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Riverwood Estate State Significant Precinct Biodiversity Assessment Report

NSW Land and Housing Corporation

DOCUMENT TRACKING

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Template 2.8.1

Executive Summary

Eco Logical Australia Pty Ltd was engaged by the NSW Land and Housing Corporation (LAHC) to prepare a Biodiversity Assessment Report (BAR) to support the planning proposal for the Riverwood Estate State Significant Precinct (the Study Area). This report has been produced to assist with the preparation of the Green Infrastructure Study as per the Study Requirements issues by the Department of Planning, Industry and Environment (DPIE). The key objectives of this report are to:

- describe the biodiversity values of the site
- outline the measures to be taken to avoid, minimise and mitigate impacts to the vegetation and threatened species habitat present within the development site
- assess the development against relevant legislation and policies

LAHC and a team of consultants have prepared a master plan for the redevelopment of the site that will renew the existing dwellings, provide for additional private dwellings, new streets and parks and community uses. The proposed master plan consists of approximately 3,900 social and private dwellings, buildings ranging between 3 and 12 storeys and local open spaces. The site comprises a small area of remnant native vegetation, and a large area of planted native and exotic trees in the suburb of Riverwood.

Although a Biodiversity Development Assessment Report (BDAR) is not required at the masterplan stage, LAHC sought to prepare a Biodiversity Assessment Report (BAR) that follows a BDAR format to better understand, avoid, mitigate and offset impacts of the proposal on the biodiversity values of the site. The master plan has been refined to reduce impacts on planted native vegetation and completely avoid impacts on remnant native vegetation within the Study Area.

During development of the master plan, the BAM was updated in 2020 and introduced a streamlined module for assessing planted native vegetation. Section 2.2 of the BAM and the Planted Native Vegetation Assessment Module, Appendix D of BAM 2020 was applied to the planted native vegetation within the development site, with the decision-making key supporting the assessment. The streamlined assessment was used because the native vegetation was planted for purposes of street trees and other roadside plantings, windbreaks and landscaping in parks and gardens.

One Plant Community Type (PCT), PCT 849 *Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain* (Cumberland Plain Woodland in the Sydney Basin Bioregion Critically Endangered Ecological Community) was identified within the Study Area in a low-moderate condition. This PCT was present outside of the development footprint and will be retained.

The proposal will result in the direct removal of approximately 3.98 ha of planted native vegetation, no remnant native vegetation and 0.2.83 ha of exotic vegetation. No ecosystem credits are required for planted native vegetation.

Three Matters of National Environmental Significance (MNES) were identified as having potential to be adversely affected by the proposed works:

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

- *Chalinolobus dwyeri* (Large-eared Pied Bat)
- *Lathamus discolor* (Swift Parrot)

Application of the Commonwealth Significant Impact Criteria was undertaken for these species and concluded that the project is unlikely to have a significant impact.

No other threatened flora or fauna species were recorded within the Study Area during the field surveys. No species credit species were identified within the development site. No species credits species are required to be offset as a result of the proposed development.

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Abbreviations

Abbreviation	Description
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Credit Calculator
BC Act	NSW Biodiversity Conservation Act 2016
BAR	Biodiversity Assessment Report
BDAR	Biodiversity Development Assessment Report
CEEC	Critically Endangered Ecological Community
DAWE	Commonwealth Department of Agriculture, Water and Environment
DPIE	NSW Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
ELA	Eco Logical Australia Pty Ltd
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
FM Act	NSW Fisheries Management Act 1994
GIS	Geographic Information System
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
LAHC	Land and Housing Corporation
LEP	Local Environmental Plan
LGA	Local Government Area
LLS	Local Land Service
MNES	Matters of National Environmental Significance
NRAR	Natural Resources Access Regulator
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SSI	State Significant Infrastructure

Abbreviation	Description
TEC	Threatened Ecological Community
VIS	Vegetation Information System
WM Act	NSW Water Management Act 2000

1. Stage 1: Biodiversity assessment

1.1 Introduction

Eco Logical Australia Pty Ltd was engaged by the NSW Land and Housing Corporation (LAHC) to prepare a Biodiversity Assessment Report (BAR) to support the planning proposal for the Riverwood Estate State Significant Precinct. This report has been produced to assist with the preparation of the Green Infrastructure Study as per the Study Requirements issues by the Department of Planning, Industry and Environment (DPIE). The key objectives of this report are to:

- describe the biodiversity values of the site
- outlines the measures to be taken to avoid, minimise and mitigate impacts to the vegetation and threatened species habitat present within the development site
- assess the development against relevant legislation and policies

This BAR has been prepared by Diane Campbell and Toni Frecker, who are Accredited Persons (BAAS17069 and BAAS19074) under the NSW *Biodiversity Conservation Act 2016* (BC Act).

1.2 Background

The Riverwood Renewal project provides an opportunity to revitalise the Riverwood social housing estate into an integrated mixed-use precinct that will deliver a mix of social and private dwellings. The revitalisation of the Riverwood Estate offers the government the opportunity to renew aging social housing whilst significantly improving this area, and the quality of life for residents.

A key objective of the project is to establish a new planning framework to facilitate renewal of the Riverwood Estate.

LAHC and a team of consultants have prepared a master plan for the redevelopment of the site that will renew the existing dwellings, provide for additional private dwellings, new streets and parks and community uses. The proposed master plan consists of approximately 3,900 social and private dwellings, buildings ranging between 3 and 12 storeys and local open spaces.

1.3 The Study Area

The Riverwood Estate State Significant Precinct (the Study Area) is an area of 30 ha and is located within the Canterbury Bankstown LGA. The Study Area contains a large area of government-owned land (16.7 ha owned by LAHC) and is of state importance in achieving key government policy objectives, particularly renewing social housing and increasing housing supply.

The general description of the Study Area is displayed on the following maps:

- Site Map (Figure 1)
- Location Map (Figure 2)
- Master Plan Layout (Figure 3)
- Master Plan Footprint (Figure 8)

The Study Area includes public roads, parks and multistorey buildings with planted native and exotic vegetation throughout. Additionally, a relatively small area of remnant native vegetation remains within two park areas which is being retained. The planted native vegetation includes mature trees and shrubs in both the street verges and within the residential lots.

One remnant native Plant Community Type (PCT) is present within the master plan Study Area: PCT 849 – Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain. This remnant native vegetation is being retained.

1.4 Proposed Master Plan

The planning proposal for the Study Area will be submitted with a proposed master plan.

The master plan footprint is shown in Figure 8. The Riverwood Renewal project includes:

- Demolition of existing buildings
- Widening and construction of roads
- Construction of multistorey residential buildings including basement parking
- Construction of park infrastructure
- Landscape works

The Riverwood Estate State Significant Precinct (SSP) site currently supports residential land use. The master plan development site includes public roads, parks and multistorey buildings with planted native and exotic vegetation throughout. Additionally, a relatively small area of remnant native vegetation remains within two park areas which is being retained. The planted native vegetation includes mature trees and shrubs in both the street verges and within the residential lots.

One remnant native Plant Community Type (PCT) is present within the master plan Study Area: PCT 849 – Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain. This remnant native vegetation is being retained.

1.4.1 Sources of information used

The following data sources were reviewed as part of this report:

- Biodiversity Assessment Methodology Calculator (OEH, 2021)
- BioNet Vegetation Classification (NSW EES, accessed 2021)
- BioNet /Atlas of NSW 5 km database search (NSW EES, accessed 2020)
- Threatened Biodiversity Data Collection (NSW EES, accessed 2021)
- EPBC Act Protected Matters Search Tool 5 km database search (DAWE 2021)
- The Native Vegetation of the Sydney Metropolitan Area (OEH 2016)
- Aerial mapping (SIXMaps and Nearmap)
- Additional GIS datasets including soil, topography, geology and drainage
- Additional reports and threatened species information sources.

Site Map

Riverwood



Figure 1: Site Map

Location Map

Riverwood

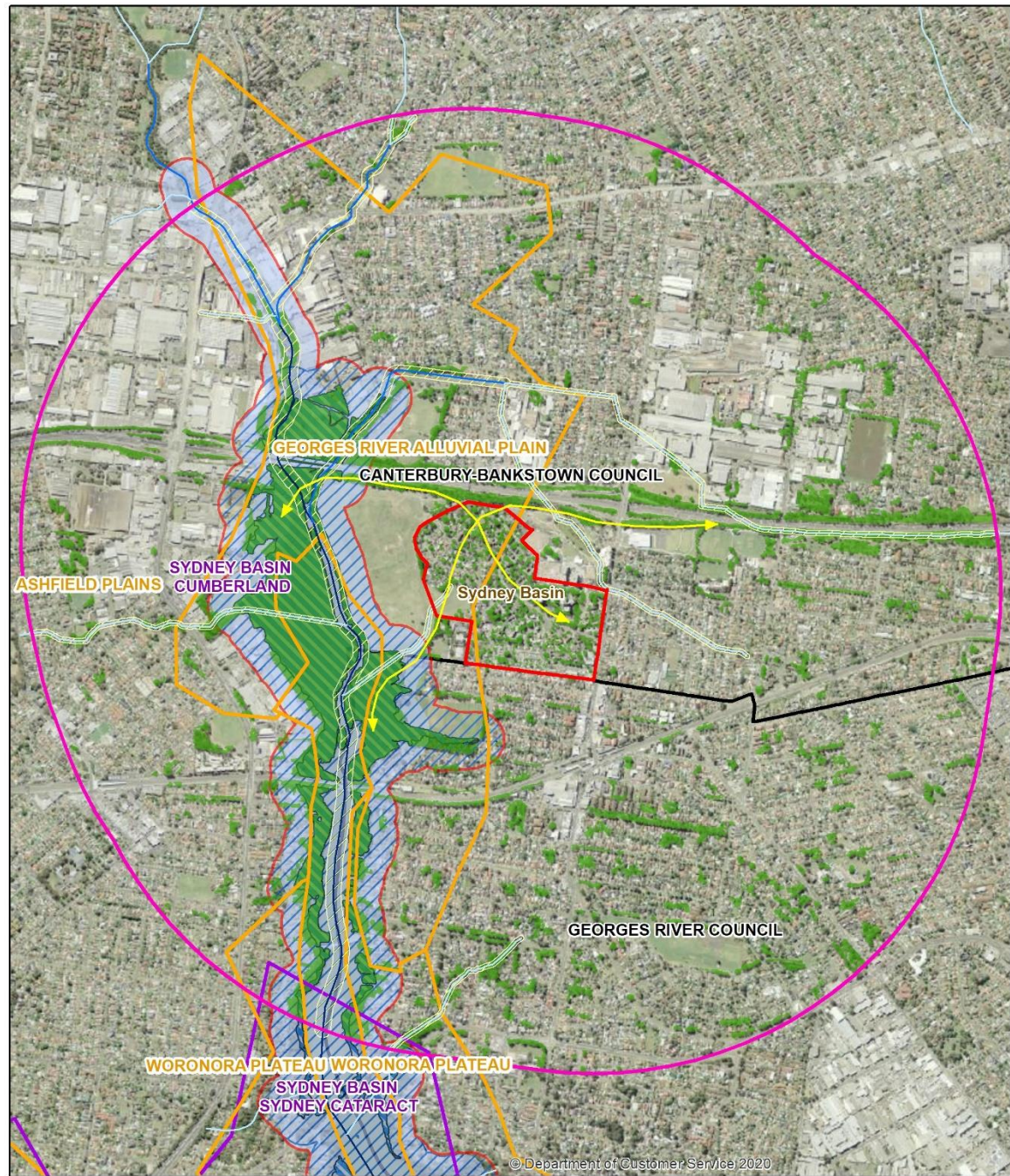


Figure 2: Location Map



Figure 3: Master plan layout

1.5 Legislative context

Table 1: Legislative context

Name	Relevance to the project
Commonwealth	
<i>Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)</i>	Matters of National Environmental Significance have been identified on or near the master plan development site. This report assesses impacts to MNES and concludes that the master plan development is not likely to have a significant impact on MNES.
NSW	
<i>Environmental Planning and Assessment Act 1979 (EP&A Act)</i>	<p>The planning proposal for the Riverwood Estate State Significant Precinct will be submitted with a proposed master plan and Design Guide under the EP&A Act. Study Requirements have been issued and require assessment of:</p> <p>The study is to demonstrate consideration of:</p> <ul style="list-style-type: none"> Retention of existing trees and provision of new trees, the capacity of the proposal to allow for the growth of new trees to maturity; Impacts on biodiversity and measures to avoid and minimise impacts, protect and enhance biodiversity through the greening of public and private spaces and the retention of existing habitat including habitat provided by built structures;
<i>Biodiversity Conservation Act 2016 (BC Act)</i>	<p>The planning proposal and master plan does not require a Biodiversity Development Assessment Report under the Biodiversity Conservation Act, however in this case ELA recommend preparing a BAR that follows a BDAR format as it:</p> <ul style="list-style-type: none"> will allow LAHC to understand the magnitude (if any) of biodiversity offset costs of future development – thus allowing lack to better understand project feasibility; and provides the basis for lodgement of DAs in the future <p>Biodiversity offsets are not required to be provided at the planning proposal / master plan stage.</p>
<i>Fisheries Management Act 1994 (FM Act)</i>	The master plan development does not involve impacts to Key Fish Habitat, does not involve harm to marine vegetation, dredging, reclamation or obstruction of fish passage. A permit or consultation under the FM Act is not required.
<i>Local Land Services Amendment Act 2016 (LLS Act)</i>	<p>The LLS Act does not apply to areas of the state to which the SEPP Vegetation applies. The Vegetation SEPP applies to the Canterbury – Bankstown local government area.</p>
<i>Water Management Act 2000 (WM Act)</i>	The project does not involve works on waterfront land. A Controlled Activity Approval under s91 of the WM Act is not required.
Vegetation SEPP	The Vegetation SEPP applies to master plan does not require development consent at this stage. As this project requires consent under the EP&A Act, the Vegetation SEPP is not relevant.
SEPP (Coastal Management) 2018	The proposed master plan Study Area occurs approximately 250 m to the east of Coastal Wetlands mapped as part of the Coastal Environment Area Map.
SEPP (Koala Habitat Protection) 2020	The Study Area is not located within a Local Government Area to this SEPP applies.
Local	
Canterbury - Bankstown Local Environment Plan	The subject site is primarily zoned R4 and R3 under the Canterbury - Bankstown LEP 2012.

1.6 Landscape features

Although the BAM Calculator was not used, the BAM was followed as a guide to derive the landscape features information in this subsection.

1.6.1 IBRA regions and subregions

The Study Area falls within the IBRA region and subregion as outlined in Table 2.

Table 2: IBRA region and subregion

IBRA region	Area within Master plan development site (ha)
Sydney Basin	30
IBRA subregion	Area within Master plan development site (ha)
Cumberland	30

1.6.2 Native vegetation extent

The extent of native vegetation within the Study Area and assessment area is outlined in Table 3.

Table 3: Native vegetation extent

Area within the master plan development site (ha)	Area within the 1,500 m buffer area (ha)
8.66 ha	136

There are no differences between the mapped vegetation extent and the aerial imagery.

1.6.3 Rivers and streams

The Study Area does not contain any rivers or streams.

1.6.4 Wetlands

The Study Area does not include any wetlands.

1.6.5 Connectivity features

The Study Area site contains the connectivity features outlined in Table 4 and shown in Figure 2. Connectivity to large tracts of habitat is considered suitable for mobile species such as mammals, birds and bats. This includes flyways for migratory birds and bat species moving through the landscape.

Table 4: Connectivity features

Connectivity feature name	Feature type
Salt Pan Creek	Core bushland, riparian areas
Salt Pan Creek Riverwood Wetlands	Wetland

No connectivity is available from the Study Area to the east and south, as this area consists of residential development with sporadic urban and backyard vegetation. The main connectivity is currently available to the south west of the site linking to riparian vegetation associated with Salt Pan Creek and Salt Pan Creek Wetlands. To the north of the site there is a narrow east-west band of vegetation adjacent to the South Western Motorway, however this is dissected by the motorway. Within the Study Area there is connectivity provided by roadside planted trees. Considering the location of the master plan site which occurs to the east of a large patch of riparian vegetation, the development site does not provide significant connectivity across the landscape.

1.6.6 Areas of geological significance and soil hazard features

The Study Area does not contain areas of geological significance and soil hazard features.

1.6.7 Site context

1.6.7.1 Method applied

The site-based method has been applied to this Study Area. Local data was not used.

1.6.7.2 Percent native vegetation cover in the landscape

The current percent native vegetation cover in the landscape was assessed in a Geographic Information System (GIS) using aerial imagery sourced from SIX Maps using increments of 5%. The results of this analysis are shown in Table 5.

Table 5: Percent native vegetation cover in the landscape

Area within the master plan development site (ha)	Cover within the 1,500 m buffer area (%)
8.66	12.6

1.6.7.3 Patch size

Patch size was calculated using available vegetation mapping for all patches of intact native vegetation on and adjoining the master plan development site. The patch size is within the size category of > 100 ha under the BAM.

1.7 Native vegetation

1.7.1 Survey effort

Vegetation survey was undertaken within Study Area by ecologists Toni Frecker and James King on 2nd and 3rd December 2020 (Figure 6). A total of five (5) full floristic and vegetation integrity plots were undertaken in accordance with the BAM (Table 6) to identify PCTs and TECs on the subject site.

The plot locations area displayed in Figure 6. It should be noted that two of the plot dimensions were modified to 10 m x 100 m in order to fit into the permitted survey area and existing vegetation. All field data collected at full-floristic and vegetation integrity plots is included in Appendix B:.

Table 6: Full floristic and vegetation integrity plots

Veg Zone	PCT ID	PCT Name	Condition	Area (ha)	Plots required	Plots surveyed
1	849	<i>Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain</i>	low-moderate	0	0	1
2	NA	<i>Note under Section 4.1 (2) c of BAM 2020 a PCT is not assigned to planted native vegetation where it is eligible to be assessed in accordance with the Planted Native Vegetation Streamlined Assessment Module</i>	planted native vegetation	3.98	0	4

1.7.2 Plant Community Types present

One Plant Community Type represented remnant native vegetation within the master plan, being PCT 849 *Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain*. This PCT conforms to the listed TEC under the BC Act, *Cumberland Plain Woodland in the Sydney Basin Bioregion Critically*

Endangered Ecological Community, but the vegetation present on site does not meet the condition thresholds of the EPBC Act due to its small size, lack of connectivity and condition being trees with a mown understorey.

During the refinement of the master plan, direct impacts on the Cumberland Plain Woodland in the Sydney Basin Bioregion has been avoided.

Justification for the selection of the PCT occurring on the master plan Study Area is based on a quantitative analysis of full-floristic plot data and is provided in Table 8.

The development footprint also contains planted vegetation consisting of mature native and exotic trees and shrubs with managed exotic understorey.

Table 7: Plant Community Types

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Area (Impact)	Percent cleared
849 (mixed understorey)	<i>Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain</i>	Coastal Valley Grassy Woodlands	Grassy Woodlands	0 ha	93%
Planted vegetation	Planted vegetation	N/A	N/A	3.98 ha	N/A
Exotic vegetation	Exotic vegetation	N/A	N/A	2.83	N/A

Table 8: PCT selection justification

PCT ID	PCT Name	Selection criteria	Species relied upon for identification of vegetation type and relative abundance
849	<i>Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain</i>	IBRA region, subregion, soil landscape, elevation and results of floristic plot analysis including the presence of positive diagnostic canopy species	Presence of <i>Eucalyptus moluccana</i> , <i>E. tereticornis</i> , <i>E. crebra</i> as canopy species and in the groundlayer <i>Microlaena stipoides</i> var. <i>stipoides</i> and <i>Dichondra repens</i>

1.7.3 Vegetation integrity assessment

As there are no impacts on Cumberland Plain Woodland there was no vegetation integrity assessment undertaken using the Credit Calculator (BAMC).

1.7.4 Streamlined assessment module – Planted native vegetation

Section 2.2 of the BAM contains a streamlined assessment module for planted native vegetation. The streamline assessment can be used where the native vegetation was planted for purposes such as street trees and other roadside plantings, windbreaks, landscaping in parks and gardens, and revegetation for environmental rehabilitation.

The streamlined assessment module for planted native vegetation has been applied to part of the development site where areas of planted native vegetation will be impacted.

The planted native vegetation within the Study Area has been planted mostly in straight lines for the purpose of landscape plantings around the streets, small parks and backyards of Riverwood. Appendix D of the BAM provides a decision-making key for the assessment of the planted native vegetation. This decision-making key was applied to the sections of planted native vegetation mapped within the site. This assessment is displayed in Table 9.

Table 9: Decision-making key for planted native vegetation

Question	Decision making-key (answer selected in bold font)
1. Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?	<ul style="list-style-type: none"> • Yes The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM. • No..... Go to 3
2. Is the planted native vegetation: <ul style="list-style-type: none"> a. planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and b. the primary objective was to replace or regenerate a plant community type or a threatened plant species population or its habitat? 	<ul style="list-style-type: none"> • Yes The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM. • No..... Go to 3
3. Is the planted/translocated native vegetation individuals of a threatened species or other native species planted/translocated for the purpose of providing threatened species habitat under one of the following: <ul style="list-style-type: none"> a. a species recovery project b. Saving our Species project c. other types of government funded restoration project d. condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat e. legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings (e.g. Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act) f. ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan, or 	<ul style="list-style-type: none"> • Yes The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM. • No..... Go to 4

Question	Decision making-key (answer selected in bold font)
g. approved vegetation management plan (e.g. as required as part of a Controlled Activity Approval for works on waterfront land under the NSW <i>Water Management Act 2000</i>)?	
4. Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation?	<ul style="list-style-type: none"> • Yes..... Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied). • No..... Go to 5.
5. Is the native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as: windbreaks in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or teatree farms?	<ul style="list-style-type: none"> • Yes Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied) • No..... Go to 6.
6. Is the planted native vegetation a species listed as a widely cultivated native species on a list approved by the Secretary of the Department (or an officer authorised by the Secretary)?	<ul style="list-style-type: none"> • N/A

Section D.2 of Appendix D of the BAM requires that the planted native vegetation is assessed for threatened species habitat. Opportunistic survey and habitat assessment for threatened flora and fauna habitat was undertaken as part of the field survey. The planted native vegetation consisted primarily of planted *Eucalyptus robusta* and *Eucalyptus tereticornis* planted mostly in straight lines along the streets. Following a habitat assessment of this area it was determined that the planted native vegetation does not have potential to provide suitable habitat for threatened flora species.

Seven hollow-bearing trees, three nests and one stag, were identified within the area of planted native vegetation on site providing evidence of fauna. It was determined that the planted native vegetation provides potential roosting or breeding habitat for the threatened fauna species *Ninox strenua* (Powerful Owl). The planted native vegetation was observed to provide habitat for nesting for *Cacatua galerita* (Sulphur-crested Cockatoo) and could serve as foraging habitat for urban and peri-urban fauna such as common bird species and may serve as foraging habitat for threatened fauna species. Small stick nests were present providing evidence of *Gymnorhina tibicen* (Magpie) and *Strepera graculina* (Pied Currawong) nesting, and some larger nests occupied by *Threskiornis molucca* (White Ibis). An area of 3.98 ha of planted native vegetation will be impacted and as outlined in the BAM, does not require offset as a result of this streamlined assessment module.

If there is evidence that threatened species are using the planted native vegetation as habitat, the assessor must apply Section 8.4 of the BAM to mitigate and manage impacts on these species. Species credits are not required to offset the proposed impacts.

The steps taken to assess threatened species habitat and all reasonable measures proposed to be taken to mitigate or minimise impacts are set out in Sections 1.6.1 and Section 2.2.5.



Figure 4: PCT 849 (mixed understory)



Figure 5: Planted vegetation

Plant Community Type

Riverwood



Figure 6: Plant Community Types – PCT 849, planted native vegetation and exotic vegetation, habitat features and plot locations

Threatened Ecological Community

Riverwood

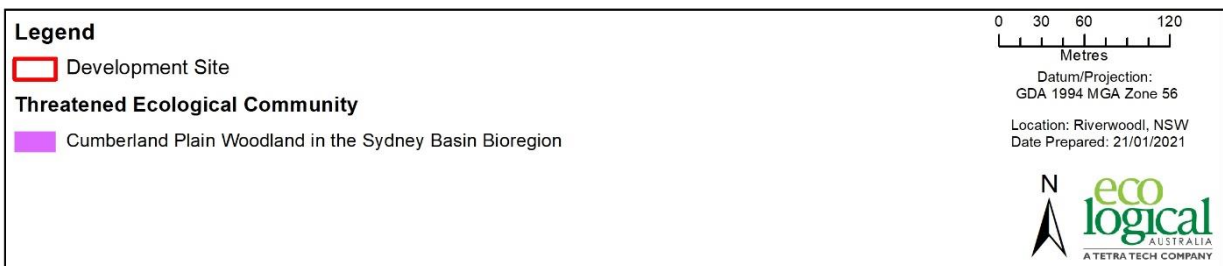


Figure 7: Threatened Ecological Communities

1.8 Threatened species

1.8.1 Ecosystem credit species

No ecosystem credit species were predicted to occur at the development site due to the proposal not clearing any remnant native vegetation.

1.9 Species credit species

No species credit species were predicted to occur at the development site due to the proposal not clearing any remnant native vegetation, and species credits are not required to offset the proposed impacts under the planted native vegetation module.

2. Stage 2: Impact assessment (biodiversity values)

2.1 Avoiding impacts

2.1.1 Locating a project to avoid and minimise impacts on vegetation and habitat

The master plan proposes to redevelop the residential area with the staged construction of multistorey residential buildings and basement car parking infrastructure. The master plan avoids the identified TEC, with impacts being limited to street trees and exotic vegetation. Landscaping including tree retention and installation of larger tree stock is also proposed as part of this master plan and is intended for future Development Applications. The site is in an urban area which avoids and minimises impacts to better quality vegetation and more important habitat in the locality, as outlined in Table 10.

Table 10: Locating a project to avoid and minimise impacts on vegetation and habitat

Approach	How addressed	Justification
Locating the project in areas where there are no biodiversity values	The master plan footprint covers areas of urban development where biodiversity values are generally lacking and consisting primarily of planted street trees, urban gardens and exotic vegetation.	Areas of higher biodiversity, being two patches of Cumberland Plain Woodland, are excluded from the master plan development footprint and retained in reserves within the master plan area. In terms of design, additional trees may be retained by including narrower roadways and the placement of basement entrances to avoid mature native trees at detailed design stage as part of future development applications.
Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition	The master plan footprint has been designed and located to utilise areas where native vegetation is in lower condition.	As above, areas of higher biodiversity values e.g. the vegetation which is remnant PCT 849 is to be retained. The project has been located to utilise existing developed areas.
Locating the project in areas that avoid habitat for species and vegetation in high threat categories (e.g. an EEC or CEEC), indicated by the biodiversity risk weighting for a species	The master plan footprint has been located to utilise areas where native vegetation and threatened species habitat is in lower condition in the context of the locality.	Areas of TEC have been avoided and potential marginal habitat for Cumberland Plain Land Snail. The TEC and potential marginal habitat for Cumberland Plain Land Snail is being avoided. 3.98 ha of planted native vegetation being removed
Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained	The master plan footprint is located to the east of Salt Pan Creek and the Salt Pan Creek Wetlands.	Connectivity across the landscape is not being affected by the master plan footprint. The Study Area is primarily an urban planting to the east of a large patch of riparian vegetation.

2.1.2 Prescribed biodiversity impacts

The development site has the prescribed biodiversity impacts as outlined in Table 11.

Table 11: Prescribed biodiversity impacts

Prescribed biodiversity impact	Description in relation to the master plan development site	Threatened species or ecological communities effected
Impacts of master plan development on the habitat of threatened species or ecological communities associated with non-native vegetation	The development site contains non-native vegetation canopy which will be removed as part of the proposal. This non-native vegetation is considered to provide marginal foraging and breeding habitat for two threatened species, due to the presence of flowering planted vegetation and the presence of hollow bearing trees.	<i>Pteropus poliocephalus</i> (Grey-headed Flying-fox) foraging habitat <i>Ninox strenua</i> (Powerful Owl) potential breeding hollows, currently occupied by <i>Cacatua galerita</i> (Sulphur-crested Cockatoo)

2.1.2.1 Locating a project to avoid and minimise prescribed biodiversity impacts

The development site has been located in a way which avoids and minimises prescribed biodiversity impacts as outlined in Table 12.

Table 12: Locating and designing a project to avoid and minimise prescribed biodiversity impacts

Approach	How addressed	Justification
Locating and designing the development to avoid severing or interfering with corridors connecting different areas of habitat, migratory flight paths to important habitat or preferred local movement pathways	The master plan will involve the removal of some planted native and exotic vegetation. The master plan has been refined to reduce the area of impact from 4.47 ha to 3.98 ha and retain foraging habitat and retain all remnant native vegetation; however hollow bearing trees will be removed.	Removal of foraging habitat for Grey-headed flying-fox and potential breeding habitat for Powerful Owl will have a localised impact. However, vegetation in the impact area is primarily planted and highly urbanised, where exchange of genetic material between adjacent or nearby habitat is already limited. The footprint will not impact on the ability of the above mobile species to connect to remnant native vegetation which is primarily located to the west of the site along Salt Pan Creek.
Optimising project layout to minimise interactions with threatened and protected species and ecological communities, e.g. designing turbine layout to allow buffers around features that attract and support aerial species, such as forest edges, riparian corridors and wetlands, ridgetops and gullies	The footprint has been generally placed to avoid impacts to areas of high biodiversity value by retaining all remnant native vegetation within the master plan Study Area.	The footprint has utilised the portion of the development site which includes primarily planted native and exotic vegetation of lower biodiversity value due to the highly urbanised nature of the Study Area.

2.2 Assessment of Impacts

2.2.1 Direct impacts

The direct impacts of the development on:

- native vegetation are outlined in Table 13
- threatened ecological communities are avoided
- prescribed biodiversity is outlined in Section 2.2.2

Table 13: Direct impacts to native vegetation

Vegetation Zone	PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Condition	Direct impact (ha)
1	849	<i>Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain</i>	Grassy Woodland	Coastal Valley Grassy Woodlands	Low Moderate	- 0
2	Planted	Planted native vegetation	NA	NA	Planted native vegetation	3.98
Total						3.98

2.2.2 Indirect impacts

The indirect impacts of the development are outlined in Table 14.

Table 14: Indirect impacts

Indirect impact	Project phase	Nature	Extent	Frequency	Duration	Timing
Sedimentation and contaminated and/or nutrient rich run-off	Construction	Runoff during construction works	Confined to development site with sediment fencing	During heavy rainfall or storm events	During rainfall events	Short-term impacts
Noise, dust or light spill	Construction	Noise and dust created from machinery (no night works proposed therefore no light spill)	Noise and dust likely to carry beyond development site boundary	Daily, during construction works	Sporadic throughout construction period	Short-term impacts
Inadvertent impacts on adjacent habitat or vegetation	Construction	Damage to adjacent habitat or vegetation	Adjacent vegetation	Daily, during construction works	Throughout construction period	Short-term impacts

Indirect impact	Project phase	Nature	Extent	Frequency	Duration	Timing
Transport of weeds and pathogens from the site to adjacent vegetation	Construction	Spread of weed seed or pathogens	Potential for spread into adjacent habitat	Daily, during construction works	Sporadic throughout construction period	Potentially long-term impacts
Rubbish dumping	Construction / operation	Illegal dumping by local residents/ construction crews	Potential for rubbish to spread via wind into adjacent vegetation	Potential to occur at any time throughout construction or operational phases	Throughout life of project	Short-term impacts

2.2.3 Prescribed biodiversity impacts

The development site has the prescribed biodiversity impacts as outlined in Table 15.

Table 15: Direct impacts on prescribed biodiversity impacts

Prescribed impact	biodiversity	Nature	Extent	Frequency	Duration	Timing
Impacts of master plan development on the habitat of threatened species or communities associated with non-native vegetation		Removal of non-native vegetation which provides marginal foraging habitat for threatened Grey-headed Flying Fox and marginal potential breeding habitat for Powerful Owl	Removal of up to 3.98 ha of non-native vegetation	Single event, planned in stages as the master plan area is developed	Permanent	Long term impacts

2.2.4 Mitigating and managing impacts

Measures proposed to mitigate and manage impacts at the development site before, during and after construction are outlined in Table 16. A risk assessment has been undertaken for any residual impacts likely to remain after the mitigation measures have been applied. The risk assessment is provided in Appendix D.

Table 16: Measures proposed to mitigate and manage impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed wildlife handler during clearing events	Moderate	Minor	<p>Pre-clearance survey of trees to be removed and identification/location of habitat trees by a suitably qualified ecologist.</p> <p>Avoid clearing works in later winter/spring during breeding/nesting period for birds</p> <p>Trees identified for retention should be clearly delineated as a 'No Go' zone with high visibility bunting.</p> <p>Supervision by a qualified ecologist/licensed wildlife handler during tree removal in accordance with best practise methods.</p> <p>Any tree removal is to be undertaken by a contractor under the supervision of a suitably qualified project arborist.</p>	Any fauna utilising habitat within the development site will be identified and managed to ensure clearing works minimise the likelihood of injuring resident fauna	During clearing works	Project Manager / Ecologist
Installing artificial habitats for fauna in adjacent retained vegetation and habitat or human made structures to replace the habitat resources lost and encourage animals to move from the impacted site, e.g. nest boxes	Minor	Negligible	Any trees removed that have hollows/hollow trunks/fissures should be retained as ground fauna habitat and/or used as replacement hollows and attached to trees within or in vegetation adjacent to the development site. If it is impractical to use salvaged hollows as replacement tree hollows, compensatory nest boxes should be installed where practical.	Replacement of habitat features removed	Prior to and during clearing works	Project Manager/ Ecologist
Clearing protocols that identify vegetation to	Moderate	Minor	Vegetation identified for retention should be clearly delineated as a 'No Go' zone with high visibility bunting.	Vegetation to be retained outside of the	Demarcation of vegetation to be	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chain-saw, rather than heavy machinery, is preferable in situations where partial clearing is proposed			No temporary facilities i.e. site offices/toilets/soil stockpiling is to occur within tree protection zone.	development site boundary will not be disturbed/impacted	set up prior to any works occurring on site and to remain throughout duration of construction works	
Sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment	Moderate	Minor	Appropriate controls are to be utilised to manage exposed soil surfaces and stockpiles to prevent sediment discharge into waterways. Soil and erosion measures such as sediment fencing, clean water diversion must be in place prior the commencement of the construction work and must be regularly inspected and maintained throughout the development of the site.	Erosion and sedimentation will be controlled	For the duration of construction works	Project Manager
Lighting needs to be designed to minimise impacts to nocturnal and diurnal fauna.	Moderate	Minor	Light pollution can be reduced by limiting the duration of spotlight illumination, reducing the brightness of lights where possible, installing shield fixtures to reduce light scattering, and using narrow-spectrum light sources to reduce the wavelengths likely to interfere with animal behaviour (Gaston et al 2012). High priority areas where the implementation of measures to reduce light pollution should be considered would be located adjacent to important habitat. Wildlife friendly lighting (i.e. filtered yellow-green and amber LEDs wavelength of 590 nm with light shield protection controlling light spill) should be considered in the retained bushland areas.	Lighting impacts on nocturnal and diurnal fauna is minimised.	During clearing works and post construction (i.e. design).	Project Manager/ Landscape Designer/ Ecologist

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	High	Minor	<p>Phytophthora control measures must be undertaken from the commencement of the project to minimise the risk of spread and to the site. The following guidelines should be followed:</p> <p>https://www.rbgsyd.nsw.gov.au/science/plants/pests-diseases/phytophthora-dieback/disinfection-procedures</p> <p>http://www.environment.gov.au/biodiversity/invasive-species/publications/management-phytophthora-cinnamomi-biodiversity-conservation</p> <p>Vehicles, machinery and building refuse should remain only within the development site.</p> <p>Weed management to be undertaken where required.</p>	Spread of weeds and pathogens prevented	For the duration of construction works and post-construction	Project Manager
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented	Minor	Negligible	<p>Construction staff to be briefed prior to work commencing to be made aware of any sensitive biodiversity values present and environmental procedures such as:</p> <ul style="list-style-type: none"> Site environmental procedures (vegetation management, sediment and erosion control, exclusion fencing and weeds) What to do in case of environmental emergency (chemical spills, fire, injured fauna) <p>Key contacts in case of environmental emergency</p>	All staff entering the development site are fully aware of all the ecological values present within the Lot and environmental aspects relating to the development and know what to do in case of any environmental emergencies	To occur for all staff entering/working at the development site. Site briefings should be updated based on phase of the work and when environmental issues become apparent.	Project Manager
Making provision for the ecological restoration, rehabilitation and/or	Moderate	Minor	Landscaping in the development site is to use locality derived native species and those found within the PCT present.	Areas within the development site will be landscaped using appropriate species	Throughout construction and following completion of	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
ongoing maintenance of retained native vegetation habitat adjacent to the master plan development site					construction activities.	

2.2.5 Serious and Irreversible Impacts (SII)

The development does not have any Serious and Irreversible Impacts (SII) on threatened ecological communities and does not pose any risk of SII to any candidate species.

Masterplan Footprint

Riverwood



Figure 8: Final project footprint

3. Consistency with legislation and policy

3.1 *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where “Matters of National Environmental Significance” (MNES) may be affected. Under the Act, any action which “has, will have, or is likely to have a significant impact on a matter of MNES” is defined as a “controlled action”, and requires approval from the Commonwealth Department of Agriculture, Water and the Environment (DAWE), which is responsible for administering the EPBC Act.

The process includes conducting an Assessment of Significance for listed threatened species and ecological communities that represent a matter of MNES that will be impacted as a result of the proposed action. Significant impact guidelines (formerly DotEE 2014) that outline a number of criteria have been developed by the Commonwealth, to provide assistance in conducting the Assessment of Significance and help decide whether or not a referral to the Commonwealth is required. The likelihood of occurrence for EPBC listed threatened species and communities is shown in Appendix E.

Three threatened species listed under the EPBC Act was identified as having potential to occur within the development site:

- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Chalinolobus dwyeri* (Large-eared Pied Bat)
- *Lathamus discolor* (Swift Parrot)

The significant impact criteria were applied to these species (Appendix E) and it was determined that the proposed development is unlikely to have a significant impact on any EPBC listed threatened species. Therefore, a Commonwealth referral is not recommended.

4. References

Bureau of Meteorology 2020. Past data and graphs. Available at [Latest Capital City Observations Horsley Park \(bom.gov.au\)](https://www.bom.gov.au/observing/capitalcity/observations/horsley-park/)

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Land and Property Information. 2015, 'SIX maps aerial imagery'.

NSW Energy, Environment and Science, part of the Department of Planning, Industry and Environment 2020. NSW BioNet: Atlas of NSW Wildlife online search tool. Available: (<http://www.bionet.nsw.gov.au/>)

NSW Energy, Environment and Science, part of the Department of Planning, Industry and Environment 2021 BioNet Threatened Biodiversity profiles.
<https://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx>

NSW Energy, Environment and Science, part of the Department of Planning, Industry and Environment 2021 BioNet Vegetation Classification.
<https://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx>

Office of Environment and Heritage (OEH) BAM Calculator 2021.
<https://www.lmbc.nsw.gov.au/bamcalc/home/AssessmentCal>

Appendix A: Definitions

Terminology	Definition
Biodiversity credit report	The report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site.
BioNet Atlas	The BioNet Atlas (formerly known as the NSW Wildlife Atlas) is the OEH database of flora and fauna records. The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails) and some fish
Broad condition state:	Areas of the same PCT that are in relatively homogenous condition. Broad condition is used for stratifying areas of the same PCT into a vegetation zone for the purpose of determining the vegetation integrity score.
Connectivity	The measure of the degree to which an area(s) of native vegetation is linked with other areas of vegetation.
Credit Calculator	The computer program that provides decision support to assessors and proponents by applying the BAM, and which calculates the number and class of biodiversity credits required to offset the impacts of a development or created at a biodiversity stewardship site.
Development	Has the same meaning as development at section 4 of the EP&A Act, or an activity in Part 5 of the EP&A Act. It also includes development as defined in section 115T of the EP&A Act.
Development footprint	The area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials.
Development site	An area of land that is subject to a proposed development that is under the EP&A Act.
Ecosystem credits	A measurement of the value of EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur with a PCT. Ecosystem credits measure the loss in biodiversity values at a development site and the gain in biodiversity values at a biodiversity stewardship site.
High threat exotic plant cover	Plant cover composed of vascular plants not native to Australia that if not controlled will invade and outcompete native plant species.
Hollow bearing tree	A living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the minimum entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1 m above the ground. Trees must be examined from all angles.
Important wetland	A wetland that is listed in the Directory of Important Wetlands of Australia (DIWA) and SEPP 14 Coastal Wetlands
Linear shaped development	Development that is generally narrow in width and extends across the landscape for a distance greater than 3.5 kilometres in length
Local population	The population that occurs in the Study Area. In cases where multiple populations occur in the Study Area or a population occupies part of the Study Area, impacts on each subpopulation must be assessed separately.
Local wetland	Any wetland that is not identified as an important wetland (refer to definition of Important wetland).
Mitchell landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.
Multiple fragmentation	Developments such as wind farms and coal seam gas extraction that require multiple extraction points (wells) or turbines and a network of associated development including roads, tracks, gathering systems/flow lines, transmission lines

Terminology	Definition
impact development	
Operational Manual	The Operational Manual published from time to time by OEH, which is a guide to assist assessors when using the BAM
Patch size	An area of intact native vegetation that: a) occurs on the development site or biodiversity stewardship site, and b) includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤ 30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the development site or stewardship site..
Proponent	A person who intends to apply for consent to carry out development or for approval for an activity.
Reference sites	The relatively unmodified sites that are assessed to obtain local benchmark information when benchmarks in the Vegetation Benchmarks Database are too broad or otherwise incorrect for the PCT and/or local situation. Benchmarks can also be obtained from published sources.
Regeneration	The proportion of over-storey species characteristic of the PCT that are naturally regenerating and have a diameter at breast height < 5 cm within a vegetation zone.
Remaining impact	An impact on biodiversity values after all reasonable measures have been taken to avoid and minimise the impacts of development. Under the BAM, an offset requirement is calculated for the remaining impacts on biodiversity values.
Retirement of credits	The purchase and retirement of biodiversity credits from an already-established biobank site or a biodiversity stewardship site secured by a biodiversity stewardship agreement.
Riparian buffer	Riparian buffers applied to water bodies in accordance with the BAM
Sensitive biodiversity values land map	Development within an area identified on the map requires assessment using the BAM.
Site attributes	The matters assessed to determine vegetation integrity. They include: native plant species richness, native over-storey cover, native mid-storey cover, native ground cover (grasses), native ground cover (shrubs), native ground cover (other), exotic plant cover (as a percentage of total ground and mid-storey cover), number of trees with hollows, proportion of over-storey species occurring as regeneration, and total length of fallen logs.
Site-based development	a development other than a linear shaped development, or a multiple fragmentation impact development
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Subject land	Is land to which the BAM is applied in Stage 1 to assess the biodiversity values of the land. It includes land that may be a development site, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement.
Threatened Biodiversity Data Collection	Part of the BioNet database, published by OEH and accessible from the BioNet website.
Threatened species	Critically Endangered, Endangered or Vulnerable threatened species as defined by Schedule 1 of the BC Act, or any additional threatened species listed under Part 13 of the EPBC Act as Critically Endangered, Endangered or Vulnerable.
Vegetation Benchmarks Database	A database of benchmarks for vegetation classes and some PCTs. The Vegetation Benchmarks Database is published by OEH and is part of the BioNet Vegetation Classification.

Terminology	Definition
Vegetation zone	A relatively homogenous area of native vegetation on a development site, land to be biodiversity certified or a biodiversity stewardship site that is the same PCT and broad condition state.
Wetland	An area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle. Wetlands may exhibit wet and dry phases and may be wet permanently, cyclically or intermittently with fresh, brackish or saline water
Woody native vegetation	Native vegetation that contains an over-storey and/or mid-storey that predominantly consists of trees and/or shrubs

Appendix B: Vegetation plot data

Scientific name	Common name	Native, Exotic, High Threat	Exotic	Growth form group	Stratum	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5	
Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
<i>Agapanthus praecox</i>		E		G								0.1	3		
<i>Agave</i> sp.		E		G								1	3		
<i>Brachychiton populneus</i> subsp. <i>populneus</i>	Kurrajong			Tree				5	2						
		N		U											
<i>Bromus catharticus</i>		E		G		1	5	0.2	50						
<i>Camellia japonica</i>		E		M								0.5	1		
<i>Cenchrus clandestinus</i>	Kikuyu	HTE		G		30	1000								
<i>Commelina cyanea</i>		N		Forb	G					30	1000				
<i>Cotoneaster</i> sp.		E		M				5	1						
<i>Cotula australis</i>		N		Forb	G			0.2	20	0.5	20				
<i>Cynodon dactylon</i>	Couch	E		G		40	500	10	100	10	100	1	10		

Scientific name	Common name	Native, Exotic, High Threat	Exotic	Growth form group	Stratum	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5	
						Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
<i>Cyperus gracilis</i>		N		G		0.2	20	4	100	10	100			0.2	20
<i>Dichondra repens</i>	Kidney Weed	N		Forb	G	5	100			20	500			4	100
<i>Ehrharta erecta</i>	Panic Veldt Grass	HTE			G	1	20	2	50	4	50	0.5	20	5	50
<i>Erodium cicutarium</i>		E			G					5	50				
<i>Eucalyptus crebra</i>	Small-leaved Ironbark	N		Tree	U			15	4	20	2				
<i>Eucalyptus fibrosa</i>	Red Ironbark	N		Tree	U			5	1						
<i>Eucalyptus longifolia</i>		N		Tree	U	1	1					5	1		
<i>Eucalyptus moluccana</i>		N		Tree	U	40	2								
<i>Eucalyptus robusta</i>	Swamp Mahogany	N		Tree	U									20	4
<i>Eucalyptus grandis</i>		N		Tree	U			4	1						
<i>Eucalyptus tereticornis</i>		N		Tree	U					2	1	20	3		

Scientific name	Common name	Native, Exotic, High Threat Exotic	Growth form group	Stratum	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5	
					Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
<i>Euchiton</i> spp.		E		G									0.1	10
<i>Ficus rubiginosa</i>		N	Tree	U									1	1
<i>Fragaria</i> spp.		E		G					2	50				
<i>Gamochaeta calviceps</i>	Cudweed	E		G									0.2	20
<i>Hypochaeris radicata</i>	Catsear	E		G			0.2	20			0.1	5	5	50
<i>Lagerstroemia</i> sp.	Crepe Myrtle	E		M					3	1				
<i>Ligustrum lucidum</i>	Large-leaved Privet	HTE		M							5	1		
<i>Lophostemon confertus</i>	Brushbox	N	Tree	U			10	1						
<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass	N	Grass and grass-like	G	20	100			10	100				
<i>Modiola caroliniana</i>		E		G	0.5	20	3	100	5	100	3	50	10	1000
<i>Paronychia brasiliensis</i>		E		G			1	100	5	100	5	100	30	2000
<i>Paspalum dilatatum</i>	Paspalum	HTE		G	1	5							0.5	5

Scientific name	Common name	Native, Exotic, High Threat Exotic	Growth form group	Stratum	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5	
					Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
<i>Pistacia chinensis</i>		E		M					10	2				
<i>Poa annua</i>		E		G	1	20								
<i>Robinia pseudoacacia</i>		E		U							5	1		
<i>Sida rhombifolia</i>	Paddy's Lucerne	E		G			0.1	2	0.1	2				
<i>Solanum linnaeanum</i>		E		G			0.1	1			0.1	3		
<i>Solanum nigrum</i>		E		G			0.2	10						
<i>Toxicodendron succedaneum</i>		E		G							10	1		
<i>Tradescantia sp.</i>	Trad	E		G					0.1	2				
<i>Trifolium spp.</i>		E		G	0.1	1			5	50			2	50



Diane Campbell SENIOR ECOLOGIST

Appendix C Staff CVs

Diane has undertaken extensive work in the management of teams in biodiversity conservation, planning and ecology for more than 25 years in the local and state government sector and four years in consulting. She has a strong appreciation of current and historic local government and Crown lands land management and biodiversity legislation, policy and methods. Diane has prepared numerous plans of management for local government; both specific and generic plans for several local government areas (LGAs) within Sydney. She prepared a comprehensive Vegetation Management Plan for all Council managed land in the Bathurst Regional LGA and undertook the Roadside Vegetation Survey and Booklet for Moree Plains Shire Council. Many of her projects require the balancing of community use with natural area management and involve significant community consultation. She is an Accredited Assessor under the Biodiversity Assessment Method (BAM) and a BioBanking Assessor and has undertaken many BAM assessments. Diane developed a BioBanking program for Hornsby Shire Council and established several BioBanking Agreement sites. Her expertise in biodiversity conservation and ecology are complemented by extensive knowledge and skills in local government planning and programs, as well as experience in implementing environmental projects throughout a range of disciplines.

QUALIFICATIONS

- Bachelor of Science, University of Sydney
- Accredited Biodiversity Assessment Method Assessor
- Accredited Biobank Assessor
- Certificate IV in Contract Management AWARDS

Centenary Medal for Services to the Environment

RELEVANT PROJECTS

Biodiversity Assessment Method (BAM), Biobanking and Offsets

- Wagga Wagga BAM plots for Transgrid high voltage power line, Aurecon
- Bago State Forest Tumut BAM plots for Transgrid high voltage power line, Aurecon
- Warnervale Rd Hamlyn Terrace Biodiversity Development Assessment Report (BDAR) BAM plots and targeted survey,
- East Kurrajong North Biodiversity Stewardship Agreement variation for species credits
- East Kurrajong South BSA variation for species credits
- Mount Tootie Bilpin Biodiversity stewardship site feasibility assessment
- Western Sydney University Campbelltown Stage 6 BDAR
- Aquatic Drive Kiama Subdivision BDAR field work
- Ecological constraints assessment - O'Briens Road Cattai - BAM plots
- 50 Phillip Street Sydney BDAR waiver and microbat habitat assessment
- Lane Cove Council Golf Course and Recreation Centre BDAR
- Horsley Drive BDAR

- Fort Street School Millers Point BDAR and microbat habitat assessment
- Glenlee Biodiversity Stewardship Site Feasibility, SADA Services
- Vegetation Offsets Guide, Sydney Water
- Kingswood Hospital BDAR Waiver
- Ecological Constraints Due Diligence – Chittick Lane Cobbitty – BAM plots and credit calculations for Biodiversity Development Assessment Report (BDAR) and Biodiversity Stewardship Site Report (BSSAR), Hixson Pty Ltd
- Preliminary BDAR and BSAAR credit calculations for Elizabeth Drive, Badgerys Creek Stages 2-4, Elizabeth Drive Enterprises
- BDAR Waiver and Flora and Fauna Assessment Parramatta West Public School, NSW Department of Education
- BDAR 415 Boundary Road, Maraylya, Turnbull International Planning
- Preliminary Scoping Analysis – Biodiversity Offsets Scheme for Mt Panorama Second Circuit, Bathurst Regional Council
- BAM Quadrats 27 Jennifer Street, Little Bay, St Michaels Golf Course
- BAM Quadrats and Targeted Searches Redbank Southern Valley Precinct and Community Shopping Precinct, Redbank Communities
- Campbelltown Offsets Policy and Calculator, Campbelltown City Council
- Springwood Land Holdings Constraints Mapping and Biodiversity Credits, Diocese of Parramatta
- St Columbas High School and St Thomas Aquinas Primary School Biobanking Feasibility Report, Diocese of Parramatta
- Vegetation Offset Plan for Federation Forest Mount Druitt, Blacktown City Council
- Upper Pyes Creek and New Farm Road Biobanking Agreement and Credit Sales, Hornsby Shire Council
- Dog Pound Creek Biobanking Agreement and Credit Sales, Hornsby Shire Council
- Green Offsets Policy Development, Review and Implementation, Hornsby Shire Council
- M2 Upgrade Biodiversity Offset Proposals to Leightons Construction, Hornsby Shire Council
- Biobanking Expression of Interest, Hornsby Shire Council
- NorthConnex Tunnel Council and Joint Venture Partners Commitment for Biodiversity Offsets and Community Report, Hornsby Shire Council
- Galston Park Biobanking Community Report, Hornsby Shire Council

Biodiversity Planning and Conservation

- Bellingen Biodiversity Strategy, Bellingen Shire Council
- Biodiversity Framework and Action Plan, Canada Bay Council
- Bathurst Regional Council Updated Vegetation Management Plan, Bathurst Regional Council
- Moree Plains Roadside Vegetation Mapping, Glovebox Guide, Training and Construction Documentation, Moree Plains Shire Council
- Acquisition of 74ha of Bushland from Department of Planning, Hornsby Shire Council
- Biodiversity Conservation Strategy, Program Implementation and Strategy/ Program Reviews, Hornsby Shire Council

- BioMap Project Council Submission, Hornsby Shire Council
- Habitat Connectivity, Incentives and Capacity Building Project, Hornsby Shire Council
- Restoration of Roadside Corridors, Hornsby Shire Council
- Warriewood Wetlands Acquisition Expert Statements, Pittwater Council
- Hamilton Estate Acquisition, Pittwater Council
- Ingleside Escarpment Acquisition Flora and Fauna Report and Heritage Analysis, Pittwater Council
- Bate Bay Master plan and Studies, NPWS Submission to Department of Planning, National Parks and Wildlife Service
- Landscape Management Policy, Pittwater Council
- Pittwater Flora and Fauna Habitat and Corridor Conservation Strategy, Pittwater Council
- Feral Animal Management Plan, Canterbury Bankstown Council

Vegetation Surveys and Restoration

- Vegetation Management Plan for Peter Parade Flood Levee Repair Works, Old Toongabbie Creek, city of Parramatta, Parramatta City Council
- Report for Vegetation Bonds Release for Exotic Nurseries Old Northern Road Dural, Exotic Nurseries
- Flora and Fauna Assessment Report including *Xanthosia scopulicola* for East Station Upgrade of the Scenic World Skyway, Katoomba, Scenic World
- Scenic World Katoomba Constraints Report, Vegetation Survey and Mapping, Scenic World
- Review of Endangered Ecological Community Mapping, Hornsby Shire Council
- Commissioned Study of Vegetation Communities of Hornsby Shire and inclusion into LEP and DCP, Hornsby Shire Council
- Commissioned Vegetation Condition Analysis and Ranking Study of Hornsby Shire, Hornsby Shire Council
- Commissioned Conservation Significance Assessment Map, Hornsby Shire Council
- Commissioned Urban Remnant Vegetation Study in Hornsby Shire, GIS Maps and incorporation into DCP, Hornsby Shire Council
- Commissioned Southern Rural Remnant Vegetation in Hornsby Shire, GIS Maps and incorporation into DCP, Hornsby Shire Council
- Land Rationalisation and Acquisition, Assessment of Vegetation on Council Land, Hornsby Shire Council
- Vegetation survey of Yengo National Park proposal, National Parks and Wildlife Service
- Survey of Cudmirrah Nature Reserve Proposal, National Parks and Wildlife Service
- Delivery and Review of Contract Bushland Restoration Program, Hornsby Shire Council
- Delivered Contract bushland restoration program, Pittwater Council
- Delivered regional noxious weed and feral animal control programs, Hornsby Council
- Phytophthora and Myrtle Rust Management Action Plans, Hornsby Council
- Aboriginal Land Claims – Assessed vegetation on ALCs throughout NSW, National Parks and Wildlife Service
- Investigation of Aboriginal Land Claims at Moonbi, National Parks and Wildlife Service

- Investigation of the Colonel Nature Reserve Proposal at Aberdeen NSW, National Parks and Wildlife Service
- Northern Wheatbelt NSW Vegetation Survey – member of the team mapping vegetation and undertaking field surveys of native vegetation, National Parks and Wildlife Service.

Environmental Impact Assessment and Planning reviews

- Ecological Impact Assessment for Private Dwelling and Burial Ground Coolongolook, Brewster Murray
- The Maltings Mittagong Ecological Constraints Report, Halcyon Hotels
- Northern Metropolitan Cemetery Ecological Planning Proposal Report, Northern Cemeteries Trust
- Orchard Hills Biodiversity Planning Review, Legacy Property
- Campbelltown Council In-house Consultant – in-house consultant for 2 years to review ecological, contamination, bushfire, wastewater and other impacts of development applications, planning proposals, biobanking statements and biocertification. Prepared submissions on Coastal Management SEPP, Biodiversity Conservation Regulation, input to land acquisition policy, Campbelltown City Council.
- Anglicare Village Pembroke Road, Minto - Ecological Constraints and Impact Assessment Report incl. targeted koala surveys, Cumberland Plain land Snail surveys, Cumberland Plain Woodland and River-flat Eucalypt forest EECs, Midson Group.
- St Peter and St Pauls Assyrian School, Cecil Park - Ecological Impact Assessment Report, PMDL Planning
- Biodiversity Assessment – Tallawong Road Rouse Hill including Cumberland Plain Woodland and threatened microbat species, Metro Award and Tallawong Pty Ltd.
- Biodiversity Assessment - 44 Cudgeong Road, Rouse Hill including Cumberland Plain Woodland and threatened microbat species, Metro Award.
- Biodiversity Assessments – 10 Advance Street and 5 Schofields Road, Schofields including Cumberland Plain Woodland, River-flat Eucalypt Forest and threatened microbat species, ARK built Investments Pty Ltd.
- Craigend Road, Leura - Ecological Impact Assessment Report and Vegetation Management Plan, John Stuart
- Ecological Study and Review of Environmental Factors – Parramatta Footbridge including Mangrove and threatened microbat species, Bonacci Infrastructure.
- Review of Environmental Factors and Ecological Impact Assessment – Repair of Peter Parade Levee including River-flat Eucalypt Forest and threatened microbat species, Parramatta Council.
- Statement of Environmental Effects and Fauna Assessment for Dual Occupancy Pendle Hill – undertook fauna and environmental investigations and prepared SEE, Aruna Bellach.
- 70 McCarrs Creek Road - Ecological Impact Assessment Report and Biodiversity Management Plan, James de Soyres and assocs.
- 169 Forest Way, Belrose - Update of Road Ecological Impact Assessment Report and Biodiversity Management Plan, Japara Healthcare

- Review of Environmental Factors for Bar Island Restoration, Hawkesbury River - Prepared the REF for the restoration of the heritage chimney, graves and memorial on Bar Island a naturally vegetated remote island in the Hawkesbury estuary, Hornsby Shire Council.
- South Dural Planning Proposal – Responsible for review of initial South Dural Planning Proposal and input to Council reports, Hornsby Shire Council.
- Hornsby Mountain Bike Trail - Responsible for consultants preparing a range of studies and a Review of Environmental Factors for the mountain bike track and for the Council approval report and environmental controls, Hornsby Shire Council.
- Hornsby Housing Strategy – Prepared consultant brief, worked with strategic planners and consultants and reviewed study on constraints mapping of vegetation for the Hornsby Housing Strategy, Hornsby Shire Council
- Cherrybrook Station Urban Precinct – Responsible for submissions to station precinct planning and urban release planning regarding the conservation of endangered ecological communities, water quality and riparian connectivity and walking track linkages, Hornsby Shire Council.
- Bush Fire Environmental impact assessments – Approved REFs and Part V assessments prepared by staff for hazard reduction burns and fire trail upgrades, Hornsby Shire Council.
- Warriewood Valley Urban Land Release – Responsible for input to the ecological, water management and infrastructure studies, preparation of Section 94 Plan for Bushfire Trail, member Section 94 Committee for the Warriewood Valley and input to the Valley Master plan, Pittwater Council.
- Warriewood Wetlands Burn – Prepared a assessment of response of wetland flora species to fire as part of the Review of Environmental Factors for the burn that removed a large area of dead aquatic woody weed previously treated as part of the restoration plan, Pittwater Council.
- Environmental Impact Report for Television and Radio Satellites Lord Howe Island- Prepared the Environmental Impact Report for radio and television satellites including multicriteria analysis of levels of service, coverage, cost and impacts on flora and fauna, National Parks and Wildlife Service.
- Review of Public Submissions Report and Recommendation for Communications Tower – Morton National Park –Prepared the public submissions report following exhibition of the Public Environment Report for Commonwealth tower in Morton National Park, National Parks and Wildlife Service.

Wetlands, Catchment and waterway management

- Tudar Road Wetland Plan of Management – Flora and fauna surveys, coordinated catchment hydrology and hydraulic modelling and assessment, community consultation and draft Plan of Management, Sutherland Shire Council.
- One Tree Reach Wetland - Vegetation surveys, obtained multiple grants for restoration and fencing, aquatic and terrestrial studies, land acquisition, investigation and mitigation of acid sulfate soils, bushland restoration, boardwalk construction and access, and plan of management preparation, Hornsby Shire Council.
- Hornsby Council Catchment Remediation Program - Responsible for the CRR program that annually constructed wetlands, stormwater reuse, gross pollutant traps and management devices to the value of \$1.1m and maintained approximately 450 DRR devices to improve

stormwater quality entering freshwater creeks and the Hawkesbury River, Hornsby Shire Council.

- Waterbird Study of Hornsby Shire – Identified data gap, grant applications and responsible for staff overseeing the consultant study, Hornsby Shire Council.
- Old Dromana Wetland Fauna Survey Gwydir River Moree Plains – member of a small team undertaking fauna survey of the floodplain wetland, National Parks and Wildlife Service.
- Management of Warriewood Wetlands – Responsible for consultants undertaking palynological study of wetland peat soils and preparing a weed management strategy. Responsible for contractor aquatic weed control and contract bush regeneration post burn, and Bushcare field days Pittwater Council.
- Management of Careel Bay Wetlands – Responsible for wetland migratory bird and vegetation study, intertidal organisms study including mangroves encroachment into saltmarsh, study of water quality including leachate from former landfill and for saltmarsh relocation and contract and volunteer bush regeneration, Pittwater Council.
- Narrabeen Creek Constructed Wetland – Warriewood - Responsible for the project to address stormwater quality through construction of a sediment basin, weed control and restoration of riparian habitat in the creek line corridor, Pittwater Council.
- Pittwater Estuary Management Study – responsible for management study of the Pittwater estuary, Pittwater Council.
- Member of Narrabeen Lagoon Floodplain Management Committee Pittwater, Pittwater Council
- Member of Pittwater Coastal Management Committee, Pittwater Council
- Pittwater Estuary Management Committee, Pittwater Council
- Member of Sydney Northern Beaches Catchment Management Committee - provided input to strategic plan and implementing actions
- Representative on Coastal Committee of NSW, National Parks and Wildlife Service
- Representative on State Catchment Management Coordinating Committee, National Parks and Wildlife Service

Threatened species management

- Saving Our Species – expert panel member for Blue Gum High Forest and Sydney Turpentine Ironbark Forest SOS programs, Office of Environment and Heritage
- Threatened Species and Vegetation Management Plan for Rex Road Georges Hall – prepared plan to conserve and manage *Pimelea spicata*, Cumberland Plain Woodland and potential habitat for Cumberland Plain Land Snail retained in two Conservation Areas as part of Donington Gardens Stage 2 seniors living, APP Corporation.
- Dural Woodland Snail – Commonwealth Endangered Species Listing - Submission on Commonwealth listing of the Dural Land Snail (*Pommerhelix duralensis*), Hornsby Shire Council.
- Recovery Team for Blue Gum High Forest – recovery team member for Draft Recovery Plan for Critically Endangered Ecological Community (EPBC Act), Australian Government.
- Recovery Team for Turpentine Ironbark Forest recovery team member for Draft Recovery Plan Critically Endangered Ecological Community (EPBC Act), Australian Government.

- Recovery Plan for *Zieria involucreata* – Input to draft and implementation of Recovery Plan incl field investigations, liaising with OEH, private landholders and Aboriginal community, Council submission, installing roadside signs and providing on-site information to Works staff undertaking road upgrades, Hornsby Shire Council.
- Recovery Plan for *Asterolasia elegans* – Input to the Recovery Plan, field investigations with OEH, contributions including the need for ex situ seed bank for the species due to vulnerability to wildfire, Hornsby Shire Council.
- *Darwinia biflora* UTS Offset Project – Provided offset sites at Mount Colah and North Epping for *Darwinia biflora* to offset its loss from a housing development at UTS Lindfield, Hornsby Shire Council.
- Priority Action Statement 2 for *Persoonia mollis* var. *maxima* –Contributed to draft PAS2 as part of expert group, Hornsby Shire Council.
- *Hibbertia* sp. Turramurra - Contributed to conservation plan for new species *Hibbertia* sp. Turramurra, Hornsby Shire Council
- Survey of threatened species *Ooline* (*Cadelia pentastylis*) – member of the team undertaking rare plant surveys including soil sampling, vegetation and invertebrates, National Parks and Wildlife Service.
- Threatened Species Management Plan – Responsible for commissioning the plan. Used the plan to prepare the Biodiversity Development Control Plan for Pittwater, Pittwater Council.
- Community Survey of Koalas, Squirrel Glider and Long-nosed Bandicoot (Pittwater Council)
- Project SAFE Saving Animals from Extinction – Developed a joint project for fauna conservation with Taronga Zoo, Pittwater Council.
- Established and Managed Threatened Species Unit of the National Parks and Wildlife Service following the introduction of new threatened species legislation in NSW.

Plans of Management

- Riverglade Reserve Plan of Management Hunters Hill Council
- Sophia Park Wetland Plan of Management, Shellharbour Council
- Draft Tudar Road Wetland Plan of Management, Sutherland Shire Council
- Generic Plans of Management for 600 Reserves Community and Crown Land, Hornsby Council
- Bar Island Plan of Management, Hornsby Council
- One Tree Reach Studies Coordination and Plan of Management, Hornsby Council
- Old Mans Valley Plan of Management, Natural Areas, Land Categories and Mountain Bike Tracks, Hornsby Council
- Specific Plans of Management - Angophora Reserve, McKay Reserve, Stapleton Park, Irrawong Reserve, Warriewood Wetlands (Volumes 1 & 2), Careel Bay Wetlands, Pittwater Council
- Urban Bushland Plan of Management, Vegetation and Fauna Overview and Inventory and Action Plan, Pittwater Council

Recreation planning and management

- Westleigh Natural Area and Mountain Bike Track Review, Hornsby Shire Council
- Ecological Feasibility Study - Warrimoo Mountain Bike Trail – study to assess reopening of trail, incl. field work, Plant Community Types, impact assessment and mitigation with Council staff

and Mountain Bike Track builder, and report including IMBA standards and community Trailcare program for construction and maintenance of track, Ku-ring-gai Council.

- Hornsby Mountain Bike Trail: Responsible for staff and consultant studies to establish mountain bike trail in the Hornsby Shire including extensive stakeholder engagement, scoping and detailed studies and overseeing the construction, establishment and management of the trail. Responsible for commissioning a second REF, trail designs and tender to relocate trail as a result of project to deliver NorthConnex tunnel spoil to the Hornsby Quarry, Hornsby Shire Council.
- Hornsby Heritage Steps – Responsible for staff delivering the significant heritage restoration grant project. Ensured that the major construction job was staged to match staff capability and WHS considerations with movement of 100 tonne of rock by helicopter to man-handled receiving sites in an inaccessible forest location with high potential for branch drop. Negotiated NPWS staff assistance to coordinate the helicopter including loading of the rock, Hornsby Shire Council.
- Bushwalking Master plan, Guided Walks and Microsite – Responsible for development of a tracks program and master plan. Identified and prepared successful funding proposals for the \$10m program from the Special Rate Variation and the Section 94 Developer Contributions and staff prepared grant applications. Responsible for delivery of the track construction and signage, for expansion of the free guided walks program and major contributions to the 'Discover Hornsby' microsite GIS maps and text, Hornsby Shire Council.
- One Tree Reach Public Facilities – Obtained grants responsible for staff who project managed construction of the boardwalk, forest walk, car park, seats, tables and signage, Hornsby Shire Council.
- Bar Island Jetty, Boardwalk and Track Construction, Hornsby Shire Council
- Warriewood Wetlands Boardwalk, Pittwater Council
- Careel Bay Boardwalk, Pittwater Council
- Irrawong Reserve Boardwalk, Pittwater Council
- Bicentennial Coastal Walkway and Rock Fall Management, Pittwater Council

Bush fire management

- Bush Fire Management and Fire Trail Upgrades – Member of the Hornsby Ku-ring-gai Bush Fire Management Committee, undertook strategic review, expansion and scheduling of Asset Protection Zones (APZs) and maintenance of APZs and fire trails on Council managed land. Project managed grants for the environmental impact assessment and construction/ major upgrade of fire trails including Fraser Road, Bambil Hamley, Woodcourt, Old Mans Valley and Berkeley Trail upgrade with NPWS, Hornsby Shire Council
- Service Level Agreement with the Rural Fire Service – Negotiated then expired SLA with RFS transferring to RFS operational responsibility to prevent, suppress and mitigate fires, with Council retaining responsibility for assets and support services, Hornsby Shire Council.
- Service Level Agreement with the Rural Fire Service – Negotiated SLA with RFS transferring to RFS operational responsibility to prevent, suppress and mitigate fires, with Council requiring leases of brigade buildings, whilst retaining other responsibilities for assets and support, Pittwater Council.

- Hornsby Ku-ring-gai Bush Fire Risk Management Plan - Input to the HK Bush Fire RMP 2010-2015 and 2016 Hornsby Ku-ring-gai Bush Fire Management Plan, Hornsby Shire Council
- Council Staff Bush Fire Fighter Training – Organised staff training in Bush Fire Awareness, Bush Fire Support and modules of Basic Bushfire Fighter modules, Hornsby Shire Council.
- Warringah Pittwater Bush Fire Risk Management Plan – Contributed to the threatened species section of the Warringah Pittwater Bush Fire Risk Management Plan 1997. Responsible for all bush fire matters including all Bush Fire Committees, responsible for fire brigade buildings, environmental impact assessment of burns, conducting ecological burns and pre and post fire weeding, Hornsby Shire Council.
- Warriewood Valley Bushfire Trail Section 94 Plan – Responsible for the preparation of the Section 94 Plan for Developer Contributions for construction of the Bush Fire Trail for the Warriewood Valley Urban Land Release, Pittwater Council.

Heritage management

- Mount Penang Natural Heritage Assessment, TDK Architects
- Wisemans Cemetery Protection and Restoration – Following the destruction of headstones by wildfire, developed and implemented NSW Heritage Grant project to restore historic graves in accordance with condition report, create an APZ, install a fire trail gate, restore fencing and undertake weed control in the cemetery, Hornsby Council.
- Plan of Management for Bar Island – Plan of management preparation and implementation through multiple grants for restoration of the church chimney and graves, memorial, bush regeneration, APZ, reconstruction of the jetty, seats and signage, walking track upgrades and a boardwalk across the midden following liaison with the Aboriginal community, Hornsby Council.
- Aboriginal Cultural Heritage Management and Awareness Training, National Parks and Wildlife Advisory Committee
- Hornsby Heritage Steps - Responsible for the project that included detailed heritage inventory and works report and delivery of the step restoration including operational oversight, securing of grants and funding, safety management and project partners, Hornsby Shire Council.
- Australian Natural Heritage Charter – Member of Working Party to prepare the Australian Natural Heritage Charter to conserve places of natural heritage significance to complement the ICOMOS Charter for Places of Cultural Significance (the Burra Charter). Also working party member for Guidelines for the use of the Australian Natural Heritage Charter, Australian Government Department of the Environment.

Natural resource management

- Northconnex EIS – Reviewed and was responsible for part of submission to the EIS on the ecological impacts and impacts on water quality. Responsible for gaining agreement for Lend Lease Bouygues Joint Venture to offset loss of Blue Gum High Forest and Turpentine Ironbark Forest through purchasing biodiversity credits from the establishment of Biobanking sites in Waitara Creek and Arcadia/ Galston, Hornsby Shire Council.
- Northconnex Quarry EIS – Input to EIS submission on the ecological impacts, Hornsby Shire Council.

- M2 Upgrade – Input to EIS submission, negotiated elements of the purchase and temporary use of Council bushland for the project, managed pathogen control on the project site prior to handover to the construction contractor, and provided offset sites for the project's Biodiversity Offset Strategy. Developed a partnership project with Transurban to restore vegetation at a high-profile section of the M2 lease area with Council project managing bush regeneration contractors for Transurban, establishing a model for bushland restoration along the motorway lease, Hornsby Shire Council.
- North West Rail Link – Input to EIS submission on ecological impacts. Responsible for offsets (establishing biobanking sites on Council land), regular construction stakeholder meetings and issues including salvage of trees for reuse as bush furniture, topsoil translocation to Bushcare sites, and the fencing and subsequent planning for protection of a new species listed as threatened, Hornsby Shire Council.
- Epping to Thornleigh Third Track – Input to EIS submission on ecological impacts and worked with consultants on offsets (established biobanking sites on Council land), landscape management and tree management issues, Hornsby Shire Council
- Roadworks Construction Environmental Management Plans (CEMP) - Reviewed CEMPs for infrastructure projects within the Hornsby local government area, Hornsby Shire Council.
- Established and Managed Hornsby Council Natural Resources Branch
- Established and Managed Pittwater Council Natural Resources Branch



Toni Frecker SENIOR ECOLOGIST

Toni has over ten years' experience as an environmental consultant specialising in ecological assessment and native vegetation rehabilitation. Toni has experience in a broad range of projects; including flora surveys to guide planning outcomes, flora and fauna impact assessments and surveys, weed management planning, revegetation of rehabilitated areas and water quality studies. She also has skills in the assessment of post-mining revegetation, the management and control of weed populations, the liaison with stakeholders and the management of sub-contractors and field staff. Toni has extensive botanical experience, including the Sydney Region, the Central Coast, Southern Highlands, Blue Mountains, and the Hunter Valley. She has also undertaken targeted surveys for threatened flora species, and co-ordinated the establishment of field trials to determine effective weed management and competitive planting techniques and the establishment of native vegetation.

QUALIFICATIONS

Accredited BAM Assessor

PROJECT EXPERIENCE

ECOLOGICAL ASSESSMENTS

Assessment of development and potential impact areas including flora and fauna field surveys; targeted flora field surveys specifically for threatened species; biodiversity field surveys to guide both planning and development; and desktop studies. Projects include:

- Ecological Constraints Assessment and Flora and Fauna Assessment for Telopea Master Planning
- Flora and Fauna Assessment for tree management works for Sydney Trains
- M5 Widening Project
- Targeted Survey for threatened flora species at Warnervale
- Ecological Assessment for a rezoning proposal at Tahmoor
- Flora and Fauna Assessment for sewer developments within the North West Growth Centre
- Flora and Fauna Assessment, Upgrade to Marsden Park 132kV Electricity Line
- Ecological Assessment for Master Plan site in North Ryde
- BER School Program Ecological Studies
- Ecological Constraints Analysis for Richmond Road
- Ecological Constraints Analysis for Defence site at Moorebank
- Threatened Species assessment for Long nosed Bandicoot population at North Head
- Flora and Fauna Assessment, Navigation Aids, Sydney Ports Corporation (with particular reference to Eastern Suburbs Banksia Scrub)
- Flora and Fauna Assessment, NBN Facility, Woolumla
- Project Ecologist for Harbord Diggers development
- Ecological Assessment for a rezoning proposal at Glenlee
- Assessment of Plant Species with regard to safety in Brightmore Reserve, Neutral Bay

Tahmoor Colliery Rehabilitation Monitoring -

Annual assessment over 7 years of post-mining rehabilitation and revegetation areas including provision of recommendations for improvement in these areas, with reference to mine closure conditions, and future revegetation programs. Managed the establishment of permanent monitoring sites for this ongoing assessment.

Charbon Coal Vegetation Monitoring – monitoring of vegetation in control sites

Land Management Plan for Edmondson Regional Park – investigation of ecological values, weed management issues and future planning issues relating to the development of a major regional park within the South West Growth Centre. A Plan of Management was produced to guide future management for both the rehabilitation of native vegetation communities and management of land values following the opening of the park areas to recreational activities.

Land Management Plan for Leacock Regional Park – investigation of weed management issues in relation to enhancing native vegetation and fauna habitat. A vegetation management plan was produced to guide rehabilitation of the park over a ten year period.

Vegetation Management Plans – preparation of numerous vegetation management plans to guide the rehabilitation of biodiversity zones within residential, rural cluster and industrial development sites. These development areas are located within Western and Northern Sydney including within The Hills LGA, Campbelltown LGA, Blacktown LGA, Wollondilly LGA and Warringah LGA.

Weed Control & Management, Liverpool Military Area & Marrangaroo Training Area – investigation and assessment of both weed populations and natural areas within the management areas, with preparation of Weed Management Plans and annual work schedules. Management of weed control programmes and annual reporting over a three year program

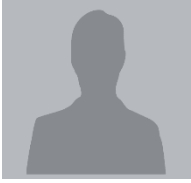
Holsworthy Greening Project – the co-ordination and planning of broad scale revegetation of Endangered Ecological Communities in Western Sydney including management of both sub-contractors and AECOM field staff undertaking revegetation works, and liaison with various stakeholder groups. Carried out monitoring of revegetation success and reporting on revegetation trial results to both the client and the broader scientific community

Pre-clearance survey, M5 Widening Project

Pre-clearance survey, Ravensworth North – ecological survey of development areas prior to clearing, data on threatened species and communities, fauna habitat conditions, and biological safety issues

Sydney Harbour Water Quality - Responsible for the collation and analysis of data relating to the water quality at Sydney Harbour beaches

Catchment Management Support System for the Hawkesbury-Nepean Catchment - Developed a detailed publication which quantified the impact of individual stormwater control methods on water quality and provided input data to the Catchment Management Support System developed by CSIRO



James King GRADUATE GIS ANALYST

James joined Eco Logical Australia in 2019 after graduating from the University of Sydney with a Bachelor of Environmental Systems (Hons) in 2018. Through his studies, James gained skills and experience in tree physiology assessments, hydrological studies and soil science analyses as well as spatial analysis and data management. James also received first class in his Honours thesis which centred around tree physiological analyses to investigate the role of water stress in causing a dieback event in the Monaro region of NSW.

Since being at ELA, James has been involved in a range of projects across multiple disciplines involving biodiversity mapping, data management and analyses, support for the preparation of Biodiversity Development Assessment Reports (BDAR), Review of Environmental Factors (REF), Vegetation Management Plans (VMP), mobile data collection design using ArcCollector and implementation of field survey using differential GPS (DGPS).

QUALIFICATIONS

- Bachelor of Environmental Systems (Hons) (The University of Sydney, 2018)
- White Card (General Construction Induction Card)

EXPERIENCE

ECOLOGICAL ASSESSMENTS – LARGE SCALE SURVEY PREPARATION AND DATA MANAGEMENT/MAPPING

- Sydney Water Prospect to Macarthur Drought Response
- Humelink Ecological Assessment
- Edmondson Regional Park Survey - Field surveys using a Trimble DGPS
- Sydney Swans Headquarter Works BDAR
- Northern Gateway Biocertification BDAR
- O’Connell St Caddens FFA, Bushfire and BDAR
- West Pennant Hills, Oratava Avenue BDAR
- Cowan Pole Replacement REF
- Great North Walk Campsite Upgrades REF
- Feeder 683, Clarence Access Track REF
- Withers Rd Fauna and Flora REF
- Ku-Rong Gai Rail Feeder REF
- Helensburg Sydney Trains Access Track REF

BUSHFIRE ASSESSMENTS

- Murrumbateman Bushfire Assessment
- Bringelly Business Hub
- Future Generation Exploratory Works 2 BMP

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

- Moorebank Underpass
- Tallawong Road Rouse Hill Sewer Lead-in

MAPPING

- Canada Bay – updating Environmentally Sensitive and Biodiversity Land Maps
- Montara Class Action data analysis and map series preparation

Appendix D : Risk Assessment

A risk assessment has been undertaken for any residual impacts likely to remain after the mitigation measures have been applied. The risk likelihood criteria, consequence criteria and the risk matrix relevant to the risk assessment are provided in Table 17, Table 18 and Table 19 respectively.

Table 17: Likelihood criteria

Likelihood criteria	Description
Almost certain (Common)	Will occur, or is of a continuous nature, or the likelihood is unknown. There is likely to be an event at least once a year or greater (up to ten times per year). It often occurs in similar environments. The event is expected to occur in most circumstances.
Likely (Has occurred in recent history)	There is likely to be an event on average every one to five years. Likely to have been a similar incident occurring in similar environments. The event will probably occur in most circumstances.
Possible (Could happen, has occurred in the past, but not common)	The event could occur. There is likely to be an event on average every five to twenty years.
Unlikely (Not likely or uncommon)	The event could occur but is not expected. A rare occurrence (once per one hundred years).
Remote (Rare or practically impossible)	The event may occur only in exceptional circumstances. Very rare occurrence (once per one thousand years). Unlikely that it has occurred elsewhere; and, if it has occurred, it is regarded as unique.

Table 18: Consequence criteria

Consequence category	Description
Critical (Severe, widespread long-term effect)	Destruction of sensitive environmental features. Severe impact on ecosystem. Impacts are irreversible and/or widespread. Regulatory and high-level government intervention/action. Community outrage expected. Prosecution likely.
Major (Wider spread, moderate to long term effect)	Long-term impact of regional significance on sensitive environmental features (e.g. wetlands). Likely to result in regulatory intervention/action. Environmental harm either temporary or permanent, requiring immediate attention. Community outrage possible. Prosecution possible.

Consequence category	Description
Moderate (Localised, short-term to moderate effect)	Short term impact on sensitive environmental features. Triggers regulatory investigation. Significant changes that may be rehabilitated with difficulty. Repeated public concern.
Minor (Localised short-term effect)	Impact on fauna, flora and/or habitat but no negative effects on ecosystem. Easily rehabilitated. Requires immediate regulator notification.
Negligible (Minimal impact or no lasting effect)	Negligible impact on fauna/flora, habitat, aquatic ecosystem or water resources. Impacts are local, temporary and reversible. Incident reporting according to routine protocols.

Table 19: Risk matrix

Consequence	Likelihood				
	Almost certain	Likely	Possible	Unlikely	Remote
Critical	Very High	Very High	High	High	Medium
Major	Very High	High	High	Medium	Medium
Moderate	High	Medium	Medium	Medium	Low
Minor	Medium	Medium	Low	Low	Very Low
Negligible	Medium	Low	Low	Very Low	Very Low

Table 20: Risk assessment

Potential impact	Project phase	Risk (pre-mitigation)	Risk (post mitigation)
Vegetation clearing	Construction / operation	Medium	Medium
Sedimentation and contaminated and/or nutrient rich run-off	Construction	High	Very Low
Noise, dust or light spill	Construction	Low	Very Low

Potential impact	Project phase	Risk (pre-mitigation)	Risk (post mitigation)
Inadvertent impacts on adjacent habitat or vegetation	Construction	Medium	Very Low
Transport of weeds and pathogens from the site to adjacent vegetation	Construction	Medium	Low
Vehicle strike	Construction / operation	Low	Very Low
Trampling of threatened flora species	Construction / operation	Low	Very Low
Rubbish dumping	Construction / operation	Low	Very Low
Wood collection	Construction / operation	Low	Very Low
Bush rock removal and disturbance	Construction / operation	Low	Very Low
Increase in predatory species populations	Construction / operation	Low	Very low
Increase in pest animal populations	Construction / operation	Low	Very low
Increased risk of fire	Construction / operation	Low	Very Low
Disturbance to specialist breeding and foraging habitat.	Construction / operation	Low	Very Low

Appendix E : Likelihood of Occurrence for EPBC Act

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search. Only species listed under the EPBC Act were included in the assessment. Species listed only under the BC Act were assessed as part of determining credit species included in the BAMC. Five terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposal site, results of the site inspection and professional judgement. Some Migratory or Marine species identified from the Commonwealth database search have been excluded from the assessment, due to lack of habitat. The terms for likelihood of occurrence are defined below:

- “known” = the species was or has been observed on the site
- “likely” = a medium to high probability that a species uses the site
- “potential” = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- “unlikely” = a very low to low probability that a species uses the site
- “no” = habitat on site and in the vicinity is unsuitable for the species.

A test of significance was conducted for threatened species that were recorded within the Study Area or had a higher likelihood of occurring and were not recorded during the site visit. It is noted that some threatened fauna species that are highly mobile, wide ranging and vagrant may use portions of the Study Area intermittently for foraging. For these fauna species, the habitat present and likely to be impacted is not considered to be important to the threatened species, particularly in relation to the amount of similar habitat remaining in the surrounding landscape. As such, a test of significance in reference to Commonwealth legislation was not considered necessary.

Information provided in the habitat associations’ column has primarily been extracted (and modified) from the Commonwealth Species Profile and Threats Database and the NSW Threatened Species.

Table 21: EPBC Act Likelihood of Occurrence - Vegetation Communities

Scientific Name	Common name	EPBC Act Status	Distribution and habitat	Likelihood of Occurrence	Impact assessment required
Coastal Swamp Oak Forest / Swamp Oak Floodplain Forest		E	The community occurs in sub-tropical, sub-humid and temperate climatic zones from Curtis Island, north of Gladstone, in QLD to Bermagui in NSW. The ecological community is found within the South Eastern Queensland, NSW North Coast, Sydney Basin and South East Corner IBRA7 bioregions in coastal catchments, mostly at elevations of less than 20 m ASL that are typically found within 30 km of the coast. This distance varies by catchment; for example, low elevations can occur as far as 40 km inland on the Hawkesbury River, or more than 100 km on the Clarence River. On the mid and north coast of NSW the ecological community may also occur up to 50 m ASL on floodplains of, or coastland flats associated with, former or current coastal river systems (Department of Environment and Climate Change, 2007). Coastal Swamp Oak Forest typically occurs on unconsolidated sediments, including alluvium deposits, and where soils formed during the Quaternary period as a result of sea-level rise during the Holocene period	No. not identified in the site during survey	No
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion		E	Occurs within the local government areas of Bankstown, Blacktown, Campbelltown, Hawkesbury, Liverpool and Penrith. Mainly found in the Castlereagh area of the Cumberland Plain, with small patches occurring at Kemps Creek and Longneck Lagoon; also present around Holsworthy. Occurs almost exclusively on soils derived from Tertiary alluvium, or on sites located on adjoining shale or Holocene alluvium. Often adjacent to and on slightly higher ground than Castlereagh Ironbark Forest or Shale Gravel Transition Forest in the Sydney Basin Bioregion.	No. not identified in the site during survey	No
Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion (EPBC Act)		CE	Occurs in western Sydney, with the most extensive stands occurring in the Castlereagh and Holsworthy areas. Smaller remnants occur in the Kemps Creek area and in the eastern section of the Cumberland Plain. Mainly occurs on clay soils derived from the deposits of ancient river systems (alluvium), or on shale soils of the Wianamatta Shales.	No. not identified in the site during survey	No
Shale Sandstone Transition Forest of the Sydney Basin Bioregion		CE	Occurs at the edges of the Cumberland Plain, where clay soils from the shale rock intergrade with earthy and sandy soils from sandstone, or where shale caps overlay sandstone. The boundaries are indistinct, and the species composition varies depending on the soil influences. High-sandstone-influence sites have poor rocky soils, and many shrubs which rely on nitrogen-fixing root nodules and soil/root fungi to obtain nutrients. High-sandstone-influence sites have poor rocky soils, and many shrubs which rely on nitrogen-fixing root nodules and soil/root fungi to obtain nutrients.	No. not identified in the site during survey	No
River-flat Eucalypt Forest on Coastal Floodplains of Southern NSW and Eastern		CE	This community occurs in the South East Corner and Sydney Basin IBRA regions on alluvial landforms related to coastal river floodplains and associated sites where transient water accumulates, including floodplains, river-banks, riparian zones, lake foreshores, creek lines (including the floors of tributary gullies), floodplain	No. not identified in	No

Scientific Name	Common name	EPBC Act Status	Distribution and habitat	Likelihood of Occurrence	Impact assessment required
VIC / River-Flat Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Eucalypt		pockets, depressions, alluvial flats, fans, terraces, and localised colluvial fans. Floodplains may be occasionally or more often saturated, water-logged or inundated. The ecological community is typically found below 50 m ASL but can occur up to 250 m ASL. The community occurs on alluvial soils of various textures, including silts, clay loams and sandy loams, gravel and cobbles.	the site during survey	
Turpentine-Ironbark Forest of the Sydney Basin Bioregion (EPBC Act)		CE	Occurs in Sydney and is heavily fragmented, with only 0.5 percent its original extent remaining intact. The ecological community occurs close to the shale/sandstone boundary on the more fertile shale influenced soils, in higher rainfall areas on the higher altitude margins of the Cumberland Plain, and on the shale ridge caps of sandstone plateaus. This is a transitional community, found between Cumberland Plain Woodland in direr areas and Blue Gum High Forest	No. not identified in the site during survey	No
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion (EPBC Act)		E	The Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion is typically tall open eucalypt forests found on basalt and basalt-like substrates in, or adjacent to, the Sydney Basin Bioregion. The ecological community usually occurs at elevations between 650 m and 1050 m above sea level, although outliers may occur at elevations as low as 350 m (e.g. closer to the coast) or as high as 1200 m (e.g. on higher plateaux). The ecological community occurs in areas of high rainfall, generally ranging from 1000 to 1800 mm/year. The structure of the ecological community varies from tall open forest to woodland depending on aspect, slope, soil conditions, soil depth, and previous disturbance.	No. not identified in the site during survey	No
Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest		CE	Remnants scattered widely across the Cumberland Plain in western Sydney. Typically occurs on heavy clay soils derived from Wianamatta Shale. Flat to undulating or hilly terrain, at elevations up to approximately 350 metres above sea level. Predominantly associated with clay soils, that are derived from Wianamatta Shale geology. Minor occurrences may be present on other soil groups, notably Holocene Alluvium and soils derived from the Mittagong Formation	Yes – identified within the Study Area	No – not to be impacted by the development
Western Sydney Dry Rainforest and Moist Woodland on Shale		CE	Cumberland Plain Sub-region of the Sydney Basin Bioregion. It generally occurs in rugged terrain and other patches may occur on undulating terrain, with dry rainforest patches typically occupying steep lower slopes and gullies, and moist woodland patches typically occupying upper sections of the slope Occurs almost exclusively on clay soils derived from Wiannamatta Group shales."	No. not identified in the site during survey	No

Table 22: EPBC Act Likelihood of Occurrence - Flora and Fauna

Scientific Name	Common name	BC Act Status	EPBC Act Status	Distribution and habitat	Likelihood of Occurrence	Impact assessment required
FAUNA						
<i>Anthochaera phrygia</i>	Regent Honeyeater	E4A	CE	Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions. Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of <i>Casuarina cunninghamiana</i> (River Oak).	Unlikely	No
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E1	E	Found over most of NSW except for the far north-west. Permanent freshwater wetlands with tall, dense vegetation, particularly <i>Typha</i> spp. (bullrushes) and <i>Eleocharis</i> spp. (spikerushes).	No. The development site does not contain suitable habitat for this species	No
<i>Calidris canutus</i>	Red Knot		E, M	Summer migrant to Australia. In NSW, widespread in suitable habitat along the coast. Occasionally recorded inland in all regions. Intertidal mudflats, sandflats sheltered sandy beaches, estuaries, bays, inlets, lagoons, harbours, sandy ocean beaches, rock platforms, coral reefs, terrestrial saline wetlands near the coast, sewage ponds and saltworks. Rarely inland lakes or swamps.	No. The development site does not contain suitable habitat for this species	No
<i>Calidris ferruginea</i>	Curlew Sandpiper	E1	CE, M	Occurs along the entire coast of NSW, and sometimes in freshwater wetlands in the Murray-Darling Basin. Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	No. The development site does not contain suitable habitat for this species	No
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Recorded from Rockhampton in Qld south to Ulladulla in NSW. Largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes. Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	Potential. There are hollow bearing trees but no other roosting structures (caves) in the development site.	Yes

Scientific Name	Common name	BC Act Status	EPBC Act Status	Distribution and habitat	Likelihood of Occurrence	Impact assessment required
<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E	E	Central and southern populations inhabit heath and open woodland with a heathy understorey. In northern NSW, habitat comprises open forest with dense tussocky grass understorey.		
<i>Dasyurus maculatus maculatus</i> (SE mainland population)	Spotted-tailed Quoll	V	E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld. Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	No. This species relies on large areas of connected habitat. The development site is fragmented and does not form part of a large patch	No
<i>Falco hypoleucos</i>	Grey Falcon	E1	V	Arid and semi-arid zones. In NSW, found chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Shrubland, grassland and wooded watercourses, occasionally in open woodlands near the coast, and near wetlands.	No. The known distribution of this species does not overlap with the development site	No
<i>Gallinago hardwickii</i>	Latham's Snipe		M	Migrant to east coast of Australia, extending inland west of the Great Dividing Range in NSW. Freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grasslands or heathlands.	No. There is no potential habitat for this species in the development site	No
<i>Grantiella picta</i>	Painted Honeyeater	V	V	Widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas. Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	Unlikely. The vegetation present does not contain species typically used for foraging by this species.	No
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	South eastern NSW and Victoria, in two distinct populations: a northern population in the sandstone geology of the Sydney Basin as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	No. There are no waterways in the development site	No
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	V	All coastal regions of NSW, inland to the western slopes and inland plains of the Great Divide. Occurs most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	No. There is no potential habitat for this species in the development site	No

Scientific Name	Common name	BC Act Status	EPBC Act Status	Distribution and habitat	Likelihood of Occurrence	Impact assessment required
<i>Lathamus discolor</i>	Swift Parrot	E1	CE	Migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes. Box-ironbark forests and woodlands.	Potential for foraging – suitable foraging habitat present and nearby records in the past 10 years	Yes
<i>Limosa lapponica baueri</i>	Bar-tailed Godwit	-	V	Summer migrant to Australia. Widespread along the coast of NSW, including the offshore islands. Also numerous scattered inland records. Found on intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons, bays, seagrass beds, saltmarsh, sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. Rarely inland wetlands, paddocks and airstrips.	No. There is no potential habitat for this species in the development site	No
<i>Litoria aurea</i>	Green and Golden Bell Frog	E1	V	Since 1990, recorded from ~50 scattered sites within its former range in NSW, from the north coast near Brunswick Heads, south along the coast to Victoria. Records exist west to Bathurst, Tumut and the ACT region. Marshes, dams and stream-sides, particularly those containing Typha spp. (bullrushes) or Eleocharis spp. (spikerushes). Some populations occur in highly disturbed areas.	No. There are no waterways in the development site	No
<i>Mixophyes balbus</i>	Stuttering Frog	E1	V	Along the east coast of Australia from southern Qld to north-eastern Victoria. Rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range.	No. There are no waterways in the development site	No
<i>Monarcha melanopsis</i>	Black-faced Monarch		M	In NSW, occurs around the eastern slopes and tablelands of the Great Divide, inland to Coutts Crossing, Armidale, Widden Valley, Wollemi National Park and Wombeyan Caves. It is rarely recorded farther inland. Rainforest, open eucalypt forests, dry sclerophyll forests and woodlands, gullies in mountain areas or coastal foothills, Brigalow scrub, coastal scrub, mangroves, parks and gardens.	Unlikely	No
<i>Monarcha trivirgatus</i>	Spectacled Monarch			Coastal eastern Australia south to Port Stephens in NSW. Mountain/lowland rainforest, wooded gullies, riparian vegetation including mangroves.	No. The development site does not contain suitable habitat for this species	No

Scientific Name	Common name	BC Act Status	EPBC Act Status	Distribution and habitat	Likelihood of Occurrence	Impact assessment required
<i>Motacilla flava</i>	Yellow Wagtail		M	Regular summer migrant to mostly coastal Australia. In NSW recorded Sydney to Newcastle, the Hawkesbury and inland in the Bogan LGA. Swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, lawns.	No. The development site does not contain suitable habitat for this species	No
<i>Myiagra cyanoleuca</i>	Satin Flycatcher		M	In NSW, widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains. Eucalypt-dominated forests, especially near wetlands, watercourses, and heavily vegetated gullies.	No. The development site does not contain suitable habitat for this species	No
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	V	V	- Occurs along the length of NSW from the coastal plains to the western slopes of the Great Dividing Range. Found in eucalypt and cypress pine open forests and woodlands, ecotones between woodland and grassland, or coastal forest and heath.	No	No
<i>Pandion cristatus</i>	Osprey	V	M	Common around the northern NSW coast, and uncommon to rare from coast further south. Some records from inland areas. Utilises rocky shorelines, islands, reefs, mouths of large rivers, lagoons and lakes.	No	No
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E1	V	In NSW they occur from the Qld border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges.	No. The development site does not contain suitable habitat for this species	No
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo	V	V	In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range, with an annual rainfall exceeding 760 mm. Coastal heaths and dry and wet sclerophyll forests.	No. The development site does not contain suitable habitat for this species	No
<i>Phascolarctos cinereus</i>	Koala	V	V	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. There are sparse and possibly disjunct populations in the Bega District, and at several sites on the southern tablelands. Eucalypt woodlands and forests.	No. Not identified during targeted survey	No

Scientific Name	Common name	BC Act Status	EPBC Act Status	Distribution and habitat	Likelihood of Occurrence	Impact assessment required
<i>Pommerhelix duralensis</i>	Dural Land Snail	E	E	Endemic to NSW. Occurs along the northwest fringes of the Cumberland Plain, within the Hills Shire, Blue Mountains City, Penrith City, Hornsby Shire and Parramatta City LGAs. Occurs in shale-sandstone transitional landscapes. Found in Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest; Turpentine-Ironbark Forest; Shale/Sandstone Transition Forest; Turpentine Ironbark Margin Forest; Hinterland Sandstone Gully Forest; and Sydney Hinterland Transition Woodland.	No. The development site is not one of the known locations.	No
<i>Pseudomys novaehollandiae</i>	New Holland Mouse		V	Fragmented distribution across eastern NSW. Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes.	No. The development site does not contain suitable habitat for this species	No
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Along the eastern coast of Australia, from Bundaberg in Qld to Melbourne in Victoria. Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	Potential	Yes
<i>Rhipidura rufifrons</i>	Rufous Fantail		M	Coastal and near coastal districts of northern and eastern Australia, including on and east of the Great Divide in NSW. Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	No. The development site does not contain suitable habitat for this species	No
<i>Rostratula australis</i>	Australian Painted Snipe	E1	E	In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Swamps, dams and nearby marshy areas.	No. The development site does not contain suitable habitat for this species	No
FLORA						
<i>Acacia bynoeana</i>	Bynoe's Wattle	E1	V	Found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. Heath or dry sclerophyll forest on sandy soils.	Unlikely –	No
<i>Acacia pubescens</i>	Downy Wattle	V	V	Restricted to the Sydney region around the Bankstown-Fairfield-Rookwood and Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Open woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and	No. Not identified in the development site during survey	No

Scientific Name	Common name	BC Act Status	EPBC Act Status	Distribution and habitat	Likelihood of Occurrence	Impact assessment required
				Cumberland Plain Woodland. Occurs on alluviums, shales and at the intergrade between shales and sandstones.		
<i>Allocasuarina glareicola</i>		E	E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool	No. Not identified in the development site during survey	No
<i>Caladenia tessellata</i>	Thick Spider Orchid	E1	V	Currently known from two disjunct areas; one population near Braidwood on the Southern Tablelands and three populations in the Wyong area on the Central Coast. Grassy sclerophyll woodland on clay loam or sandy soils, or low woodland with stony soil.	No. Not identified in the development site during survey	No
<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	V	V	In NSW, recorded mainly on coastal and near coastal ranges north from Victoria to near Forster, with two isolated occurrences inland north-west of Grafton. Coastal heathlands, margins of coastal swamps and sedgeland, coastal forest, dry woodland, and lowland forest.	No. Not identified in the development site during survey	No
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E1	E	Restricted to eastern NSW, from Brunswick Heads on the north coast to Gerroa in the Illawarra region, and as far west as Merriwa in the upper Hunter River valley. Dry rainforest; littoral rainforest; <i>Leptospermum laevigatum</i> - <i>Banksia integrifolia</i> subsp. <i>integrifolia</i> (Coastal Tea-tree–Coastal Banksia) coastal scrub; <i>Eucalyptus tereticornis</i> (Forest Red Gum) or <i>Corymbia maculata</i> (Spotted Gum) open forest and woodland; and <i>Melaleuca armillaris</i> (Bracelet Honey-myrtle) scrub.	No. Suitable habitat is not present	No
<i>Darwinia biflora</i>		V	V	Has been recorded from locations between Nowra and Pittwater and may occur as far north as Port Stephens. Dry sclerophyll forest and moss gardens over sandstone.	No. Suitable habitat is not present	No
<i>Deyeuxia appressa</i>		E1	E	NSW endemic known only from two pre-1942 records in the Sydney area: Herne Bay south of Bankstown and Killara, near Hornsby. Moist conditions.		
<i>Eucalyptus camfieldii</i>	Camfield's Stringybark	V	V	Narrow band from the Raymond Terrace area south to Waterfall. "Coastal heath on shallow sandy soils overlying Hawkesbury sandstone, mostly on exposed sandy ridges. "	No. Suitable habitat is not present	No

Scientific Name	Common name	BC Act Status	EPBC Act Status	Distribution and habitat	Likelihood of Occurrence	Impact assessment required
<i>Genoplesium baueri</i>	Bauer's Midge Orchid	E1	E	Has been recorded from locations between Nowra and Pittwater and may occur as far north as Port Stephens. Dry sclerophyll forest and moss gardens over sandstone.	No. No suitable habitat present.	No
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>	Small-flower Grevillea	V	V	Sporadically distributed throughout the Sydney Basin and in the Hunter in the Cessnock - Kurri Kurri area. Also known from Putty to Wyong and Lake Macquarie on the Central Coast. Heath and shrubby woodland to open forest on sandy or light clay soils usually over thin shales.	No. Not identified during survey.	No
<i>Hibbertia puberula</i> subsp. <i>glabrescens</i>		E4A	CE	Known to occur in only one population, at Bankstown Airport in Sydney's southern suburbs. "Heavily modified low grass/shrub association (ex Cooks River/Castlereagh Ironbark Forest) on sandy alluvium with a high silt content.	No. No suitable habitat present.	No
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	V	Only found in NSW, populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Damp places, often near streams or low-lying areas on alluvial soils.	No. Suitable habitat not present.	No
<i>Melaleuca deanei</i>	Deane's Paperbark		V	Ku-ring-gai/Berowra area, Holsworthy/Wedderburn area, Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. Heath on sandstone.	No. Suitable habitat not present.	No
<i>Persicaria elatior</i>	Tall Knotweed	V	V	In south-eastern NSW recorded from Mt Dromedary, Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests).	No. No suitable habitat present.	No
<i>Persoonia hirsuta</i>	Hairy Geebung	E1	E	Scattered distribution around Sydney, from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. Sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	No. No suitable habitat present.	No
<i>Persoonia nutans</i>	Nodding Geebung	E	E	Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south. Northern populations: sclerophyll forest and woodland (Agnes Banks Woodland, Castlereagh	No. No suitable habitat present.	No

Scientific Name	Common name	BC Act Status	EPBC Act Status	Distribution and habitat	Likelihood of Occurrence	Impact assessment required
				Scribbly Gum Woodland and Cooks River / Castlereagh Ironbark Forest) on aeolian and alluvial sediments. Southern populations: tertiary alluvium, shale sandstone transition communities and Cooks River / Castlereagh Ironbark Forest.		
<i>Pimelea curviflora</i> var. <i>curviflora</i>		V	V	Confined to the coastal area of the Sydney and Illawarra regions between northern Sydney and Maroota in the north-west and Croom Reserve near Albion Park in the south. Woodland, mostly on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes	No. No suitable habitat present.	No
<i>Pimelea spicata</i>	Spiked Rice-flower	E	E	Two disjunct areas; the Cumberland Plain (Marayong and Prospect Reservoir south to Narellan and Douglas Park) and the Illawarra (Landsdowne to Shellharbour to northern Kiama). Well-structured clay soils. <i>Eucalyptus moluccana</i> (Grey Box) communities and in areas of ironbark on the Cumberland Plain. Coast Banksia open woodland or coastal grassland in the Illawarra."	No. No suitable habitat present.	No
<i>Pterostylis saxicola</i>	Sydney Plains Greenhood		E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. Small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines, adjacent to sclerophyll forest or woodland on shale/sandstone transition soils or shale soils	No. No suitable habitat present.	No
<i>Rhizanthella slateri</i>	Eastern Australian Underground Orchid	V	E	In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Sclerophyll forest in shallow to deep loams.	No. The development site is not one of the known locations.	No
<i>Rhodomyrtus psidioides</i>	Native Guava	CE	CE	Occurs from Broken Bay, 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	No. The development site does not contain suitable habitat for this species	No

Scientific Name	Common name	BC Act Status	EPBC Act Status	Distribution and habitat	Likelihood of Occurrence	Impact assessment required
				drainage lines. This species is characterised being extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.		
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E1	V	Only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest.	No. No suitable habitat present and not identified during survey	No
<i>Thesium australe</i>	Austral Toadflax	V	V	In eastern NSW it is found in very small populations scattered along the coast, and from the Northern to Southern Tablelands. Grassland on coastal headlands or grassland and grassy woodland away from the coast.	No. Suitable habitat is not present.	No

Appendix F : Assessment of Significance for EPBC listed species

Pteropus poliocephalus (Grey-headed Flying-fox)

The Grey-headed Flying Fox is listed as vulnerable under the EPBC Act. The distribution and habitat associations for this threatened species are presented.

This species was not recorded on site during the survey but has been recorded within 5 km of the site. No camps were identified within the development site, however there is a nearby Nationally Important Flying-fox Camp within 5 km of the development site – at Oatley to the southeast. The proposed action will remove 3.98 ha of native vegetation. No camps or important populations will be affected by the proposed action.

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	lead to a long-term decrease in the size of an important population of a species	A Nationally Important Camp is one that contains $\geq 10,000$ Grey-headed Flying Fox in more than one year in the last 10 years, or have been occupied by more than 2,500 GHFF permanently or seasonally every year for the last 10 years (Department of the Environment (DoE) 2015). No roosting habitat (camps) or important population will be affected by the proposed action. The proposed action will remove 3.98 ha of planted vegetation, some of which comprises suitable foraging habitat for the Grey-headed Flying-fox. The Grey-headed Flying-fox is recorded as travelling long distances (up to 50 km) on feeding forays. Given the proximity of more suitable habitat within the assessment area and no camps or important populations will be impacted, the removal of this potential foraging habitat would not lead to the long-term decrease in the size of an important population of Grey-headed Flying-fox.
2)	reduce the area of occupancy of an important population	The proposed action would reduce the amount of potential foraging habitat for this species by 3.98 ha. No important population of the Grey-headed Flying-fox is known to occupy the development site in the form of a camp but may occasionally forage within the development site. The Grey-headed Flying-fox is recorded as travelling long distances on feeding forays and would likely utilise the potential foraging habitat outside of the development site.
3)	fragment an existing important population into two or more populations	The proposed action will remove 3.98 ha of potential foraging vegetation within an already fragmented or disjunction urban landscape. The species is highly mobile with the ability to travel up to 50 km for foraging purposes. However, no camps will be affected, other areas of foraging habitat are present in the region and the proposal will not present a barrier of movement for this species. Therefore, the proposed action is not considered to fragment an existing important population into two or more populations.
4)	adversely affect habitat critical to the survival of a species	The Draft Recovery Plan for the Grey-headed Flying-fox 2017 identifies 'a continuous temporal sequence of

Criterion	Question	Response
		productive foraging habitats, linked by migration corridors or stopover habitats, and suitable roosting habitat within nightly commuting distance of foraging areas' as habitat critical to the survival of the species. No camps will be affected by the proposed action, and the proposed action will remove 3.98 ha of vegetation, will remove some suitable foraging habitat for the Grey-headed Flying-fox, however there are suitable foraging habitats present along the riparian zones of Salt Pan Creek, the Georges River, the Cooks River and their tributaries. The Grey-headed Flying-fox is recorded as travelling long distances (50 km) on feeding forays and suitable habitat is available outside of the development site.
5)	disrupt the breeding cycle of an important population	The proposed action will remove 3.98 ha of vegetation, some of which comprises suitable foraging habitat for the Grey-headed Flying-fox. The proposed action will not disrupt the breeding cycle of the Grey-headed Flying-fox given that no camps or important population will be impacted by the proposed action and suitable foraging habitat is available adjacent to the development site.
6)	modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action will remove 3.98 ha of vegetation, including foraging habitat for the Grey-headed Flying-fox. Grey-headed Flying-fox camps will not be removed or disturbed. The proposal will not modify, destroy, remove or isolate or decrease the availability or quality of habitat, and that is available outside of the development site in reserves along Salt Pan Creek, the Georges River, the Cooks River and their tributaries, to an extent that will result in the decline of the species.
7)	result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The proposed action is unlikely to result in the establishment of an invasive species that is harmful to the Grey-headed Flying-fox.
8)	introduce disease that may cause the species to decline, or	Grey-headed Flying-fox are reservoirs for the Australian bat lyssavirus and can cause clinical disease and mortality in Grey-headed Flying-fox. The proposed action would not increase the incidence of this disease.
9)	interfere substantially with the recovery of the species.	A Draft National Recovery Plan for the Grey-headed Flying-fox was developed in 2017. The relatively small amount of foraging habitat to be removed is unlikely to substantially interfere with the recovery of this species.
Conclusion	Is there likely to be a significant impact?	No. In consideration of the above, the proposed action is unlikely to have a significant impact on the Grey-headed Flying-fox.

Chalinolobus dwyeri (large-eared Pied bat)

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	lead to a long-term decrease in the size of an important population of a species	<p>An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:</p> <ul style="list-style-type: none"> • key source populations either for breeding or dispersal • populations that are necessary for maintaining genetic diversity, and/or • populations that are near the limit of the species range. <p>The proposal is not likely to lead to a decrease in the size of an important population of this species as no maternity habitats would be affected and potential foraging habitat would also remain within the surrounding landscape.</p>
2)	reduce the area of occupancy of an important population	The proposal would not reduce the area of occupancy of an important population as no maternity habitat would be removed and potential foraging habitat would be retained and managed, noting a small amount of potential foraging habitat would be impacted.
3)	fragment an existing important population into two or more populations	The proposal would not fragment an important population of this species as they are highly mobile and no maternity roosts would be affected.
4)	adversely affect habitat critical to the survival of a species	As the proposal would not involve the removal of any maternity roosts, it would be unlikely to create a barrier to movement or remove breeding habitat. Therefore, it is unlikely that habitat critical to the survival of this species would be adversely affected.
5)	disrupt the breeding cycle of an important population	As no maternity sites would be removed or disturbed, and the site is unlikely to represent important foraging or roosting habitat, it is unlikely the proposed work would disrupt the breeding cycle of an important population.
6)	modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	As no maternity sites would be removed or disturbed, and potential foraging habitat would be retained and managed and also exists outside of the site, the proposal would be unlikely to modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
7)	result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The proposal would not result in the establishment of invasive species, such as weeds, that would be harmful to the Large-eared Pied Bat. It is unlikely that the proposal would result in an increased number of weeds due to the current disturbed nature of the site.
8)	introduce disease that may cause the species to decline, or	The proposal is unlikely to present significant ecological stress on maternity sites is therefore unlikely to affect this species. The proposal would be unlikely to introduce a disease that may cause this species to decline

Criterion	Question	Response
9)	interfere substantially with the recovery of the species.	The recovery plan for the Large-eared Pied Bat states that while all major threatening processes for this species has not been identified, destruction of, or interference with, subterranean roosts and maternity sites is a confirmed threat (DERM 2011). The proposal would not disturb any maternity roosts for the Large-eared Pied Bat.
Conclusion	Is there likely to be a significant impact?	No. It is unlikely that the development will significantly impact on the Large-eared Pied Bat.

Lathamus discolor (Swift Parrot)

The species breeds in Tasmania and is not known to breed on the Australian mainland. Foraging habitat within the footprint is minimal and no individuals are likely to be directly impacted by the works. The development site does not contain mapped important areas for this species (the mapped important areas for Swift Parrot was accessed 17 February 2021).

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	lead to a long-term decrease in the size of a population	No. The habitat within the site is considered marginal and highly fragmented for the species. No individuals were identified during survey. The species would not rely on the site, are highly mobile and would utilise a range of foraging resources within the locality.
2)	Reduce the area of occupancy of a species	No. The habitat within the site is not breeding habitat and foraging habitat is considered marginal for the species and extends beyond the site. The species would not rely on the site, are highly mobile and would utilise a range of foraging resources.
3)	Fragment an existing population into two or more populations	No. There is one single interbreeding population of the Swift Parrot. The proposed action would not impact any known breeding habitat as the species only breeds in Tasmania and migrates to the mainland over the winter. The species would not rely on the site, are highly mobile and would utilise a range of foraging resources.
4)	Adversely affect habitat critical to the survival of the species	Habitat critical to the survival of the species refers to areas that are necessary: for activities such as foraging, breeding, roosting or dispersal, for the long-term maintenance of the species, to maintain genetic diversity and long term evolutionary development or for the reintroduction of populations or recovery of the species. The proposed action would not impact any known breeding habitat. The species would not rely on the site, are highly mobile and would utilise a range of foraging resources.
5)	Disrupt the breeding cycle of a population	The Swift Parrot breeds in Tasmania during summer and migrates to the mainland during winter. Therefore, no breeding habitat would be affected as part of the proposed action. The species has potential to occasionally utilise the foraging resources available in the development site. However, it is highly unlikely that these resources would be relied upon.
6)	Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Swift Parrot breeds in Tasmania during summer and migrates to the mainland during winter. Therefore, no breeding habitat would be affected as part of the proposed action. The species would not rely on the site, due to small extent of potential foraging habitat, and abundance of suitable habitat within the locality. This species is known to utilise a range of foraging resources. Although the development site would form a mosaic of

Criterion	Question	Response
		resources in the locality, it is too limited to solely support any individuals.
7)	Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Invasive species which pose a threat to the Swift Parrot include those which increase competition for food and nesting resources such as the Noisy Miner. The development site contains fragmented, marginal foraging habitat in an area that is located in a moderately dense area. As such, species like the Noisy Miner are already in abundance in these areas due to their preference for open areas. The proposed action would not increase the presence of the Noisy Miner or other nectivorous species likely to be a threat to the Swift Parrot.
8)	Introduce disease that may cause the species to decline	The Swift Parrot is susceptible to Psittacine Beak and Feather Disease (PBFD). Increases in stress caused by competition for food and roosting resources can increase the impacts of PBFD on the population. No known breeding sites would be affected and only marginal foraging habitat which would not be relied upon.
9)	Interfere with the recovery of the species	The recovery actions are not relevant to the site
	Conclusion - Is there likely to be a significant impact?	No. It is unlikely that the development will significantly impact on the Swift Parrot.

