Wallacia Country Club
Biodiversity Development Assessment Report

St John's Park Bowling Club

ecological AUSTRALIA
A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au

DOCUMENT TRACKING

Project Name	Wallacia Country Club BDAR
Project Number	18535
Project Manager	David Bonjer
Accredited Assessor certification	 BAAS19045
Prepared by	Janene Devereux
Reviewed by	Meredith Henderson
Approved by	Meredith Henderson
Status	Draft
Version Number	1
Last saved on	8 June 2021

This report should be cited as 'Eco Logical Australia. 2021 Wallacia Country Club BDAR. Prepared for St John's Park Bowling Club.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd.

Template 2.8.1

Executive Summary

Eco Logical Australia Pty Ltd (ELA) was engaged by St John's Park Bowling Club to prepare a Biodiversity Development Assessment Report (BDAR) for the proposed re-design of the existing Wallacia Country Club building, car park and surrounds within 13 Park Road, Wallacia (the study area). This BDAR is required because the development site is located on the Biodiversity Values Map.

This BDAR would support the application DA 21/0130 to Penrith City Council under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This BDAR has been prepared to meet the requirements of the Biodiversity Assessment Method (BAM) established under Section 6.7 of the *Biodiversity Conservation Act 2016* (BC Act). Impacts to the study area have been previously assessed by Travers Bushfire and Ecology in a 2017 Flora and Fauna report and in a 2019 BDAR.

ELA understands that the development within the study area consists of the alterations and additions to the existing Wallacia Country Club including a new swimming pool and gym complex, alterations and expansion of existing car park, new synthetic bowling green and landscaping around refurbished Club building including a practice putting green.

The proposed development will require the removal of approximately 0.19 ha of Exotic / Ornamental vegetation and 0.04 ha of Planted Native vegetation. The removal of native planted vegetation was assessed using a streamlined assessment for Planted Native Vegetation. The removal of exotic and ornamental vegetation does not require assessment.

This BDAR outlines the measures taken to avoid, minimise and mitigate impacts on the vegetation and species habitat present within the development footprint and measures to minimise impacts during construction and operation of the development. Vegetation within the development site is classified as Exotic/Ornamental and Planted Native vegetation, therefore no calculations through the Biodiversity Assessment Method Credit Calculator (BAMC) were carried out.

Targeted survey for species credit species has been completed as part of previous assessments across the study area and surrounds (Travers 2017 and 2019a) and more recent vegetation mapping revisions were undertaken by ELA in 2021. No threatened species were recorded, or are presumed present within the development site.

Matters of National Environmental Significance (MNES) listed under the EPBC Act were considered for the development, however, no species or community was considered likely to occur.

Contents

1. Stage 1: Biodiversity assessment 1

1.1 Introduction 1

1.1.1 General description of the development site 1
1.1.2 Development site footprint 1

2. Legislative context 4
3. Methodology 6

3.1.1 Literature and Data Reviews 6

3.2 Landscape features 6

3.2.1 IBRA regions and subregions 6
3.2.2 Native vegetation extent 6
3.2.3 Rivers and streams 6
3.2.4 Wetlands 6
3.2.5 Connectivity features 6
3.2.6 Areas of geological significance and soil hazard features 7
3.2.7 Site context 7

3.3 Native vegetation 7

3.3.1 Survey effort 7
3.3.2 Plant Community Types present 8
3.3.3 Biodiversity Values Map 8
3.3.4 Streamlined assessment module – Planted native vegetation 8
3.3.5 Use of local data 10

3.4 Threatened species 13

3.4.1 Targeted surveys 13
3.4.2 Expert reports 15

4. Stage 2: Impact assessment (biodiversity values) 16

4.1 Avoiding impacts 16

4.1.1 Locating a project to avoid and minimise impacts on vegetation and habitat 16
4.1.2 Prescribed biodiversity impacts 17

4.2 Assessment of Impacts 18

4.2.1 Direct impacts 18
4.2.2 Change in vegetation integrity 18
4.2.3 Indirect impacts 18
4.2.4 Prescribed biodiversity impacts 19
4.2.5 Mitigating and managing impacts 20
4.2.6 Serious and Irreversible Impacts (SAII) 23

4.3 Risk assessment 23
4.4 Impact summary 25

4.4.1 Serious and Irreversible Impacts (SAII) 25
4.4.2 Impacts requiring offsets 25
4.4.3 Impacts not requiring offsets 25
4.4.4 Areas not requiring assessment 25
4.4.5 Credit summary 25
4.5 Consistency with legislation and policy 28
4.5.1 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) 28

5. References 29
Appendix A: Definitions 30
Appendix B: EPBC Act Likelihood of Occurrence 34

List of Figures

Figure 1: Site Map 2
Figure 2: Location Map 3
Figure 3: Biodiversity Values Map and development footprint 11
Figure 4: Plant Community Types and development footprint 12
Figure 5: Impacts not requiring offset 26
Figure 6: Areas not requiring assessment 27

List of Tables

Table 1: Legislative context 4
Table 2: Native vegetation extent 6
Table 3: Percent native vegetation cover in the landscape 7
Table 4 Appendix D1 – Planted Native Vegetation decision making key (DPIE 2020) 9
Table 5: Travers species credit species and threatened flora survey effort (Travers 2019a). 13
Table 6: Travers birds survey effort (Travers 2019a). 14
Table 7: Travers Bushfire and Ecology nocturnal birds, microbats and arboreal mammals survey effort (Travers 2019a). 14
Table 8: Travers Bushfire and Ecology reptiles and amphibians survey effort (Travers 2019a). 14
Table 9: Travers Bushfire and Ecology invertebrate survey effort (Travers 2019a). 15
Table 10: Weather conditions 15
Table 11: Locating and designing a project to avoid and minimise impacts on vegetation and habitat 16
Table 12: Prescribed biodiversity impacts 17
Table 13: Locating and designing a project to avoid and minimise prescribed biodiversity impacts 17
Table 14: Direct impacts to native vegetation 18
Table 15: Indirect impacts 18
Table 16: Direct impacts on prescribed biodiversity impacts 19
Table 17: Measures proposed to mitigate and manage impacts 20

Table 18: Likelihood criteria 23
Table 19: Consequence criteria 23
Table 20: Risk matrix 24
Table 21: Risk assessment 24
Table 22: Likelihood of occurrence for threatened entities 35

Abbreviations

Abbreviation	Description
BAM	Biodiversity Assessment Method 2020
BAMC	Biodiversity Assessment Method Credit Calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
CEEC	Critically Endangered Ecological Community
DNG	Derived Native Grassland
DAWE	Commonwealth Department of Agriculture, Water and the 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
LGA	Local Government Area
LLS	Local Land Service
NSW	New South Wales
NRAR	NSW Natural Resources Access Regulator
EESG	NSW Environment, Energy and Science
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SSI	State Significant Infrastructure
TEC	Threatened Ecological Community
VIS	Vegetation Information System
WM Act	NSW *Water Management Act 2000*

1. Stage 1: Biodiversity assessment

1.1 Introduction

This Biodiversity Development Assessment Report (BDAR) has been prepared by Janene Devereux, who is an Accredited Person under the NSW *Biodiversity Conservation Act 2016* (BC Act) (Accreditation BAAS19045). This document is approved by Meredith Henderson (Accreditation BAAS17001).

A BDAR was prepared for the study area and surrounds for another development application by Travers Bushfire and Ecology (hereafter referred to as Travers) in 2019. An additional BDAR was prepared and submitted for this area by ELA in March 2021 (ELA 2021). Field methodologies and results are provided in Travers 2019 and those relevant to the study area are reproduced within this BDAR for context.

1.1.1 General description of the development site

The proposed development site is defined as the area of land subject to the proposed development application DA 21/0130. This study area is located at 13 Park Road, Wallacia (Lot 1 DP1254545 and Lot 3 & 4 DP18701) in the City of Penrith local government area (LGA).

The study area currently contains a portion of an operational golf course and associated club house infrastructure, paths, and parking areas. The study area is zoned as E3 under the Penrith Local Environment Plan (LEP) 2010 and has a total area of about 1.56 ha. A small portion of the study area contains land mapped by the Biodiversity Values Map (LMBC 2021).

This report includes two base maps, the Site Map (Figure 1) and the Location Map (Figure 2).

1.1.2 Development site footprint

The proposed development includes:

- Alterations and additions to the existing Wallacia Country Club building to include:
  - updated Golf pro-store
  - expanded gaming facilities, kitchen and dining area including new outdoor terrace
  - new swimming pool and gym complex.
- Alterations and expansion of existing car park
- New synthetic bowling green
- Removal of 48 trees/shrubs within the site boundary (exotic/ornamental vegetation)
- Landscaping around refurbished Club building including a practice putting green
- Civil and road works to Park Road. Including the removal of three trees.

Please refer to Figure 3 for the proposed development footprint. Any works confined to the areas within the development footprint are hereafter referred to as the 'development site'.

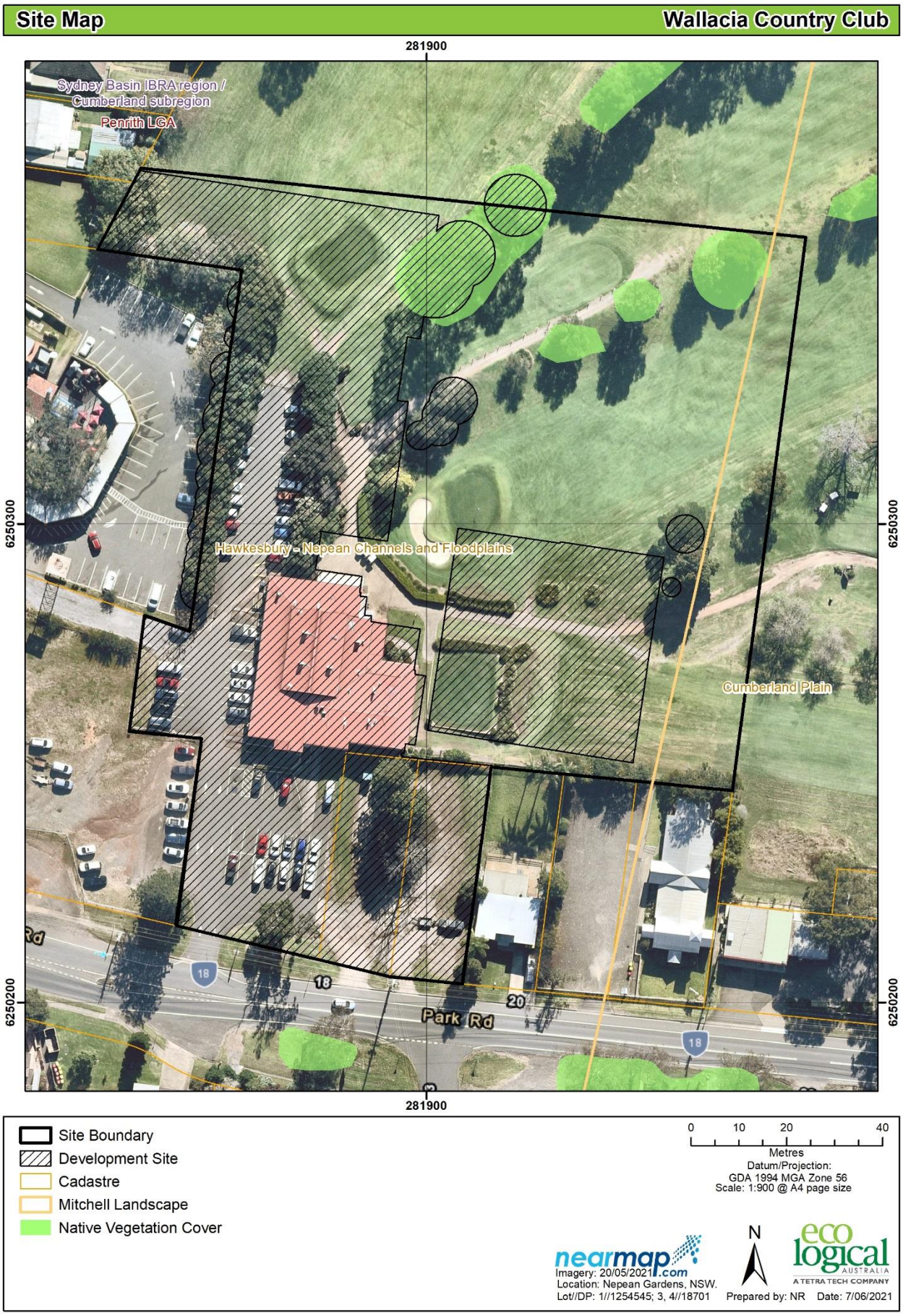

Figure 1: Site Map

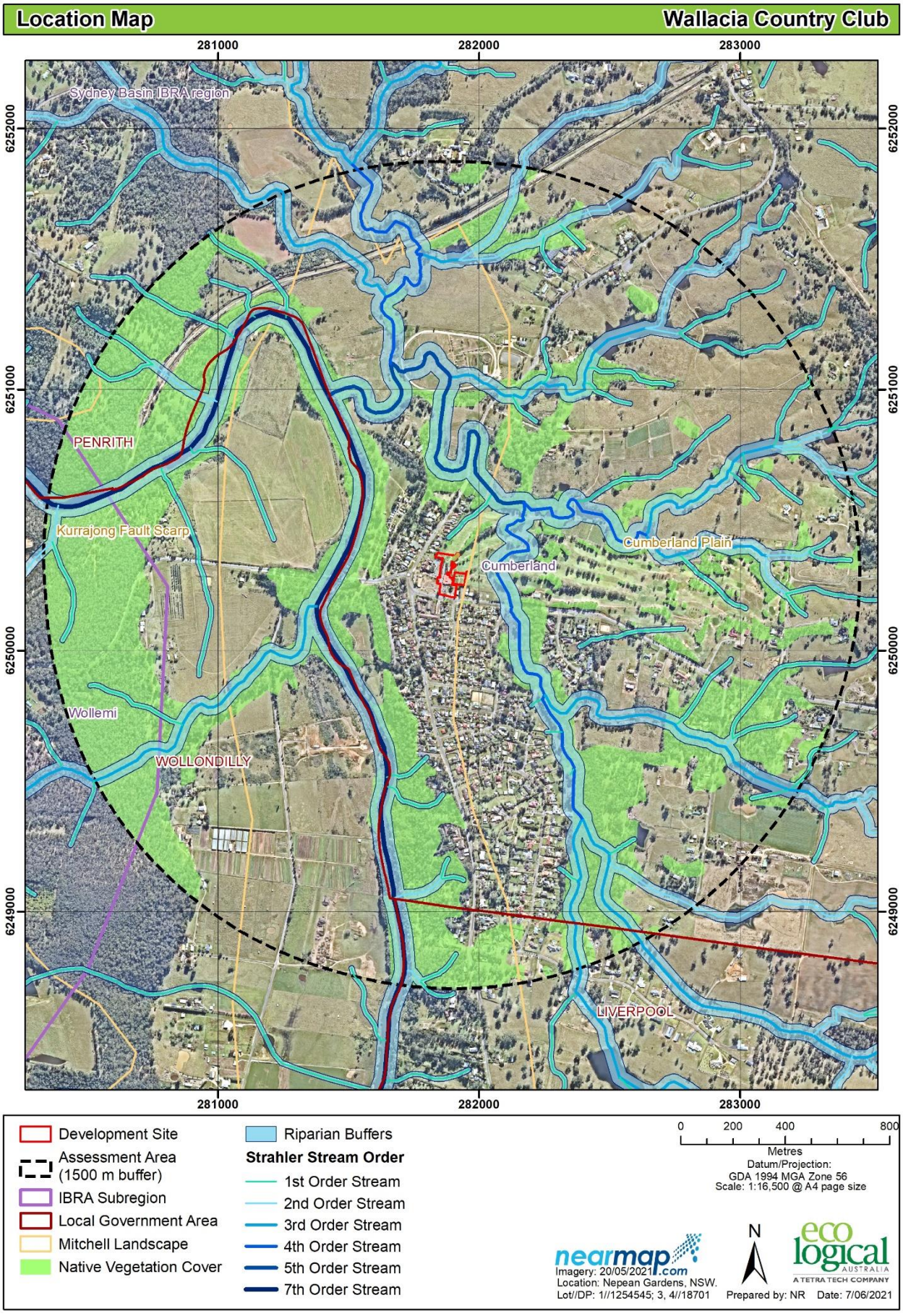

Figure 2: Location Map

2. Legislative context

Table 1: Legislative context

Name	Relevance to the project	Report Section
Commonwealth		
Environment Protection and Biodiversity Conservation Act 1999	Matters of national Environmental Significance have been identified on or near the development site. This report assesses impacts to MNES and concludes that the development is not likely to have a significant impact on MNES.	Section 4.5
State		
Environmental Planning and Assessment Act 1979	The proposed development requires consent under the (Penrith Local Environmental Plan 2010 (LEP) and is to be assessed under Part 4 of the EP&A Act.	Section 1
Biodiversity Conservation Act 2016	The proposed development is within the land classified under the Biodiversity Values Map and requires submission of a Biodiversity Development Assessment Report.	Entire report
Fisheries Management Act 1994	The 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.	N/A
Local Land Services Amendment Act 2016	The LLS Act does not apply to areas of the state to which the SEPP Vegetation applies. The Vegetation SEPP applies to the Penrith local government area.	N/A
Water Management Act 2000	The project does not involve works on waterfront land	N/A
Planning Instruments		
Vegetation SEPP	The Vegetation SEPP applies to development that does not require consent. As this project requires consent under the Penrith City Council LEP, the Vegetation SEPP is not relevant.	N/A
Coastal Management SEPP	The proposed development is not located on land subject to the Coastal Management SEPP	N/A
State Environmental Planning Policy (Koala Habitat Protection) 2020	The proposed development is not located within a LGA to which the SEPP Koala Habitat Protection applies.	N/A
Penrith Local Environment Plan	The development site is zoned E3 under the Penrith LEP 2010.	N/A

Name	Relevance to the project	Report Section
Penrith City Council Development Control Plan (DCP)	The Penrith City Council DCP contains provisions relating to native vegetation. Section C2-2.1 states that the objective of protecting trees and other vegetation where possible is to: a. To protect and conserve the biodiversity values of trees and other vegetation in the City, b. To maintain the diversity and quality of ecosystems and enhance their capacity to adapt to change, c. To support conservation and threat abatement action to minimise biodiversity loss and conserve threatened species and ecological communities in nature, d. To protect and enhance biodiversity corridors, landscape character and scenic values of the City, e. Recognise the importance and function of trees and other vegetation for Cooling our City, f. To preserve the amenity of the City through the preservation of trees and other vegetation, g. To preserve existing trees and other vegetation where possible during the planning, design, development and construction process, h. To firstly avoid or minimise impacts of a proposed development and land use change on biodiversity and if impacts are unavoidable provide appropriate offsets, i. To achieve an appropriate balance between the protection of trees and other vegetation and mitigating risks from natural hazards.	N/A

3. Methodology

3.1.1 Literature and Data Reviews

A BDAR was prepared in 2019 by Travers (2019a) for another development application that includes the current Wallacia Country Club development site, an additional BDAR for a similar area was produced in 2021 by ELA. Survey data, including methodologies and results, collected from these previous assessments are used within this report to inform the assessment of this project.

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

- BioNet Vegetation Classification 2021
- Additional GIS datasets including soil, topography, geology and drainage
- Flora and Fauna Assessment Report (Travers 2017)
- Biodiversity Development Assessment Reports (Travers 2019a and ELA 2021)
- Tree Assessment (Travers 2019b).
- Vegetation Management Plan (Travers 2019c).

3.2 Landscape features

3.2.1 IBRA regions and subregions

The development site falls within the Sydney Basin IBRA region and the Cumberland Plain IBRA subregions.

3.2.2 Native vegetation extent

The extent of native vegetation within the development site and buffer is outlined in Table 2.

Table 2: Native vegetation extent

Native vegetation cover within the development site (ha)	Native vegetation within the 1,500 m buffer area (ha)	Total area within the buffer (ha)	Percent native vegetation cover within the buffer area (%)
0.04 ha	247.8	782.6	31.7

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

3.2.3 Rivers and streams

The development site does not contain any rivers or streams. Watercourses and stream buffers within the buffer are mapped on the Location Map (Figure 2).

3.2.4 Wetlands

The development site does not contain any wetlands.

3.2.5 Connectivity features

Limited connectivity features exist within the development site due to the area of cleared land and proximity to urban areas. Connectivity features are illustrated within Figure 1 and 2.

3.2.6 Areas of geological significance and soil hazard features

The study area does not contain karst, caves, crevices, cliffs or other areas of geological significance. The study area does not contain soil hazard features.

3.2.7 Site context

3.2.7.1 Method applied

The site-based method has been applied to this development.

3.2.7.2 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 percent native vegetation cover within the assessment area (782.64 ha) is 31.66% (247.79 ha) (Table 3).

The results of this analysis are shown in Table 3.

Table 3: Percent native vegetation cover in the landscape

Native vegetation within the study area (ha)	Native vegetation cover within the 1,500 m buffer area (%)
247.85	31.7%

3.2.7.3 Patch size

Patch size was calculated using available vegetation mapping for all patches of intact native vegetation on and adjoining the study area. The patch size is greater than 100 ha which falls into the > 101 ha size class consistent with BAM.

3.3 Native vegetation

3.3.1 Survey effort

Vegetation surveys were originally undertaken by Travers in both 2017 and 2019 across the development site and its surrounds to the north and east, extending throughout the existing golf course. Initial flora surveys specific to the development site were undertaken on 5 October 2017 which included:

- Random meanders to gain a full species list of the plants within the study area
- Tree assessments
- Threatened species searches were conducted as near linear transects within areas of potential habitat.

Updated botanical surveys were undertaken on 3 December 2019 which included a revision of 2017 vegetation mapping.

Additional surveys were conducted by ELA on 8 March 2021 which included the revision of 2019 vegetation mapping (Travers 2019a). This revised mapping was designed to be consistent with the requirements of BAM 2020.

Vegetation assessments and mapping concluded that all vegetation within the development site is classified as non-native (exotic/ornamental vegetation) or is planted native vegetation. This includes the area mapped by the Biodiversity Values Map.

3.3.2 Plant Community Types present

The vegetation within the development site is classified Exotic/Ornamental vegetation (0.19 ha) and Planted Native vegetation (0.04 ha), both of which do not conform to a native Plant Community Types (PCTs). No other vegetation exists within the development site. No Threatened Ecological Communities (TECs) were recorded. The remainder is classified as cleared land (0.81 ha) (see Figure 4).

Exotic/ Ornamental vegetation within the development site contains landscaping and ornamental species such as *Cupressus* sp. (Cypress), *Ulmus parvifolius* (Elm), *Callistemon viminalis* (Bottlebrush), *Photinia* sp., *Grevillea robusta* (Silky Oak) and *Ligustrum lucidum* (Travers 2019b).

Planted Native vegetation within the development site consists of three *Corymbia maculata* trees (see Figure 4). Planted Native vegetation within the development site are considered under the Planted Native Vegetation streamlined assessment (Appendix D of the BAM) as these species have been planted for functional, aesthetic or horticultural purposes (see Section 3.3.4).

3.3.3 Biodiversity Values Map

Figure 3 illustrates the development site and interaction with the Biodiversity Values Map. The map layer is present within the development site as an extension of habitat which has value for 'Threatened species or communities with potential for serious and irreversible impacts' (DPIE 2018). Site investigations however, indicated that the proposed area for clearing within the development site is classified as Planted Native Vegetation, and can be assessed through a streamlined assessment (see Section 3.3.4)

3.3.4 Streamlined assessment module – Planted native vegetation

Section 2.2 of BAM 2020 contains a streamlined assessment module for planted native vegetation. The streamlined assessment can be used where 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 affected.

The planted native vegetation within the development site (0.04 ha) has been planted for the purpose of landscape plantings in the golf course grounds. Appendix D of BAM provides a decision-making key for the assessment of the planted native vegetation (see below in Table 4). This decision-making key was applied to the sections of planted native vegetation mapped within the development site. Following the decision key, the most appropriate result is D.1.5 since the planted vegetation is considered to be for functional and aesthetic purposes. Therefore, for those patches identified as planted native vegetation the use of Chapters 4 (native vegetation integrity plots) and 5 (threatened species assessment) are not required to be applied. The planted native vegetation must be assessed for threatened species habitat and suitable minimisation and mitigation measures must be applied (see Section 4 for details).

Table 4 Appendix D1 – Planted Native Vegetation decision making key (DPIE 2020)

Question	Response as per the development site
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? i Yes .... The planted native vegetation must be allocated to the best-fit PCT and the BAM must be applied. ii No..... Go to 2.	No, the planted vegetation is not considered part of remnant native vegetation. **Go to 2**.
2. Is the planted native vegetation: **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? i Yes .... The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM. ii No..... Go to 3.	No, the planted vegetation is not considered to be planted for the purpose of environmental rehabilitation, or to replace or regenerate a PCT containing threatened plant species or habitat. **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: **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 **g.** approved vegetation management plan (e.g. as required as part of a Controlled Activity Approval for works on waterfront land under the NSW Water Management Act 2000)? i Yes .... The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM. ii No..... Go to 4.	No, the planted vegetation does not consist of individuals of a threatened species or planted to provide habitat for a threatened species. **Go to 4**.
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? i 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). ii No..... Go to 5.	No, the planted vegetation is not considered part of voluntarily revegetation, environmental rehabilitation or restoration. **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	**Yes**, the planted vegetation is considered planted for functional, aesthetic, horticultural or plantation forestry purposes, such as landscaping in a golf course.

Question	Response as per the development site
parks, gardens and sport fields/complexes, macadamia plantations or teatree farms? i 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). ii 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)? i 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). ii No..... There may be other types of occurrences of planted native vegetation that do not easily fit into the decision-making key above. Assessors should contact the BAM Support mailbox at bam.support@environment.nsw.gov.au for further advice on using the BAM to assess other types of occurrences of planted native vegetation.	No, the planted vegetation does not consist of species listed as a widely cultivated native species on a list approved by the Secretary of the Department.

3.3.5 Use of local data

The use of local data is not proposed.

Figure 3: Biodiversity Values Map and development footprint

Figure 4: Plant Community Types and development footprint

3.4 Threatened species

Threatened flora and fauna surveys were undertaken across the development site as part of a greater ecological assessment (Travers 2019a). No threatened flora was recorded, nor were any habitat values recorded, such as hollows bearing trees, nests, burrows etc. No ecosystem credit species or species credit species were generated for the development site.

3.4.1 Targeted surveys

Threatened flora and fauna surveys were undertaken across the development site as part of another ecological assessment (Travers 2019a). No threatened flora was recorded, nor were any habitat values recorded, such as hollows bearing trees, nests, burrows. The vegetation present does not comprise any Plant Community Type that can be entered in the BAMC. Therefore, no ecosystem credit species or species credit species were generated for the development site.

However, as part of the other development application, targeted surveys for species credit species were undertaken at the development site by Travers (Travers 2019a). The dates of these surveys are outlined in Table 5 to Table 9 below.

The survey effort across the development site and surrounds (Travers 2019a) included the following:

- Diurnal bird surveys
- Spotlighting and call playback for nocturnal mammals, forest owls and Green and Golden Bell Frog
- Ultrasonic recorders for microbats
- Opportunistic habitat searches for reptiles
- Spotlighting and call identification for amphibians
- Vegetation mapping
- Floristic plots and BAM plots
- Targeted searches.

3.4.1.1 Threatened flora

Surveys for threatened flora were completed by Travers in 2019 as part of the other ecological assessment. Threatened species searches (as relevant) were conducted as near linear transects within areas of potential habitat. Opportunistic searches were also conducted by ELA ecologists on 8 March 2021.

Details of the targeted threatened flora survey effort is provided below in Table 5.

Table 5: Travers species credit species and threatened flora survey effort (Travers 2019a).

Species	BAM survey period (as per Travers 2019a)	Period surveyed (Travers 2019a)
Grevillea juniperina subsp. *Juniperina*	All months	5 October 2017 and 3 December 2019
Marsdenia viridiflora subsp. *viridiflora*	Nov-Feb	3 December 2019
Pimelea spicata	All months	5 October 2017 and 3 December 2019

ELA confirmed that the vegetation within the development site is highly degraded, and the likelihood of threatened flora listed above in Table 5 is very low.

3.4.1.2 Diurnal birds

Surveys for threatened birds were completed by Travers in 2017 and 2019. Dates and times of these surveys are provided below in Table 6.

Table 6: Travers birds survey effort (Travers 2019a).

Date	Field survey Technique	Survey Effort (Travers 2019a)
27/9/17	Opportunistic observation	4hrs 1230 - 1630
28/9/17	Opportunistic observation	9hrs 0800 - 1700
29/9/17	Opportunistic observation	6hrs 30min 0830 - 1500
5/10/17	Opportunistic observation	7hrs 30min 1100 - 1830
6/10/17	Opportunistic observation	8hrs 0800 - 1600
9/10/17	Opportunistic observation	2hrs 30min 1430 - 1700
10/10/17	Opportunistic observation	7hrs 30min 0700 - 1630
11/10/17	Opportunistic observation	7hrs 0730 - 1430
29/10/19	Opportunistic observation	5hrs 30min 1100 - 1630
30/10/19	Opportunistic observation	8hrs 0730 – 1530

3.4.1.3 Nocturnal Birds, Microbats and Arboreal Mammals

Targeted survey for nocturnal birds and arboreal mammals was conducted simultaneously by Travers on 5 October 2017. Spotlighting and ultrasonic recorders were utilised to detect bat species on 5 October 2017 and 29 October 2019. Dates and times of these surveys are provided below in Table 7.

Table 7: Travers Bushfire and Ecology nocturnal birds, microbats and arboreal mammals survey effort (Travers 2019a).

Date	Field survey Technique	Survey Effort (Travers 2019a)
05/10/17	Spotlighting and Call Playback	2hrs 30min 1900 - 2130
05/10/17	Ultrasonic recorders (passive monitors x 4)	Overnight – from 1800
29/10/19	Ultrasonic recorders (passive monitors x 2)	Overnight – from 1920

3.4.1.4 Reptiles and Amphibians

Targeted survey for reptiles and amphibians was conducted by Travers Bushfire and Ecology on 5-6 October 2017 and 9 October 2017. Dates and times of these surveys are provided below in Table 8.

Table 8: Travers Bushfire and Ecology reptiles and amphibians survey effort (Travers 2019a).

Date	Field survey Technique	Survey Effort (Travers 2019a)
05/10/17	Opportunistic habitat searches	7hrs 30min 1100 - 1830
05/10/17	Spotlighting and call identification Call playback (Green & Golden Bell Frog)	2hrs 30min 1900 - 2130
06/10/17	Opportunistic habitat searches	8hrs 0800 - 1600
09/10/17	Opportunistic habitat searches	2hrs 30min 1430 - 1700

3.4.1.5 Invertebrates

Targeted survey for invertebrates, such as the Cumberland Plain Land Snail and Dural Land Snail were conducted by Travers Bushfire and Ecology on 5-6 October 2017 and 9 October 2017. Dates and times of these surveys are provided below in Table 9.

Table 9: Travers Bushfire and Ecology invertebrate survey effort (Travers 2019a).

Date	Field survey Technique	Survey Effort (Travers 2019a)
05/10/17	Opportunistic habitat searches	7hrs 30min 1100 - 1830
06/10/17	Opportunistic habitat searches	8hrs 0800 - 1600
09/10/17	Opportunistic habitat searches	2hrs 30min 1430 - 1700

3.4.1.6 Weather Conditions

Weather conditions during the targeted surveys are outlined in Table 10.

Table 10: Weather conditions

Date	Weather details (Travers 2019a)
27/9/17	2/8 cloud, gentle NNE wind, no rain, 26°C
28/9/17	3/8 cloud, gentle NW wind, no rain, 26°C
29/9/17	0/8 cloud, calm NNE wind, no rain, 18°C
5/10/17	4/8 cloud, gentle NNE wind, no rain, 23°C
6/10/17	8/8 cloud, light SW wind, no rain, 19°C
9/10/17	3/8 cloud, moderate WSW wind, no rain, 32°C
10/10/17	8/8 cloud, calm S wind, no rain, 15-22°C
11/10/17	8/8 cloud, calm NE wind, showers, 18°C
29/10/19	1/8 cloud, 3-15km/h NE wind, no rain, 13-31°C
30/10/19	1/8 cloud, 2-10km/h NE wind, no rain, 13-33°C
03/12/19*	no rain, 9-30°C

* data not provided within Travers (2019a). Weather data collected from bom.gov.au (BOM 2021).

3.4.2 Expert reports

Expert reports have not been prepared for this assessment

4. Stage 2: Impact assessment (biodiversity values)

4.1 Avoiding impacts

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

The development has been located and designed in a way which avoids and minimises impacts as outlined in Table 11.

Table 11: Locating and designing 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 project has used areas where there are few biodiversity values including existing tee off areas, gardens, car parks and existing buildings.	Where practical, the development site has been located within areas of existing hardstand or significantly modified landscaped areas.
locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition	The project is located where native vegetation is categorised as native planted and exotic and threatened species habitat is considered marginal foraging habitat.	Part of the development site will affect 0.04 ha of native planted vegetation and 0.19 ha exotic vegetation, which is highly disturbed and comprises mainly a canopy with a highly modified ground layer. The vegetation was planted as part of the golf club landscaping.
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 project has been located in areas where no vegetation in high threat categories exist.	Vegetation within the site is classified as planted native and exotic/ ornamental. No remnant vegetation is present within the development site.
locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained	The project has been located within an existing and highly modified golf course, including pro shop and car parks.	The proposed development has been located to avoid clearing within the good connectivity linkages on site.
reducing the clearing footprint of the project	The clearing footprint is confined to 1.04 ha, with only 22% consisting of vegetation. All other areas are existing golf course greens and hardstand area.	The proposed development would remove 0.23 ha of vegetation which is highly disturbed and comprises mainly of canopy with a highly modified groundlayer and no shrub or midstorey.
locating ancillary facilities in areas where there are no biodiversity values or threatened species habitat or habitat for species and vegetation in high threat status categories (e.g. an EEC or CEEC)	There are no ancillary services that require assessment as part of this BDAR. Ancillary services will be located offsite in already disturbed/man-made structures (existing sheds/roads etc)	N/A
providing structures to enable species and genetic material to move across barriers or hostile gaps	Structures to enable species and genetic material to move across barriers will not be constructed.	Minimal connectivity features exist within the development site.

Approach	How addressed	Justification
making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on the development site.	The development site is to be clearly demarcated to avoid impacts to retained vegetation.	The development site is to be clearly demarcated to avoid impacts to retained vegetation. Any trees planted as part of landscaping works should be consistent with the surrounding native vegetation communities within the study area.

4.1.2 Prescribed biodiversity impacts

The development site has the prescribed biodiversity impacts as outlined in Table 12.

Table 12: Prescribed biodiversity impacts

Prescribed biodiversity impact	Description in relation to the development site	Threatened species or ecological communities effected
Human made structures or non-native vegetation	The development site contains man-made structures and non-native vegetation. This non-native vegetation is considered to provide marginal foraging habitat for threatened species. The existing pro shop does not support habitat for threatened fauna.	None.

4.1.2.1 Locating a project to avoid and minimise prescribed biodiversity impacts

The development has been located in a way which avoids and minimises prescribed biodiversity impacts as outlined in Table 13.

Table 13: 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 development will involve the removal of some native planted and exotic vegetation which is likely to provide minimal foraging habitat.	In the context of the surrounding locality, it is considered that vegetation in the impact area is primarily in a disturbed condition, already highly fragmented and consisting of mostly exotic/ ornamental vegetation. Thus, the footprint is considered to be located in an area where exchange of genetic material between adjacent or nearby habitat is already limited and will not affect the corridor connecting different areas of habitat, flight paths or preferred local movement paths.
Optimising project layout to minimise interactions with threatened and protected species and ecological communities	The footprint has been generally placed to avoid impacts to areas of high biodiversity value.	The footprint has utilised the portion of the development site which includes primarily cleared lands and vegetation of low biodiversity value. There are no threatened ecological communities and no habitat that corresponds with any PCT.

4.2 Assessment of Impacts

4.2.1 Direct impacts

The direct impacts of the development on:

- Planted native/ ornamental vegetation (0.04ha), outlined in Table 14
- Exotic/ ornamental vegetation (0.19 ha).
- Prescribed biodiversity impacts are outlined in Section 4.2.2.

Table 14: Direct impacts to native vegetation

PCT ID	PCT Name/ Vegetation type	Vegetation Class	Vegetation Formation	Direct impact (ha)
-	Native planted vegetation	-	-	0.04
-	Exotic / ornamental vegetation			0.19

4.2.2 Change in vegetation integrity

The change in vegetation integrity as a result of the development is not considered for this assessment due to the vegetation types within the development site. The vegetation present does not correspond with any Plant Community Type, therefore there is no ability to enter plot data into the BAMC.

4.2.3 Indirect impacts

All impacts are considered to be confined to the boundaries of the development site. The indirect impacts of the development are outlined in Table 15.

Table 15: Indirect impacts

Indirect impact	Project phase	Nature	Extent	Frequency	Duration	Timing
sedimentation and contaminated and/or nutrient rich run-off	Construction	Minimal due to the small area of disturbance	Downstream of the development site	During heavy rainfall or storm events	During rainfall events	Short term
transport of weeds and pathogens from the site to adjacent vegetation	Construction	Spread of weed seed or pathogens	Minimal. Impacts will be contained within already disturbed locations	During vegetation removal	Occasionally during vegetation removal	Short term
trampling of threatened flora species	Construction / operation	No threatened flora present	N/A	N/A	N/A	N/A
rubbish dumping	Construction / operation	Left by contractors during works	Potential to cause localised rubbish dumping	During construction	Occasionally during vegetation removal	Short term
increase in predatory species populations	Construction / operation	Negligible likelihood of impact occurring as only a small degraded area of	N/A	N/A	N/A	N/A

		native vegetation present				
increase in pest animal populations	Construction / operation	Negligible likelihood of impact occurring as only a small degraded area of native vegetation present	N/A	N/A	N/A	N/A

4.2.4 Prescribed biodiversity impacts

The development site has the prescribed biodiversity impacts as outlined in Table 16.

Table 16: Direct impacts on prescribed biodiversity impacts

Prescribed biodiversity impact	Nature	Extent	Frequency	Duration	Timing
impacts of development on the habitat of threatened species or ecological communities associated with: • **non-native vegetation**	Removal of exotic/planted vegetation which provides minor connectivity for threatened species	Confined to the development site	During construction works	Throughout the life of the project	Long term impacts

4.2.5 Mitigating and managing impacts

Measures proposed to mitigate and manage impacts at the development site before, during and after construction are outlined in Table 17.

Table 17: Measures proposed to mitigate and manage impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
pre-clearance and avoidance to minimise the displacement of resident fauna	Negligible	Negligible	N/A – no habitat trees are present within the development site. No pre-clearance required.	N/A	N/A	N/A
timing works to avoid critical life cycle events such as breeding or nursing	Negligible	Negligible	N/A – no threatened species were recorded during field surveys for the development site (Travers 2019).	N/A	N/A	N/A
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	Negligible	Negligible	N/A – due to the small-scale of vegetation removal, and the lack of remnant/ native vegetation, no staged clearing or pre-clearance is required.	N/A	N/A	N/A
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	Negligible	Negligible	N/A – no habitat trees are present within the development site. No artificial habitat is required.	N/A	N/A	N/A
clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy	Minor	Negligible	During tree removal within the development site, any trees with the potential to fall or damage areas outside the development footprint should be removed using	Reduction of soil / vegetation disturbance outside of the development footprint	During clearing works	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
machinery, is preferable in situations where partial clearing is proposed			qualified arborists rather than heavy machinery.			
sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment	Minor	Negligible	Appropriate controls are to be utilised to manage exposed soil surfaces and stockpiles to prevent sediment discharge. Soil and erosion measures such as sediment fencing, clean water diversion must be in place prior to the commencement of the construction works and must be regularly inspected and maintained throughout the development of the site.	Erosion and sedimentation will be controlled. Reduction of any runoff into streams within the development footprint.	Prior to and during clearing works	Project Manager
temporary fencing to protect significant environmental features such as riparian zones	Negligible	Negligible	No riparian zones are within the vicinity of the development site.	N/A	N/A	N/A
hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	Moderate	Minor	Vehicles, machinery and building refuse associated with the development construction should remain only within construction footprint areas, avoiding weed or pathogen related impacts to vegetation outside of the development site	Prevent spread of weeds or pathogens	For the duration of construction works	Project Manager
staff training and site briefing to communicate environmental features to be protected and measures to be implemented	Minor	Negligible	All staff working on the development will undertake an environmental induction as part of their site familiarisation. This	All staff entering the study area are fully aware of the presence of native vegetation adjacent to the site and	To occur for all staff entering/working at the study area. Site	Project Manager

Measure	Risk mitigation before	Risk mitigation after	Action	Outcome	Timing	Responsibility
			induction will include items such as: • 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) • Key contacts in case of environmental emergency.	what to do in case of any environmental emergencies	briefings should be updated based on phase of the work and when environmental issues become apparent.	
making provision for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on or adjacent to the development site	Negligible	Negligible	No vegetation is to be retained on the site and no provision for rehabilitation.	NA	NA	N/A

4.2.6 Serious and Irreversible Impacts (SAII)

No candidate Serious and Irreversible Impacts (SAII) values are associated with the development site.

4.3 Risk assessment

A risk assessment has been undertaken for any residual impacts likely to remain after the mitigation measures (Section 4.1.1) have been applied. Likelihood criteria, consequence criteria and the risk matrix are provided in Table 18, Table 19 and Table 20 respectively, with the risk assessment provided in Table 21.

Table 18: 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 19: 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.
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.

Consequence category	Description
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 20: 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 21: Risk assessment

Potential impact	Project phase	Risk (pre-mitigation)	Risk (post mitigation)
vegetation clearing	Construction/ operation	Low	Very Low
sedimentation and contaminated and/or nutrient rich run-off	Construction	Low	Very Low
noise, dust or light spill	Construction	Low	Very Low
inadvertent impacts on adjacent habitat or vegetation	Construction	Low	Very Low
transport of weeds and pathogens from the site to adjacent vegetation	Construction	Low	Low
vehicle strike	Construction/ operation	Low	Very Low
trampling of threatened flora species	N/A	N/A	N/A
rubbish dumping	Operation	Low	Very Low
wood collection	Operation	Low	Very Low
bush rock removal and disturbance	Construction/ operation	N/A	Very Low
increase in predatory species populations	Construction/ operation	Very Low	Very Low
increase in pest animal populations	Construction/ operation	Very Low	Very Low
increased risk of fire	Construction/ operation	Low	Low
disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	N/A	N/A	N/A

4.4 Impact summary

Following implementation of BAM, direct impacts to the site are considered negligible. These are detailed below.

4.4.1 Serious and Irreversible Impacts (SAII)

As discussed in Section 4.2.6, there are no listed SAII species associated with the development site. The development is not expected to impact any SAII species.

4.4.2 Impacts requiring offsets

Offsets are not required for the removal of vegetation within the development site as they are classified as Exotic/ Ornamental and Planted Native vegetation. No impacts to threatened flora or fauna are expected to occur as a result of the development.

4.4.3 Impacts not requiring offsets

The impacts of the development not requiring offset for native vegetation are shown on Figure 5. Impacts not requiring offset includes the 0.04 ha of planted native vegetation which has been assessed under the planted native vegetation streamlined assessment module.

4.4.4 Areas not requiring assessment

Areas not requiring assessment within the development site include those identified as mown exotic grassland and other exotic flora. Areas not requiring assessment are shown in Figure 6.

4.4.5 Credit summary

No ecosystem credits or species credits are required for the development site.

Figure 5: Impacts not requiring offset

Figure 6: Areas not requiring assessment

4.5 Consistency with legislation and policy

Additional matters relating to impacts on flora and fauna which are not covered by the BC Act must also be addressed for the proposed development. Potential MNES in accordance with the EPBC Act have been addressed below.

4.5.1 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 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 Department of Environment and Energy (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.

A habitat assessment was undertaken, however due to the small scale of the development, the vegetation scheduled for removal and the lack of habitat features within the site, no species require assessment under Significant Impact Guidelines 1.1.

5. References

BioNet Threatened Biodiversity profiles.
https://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx

BioNet Vegetation Classification.
https://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx

BOM (2021). Daily Rainfall - 067027 - Bureau of Meteorology (bom.gov.au)

DAWE 2021., EPBC Online Protected Matters Database Search. Available at http://www.environment.gov.au/erin/ert/epbc/imap/map.html

DPIE 2020. 'Biodiversity Assessment Method'.

EES 2020. NSW BioNet: Atlas of NSW Wildlife online search tool. Available: (http://www.bionet.nsw.gov.au/

Eco Logical Australia. 2021 Nepean Gardens BDAR. Prepared for Catholic Metropolitan Cemeteries Trust.

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

Travers Biodiversity and Ecology (2017) Flora & Fauna Assessment. Proposed Cemetery, Lot 2 DP 1108408 13 Park Road, Wallacia. October 2017 (REF: A17162)

Travers Biodiversity and Ecology (2019a) Biodiversity Development Assessment Report. Proposed Cemetery Lot 2 DP 1108408 13 Park Road, Wallacia December 2019 (REF: 18CMCT02)

Travers Biodiversity and Ecology (2019b) Tree Assessment, Proposed 9 Hole Golf Course and Cemetery. Lot 2 DP 1108408, Lot 512 DP 1079728. 13 Park Road, Wallacia December 2019 REF: (18CMCT02T)

Travers Biodiversity and Ecology (2019c) Vegetation Management Plan. Proposed Wallacia Country Club Golf Course & Proposed Cemetery Lot 2 DP 1108408 13 Park Road, Wallacia

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 development site. In cases where multiple populations occur in the development site or a population occupies part of the development site, 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 impact development	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
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.
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.

Terminology	Definition
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: EPBC Act Likelihood of Occurrence

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the Protected Matters Search Tool for the broader assessment. 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 within the study area and in the vicinity is unsuitable for the species.

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 Data Collection.

Table 22: Likelihood of occurrence for threatened entities

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			ECOLOGICAL COMMUNITIES			
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	-	E	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. Dominated by *Eucalyptus parramattensis* subsp. *parramattensis*, *Angophora bakeri* and *Eucalyptus sclerophylla*. A small tree stratum of *Melaleuca decora* is sometimes present, generally in areas with poorer drainage. It has a well-developed shrub stratum consisting of sclerophyllous species such as *Banksia spinulosa* var. *spinulosa*, *Melaleuca nodosa*, *Hakea sericea* and *Hakea dactyloides* (multi-stemmed form). The ground stratum consists of a diverse range of forbs including *Themeda australis*, *Entolasia stricta*, *Cyathochaeta diandra*, *Dianella revoluta* subsp. *revoluta*, *Stylidium graminifolium*, *Platysace ericoides*, *Laxmannia gracilis* and *Aristida warburgii*.	No – this ecological community was not identified within the development site.	N/A	No
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	-	E	The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees. It has a dense to sparse tree layer in which *Casuarina glauca* (swamp oak) is the dominant species northwards from Bermagui. Other trees including *Acmena smithii* (Lilly Pilly), *Glochidion* spp. (Cheese Trees) and *Melaleuca* spp. (Paperbarks) may be present as subordinate species and are found most frequently in stands of the community northwards from Gosford. *Melaleuca*	No – this ecological community was not identified within the development site.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			ericifolia is the only abundant tree in this community south of Bermagui. The understorey is characterised by frequent occurrences of vines, *Parsonsia straminea, Geitonoplesium cymosum* and *Stephania japonica* var. *discolor*, a sparse cover of shrubs, and a continuous groundcover of forbs, sedges, grasses and leaf litter. The composition of the ground stratum varies depending on levels of salinity in the groundwater.			
Cooks River / Castlereagh Ironbark Forest	-	CE	Associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. The structure of the community may vary from tall open forests (>40m) to woodlands. The most widespread and abundant dominant trees include *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus amplifolia* (Cabbage Gum), *Angophora floribunda* (Rough-barked Apple) and *Angophora subvelutina* (Broad-leaved Apple). *Eucalyptus baueriana* (Blue box), *Eucalyptus botryoides* (Bangalay) and *Eucalyptus elata* (River Peppermint) may be common south from Sydney. *Eucalyptus ovata* (Swamp Gum) occurs on the far south coast, *Eucalyptus saligna* (Sydney Blue Gum) and *Eucalyptus grandis* (Flooded Gum) may occur north of Sydney, while *Eucalyptus benthamii* is restricted to the Hawkesbury floodplain. A layer of small trees may be present, including Melaleuca decora, *M. styphelioides* (prickly-leaved teatree), *Backhousia myrtifolia* (grey myrtle), *Melia azadarach* (white cedar), *Casuarina cunninghamiana* (river oak) and *Casuarina glauca* (swamp oak). Scattered shrubs	No – this ecological community was not identified within the development site.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			include *Bursaria spinosa, Solanum prinophyllum, Rubus parvifolius, Breynia oblongifolia, Ozothamnus diosmifolius, Hymenanthera dentata, Acacia floribunda* and *Phyllanthus gunnii*. The groundcover is composed of abundant forbs, scramblers and grasses.			
Cumberland Plain Woodland in the Sydney Basin Bioregion		CE	This CEEC occurs on soils derived from Wianamatta Shale, and throughout the driest part of the Sydney Basin. Before European settlement, was extensive across the Cumberland Plain, western Sydney. Today, only 9 percent of the original extent remains intact, with the remnants scattered widely across the Cumberland Plain. The dominant canopy trees of Cumberland Plain Woodland are Grey Box (*Eucalyptus moluccana*) and Forest Red Gum (*E. tereticornis*), with Narrow-leaved Ironbark (*E. crebra*), Spotted Gum (*Corymbia* maculata) and Thin-leaved Stringybark (*E.* eugenioides) occurring less frequently. The shrub layer is dominated by Blackthorn (*Bursaria spinosa*), and it is common to find abundant grasses such as Kangaroo Grass (*Themeda* australis) and Weeping Meadow Grass (*Microlaena stipoides* var. *stipoides*).	No – this ecological community was not identified within the development site.	N/A	No
Elderslie Banksia Scrub Forest in the Sydney Basin Bioregion		CE	This EEC is restricted to the Cumberland subregion of the Sydney Basin IBRA bioregion. It is only known from the Camden local government area (LGA) in proximity to the Nepean River. The ecological community occurs at low elevations, of around 60 to 100 m above sea level. It is normally above the 100 year flood level, though it is possible that some regrowth on mined sand deposits is now artificially within the present floodplain. It is found in an area	No – this ecological community was not identified within the development site.	No	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			that receives around 750 mm rainfall annually. The ecological community occurs on deep sandy substrates on high-level Tertiary alluvium. Key elements of the canopy include *Banksia integrifolia* subsp. *integrifolia* (Coast Banksia), *Angophora subvelutina* (Broad-leaved Apple), *Eucalyptus botryoides x E. saligna* (a natural hybrid of Bangalay and Sydney Blue Gum) and various other species of Eucalyptus over a mostly shrubby understorey			
River-flat eucalpty forest on coastal floodplains of southern NSW and eastern Victoria	-	CE	This CEEC is found on the river flats of the coastal floodplains. It has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include *Eucalyptus tereticornis* (Forest Red Gum), *E. amplifolia* (Cabbage Gum), *Angophora floribunda* (Rough-barked Apple) and *A. subvelutina* (broad-leaved apple). *Eucalyptus baueriana* (blue box), *E. botryoides* (bangalay) and *E. elata* (river peppermint) may be common south from Sydney, E. ovata (Swamp Gum) occurs on the far south coast, *E. saligna* (Sydney Blue Gum) and *E. grandis* (Flooded Gum) may occur north of Sydney, while *E. benthamii* is restricted to the Hawkesbury floodplain. A layer of small trees may be present, including *Melaleuca decora, M. styphelioides* (Prickly-leaved Teatree), *Backhousia myrtifolia* (Grey Myrtle), *Melia azaderach* (White Cedar), *Casuarina*	No – this ecological community was not identified within the development site.	No	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			cunninghamiana (River Oak) and *C. glauca* (Swamp Oak).			
Shale Sandstone Transition Forest of the Sydney Basin Bioregion			Occurs at the edges of the Cumberland Plain in western Sydney, most now occurs in the Hawkesbury, Baulkham Hills, Liverpool, Parramatta, Penrith, Campbelltown and Wollondilly local government areas. The main tree species include *Eucalyptus tereticornis* (Forest Red Gum), *E. punctata* (Grey Gum), stringybarks (*E. globoidea, E. eugenioides*) and ironbarks (*E. fibrosa and E. crebra*). Areas of low sandstone influence (more clay-loam soil texture) have an understorey that is closer to Cumberland Plain Woodland.	No – this ecological community was not identified within the development site.	N/A	No
Turpentine-Ironbark Forest of the Sydney Basin Bioregion	-	CE	Restricted to areas with clay soil derived from Wianamatta Shale in an area that generally has an annual rainfall of more than 950 mm. A medium-height open forest with a lower tree layer, an open low shrub layer and a prominent ground layer. Western outliers of the community in wetter habitats may have a tall open forest structure. On the lowlands, the canopy is dominated by *Syncarpia glomulifera* (Turpentine), with *Eucalyptus paniculata* (Grey Ironbark) and *E. eugenioides* (Thin-leaved Stringybark) occurring less frequently. On the margin of the Cumberland Plain, the vegetation is dominated by *Eucalyptus punctata* (Grey Gum) and *Syncarpia glomulifera,* with species such as *Corymbia gummifera* (Red Bloodwood) and *Eucalyptus globoidea* (White Stringybark) occurring sporadically. The westernmost occurrences of the community are dominated by species such as *Syncarpia glomulifera, Eucalyptus globoidea*,	No – this ecological community was not identified within the development site.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			Eucalyptus cypellocarpa (Monkey Gum), *E. notabilis* (Mountain Mahogany) and *E. paniculata* (Grey Ironbark) in southern areas. *Eucalyptus punctata* (Grey Gum) and/or *E. piperita* (Sydney Peppermint) are common in areas with sandstone influence.			
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion		E	This EEC is generally a tall open eucalypt forests found on igneous rock (predominately Tertiary basalt and microsyenite) in, or adjacent to, the Sydney Basin Bioregion. The ecological community occurs in areas of high rainfall, generally ranging from 950 to 1600 mm/year. Dominant canopy species are most often *Eucalyptus fastigata* (brown barrel), *E. viminalis* (ribbon gum) and *E. radiata* subsp. *radiata* (narrow-leaved peppermint). *Eucalyptus obliqua* (messmate stringybark), *E. elata* (river peppermint), *E. quadrangulata* (white-topped box) and *E. smithii* (ironbark peppermint) are also common components. Eucalyptus oreades (Blue Mountains ash) and *E. blaxlandii* (Blaxland‟s stringybark) are prevalent in the Blue Mountains forms, particularly on the rocky edges of basalt. *Eucalyptus cypellocarpa* (mountain grey gum) is widespread in drier sites throughout the range of the ecological community, while *E. piperita* (Sydney peppermint) may also occur. *Eucalyptus ovata* (swamp gum) may be present in areas of impeded drainage or high groundwater.	No – this ecological community was not identified within the development site.	N/A	No
Western Sydney Dry Rainforest and Moist Woodland on Shale	-	CE	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	No – this ecological community was not identified within the development site.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			Sydney Basin Bioregion. Dominated by *Eucalyptus parramattensis* subsp. *parramattensis*, *Angophora bakeri* and *Eucalyptus sclerophylla*. A small tree stratum of *Melaleuca decora* is sometimes present, generally in areas with poorer drainage. It has a well-developed shrub stratum consisting of sclerophyllous species such as *Banksia spinulosa* var. *spinulosa, Melaleuca nodosa*, *Hakea sericea* and *Hakea dactyloides* (multi-stemmed form). The ground stratum consists of a diverse range of grasses and forbs including *Themeda australis, Entolasia stricta, Cyathochaeta diandra, Dianella revoluta* subsp. *revoluta, Stylidium graminifolium, Platysace ericoides, Laxmannia gracilis* and *Aristida warburgii.*			
			FAUNA			
Actitis hypoleucos	Common Sandpiper	M	Coastal wetlands and some inland wetlands, especially muddy margins or rocky shores. Also estuaries and deltas, lakes, pools, billabongs, reservoirs, dams and claypans, mangroves.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Anthochaera phrygia	Regent Honeyeater	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 *Casuarina cunninghamiana* (River Oak).	Unlikely - suitable habitat not identified within the development site.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
Botaurus poiciloptilus	Australasian Bittern	E	Found over most of NSW except for the far north-west. Permanent freshwater wetlands with tall, dense vegetation, particularly *Typha* spp. (Bullrushes) and *Eleocharis* spp. (Spikerushes).	Unlikely - suitable habitat not identified within the development site.	N/A	No
Calidris acuminata	Sharp-tailed Sandpiper	M	Summer migrant. Widespread in most regions of NSW, especially in coastal areas, but sparse in the south-central Western Plain and east Lower Western Regions. Shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Calidris ferruginea	Curlew Sandpiper	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.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Calidris melanotos	Pectoral Sandpiper	M	Shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Chalinolobus dwyeri	Large-eared Pied Bat	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.	Unlikely - habitat present is substantially degraded such that this species is unlikely to utilise the development site for foraging or breeding.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
Cuculus optatus	Oriental Cuckoo	M	Nonbreeding habitat: monsoonal rainforest, vine thickets, wet sclerophyll forest or open Casuarina, Acacia or Eucalyptus woodland.	Unlikely - habitat present is substantially degraded such that this species is unlikely to utilise the development site for foraging or breeding.	N/A	No
Dasyurus maculatus maculatus	Spotted-tailed Quoll	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.	Unlikely – suitable habitat, in the form of maternal den site, were not identified within the development site.	N/A	No
Falco hypoleucos	Grey Falcon	V	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Gallinago hardwickii	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.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Grantiella picta	Painted Honeyeater	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 - suitable habitat not identified within the development site.	N/A	No
Heleioporus australiacus	Giant Burrowing Frog	V	South eastern NSW and Victoria, in two distinct populations: a northern population in the	Unlikely - suitable habitat not identified	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			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.	within the development site.		
Hirundapus caudacutus	White-throated Needletail	V, M	All coastal regions of NSW, inland to the western slopes and inland plains of the Great Divide. Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Hoplocephalus bungaroides	Broad-headed Snake	V	Largely confined to Triassic and Permian sandstones within the coast and ranges in an area within approximately 250 km of Sydney. Dry and wet sclerophyll forests, riverine forests, coastal heath swamps, rocky outcrops, heaths, grassy woodlands.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Lathamus discolor	Swift Parrot	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 – foraging habitat features associated with this species were identified within the development site.	Yes (minor foraging only)	No – the species is highly mobile and more foraging habitat is available within the broader locality.
Limosa lapponica	Bar-tailed Godwit	M	Summer migrant to Australia. Widespread along the coast of NSW, including the offshore islands. Also numerous scattered inland records. Intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons, bays, seagrass beds, saltmarsh, sewage farms and saltworks, saltlakes	Unlikely - suitable habitat not identified within the development site.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. Rarely inland wetlands, paddocks and airstrips.			
Litoria aurea	Green and Golden Bell Frog	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.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Mixophyes balbus	Stuttering Frog	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.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Monarcha melanopsis	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 - habitat present is substantially degraded such that this species is unlikely to utilise the development site for foraging or breeding.	N/A	No
Monarcha trivirgatus	Spectacled Monarch	M	Usually considered a denizen of the dense rainforests and moist eucalypt forests of eastern and north-eastern Australia, the Spectacled Monarch sometimes also inhabits mangroves and other densely vegetated habitats	Unlikely - suitable habitat not identified within the development site.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
Motacilla flava	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.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Myiagra cyanoleuca	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.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Numenius madagascariensis	Eastern Curlew	CE, M	Summer migrant to Australia. Primarily coastal distribution in NSW, with some scattered inland records. Estuaries, bays, harbours, inlets and coastal lagoons, intertidal mudflats or sandflats, ocean beaches, coral reefs, rock platforms, saltmarsh, mangroves, freshwater/brackish lakes, saltworks and sewage farms.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Pandion cristatus	Eastern Osprey	M	Common around the northern NSW coast, and uncommon to rare from coast further south. Some records from inland areas. Rocky shorelines, islands, reefs, mouths of large rivers, lagoons and lakes.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Petauroides volans	Greater Glider	V	This population on the south coast of NSW is bounded by the Moruya River to the north, Coila Lake to the south and the Princes Highway and cleared land exceeding 700 m in width to the west. Eucalypt forests and woodlands.	Unlikely - habitat present is substantially degraded such that this species is unlikely to utilise the development site for foraging or breeding.	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
Petrogale penicillata	Brush-tailed Rock-wallaby	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.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Phascolarctos cinereus	Koala	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.	Unlikely - Habitat present is substantially degraded such that this species is unlikely to utilise the development site for foraging or breeding.	N/A	No
Pommerhelix duralensis	Dural Land Snail	E	The species is a shale-influenced-habitat specialist, which occurs in low densities along the western and northwest fringes of the Cumberland IBRA subregion on shale-sandstone transitional landscapes. The species has a strong affinity for communities in the interface region between shale-derived and sandstone-derived soils, with forested habitats that have good native cover and woody debris.	Unlikely - Habitat present is substantially degraded such that this species is unlikely to utilise the development site.	N/A	No
Pseudomys novaehollandiae	New Holland Mouse	V	Fragmented distribution across eastern NSW. Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Pteropus poliocephalus	Grey-headed Flying-fox	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	Unlikely - habitat present is substantially degraded such that this species is unlikely to	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			swamps as well as urban gardens and cultivated fruit crops.	utilise the development site for foraging or breeding.		
Rhipidura rufifrons	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.	Unlikely - habitat present is substantially degraded such that this species is unlikely to utilise the development site for foraging or breeding.	N/A	No
Rostratula australis	Australian Painted Snipe	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.	Unlikely - suitable habitat not identified within the development site.	N/A	No
Tringa nebularia	Common Greenshank	M	Summer migrant to Australia. Recorded in most coastal regions of NSW; also widespread west of the Great Dividing Range. Terrestrial wetlands and sheltered coastal habitats.	Unlikely - suitable habitat not identified within the development site.	N/A	No
			FLORA			
Acacia bynoeana	Bynoe's Wattle	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 - the presence of this species was not identified, and suitable habitat was not identified within the development site. Site is too degraded for presence of this species.	N/A	No
Acacia pubescens	Downy Wattle	V	Restricted to the Sydney region around the Bankstown-Fairfield-Rookwood and Pitt Town area,	Unlikely - the presence of this species was not	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			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 Cumberland Plain Woodland. Occurs on alluviums, shales and at the intergrade between shales and sandstones.	identified, and suitable habitat was not identified within the development site. Site is too degraded for presence of this species.		
Allocasuarina glareicola	-	E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Castlereagh woodland on lateritic soil. Found in open woodland with *Eucalyptus parramattensis*, *Eucalyptus fibrosa*, *Angophora bakeri*, *Eucalyptus sclerophylla* and *Melaleuca decora*.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the development site. Site is too degraded for presence of this species.	N/A	No
Cynanchum elegans	White-flowered Wax Plant	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; Leptospermum laevigatum-Banksia integrifolia subsp. integrifolia (Coastal Tea-tree– Coastal Banksia) coastal scrub; Eucalyptus tereticornis (Forest Red Gum) or Corymbia maculata (Spotted Gum) open forest and woodland; and Melaleuca armillaris (Bracelet Honeymyrtle) scrub.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the development site. Site is too degraded for presence of this species.	N/A	No
Darwinia biflora	-	V	Recorded in Ku-ring-gai, Hornsby, Baulkham Hills and Ryde local government areas, in an area bounded by Maroota, North Ryde, Cowan and Kellyville. Woodland, open forest or scrub-heath on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the development site. Site is	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
				too degraded for presence of this species.		
Eucalyptus aggregate	Black Gum	V	In NSW, found in the Central and Southern Tablelands, in the South Eastern Highlands Bioregion and on the western fringe of the Sydney Basin Bioregion. Alluvial soils, on cold, poorly-drained flats and hollows adjacent to creeks and small rivers. Usually occurs in open woodland with a grassy groundlayer.	Unlikely - the presence of this species was not identified, and the development site is not within the species' distribution.	N/A	No
Eucalyptus benthamii	Camden White Gum	V	Alluvial flats of the Nepean River and its tributaries. Mainly Kedumba Valley of the Blue Mountains National Park and Bents Basin State Recreation Area. Also along the Nepean River around Camden and Cobbitty, at Werriberri (Monkey) Creek in The Oaks, and on the Nattai River in Nattai National Park. Occurs in open forest. Requires a combination of deep alluvial sands and a flooding regime.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the development site.	N/A	No
Genoplesium baueri	Bauer's Midge Orchid	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.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the development site. Site is too degraded for presence of this species.	N/A	No
Grevillea parviflora subsp. *parviflora*	Small-flowered Grevillea	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.	Unlikely - the presence of this species was not identified, and suitable habitat was not	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			Heath and shrubby woodland to open forest on sandy or light clay soils usually over thin shales.	identified within the development site. Site is too degraded for presence of this species.		
Haloragis exaltata subsp. *exaltata*		V	Disjunct distribution in the Central Coast, South Coast and North Western Slopes botanical subdivisions of NSW. Protected and shaded damp situations in riparian habitats.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the development site. Site is too degraded for presence of this species.	N/A	No
Melaleuca deanei	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.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the development site. Site is too degraded for presence of this species.	N/A	No
Micromyrtus minutiflora	-	V	Restricted to the general area between Richmond and Penrith, western Sydney. Castlereagh Scribbly Gum Woodland, Ironbark Forest, Shale/Gravel Transition Forest, open forest on tertiary alluvium and consolidated river sediments.	Unlikely - the presence of this species was not identified, and the development site is not within the species' distribution.	N/A	No
Persicaria elatior	Tall Knotweed	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	Unlikely - the presence of this species was not identified, and suitable habitat was not	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). Beside streams and lakes, swamp forest or disturbed areas.	identified within the development site. Site is too degraded for presence of this species.		
Persoonia acerosa	Needle Geebung	V	Recorded only on the central coast and in the Blue Mountains, from Mt Tomah in the north to as far south as Hill Top where it is now believed to be extinct. Dry sclerophyll forest, scrubby low-woodland and heath on low fertility soils.	Unlikely - the presence of this species was not identified, and the development site is not within the species' distribution.	N/A	No
Persoonia hirsuta	Hairy Geebung	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.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the development site. Site is too degraded for presence of this species.	N/A	No
Persoonia nutans	Nodding Geebung	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 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.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the development site. Site is too degraded for presence of this species.	N/A	No
Pimelea curviflora var. *curviflora*	-	V	Confined to the coastal area of the Sydney and Illawarra regions between northern Sydney and	Unlikely - the presence of this species was not	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			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.	identified, and suitable habitat was not identified within the development site. Site is too degraded for presence of this species.		
Pimelea spicata	Spiked Rice-flower	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. *Eucalyptus moluccana* (Grey Box) communities and in areas of ironbark on the Cumberland Plain. Coast Banksia open woodland or coastal grassland in the Illawarra.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the development site. Site is too degraded for presence of this species.	N/A	No
Pomaderris brunnea	Rufous Pomaderris	V	In NSW, found around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands. Moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the development site. Site is too degraded for presence of this species.	N/A	No
Pterostylis saxicola	Sydney Plains Greenhood	E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. There are very few known populations and they are all very small and isolated. Two populations occur within a conservation reserve (Georges River National Park; Scheyville National Park). Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation	Unlikely - The presence of this species was not identified (conspicuous species). The development site is not within the currently known locations and it was determined that the habitat is substantially	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			communities above the shelves where Pterostylis saxicola occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils. All species of Pterostylis are deciduous and die back to fleshy, rounded underground tuberoids. The time of emergence and withering has not been recorded for this species, however flowering occurs from October to December and may vary due to climatic conditions.	degraded such that this species is unlikely to utilise the development site.		
Pultenaea glabra	Smooth Bush-pea	V	Restricted to the higher Blue Mountains and has been recorded from the Katoomba-Hazelbrook and Mount Victoria areas, with unconfirmed sightings in the Mount Wilson and Mount Irvine areas. Swamp margins, hillslopes, gullies and creekbanks, within dry sclerophyll forest and tall damp heath on sandstone.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the development site. Furthermore, the site is on the fringe of the predicted distribution. Site is too degraded for presence of this species.	N/A	No
Pultenaea parviflora	-	V	Endemic to the Cumberland Plain. Mainly from Windsor to Penrith and east to Dean Park, with outlier populations at Kemps Creek and Wilberforce. Dry sclerophyll forest, especially Castlereagh Ironbark Forest, Shale Gravel Transition Forest and transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	Unlikely - the presence of this species was not identified, and suitable habitat was not identified within the development site. Site is too degraded for presence of this species.	N/A	No
Rhizanthella slateri	Eastern Underground Orchid	E	Occurs from south-east Queensland to south-east NSW. In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan	Unlikely - The presence of this species was not identified (conspicuous	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore usually located only when the soil is disturbed. Flowers September to November.	species). The development site is not within the currently known locations and it was determined that the habitat is substantially degraded such that this species is unlikely to utilise the development site.		
Rhodamnia rubescens	Scrub Turpentine	CE	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of *R. rubescens* typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m above sea level in areas with rainfall of 1,000-1,600 mm Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	Unlikely – not identified during targeted survey for this species.	N/A	No
Syzygium paniculatum	Magenta Lilly Pilly	V	Only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. Subtropical and littoral rainforest on gravels, sands, silts and clays.	Unlikely - the presence of this species was not identified, and the development site is not within the species' distribution.	N/A	No
Thelymitra kangaloonica	Kangaloon Sun Orchid	CE	Only known to occur on the southern tablelands of NSW in the Moss Vale / Kangaloon / Fitzroy Falls area at 550-700 m above sea level.	Unlikely - the presence of this species was not identified, and the development site is not	N/A	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence on site	Habitat on site directly or indirectly impacted	Impact Assessment Required
			Swamps in sedgelands over grey silty grey loam soils.	within the species' distribution.		
Thesium australe	Austral Toadflax	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.	Unlikely - suitable habitat not identified within the development site.	N/A	No

1300 646 131
www.ecoaus.com.au