		
		Spp	IBRA region	
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW	

Pseudophryne australis/ Red-crowned Toadlet	1250_Moderate	**Variation options**		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1783_Good	**Like-for-like options**		
		Spp	IBRA region	
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Good	**Like-for-like options**		
		Spp	IBRA region	
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	661_Planted_Poor	**Like-for-like options**		
		Spp	IBRA region	
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW	

		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Tetratheca glandulosa/ Tetratheca glandulosa	1250_Good	**Like-for-like options**		
		Spp	IBRA region	
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1250_Moderate	**Like-for-like options**		
		Spp	IBRA region	
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1783_Good	**Like-for-like options**		
		Spp	IBRA region	
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW	

		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Good	**Like-for-like options**		
		Spp	IBRA region	
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Poor	**Like-for-like options**		
		Spp	IBRA region	
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Appendix N. Biodiversity Offset Payment Calculator

Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00020246/BAAS18019/20/00020265	63	0	19/05/2020

Assessor Name	Assessor Number	Proposal Name	BAM Case Status
		Allambie Heights Village	Open

Assessment Type	Date Finalised
Part 4 Developments (General)	To be finalised

PCT list

Price calculated	PCT common name	Credits
Yes	**1824 -** Coastal sandstone Heath-Mallee	6
Yes	**1783 -** Sydney North exposed sandstone woodland	1
Yes	**1250 -** Coastal sandstone gully forest	2
Yes	**661 -** Coastal sand littoral forest	2
Yes	**1231 -** Coastal sand Swamp Mahogany forest	2

Species list

Price calculated	Species	Credits
Yes	***Cercartetus nanus*** (Eastern Pygmy-possum)	9
Yes	***Chalinolobus dwyeri*** (Large-eared Pied Bat)	19
Yes	***Cryptostylis hunteriana*** (Leafless Tongue Orchid)	7
Yes	***Hibbertia puberula*** (Hibbertia puberula)	9

Yes	***Pseudophryne australis*** (Red-crowned Toadlet)	0
Yes	***Tetratheca glandulosa*** (Tetratheca glandulosa)	9

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

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Pittwater	**1824 -** Coastal sandstone Heath-Mallee	No	Sydney Coastal Heaths <50%	19.73%	$246.90	1.4383	$7,637.10	6	$45,822.61
Pittwater	**1783 -** Sydney North exposed sandstone woodland	No	Sydney Coastal Dry Sclerophyll Forests <50%	19.73%	$346.38	1.7779	$ 10,714.30	1	$10,714.30
Pittwater	**1250 -** Coastal sandstone gully forest	No	Sydney Coastal Dry Sclerophyll Forests <50%	19.73%	$346.38	1.7779	$ 10,714.30	2	$21,428.61
Pittwater	**661 -** Coastal sand littoral forest	No	North Coast Wet Sclerophyll Forests >=50% and <70%	19.73%	$515.88	1.8251	$ 15,957.53	2	$31,915.05
Pittwater	**1231 -** Coastal sand Swamp Mahogany forest	No	Coastal Swamp Forests >=50% and <70%	19.73%	$283.70	2.0773	$8,775.51	2	$17,551.01

Subtotal (excl. GST) **$127,431.58**

	GST	**$12,743.16**
	Total ecosystem credits (incl. GST)	**$140,174.74**

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10155	***Cercartetus nanus*** (Eastern Pygmy-possum)		$636.69	34.3100%	$80.00	9	$8,416.25
10157	***Chalinolobus dwyeri*** (Large-eared Pied Bat)		$741.31	34.3100%	$80.00	19	$20,437.42
10187	***Cryptostylis hunteriana*** (Leafless Tongue Orchid)		$150.00	34.3100%	$80.00	7	$1,970.26
10402	***Hibbertia puberula*** (Hibbertia puberula)		$494.42	34.3100%	$80.00	9	$6,696.50
10692	***Pseudophryne australis*** (Red-crowned Toadlet)		$447.26	34.3100%	$80.00	0	Contact BCT for pricing
10798	***Tetratheca glandulosa*** (Tetratheca glandulosa)		$79.38	34.3100%	$80.00	9	$1,679.54

	Subtotal (excl. GST)	**$39,199.97**
	GST	**$3,920.00**

Total species credits (incl. GST)	**$43,119.97**

Grand total	**$183,294.71**

Appendix O. Phytophthora Hygiene Protocols

Task	Action
Timing	When possible/practical, the development should be completed in dry soil conditions and postponed following significant rainfall. Working in dry soil conditions will reduce the need for cleaning vehicles and equipment. If it is necessary to work in wet or damp areas then greater attention will need to be spent on vehicle and equipment cleaning.
Staff	Contractors and staff involved in the development are to be made aware that fungus has / has not been recorded on site, and provided with information regarding management protocols and its threat to native vegetation.
Drainage and Water	Alterations to drainage that may result in the spread of *Phytophthora* into new areas are to be avoided as highest priority. Water used during construction should be minimised. When water is necessary, it should be from a reticulated mains system, bore supply or sterilised source. Surface water collected from infected areas should not be used. Water draining from the site should not to enter bushland areas. The use of water for dust suppression should be kept to a minimum.
Landscaping and Bush Regeneration	Plants used in landscaping should be purchased from a nursery with accreditation from the Nursery Industry Association, or from a nursery with excellent hygiene conditions. Species selected for landscaping should preferably be resistant to *Phytophthora cinnamomi*. Any gravel/sand/topsoil to be bought onto site should be purchased from a Nursery Industry Association accredited supplier, or should be certified (through testing) to be free of *Phytophthora cinnamomi*. Any infected soil/sand/gravel/vegetation moved on the site, or removed from the site should be stored at in area that is also infected with *Phytophthora cinnamomi*, or a site where the pathogen will not have any impact. Storage of gravel/sand/topsoil on site should preferably be on a dry well drained surface. Construction materials such as pipes, rocks, timber, bricks etc, should be free of mud and soil when arriving at the site. Staff should not enter infected areas unless necessary, movement within these areas should be kept to a minimum.
Vehicles and Machinery	All machinery, vehicles and equipment should arrive at the site free of uncontained mud and soil, particularly on tyres, mudflaps and the underbody. Vehicles and machinery exiting the site to be free of all uncontained mud and soil, particularly on the tyres, mudflaps and the underbody. Minimise the amount of water used. Try to remove soil and mud when it is dry (a stiff brush or stick maybe useful). Cleaning will be easier and more effective if it is completed at a depot or a permanent/designated cleaning area (it is acceptable for vehicles and machinery to be taken to a cleaning facility on sealed roads). If cleaning is to occur in the field select a site with a hard, well-drained surface (eg. a road) that is well away from remnant vegetation. If possible, wash down in an area that is close to the area you have been operating in. Wash down on ramps if possible. Do not allow mud and wash-down effluent to drain into bushland. Do not drive through wash-down effluent.
Footwear and Tools	Try to remove as much mud and soil as possible when it is dry with a stiff brush or stick. Minimise the amount of water used to initially clean footwear and tools. Footwear and tools should be scrubbed with a sterile solution (see below). All mud and soil should be collected (including in liquid) and removed in a bag or bucket. This material is to be disposed of at a site that is already infected with Cinnamon Fungus, or a site that contains no bushland.
Sterilising	Equipment can be sterilised by soaking in a disinfectant such as bleach (containing sodium hypochlorite). The bleach should be diluted (1 part bleach to 10 parts water), soak the tools for a few minutes, and then rinse. Alternatively methylated spirits can also be used for sterilising small hand tools and footwear in the field. A spray bottle containing methylated spirits can be used to cover all surfaces, allowing time for it to soak into all soil material (a couple of minutes is sufficient). A sterile water solution suitable for spraying down vehicles and machinery can be made by mixing 6mL of sodium hypochlorite (eg. pool chlorine or bleach) to every 10L of water.

Appendix P. Addendum 1

Finalisation of BAM Calculations

The calculations were not able to be finalised within the calculator at the time the BDAR was written due to internal errors within the calculator. The calculations were finalised on the 24th September 2020 and submitted to the consent authority. Due to the delay between the BDAR being written and the calculations being submitted there were two minor changes in the BAM calculator output from the original case.

The first change was the inclusion of the Maroubra Woodland Snail (*Meridolum maryae*) as a candidate species. The Maroubra Woodland Snail was listed as endangered under the BC Act 2016 in May 2020 and the BAM calculator has since been updated to include this species. The species was excluded as a candidate species as suitable habitat is not present on the site. The Final Determination 2020 states that the species is most commonly found on heathland on foredunes and on podsolised dunes/sand plains that support taller heath communities including the critically endangered ecological community Eastern Suburbs Banksia Scrub.

No further alterations were made to the original calculations, however a second change was observed. Namely the development is now required to retire three credits for Red-crowned Toadlets, where previously the BAM calculator had generated zero credits. The updated output reports from the BAM calculator are provided in Addendum Attachment 1 to Addendum Attachment 7.

Addendum Attachment 1. Vegetation Zones Report – September 2020

BAM Vegetation Zones Report

Proposal Details

Assessment Id
00020246/BAAS18019/20/00020265

Assessment name
Allambie Heights Village

BAM data last updated *
20/08/2020

Assessor Name

Report Created
25/09/2020

BAM Data version *
30

Assessor Number

Assessment Type
Part 4 Developments (General)

BAM Case Status
Finalised

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

Assessment Revision
0

Date Finalised
24/09/2020

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	1824_Poor	1824-Coastal sandstone Heath-Mallee	Poor	0.29	1	
2	1824_Good	1824-Coastal sandstone Heath-Mallee	Good	0.34	1	
3	1783_Good	1783-Sydney North exposed sandstone woodland	Good	0.31	1	

4	1250_Good	1250-Coastal sandstone gully forest	Good	0.56	1	
5	661_Planted_Poor	661-Coastal sand littoral forest	Planted_Poor	0.19	1	
6	1231_Planted_Poor	1231-Coastal sand Swamp Mahogany forest	Planted_Poor	0.17	1	
7	1250_Moderate	1250-Coastal sandstone gully forest	Moderate	0.16	1	

Addendum Attachment 2. Predicted Species Report – September 2020

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00020246/BAAS18019/20/00020265	Allambie Heights Village	20/08/2020
Assessor Name	Report Created	BAM Data version *
	25/09/2020	30
Assessor Number	Assessment Type	BAM Case Status
	Part 4 Developments (General)	Finalised
	Assessment Revision	Date Finalised
	0	24/09/2020

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

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

Common Name	Scientific Name	Vegetation Types(s)
Australasian Bittern	Botaurus poiciloptilus	1231-Coastal sand Swamp Mahogany forest
Barking Owl	Ninox connivens	1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		1231-Coastal sand Swamp Mahogany forest
Black Bittern	Ixobrychus flavicollis	1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	1783-Sydney North exposed sandstone woodland
Broad-headed Snake	Hoplocephalus bungaroides	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
Dusky Woodswallow	Artamus cyanopterus cyanopterus	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest

Dusky Woodswallow	Artamus cyanopterus cyanopterus	1231-Coastal sand Swamp Mahogany forest
Eastern Chestnut Mouse	Pseudomys gracilicaudatus	1231-Coastal sand Swamp Mahogany forest
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Eastern False Pipistrelle	Falsistrellus tasmaniensis	1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Eastern Osprey	Pandion cristatus	1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Flame Robin	Petroica phoenicea	1824-Coastal sandstone Heath-Mallee
		1250-Coastal sandstone gully forest
Gang-gang Cockatoo	Callocephalon fimbriatum	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Glossy Black-Cockatoo	Calyptorhynchus lathami	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Golden-tipped Bat	Phoniscus papuensis	1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Greater Broad-nosed Bat	Scoteanax rueppellii	1824-Coastal sandstone Heath-Mallee
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest

Grey-headed Flying-fox	Pteropus poliocephalus	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Koala	Phascolarctos cinereus	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Large Bent-winged Bat	Miniopterus orianae oceanensis	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Little Bent-winged Bat	Miniopterus australis	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Little Eagle	Hieraaetus morphnoides	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Little Lorikeet	Glossopsitta pusilla	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Masked Owl	Tyto novaehollandiae	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest

Powerful Owl	Ninox strenua	1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Regent Honeyeater	Anthochaera phrygia	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Rose-crowned Fruit-Dove	Ptilinopus regina	661-Coastal sand littoral forest
Rosenberg's Goanna	Varanus rosenbergi	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Scarlet Robin	Petroica boodang	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
Spotted Harrier	Circus assimilis	1824-Coastal sandstone Heath-Mallee
Spotted-tailed Quoll	Dasyurus maculatus	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
Square-tailed Kite	Lophoictinia isura	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		1231-Coastal sand Swamp Mahogany forest
Superb Fruit-Dove	Ptilinopus superbus	661-Coastal sand littoral forest
Swift Parrot	Lathamus discolor	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest

Turquoise Parrot	Neophema pulchella	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
Varied Sittella	Daphoenositta chrysoptera	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest
White-bellied Sea-Eagle	Haliaeetus leucogaster	1824-Coastal sandstone Heath-Mallee
		1783-Sydney North exposed sandstone woodland
		1250-Coastal sandstone gully forest
		1231-Coastal sand Swamp Mahogany forest
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	1250-Coastal sandstone gully forest
		661-Coastal sand littoral forest
		1231-Coastal sand Swamp Mahogany forest

Threatened species not within the area of these PCT's

Common Name	Scientific Name	Vegetation Types(s)
Yellow-bellied Glider	Petaurus australis	1250-Coastal sandstone gully forest
		1231-Coastal sand Swamp Mahogany forest

Addendum Attachment 3. Candidate Species Report – September 2020

BAM Candidate Species Report

Proposal Details

Assessment Id 00020246/BAAS18019/20/00020265	Proposal Name Allambie Heights Village	BAM data last updated * 20/08/2020
Assessor Name	Report Created 25/09/2020	BAM Data version * 30
Assessor Number	Assessment Type Part 4 Developments (General)	BAM Case Status Finalised
	Assessment Revision 0	Date Finalised 24/09/2020

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

List of Species Requiring Survey

Name	Presence	Survey Months
Acacia bynoeana Bynoe's Wattle	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Acacia terminalis subsp. terminalis Sunshine Wattle	No (surveyed) *Survey months are outside of the months specified in Bionet.	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Allocasuarina portuensis Nielsen Park She-oak	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Eucalyptus camfieldii Camfield's Stringybark	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Callistemon linearifolius Netted Bottle Brush	No (surveyed) *Survey months are outside of the months specified in Bionet.	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Haloragodendron lucasii Haloragodendron lucasii	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Heleioporus australiacus Giant Burrowing Frog	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Cercartetus nanus Eastern Pygmy-possum	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Hibbertia puberula Hibbertia puberula	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern)	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Chalinolobus dwyeri Large-eared Pied Bat	Yes (surveyed) *Survey months are outside of the months specified in Bionet.	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Cryptostylis hunteriana Leafless Tongue Orchid	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Darwinia biflora Darwinia biflora	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Darwinia glaucophylla Darwinia glaucophylla	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Darwinia peduncularis Darwinia peduncularis	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Grammitis stenophylla Narrow-leaf Finger Fern	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Kunzea rupestris Kunzea rupestris	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Leptospermum deanei Leptospermum deanei	No (surveyed) *Survey months are outside of the months specified in Bionet.	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Litoria aurea Green and Golden Bell Frog	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Litoria brevipalmata Green-thighed Frog	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Melaleuca biconvexa Biconvex Paperbark	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Melaleuca groveana Grove's Paperbark	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Micromyrtus blakelyi Micromyrtus blakelyi	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Myotis macropus Southern Myotis	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Persoonia hirsuta Hairy Geebung	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Persoonia mollis subsp. maxima Persoonia mollis subsp. maxima	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Petaurus norfolcensis Squirrel Glider	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Potorous tridactylus Long-nosed Potoroo	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Pseudophryne australis Red-crowned Toadlet	Yes (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Syzygium paniculatum Magenta Lilly Pilly	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Tetratheca glandulosa Tetratheca glandulosa	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Genoplesium baueri Bauer's Midge Orchid	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Phascolarctos cinereus - endangered population Koala in the Pittwater Local Government Area	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Rhodamnia rubescens Scrub Turpentine	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Rhodomyrtus psidioides Native Guava	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

List of Species Not On Site

Name
Ancistrachne maidenii Ancistrachne maidenii
Asterolasia elegans Asterolasia elegans
Astrotricha crassifolia Thick-leaf Star-hair
Caladenia tessellata Thick Lip Spider Orchid

Calyptorhynchus lathami Glossy Black-Cockatoo
Camarophyllopsis kearneyi Camarophyllopsis kearneyi
Hibbertia procumbens Spreading Guinea Flower
Genoplesium plumosum Tallong Midge Orchid
Grevillea shiressii Grevillea shiressii
Hoplocephalus bungaroides Broad-headed Snake
Hygrocybe anomala var. ianthinomarginata Hygrocybe anomala var. ianthinomarginata
Hygrocybe aurantipes Hygrocybe aurantipes
Hygrocybe austropratensis Hygrocybe austropratensis
Hygrocybe collucera Hygrocybe collucera
Hygrocybe griseoramosa Hygrocybe griseoramosa
Hygrocybe lanecovensis Hygrocybe lanecovensis
Hygrocybe reesiae Hygrocybe reesiae
Lasiopetalum joyceae Lasiopetalum joyceae
Lathamus discolor Swift Parrot
Lophoictinia isura Square-tailed Kite
Melaleuca deanei Deane's Paperbark
Miniopterus australis Little Bent-winged Bat
Miniopterus orianae oceanensis Large Bent-winged Bat
Ninox connivens Barking Owl
Ninox strenua Powerful Owl
Pandion cristatus Eastern Osprey
Phascolarctos cinereus Koala
Prostanthera junonis Somersby Mintbush
Pteropus poliocephalus Grey-headed Flying-fox
Tyto novaehollandiae Masked Owl
Anthochaera phrygia Regent Honeyeater
Hygrocybe rubronivea Hygrocybe rubronivea

Callocephalon fimbriatum Gang-gang Cockatoo
Diuris bracteata Diuris bracteata
Hieraaetus morphnoides Little Eagle
Wahlenbergia multicaulis - endangered population Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield
Hibbertia spanantha Julian's Hibbertia
Pommerhelix duralensis Dural Land Snail
Haliaeetus leucogaster White-bellied Sea-Eagle
Acacia prominens - endangered population Gosford Wattle, Hurstville and Kogarah Local Government Areas
Callocephalon fimbriatum - endangered population Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas
Perameles nasuta - endangered population Long-nosed Bandicoot, North Head
Petaurus norfolcensis - endangered population Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill
Meridolum maryae Maroubra Woodland Snail

Addendum Attachment 4. Credit Summary Report – September 2020

BAM Credit Summary Report

Proposal Details

Assessment Id
00020246/BAAS18019/20/00020265

Proposal Name
Allambie Heights Village

BAM data last updated *
20/08/2020

Assessor Name

Report Created
25/09/2020

BAM Data version *
30

Assessor Number

BAM Case Status
Finalised

Date Finalised
24/09/2020

Assessment Revision
0

Assessment Type
Part 4 Developments (General)

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

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

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Coastal sand littoral forest								
5	661_Planted_Poor	23.3	0.19	0.25	High Sensitivity to Potential Gain	1.75		2
							Subtotal	**2**

Coastal sand Swamp Mahogany forest								
6	1231_Planted_Poor	25.9	0.17	0.25	High Sensitivity to Potential Gain	1.75		2
							Subtotal	**2**
Coastal sandstone gully forest								
4	1250_Good	3.0	0.56	0.25	High Sensitivity to Potential Gain	1.50		1
7	1250_Moderate	17.9	0.16	0.25	High Sensitivity to Potential Gain	1.50		1
							Subtotal	**2**
Coastal sandstone Heath-Mallee								
1	1824_Poor	46.3	0.29	0.25	High Sensitivity to Potential Gain	1.50		5
2	1824_Good	0.0	0.34	0.25	High Sensitivity to Potential Gain	1.50		1
							Subtotal	**6**
Sydney North exposed sandstone woodland								
3	1783_Good	0.0	0.31	0.25	High Sensitivity to Potential Gain	1.50		1
							Subtotal	**1**
							Total	**13**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Potential SAII	Species credits
Cercartetus nanus / Eastern Pygmy-possum (Fauna)						
1824_Poor	46.3	0.29	0.25	2	False	7

1824_Good	0.0	0.34	0.25	2	False	0
1783_Good	0.0	0.31	0.25	2	False	0
1250_Good	3.0	0.56	0.25	2	False	1
1250_Moderate	17.9	0.16	0.25	2	False	1
					Subtotal	**9**
Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)						
1824_Poor	46.3	0.29	0.25	3	True	10
1824_Good	0.0	0.34	0.25	3	True	0
1783_Good	0.0	0.31	0.25	3	True	0
1250_Good	3.0	0.56	0.25	3	True	1
661_Planted_Poor	23.3	0.19	0.25	3	True	3
1231_Planted_Poor	25.9	0.17	0.25	3	True	3
1250_Moderate	17.9	0.16	0.25	3	True	2
					Subtotal	**19**
Cryptostylis hunteriana / Leafless Tongue Orchid (Flora)						
1824_Poor	46.3	0.29	0.25	1.5	False	5
1824_Good	0.0	0.34	0.25	1.5	False	0
1783_Good	0.0	0.31	0.25	1.5	False	0
1250_Good	3.0	0.56	0.25	1.5	False	1
1250_Moderate	17.9	0.16	0.25	1.5	False	1
					Subtotal	**7**

Hibbertia puberula / Hibbertia puberula (Flora)						
1824_Poor	46.3	0.29	0.25	2	False	7
1824_Good	0.0	0.34	0.25	2	False	0
1783_Good	0.0	0.31	0.25	2	False	0
1250_Good	3.0	0.56	0.25	2	False	1
1250_Moderate	17.9	0.16	0.25	2	False	1
					Subtotal	**9**
Pseudophryne australis / Red-crowned Toadlet (Fauna)						
1824_Good	0.0	0.01	0.25	1.5	False	0
1783_Good	0.0	0.01	0.25	1.5	False	0
1250_Good	3.0	0.13	0.25	1.5	False	1
661_Planted_Poor	23.3	0.05	0.25	1.5	False	1
1250_Moderate	17.9	0.03	0.25	1.5	False	1
					Subtotal	**3**
Tetratheca glandulosa / Tetratheca glandulosa (Flora)						
1824_Poor	46.3	0.29	0.25	2	False	7
1824_Good	0.0	0.34	0.25	2	False	0
1783_Good	0.0	0.31	0.25	2	False	0
1250_Good	3.0	0.56	0.25	2	False	1
1250_Moderate	17.9	0.16	0.25	2	False	1
					Subtotal	**9**

Addendum Attachment 5. Biodiversity Credit Report (Like for Like) – September 2020

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00020246/BAAS18019/20/00020265

Proposal Name
Allambie Heights Village

BAM data last updated *
20/08/2020

Assessor Name

Assessor Number

BAM Data version *
30

Proponent Names

Report Created
25/09/2020

BAM Case Status
Finalised

Assessment Revision
0

Assessment Type
Part 4 Developments (General)

Date Finalised
24/09/2020

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

Potential Serious and Irreversible Impacts

Nil

Species
Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat

Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Predicted Threatened Species Not On Site

Name
Petaurus australis / Yellow-bellied Glider

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	Number of credits to be retired
1824-Coastal sandstone Heath-Mallee	Not a TEC	0.6	6.00
1783-Sydney North exposed sandstone woodland	Not a TEC	0.3	1.00
1250-Coastal sandstone gully forest	Not a TEC	0.7	2.00
661-Coastal sand littoral forest	Not a TEC	0.2	2.00
1231-Coastal sand Swamp Mahogany forest	Not a TEC	0.2	2.00

661-Coastal sand littoral forest	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region

	North Coast Wet Sclerophyll Forests This includes PCT's: 661, 686, 694, 827, 1217, 1237, 1244, 1285, 1504, 1841, 1843, 1915	North Coast Wet Sclerophyll Forests >=50% and <70%	Yes	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1231-Coastal sand Swamp Mahogany forest	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region
	Coastal Swamp Forests This includes PCT's: 839, 1064, 1227, 1230, 1231, 1232, 1716, 1717, 1718, 1719, 1723, 1730, 1731, 1795, 1798	Coastal Swamp Forests >=50% and <70%	Yes	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1250-Coastal sandstone gully forest	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region

	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	Yes	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1783-Sydney North exposed sandstone woodland	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region
	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	No	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1824-Coastal sandstone Heath-Mallee	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region

	Sydney Coastal Heaths This includes PCT's: 772, 881, 882, 1134, 1143, 1641, 1822, 1823, 1824, 1826	Sydney Coastal Heaths <50%	Yes	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Area	Credits
Cercartetus nanus / Eastern Pygmy-possum	1.7	9.00
Chalinolobus dwyeri / Large-eared Pied Bat	2.0	19.00
Cryptostylis hunteriana / Leafless Tongue Orchid	1.7	7.00
Hibbertia puberula / Hibbertia puberula	1.7	9.00
Pseudophryne australis / Red-crowned Toadlet	0.2	3.00
Tetratheca glandulosa / Tetratheca glandulosa	1.7	9.00

Cercartetus nanus/ Eastern Pygmy-possum	1250_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Cercartetus nanus/Eastern Pygmy-possum	Any in NSW

Cercartetus nanus/ Eastern Pygmy-possum	1250_Good	
	1250_Moderate	**Like-for-like credit retirement options**
		Spp / IBRA region
		Cercartetus nanus/Eastern Pygmy-possum / Any in NSW
	1783_Good	**Like-for-like credit retirement options**
		Spp / IBRA region
		Cercartetus nanus/Eastern Pygmy-possum / Any in NSW
	1824_Good	**Like-for-like credit retirement options**
		Spp / IBRA region
		Cercartetus nanus/Eastern Pygmy-possum / Any in NSW

Cercartetus nanus/ Eastern Pygmy-possum	1824_Poor	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Cercartetus nanus/Eastern Pygmy-possum	Any in NSW
Chalinolobus dwyeri/ Large-eared Pied Bat	1231_Planted_Poor	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW
	1250_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW
	1250_Moderate	**Like-for-like credit retirement options**	
		Spp	IBRA region

		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW
	1783_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW
	1824_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW
	1824_Poor	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW

	661_Planted_Poor	**Like-for-like credit retirement options**
		Spp / IBRA region
		Chalinolobus dwyeri/Large-eared Pied Bat / Any in NSW
Cryptostylis hunteriana/ Leafless Tongue Orchid	1250_Good	**Like-for-like credit retirement options**
		Spp / IBRA region
		Cryptostylis hunteriana/Leafless Tongue Orchid / Any in NSW
	1250_Moderate	**Like-for-like credit retirement options**
		Spp / IBRA region
		Cryptostylis hunteriana/Leafless Tongue Orchid / Any in NSW
	1783_Good	**Like-for-like credit retirement options**
		Spp / IBRA region

		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW
	1824_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW
	1824_Poor	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW
Hibbertia puberula/ Hibbertia puberula	1250_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Hibbertia puberula/Hibbertia puberula	Any in NSW

Hibbertia puberula/ Hibbertia puberula	1250_Good		
	1250_Moderate	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Hibbertia puberula/Hibbertia puberula	Any in NSW
	1783_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Hibbertia puberula/Hibbertia puberula	Any in NSW
	1824_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Hibbertia puberula/Hibbertia puberula	Any in NSW
	1824_Poor	**Like-for-like credit retirement options**	

		Spp	IBRA region
		Hibbertia puberula/Hibbertia puberula	Any in NSW
Pseudophryne australis/ Red-crowned Toadlet	1250_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW
	1250_Moderate	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW
	1783_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW

Pseudophryne australis/ Red-crowned Toadlet	1783_Good	
	1824_Good	**Like-for-like credit retirement options**
		Spp / IBRA region
		Pseudophryne australis/Red-crowned Toadlet / Any in NSW
	661_Planted_Poor	**Like-for-like credit retirement options**
		Spp / IBRA region
		Pseudophryne australis/Red-crowned Toadlet / Any in NSW
Tetratheca glandulosa/ Tetratheca glandulosa	1250_Good	**Like-for-like credit retirement options**
		Spp / IBRA region
		Tetratheca glandulosa/Tetratheca glandulosa / Any in NSW

Tetratheca glandulosa/ Tetratheca glandulosa	1250_Moderate	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW
	1783_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW
	1824_Good	**Like-for-like credit retirement options**	
		Spp	IBRA region
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW
	1824_Poor	**Like-for-like credit retirement options**	
		Spp	IBRA region

		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW

Addendum Attachment 6. Biodiversity Credit Report (Variation Options) – September 2020

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00020246/BAAS18019/20/00020265	Allambie Heights Village	20/08/2020
Assessor Name	Assessor Number	BAM Data version *
		30
Proponent Name(s)	Report Created	BAM Case Status
	25/09/2020	Finalised
Assessment Revision	Assessment Type	Date Finalised
0	Part 4 Developments (General)	24/09/2020

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

Potential Serious and Irreversible Impacts

Nil

Species
Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat

Chalinolobus dwyeri / Large-eared Pied Bat
Chalinolobus dwyeri / Large-eared Pied Bat

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Predicted Threatened Species Not On Site

Name
Petaurus australis / Yellow-bellied Glider

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	Number of credits to be retired
1824-Coastal sandstone Heath-Mallee	Not a TEC	0.6	6.00
1783-Sydney North exposed sandstone woodland	Not a TEC	0.3	1.00
1250-Coastal sandstone gully forest	Not a TEC	0.7	2.00
661-Coastal sand littoral forest	Not a TEC	0.2	2.00
1231-Coastal sand Swamp Mahogany forest	Not a TEC	0.2	2.00

661-Coastal sand littoral forest	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region

	North Coast Wet Sclerophyll Forests This includes PCT's: 661, 686, 694, 827, 1217, 1237, 1244, 1285, 1504, 1841, 1843, 1915	North Coast Wet Sclerophyll Forests >=50% and <70%	Yes	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options			
	Formation	Trading group	HBT	IBRA region
	Wet Sclerophyll Forests (Shrubby sub-formation)	Tier 6 or higher	Yes (including artificial)	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1231-Coastal sand Swamp Mahogany forest	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region
	Coastal Swamp Forests This includes PCT's: 839, 1064, 1227, 1230, 1231, 1232, 1716, 1717, 1718, 1719, 1723, 1730, 1731, 1795, 1798	Coastal Swamp Forests >=50% and <70%	Yes	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options			
	Formation	Trading group	HBT	IBRA region

	Forested Wetlands	Tier 6 or higher	Yes (including artificial)	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1250-Coastal sandstone gully forest	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region
	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	Yes	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options			
	Formation	Trading group	HBT	IBRA region
	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 7 or higher	Yes (including artificial)	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1783-Sydney North exposed sandstone woodland	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region

	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	No	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options			
	Formation	Trading group	HBT	IBRA region
	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 7 or higher	No	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1824-Coastal sandstone Heath-Mallee	**Like-for-like credit retirement options**			
	Class	Trading group	HBT	IBRA region
	Sydney Coastal Heaths This includes PCT's: 772, 881, 882, 1134, 1143, 1641, 1822, 1823, 1824, 1826	Sydney Coastal Heaths <50%	Yes	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options			
	Formation	Trading group	HBT	IBRA region

	Heathlands	Tier 7 or higher	Yes (including artificial)	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Area	Credits
Cercartetus nanus / Eastern Pygmy-possum	1.7	9.00
Chalinolobus dwyeri / Large-eared Pied Bat	2.0	19.00
Cryptostylis hunteriana / Leafless Tongue Orchid	1.7	7.00
Hibbertia puberula / Hibbertia puberula	1.7	9.00
Pseudophryne australis / Red-crowned Toadlet	0.2	3.00
Tetratheca glandulosa / Tetratheca glandulosa	1.7	9.00

Cercartetus nanus/ Eastern Pygmy-possum	1250_Good	**Like-for-like options**		
		Spp	IBRA region	
		Cercartetus nanus/Eastern Pygmy-possum	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1250_Moderate	**Like-for-like options**		
		Spp	IBRA region	
		Cercartetus nanus/Eastern Pygmy-possum	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1783_Good	**Like-for-like options**		
		Spp	IBRA region	
		Cercartetus nanus/Eastern Pygmy-possum	Any in NSW	

		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Good	**Like-for-like options**		
		Spp	IBRA region	
		Cercartetus nanus/Eastern Pygmy-possum	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Poor	**Like-for-like options**		
		Spp	IBRA region	
		Cercartetus nanus/Eastern Pygmy-possum	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Chalinolobus dwyeri/ Large-eared Pied Bat	1231_Planted_Poor	**Like-for-like options**		
		Spp	IBRA region	
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	

<table>
<tr><td rowspan="6">Chalinolobus dwyeri/ Large-eared Pied Bat</td><td rowspan="3">1231_Planted_Poor</td><td colspan="3">Variation options</td></tr>
<tr><td>Kingdom</td><td>Any species with same or higher category of listing under Part 4 of the BC Act shown below</td><td>IBRA region</td></tr>
<tr><td>Fauna</td><td>Vulnerable</td><td>Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.
or
Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</td></tr>
<tr><td rowspan="5">1250_Good</td><td colspan="3">Like-for-like options</td></tr>
<tr><td colspan="2">Spp</td><td>IBRA region</td></tr>
<tr><td colspan="2">Chalinolobus dwyeri/Large-eared Pied Bat</td><td>Any in NSW</td></tr>
<tr><td colspan="3">Variation options</td></tr>
<tr><td>Kingdom</td><td>Any species with same or higher category of listing under Part 4 of the BC Act shown below</td><td>IBRA region</td></tr>
</table>

		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1250_Moderate	**Like-for-like options**		
		Spp	IBRA region	
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1783_Good	**Like-for-like options**		
		Spp	IBRA region	
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	

		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Good	**Like-for-like options**		
		Spp	IBRA region	
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Poor	**Like-for-like options**		
		Spp	IBRA region	
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	661_Planted_Poor	**Like-for-like options**		
		Spp	IBRA region	
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	

		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Cryptostylis hunteriana/ Leafless Tongue Orchid	1250_Good	**Like-for-like options**		
		Spp	IBRA region	
		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1250_Moderate	**Like-for-like options**		
		Spp	IBRA region	
		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1783_Good	**Like-for-like options**		
		Spp	IBRA region	
		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW	

		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Good	**Like-for-like options**		
		Spp	IBRA region	
		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Poor	**Like-for-like options**		
		Spp	IBRA region	
		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Hibbertia puberula/ Hibbertia puberula	1250_Good	**Like-for-like options**		
		Spp	IBRA region	
		Hibbertia puberula/Hibbertia puberula	Any in NSW	

Hibbertia puberula/ Hibbertia puberula	1250_Good	**Variation options**		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Endangered	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1250_Moderate	**Like-for-like options**		
		Spp	IBRA region	
		Hibbertia puberula/Hibbertia puberula	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Flora	Endangered	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1783_Good	**Like-for-like options**		
		Spp	IBRA region	
		Hibbertia puberula/Hibbertia puberula	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Endangered	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Good	**Like-for-like options**		
		Spp	IBRA region	
		Hibbertia puberula/Hibbertia puberula	Any in NSW	

		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Endangered	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Poor	**Like-for-like options**		
		Spp	IBRA region	
		Hibbertia puberula/Hibbertia puberula	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Flora	Endangered	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Pseudophryne australis/ Red-crowned Toadlet	1250_Good	**Like-for-like options**		
		Spp	IBRA region	
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1250_Moderate	**Like-for-like options**		
		Spp	IBRA region	
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW	

Pseudophryne australis/ Red-crowned Toadlet	1250_Moderate	**Variation options**		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1783_Good	**Like-for-like options**		
		Spp	IBRA region	
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Good	**Like-for-like options**		
		Spp	IBRA region	
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	661_Planted_Poor	**Like-for-like options**		
		Spp	IBRA region	
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW	

		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Tetratheca glandulosa/ Tetratheca glandulosa	1250_Good	**Like-for-like options**		
		Spp	IBRA region	
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1250_Moderate	**Like-for-like options**		
		Spp	IBRA region	
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1783_Good	**Like-for-like options**		
		Spp	IBRA region	
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW	

		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Good	**Like-for-like options**		
		Spp	IBRA region	
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	1824_Poor	**Like-for-like options**		
		Spp	IBRA region	
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW	
		Variation options		
		Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
		Flora	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Addendum Attachment 7. Biodiversity Offset Payment Calculator – September 2020

Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00020246/BAAS18019/20/00020265	68	0	25/09/2020

Assessor Name	Assessor Number	Proposal Name	BAM Case Status
		Allambie Heights Village	Finalised

Assessment Type	Date Finalised
Part 4 Developments (General)	24/09/2020

PCT list

Price calculated	PCT common name	Credits
Yes	**1824 -** Coastal sandstone Heath-Mallee	6
Yes	**1783 -** Sydney North exposed sandstone woodland	1
Yes	**1250 -** Coastal sandstone gully forest	2
Yes	**661 -** Coastal sand littoral forest	2
Yes	**1231 -** Coastal sand Swamp Mahogany forest	2

Species list

Price calculated	Species	Credits
Yes	***Cercartetus nanus*** (Eastern Pygmy-possum)	9
Yes	***Chalinolobus dwyeri*** (Large-eared Pied Bat)	19
Yes	***Cryptostylis hunteriana*** (Leafless Tongue Orchid)	7
Yes	***Hibbertia puberula*** (Hibbertia puberula)	9

Yes	***Pseudophryne australis*** (Red-crowned Toadlet)	3
Yes	***Tetratheca glandulosa*** (Tetratheca glandulosa)	9

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

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Pittwater	**1824 -** Coastal sandstone Heath-Mallee	No	Sydney Coastal Heaths <50%	20.69%	$318.19	1.2437	$9,918.77	6	$59,512.63
Pittwater	**1783 -** Sydney North exposed sandstone woodland	No	Sydney Coastal Dry Sclerophyll Forests <50%	20.69%	$178.44	1.7815	$5,562.48	1	$5,562.48
Pittwater	**1250 -** Coastal sandstone gully forest	No	Sydney Coastal Dry Sclerophyll Forests <50%	20.69%	$178.44	1.7815	$5,562.48	2	$11,124.96
Pittwater	**661 -** Coastal sand littoral forest	No	North Coast Wet Sclerophyll Forests >=50% and <70%	20.69%	$173.07	1.9833	$5,395.14	2	$10,790.28
Pittwater	**1231 -** Coastal sand Swamp Mahogany forest	No	Coastal Swamp Forests >=50% and <70%	20.69%	$189.52	0.9910	$5,907.96	2	$11,815.92

Subtotal (excl. GST) **$98,806.27**

GST	**$9,880.63**
Total ecosystem credits (incl. GST)	**$108,686.90**

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10155	***Cercartetus nanus*** (Eastern Pygmy-possum)	Vulnerable	$495.24	20.6900%	$80.00	9	$6,099.35
10157	***Chalinolobus dwyeri*** (Large-eared Pied Bat)	Vulnerable	$741.31	20.6900%	$80.00	19	$18,519.05
10187	***Cryptostylis hunteriana*** (Leafless Tongue Orchid)	Vulnerable	$173.02	20.6900%	$80.00	7	$2,021.72
10402	***Hibbertia puberula*** (Hibbertia puberula)	Endangered	$1,730.17	20.6900%	$80.00	9	$19,513.28
10692	***Pseudophryne australis*** (Red-crowned Toadlet)	Vulnerable	$463.67	20.6900%	$80.00	3	$1,918.81
10798	***Tetratheca glandulosa*** (Tetratheca glandulosa)	Vulnerable	$158.64	20.6900%	$80.00	9	$2,443.16

Subtotal (excl. GST)	**$50,515.37**
GST	**$5,051.54**

Total species credits (incl. GST)	**$55,566.91**

Grand total	**$164,253.81**