Burrah Park (Elizabeth Drive Intersection) – Biodiversity Development Assessment Report

HB&B Property Pty Ltd

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Accredited Assessor Certification

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S. 6.15(1) of the *Biodiversity Conservation Act 2016* states that: *A biodiversity assessment report cannot be submitted in connection with a relevant application unless the accredited person certifies in the report that the report has been prepared on the basis of the requirements of (and information provided under) the biodiversity assessment method as at a specified date and that date is within 14 days of the date the report is so submitted*.

This Biodiversity Development Assessment Report has been prepared by Daniel McDonald and Hamish Pritchard, supervised by Michelle Frolich on the basis of the requirements of (and information provided under) the Biodiversity Assessment Method (BAM 2020).

No actual, perceived, or potential conflict of interest exists between it or between any one or more of the author's employees, consultants or agents and the project client, or is likely to arise in relation to the report that is submitted for this project.

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Executive Summary

Eco Logical Australia Pty Ltd (ELA) was engaged by HB&B Property Pty Ltd to prepare a Biodiversity Development Assessment Report (BDAR) for a proposed intersection on Lot 1 in Deposited Plan (DP) 1306448, Elizabeth Drive, Badgerys Creek (subject land). The proposed intersection will provide a road link between Elizabeth Drive and the roadworks included in the proposed State Significant Development (SSD) SSD-18406916 at 1953-2109 Elizabeth Drive, Badgerys Creek NSW. The SSD is known as Burrah Park, located within the Penrith and Liverpool Local Government Areas (LGA) and within the Western Sydney Aerotropolis precinct. The subject land is located within a historically disturbed and modified landscape, which includes built infrastructure, exotic pasture grasses for agricultural land use, and scattered patches of native vegetation and paddock trees. Cosgroves Creek, a 4th order Strahler stream, is located in the west of the subject land.

This BDAR has been prepared consistent with the Biodiversity Assessment Method (BAM) 2020, under the NSW *Biodiversity Conservation Act 2016* (BC Act).

Adjoining the proposed development footprint is certified-urban capable land in accordance with the Cumberland Plain Conservation Plan (CPCP) and does not require further assessment for impacts to biodiversity under the NSW BC Act or the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). The development does not directly impact any non-certified Avoided Land, which occurs in the subject land associated with Cosgroves Creek. This BDAR has been prepared to assess the direct and indirect impacts to biodiversity, and inform offset obligations under the Biodiversity Offset Scheme (BOS), for the extent of impacts under SSD-18406916 on non-certified Excluded Land. Impacts to Excluded Land are primarily for the widening of and signalised intersection on Elizabeth Drive, to allow access to the SSD site during construction and for the life of the project.

The Streamlined Assessment Module – Small Area has been applied for this BDAR, as the total area of native vegetation proposed to be removed is under the relevant area clearing limit threshold of 2 ha. The Streamlined Assessment Module – Planted Native Vegetation has also been applied to patches of native vegetation present within the development footprint that do not meet the criteria for a local PCT.

Field surveys were undertaken to validate vegetation and assign native vegetation to the best-fit Plant Community Type (PCT), stratify PCTs into vegetation zones based on broad condition states and identify Threatened Ecological Communities (TECs) where applicable. Vegetation integrity (VI) plots were undertaken within two (2) vegetation zones on the subject land.

One PCT was identified within the subject land, being PCT 3320 *Cumberland Shale Plains Woodland*. This PCT was present as small patches primarily within the road reserve, occurring as two vegetation zones; moderate and derived native grassland (DNG) conditions. All patches of moderate and some of the DNG PCT 3320 within the development footprint conform to the threatened ecological community (TEC) *Cumberland Plain Woodland in the Sydney Basin Bioregion*, listed as a Critically Endangered Ecological Community (CEEC) under the BC Act and an entity at risk of Serious and Irreversible Impact (SAII). No vegetation within the development footprint conformed to any EPBC Act listed TECs.

The remaining vegetation within the development footprint was mapped as planted native vegetation, mixed planted native and exotic vegetation, and exotic vegetation, which comprises the largest component of the development footprint (Table 1).

Table 1: Vegetation zones in the development footprint

Vegetation Zone	PCT ID	PCT Name	Condition	Area (ha) in development footprint
1	3320	*Cumberland Shale Plains Woodland*	Moderate	0.38
2	3320	*Cumberland Shale Plains Woodland*	DNG	0.46
-	-	Planted native	-	0.10
-	-	Exotic vegetation	-	2.60
-	-	Cleared areas	-	1.18
			Total	**4.76**

There is the potential that some native remnant and planted vegetation relatively distant from the centre of the intersection footprint will be avoided and retained within the final development design. However, designs to demonstrate this has not yet been specified. As such, the development footprint, represents the maximum clearing extent of the proposed DA and has therefore assumed a worst-case scenario for the loss of vegetation from within the development footprint.

The Streamlined Assessment Module – Small Area requires the assessment of species credit species that are at risk of SAII and threatened species incidentally recorded during field survey. *Marsdenia viridiflora* subsp. *viridiflora* and *Pultenaea parviflora* were recorded during the field survey. The only SAII candidate species considered to have potential habitat within the development footprint is *Deyeuxia appressa*. The only marginally possible suitable habitat for this species was moist habitat within the DNG vegetation zone.

Measures to avoid and minimise impacts have been considered in this BDAR. The proposed intersection is located in an area with exotic vegetation and existing cleared land of limited biodiversity value.

A total of 15 ecosystem credits are required for residual impacts to associated PCTs (Table 2). Three candidate species credit species, *Deyeuxia appressa*, *Marsdenia viridiflora* subsp. *viridiflora* – endangered population, and *Pultenaea parviflora*, require offsetting. A summary of the species credits required for impacts to candidate species credit species are shown in Table 3.

Table 2: Summary of ecosystem credits required for residual impacts of the development footprint

Vegetation Zone	PCT ID	PCT Scientific Name	Condition	Direct development footprint (ha)	Credits
1	3320	*Cumberland Shale Plains Woodland*	Modified	0.17	15
2	3320	*Cumberland Shale Plains Woodland*	Low	0.12	0
				Total	**15**

Table 3: Summary of candidate species credit species required for residual impacts of the development footprint

Species	Common Name	Direct impact number of individuals / habitat (ha)	Credits required
Deyeuxia appressa	-	1 individual (assumed presence)	3
Marsdenia viridiflora subsp. *viridiflora* – endangered population	-	0.38 ha	12
Pultenaea parviflora	-	0.38 ha	12
		Total	**27**

Removal of 0.14 ha of planted native vegetation was assessed against *Appendix D: Streamlined assessment module - planted native vegetation* of the BAM 2020 and does not require offsetting.

Potential foraging habitat for *Pteropus poliocephalus* (Grey-headed Flying-fox) and habitat for *Pultenaea parviflora*, both Commonwealth EPBC Act listed species, will be affected. The application of the Significant Impact Criteria for these species were applied and concluded that the proposed development is unlikely to cause a significant impact to Grey-headed Flying-fox or *P. parviflora*. A referral to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) is therefore, not recommended.

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Abbreviations

Abbreviation	Description
AOBV	Areas of Outstanding Biodiversity Value
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Credit Calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
Biodiversity and Conservation SEPP	*State Environmental Planning Policy (Biodiversity and Conservation) 2021*
BOS	Biodiversity Offsets Scheme
CAA	Controlled Activity Approval
CEEC	Critically Endangered Ecological Community
CPCP	Cumberland Plain Conservation Plan
DA	Development application
DAWE	Former Commonwealth Department of Agriculture, Water and the Environment (now DCCEEW)
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DBH	Diameter at Breast Height
DCP	Development Control Plan
DNG	Derived native grassland
DPIE	Former NSW Department of Planning, Industry and Environment (now NSW DCCEEW)
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
ha	Hectares
HBT	Hollow bearing tree
IBRA	Interim Biogeographic Regionalisation for Australia
KFH	Key Fish Habitat
LEP	Local Environment Plan
LGA	Local Government Area
MNES	Matters of National Environmental Significance
NSW	New South Wales
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water

Abbreviation	Description
PCT	Plant Community Type
PMST	Protected Matters Search Tool
SAII	Serious and Irreversible Impact
SEPP	State Environmental Planning Policy
SVTM	State Vegetation Type Mapping
TBDC	Threatened Biodiversity Database Collection
TEC	Threatened Ecological Community
VI	Vegetation integrity
VIS	BioNet Vegetation Classification
Western Parkland City SEPP	*State Environmental Planning Policy (Precincts – Western Parkland City) 2021*
Western Sydney Aero DCP	*Western Sydney Aerotropolis Development Control Plan 2022*
WM Act	*Water Management Act 2000*

1. Introduction

This Biodiversity Development Assessment Report (BDAR) has been prepared by Hamish Pritchard, Daniel McDonald and Michelle Frolich. Michelle is an Accredited Person (BAAS #18064) to apply the Biodiversity Assessment Method (BAM) under the NSW *Biodiversity Conservation Act 2016* (BC Act) and Daniel is awaiting his accreditation renewal. All credit calculations have been undertaken using the BAM Calculator (BAM-C) version in case number 00052142.

Definitions of terminology used throughout this report are presented in Appendix A.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 22 May 2024 and issued for SSD-70316465. Specifically, this report has been prepared to respond to the relevant SEARs in Table 4 below.

Table 4: SSD-70316465 SEARs

Item	Description of Requirement
Biodiversity	an assessment of the proposal's biodiversity impacts in accordance with *the Biodiversity Conservation Act 2016*, including the preparation of a Biodiversity Development Assessment Report (BDAR) where required under the Act, including for any works on land identified as excluded or avoided under the Cumberland Plain Conservation Plan, except where a waiver for preparation of a BDAR has been granted.

1.1. General description of the subject land

The proposed development (the Project) is located at 1953-2109 Elizabeth Drive, Badgerys Creek NSW. It is legally defined as Lot 1 in Deposited Plan (DP) 1306448, within the local government area (LGA) of Penrith City Council, approximately 12.5 km south-east of the Penrith Central Business District (CBD).

The majority of the subject land is zoned as ENT (Enterprise) under the *State Environmental Planning Policy (Precincts – Western Parkland City) 2021* (Western Parkland City SEPP). A portion of the subject land is zoned as ENZ (Environment and Recreation), and SP2 (Infrastructure – Elizabeth Drive). The subject land is a strategic landholding situated immediately north of the new Western Sydney International (Nancy-Bird Walton) Airport (WSI).

Under the NSW Mitchell Landscapes classification, the subject land is underlain by Cumberland Plain and Hawkesbury Nepean Channels and Floodplains. Currently, land includes a mixture of native and exotic vegetation, waterbodies, watercourses and a residential building and associated infrastructure. In its current state, the subject land is used for agricultural purposes and is dominated by exotic pasture.

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

1.2. Terms used in this report

The subject land comprises of Lot 1 DP 1306448 and has an approximate area of 171.98 ha. The development footprint is comprised of the remaining areas of the subject land which fall outside of certified-urban capable land under the Cumberland Plain Conservation Plan (CPCP) (Figure 3), accounting for an area of approximately 4.76 ha (hereafter referred to as the 'development footprint'). The subject land and development footprint are both presented below in Figure 2.

1.3. Brief description of the proposed development

This report has been prepared to accompany an SSDA at 1953-2109 Elizabeth Drive, Badgerys Creek NSW (SSD-70316465). The application seeks consent for a concept plan including future development lots and building footprints. The development also seeks consent for the Stage 1 works which will include bulk earthworks across the site, infrastructure delivery, road access/intersections, internal road construction, civil infrastructure and utilities, stormwater infrastructure works and the construction of three (3) warehouse buildings.

This BDAR relates to impacts on Excluded Land under the CPCP within the subject land, primarily for the signalised intersection on Elizabeth Drive at the entrance to the SSDA site.

1.4. Sources of information used

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

- BioNet Vegetation Classification System Version 3.1 (NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW 2024a) (accessed July 2024)
- BioNet Atlas (Atlas of NSW Wildlife) 5 km database search (NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW 2024b) (accessed July 2024)
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool 5 km radius database search (Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) 2024a) (accessed July 2024)
- NSW Government ePlanning Spatial Viewer (accessed July 2024)
- National Flying-fox Monitoring data (DCCEEW 2024b) (accessed July 2024)
- Biodiversity Assessment Method 2020 (DPIE 2020)
- Biodiversity Assessment Methodology Calculator (BAM-C) version 67
- NSW Government Biodiversity Values Map (NSW DCCEEW 2024c) (accessed July 2024)
- NSW BAM Important Area Mapping (NSW DCCEEW 2024d) (accessed July 2024)
- NSW State Environmental Planning Policies
- NSW Threatened Biodiversity Data Collection (online)
- Threatened species profiles and recovery plans
- State Vegetation Type Map (SVTM) (NSW DCCEEW 2024g) (accessed July 2024)
- Additional Geographic Information System (GIS) datasets including soil, topography, geology and drainage
- Aerial photography (Historical Imagery) of the subject land was also used to investigate the extent of vegetation cover and landscape features.
- Cumberland Plain Conservation Plan Viewer (DPHI 2024)
- *Western Sydney Aerotropolis Development Control Plan 2022*
- *Western Sydney Aerotropolis Precinct Plan 2022*.

Species searches from both the NSW BioNet database and the Commonwealth Protected Matters Search Tool (PMST) were undertaken around the co-ordinates, UTM Zone 56, 289955E, 6249886 S on 9 October 2024. The results of these searches were combined to produce a list of threatened species, populations and communities either previously recorded or considered to have the potential to occur within the subject land. The likelihood of occurrences for threatened species, populations and communities in the subject land was then determined based on the location of database records, the

likely presence or absence of suitable habitat in the subject land and knowledge of the species' ecology. Additionally, the BAM calculator generates a list of threatened species associated with the Plant Community Types within the development footprint. This information informed the subsequent field survey.

After the field survey had been completed, the likelihood of occurrence of each species, population or communities was re-assessed. This was based on the increase in knowledge about the extent and type of habitats and which species were present within the subject land. The likelihood of occurrence for threatened species, populations and communities within the subject land is presented in Appendix B. Appendix B is mainly relevant to the Commonwealth's Protected Matters Search Tool and consideration of the EPBC Act and associated policies.

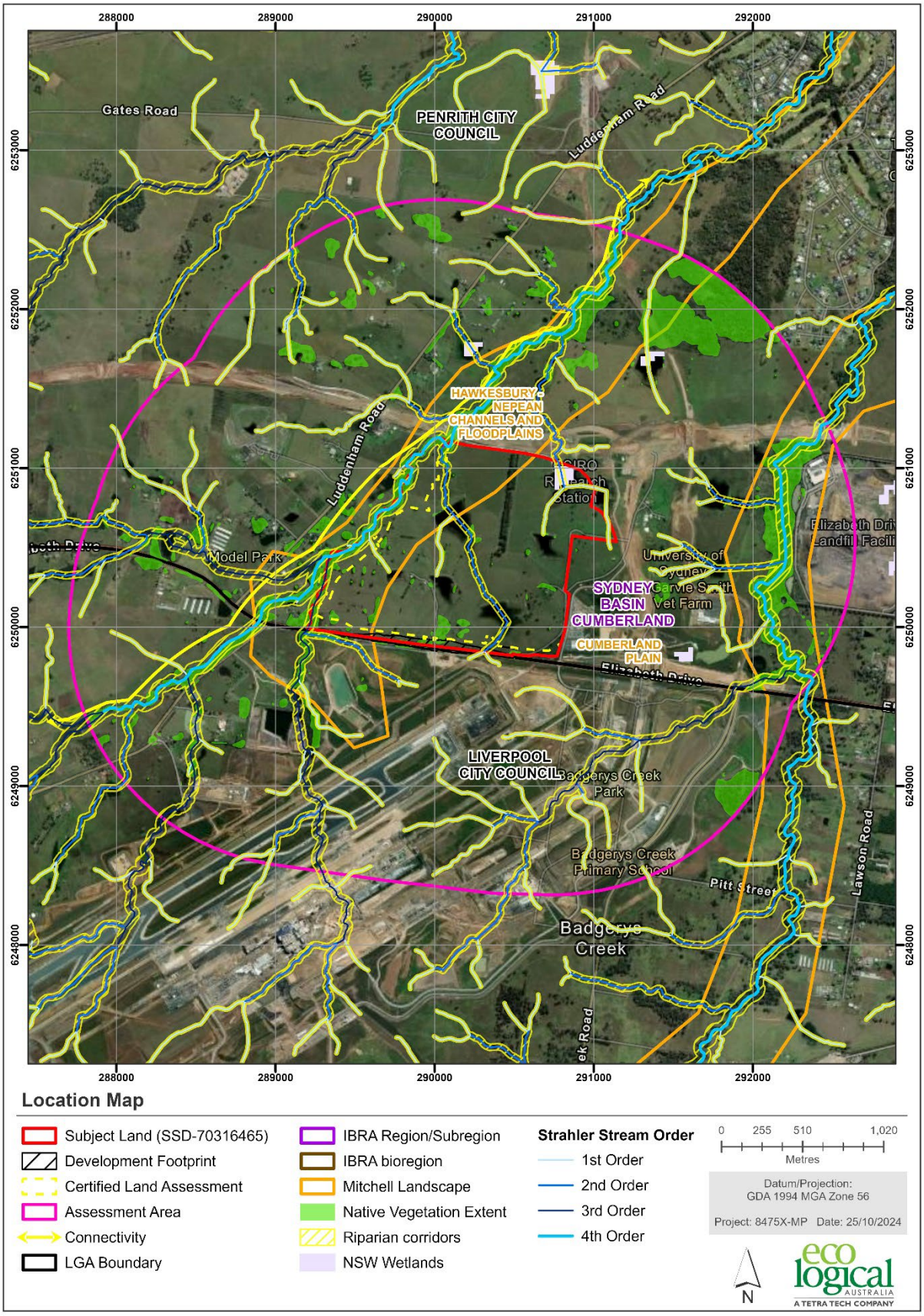

Figure 1: Location map

Figure 2: Site map

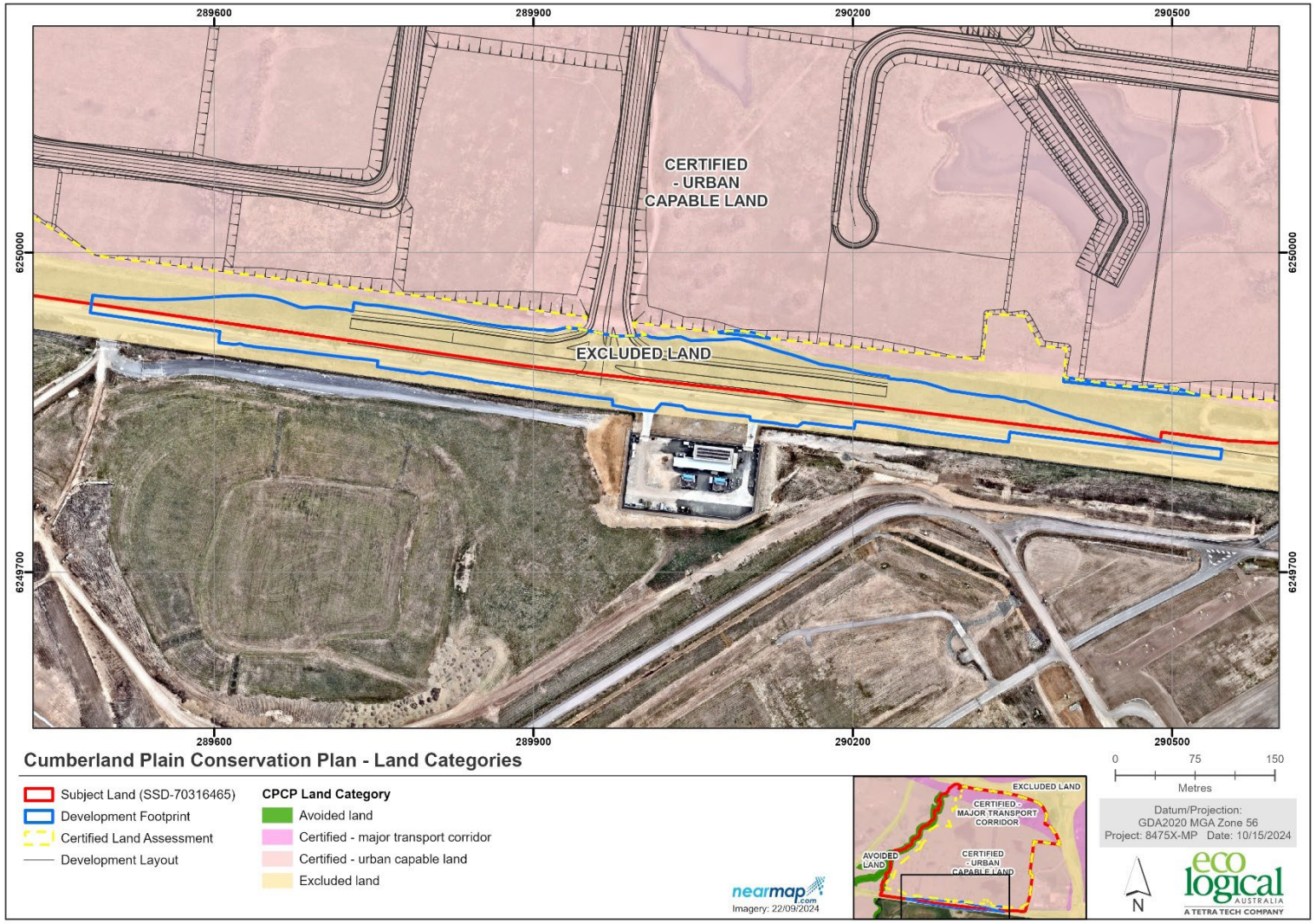

Figure 3: CPCP Land Categories

1.5. Legislative context

Legislation relevant to the subject land is outlined in Table 5.

Table 5: Legislative context

Name	Relevance to the project
Commonwealth Legislation	
Environment Protection and Biodiversity Conservation Act 1999	The EPBC Act establishes a regime for assessing and regulating the environmental impact of activities (including development) where a Matters of National Environmental Significance (MNES) may be affected. Under the EPBC 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 Minister. The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) is responsible for administering the EPBC Act. The process includes undertaking an Assessment of Significance for listed threatened species and ecological communities that represent a matter of MNES that will be affected as a result of the proposed action. The Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (CoA 2013) provide overarching guidance on determining whether an action is likely to have a significant impact on a MNES. MNES known or with the potential to occur within non-certified portions of the subject land include *Pultenaea parviflora* and *Pteropus poliocephalus* (Grey-headed Flying-fox). Assessments of Significance for these species (Appendix C), concluded that the actions as part of the proposed DA are unlikely to constitute a significant impact upon these species.
NSW State Legislation	
Environmental Planning and Assessment Act 1979	The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the principal planning legislation for NSW. It provides a framework for the overall environmental planning and assessment of development proposals. The proposed development is assessed under Part 4 of the EP&A Act.
Biodiversity Conservation Act 2016	The proposed development will require the submission of a BDAR as part of the requirements of the Secretary's Environmental Assessment Requirements (SEARs) issued for this SSDA .
Fisheries Management Act 1994	There is no Key Fish Habitat (KFH) mapped within the development footprint. However, Cosgroves Creek occurs immediately west of the development footprint and is mapped as KFH. Indirect impacts to KFH are required to be considered. No permits or consultation under the *Fisheries Management Act 1994* (FM Act) will be required, given the absence of marine habitat and natural fish habitat within the development footprint.
Water Management Act 2000	There are no watercourses mapped within the development footprint. As such, a Controlled Activity Approval (CAA) under the WM Act is not required.
Environmental Planning Instruments	
State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP)	Chapter 2 of the Biodiversity and Conservation SEPP applies to vegetation in non-rural areas, with the aim to protect the biodiversity values of trees and other vegetation in non-rural areas of the State, and to preserve the amenity of non-rural areas of the State through the preservation of trees and other vegetation. Chapter 2 applies to development that does not require consent. As this project requires consent under the EP&A Act, this section of the Biodiversity and Conservation SEPP is not relevant. Chapter 4 contains the land-use planning and assessment framework for Koala habitat within the Metropolitan Sydney and Central Coast. Penrith LGA is not land to which this chapter applies. Chapter 6 applies to land that falls within certain catchment areas. As the land falls within the Hawkesbury-Nepean Catchment, this chapter applies to the development. A development must exhibit that a development will not impact water quality and quantity of natural water sources or aquatic ecological values to the satisfaction of a consent authority.

Name	Relevance to the project
State Environmental Planning Policy (Precincts - Western Parkland City) 2021 (Western Parkland City SEPP)	The development footprint is zoned as ENT – Enterprise. The object of this land zone in accordance with Chapter 4 of the SEPP are as follows: • To encourage employment and businesses related to professional services, high technology, aviation, logistics, food production and processing, health, education and creative industries. • To provide a range of employment uses (including aerospace and defence industries) that are compatible with future technology and work arrangements. • To encourage development that promotes the efficient use of resources, through waste minimisation, recycling and re-use. • To ensure an appropriate transition from non-urban land uses and environmental conservation areas in surrounding areas to employment uses in the zone. • To prevent development that is not compatible with or that may detract from the future commercial uses of the land. • To provide facilities and services to meet the needs of businesses and workers. The proposed development is in accordance with the objectives of the ENT zone.
Western Sydney Aerotropolis Development Control Plan 2022 (Western Sydney Aero DCP)	Section 2.4 of the Western Sydney Aero DCP outlines general controls for developments surrounding vegetation and biodiversity. Section 2.4.2. refers to protection of biodiversity and states that efforts should be made to avoid and minimise impacts to native vegetation and ecological communities. A performance outcome of this section states that populations of threatened species are to be retained and the condition of suitable habitat that would support long-term viability is to be improved. Other performance outcomes include facilitating habitat connectivity and reducing amount of disturbance adjacent to conservation areas.
Western Sydney Aerotropolis Precinct Plan 2022	The Precinct Plan provides overall objectives and directions for development in the Aerotropolis. The plan establishes the strategic vision and general objectives, proposed land uses, performance criteria for development of land and the approach to both infrastructure and water cycle management. The Precinct Plan provides an open space framework indicating the requirement of riparian parks, creeks, open space and ecological corridors along Cosgrove Creek west of the development footprint. It also states that waterways and riparian corridors are to be retained and rehabilitated to a natural state. The proposal complies with this framework through the avoidance of impacts within the Cosgrove Creek riparian corridor, which is protected through Avoided Land under the CPCP (Figure 3) and High Biodiversity Values mapping under the Western Parkland City SEPP.

2. Streamlined assessment module

2.1. BAM Appendix C – Small area

Appendix C of the BAM (DPIE 2020) outlines a streamlined assessment module for assessing small areas. The streamlined assessment module can be applied where the area clearing limits are under a certain threshold, outlined in Table 6.

The assessment module relies on identifying the minimum lot size of a subject land to determine thresholds which can be applied to determine if a project meets the clearing limit criteria. The subject land does not have an associated minimum lot size; therefore, the actual lot size was used. The actual lot size of the subject land is 171.98 ha and the area of native vegetation to be cleared is less than 1 ha. Considering a total of 0.84 ha of native vegetation is proposed to be cleared on non-certified (Excluded Land) under the SSDA, the small area module has been applied under the BAM.

Table 6: Area clearing limits for application of the small area development module

Minimum lot size associated with the property[1]	Maximum area clearing limit for application of the small area development module
Less than 1 ha	≤1 ha
Less than 40 ha but not less than 1 ha	≤2 ha
Less than 1000 ha but not less than 40 ha	≤3 ha
1000 ha or more	≤5 ha

[1] shown in the lot size maps made under the relevant local environmental plan (LEP), or actual lot size (where there is no minimum lot size provided for the relevant land under the LEP).

The Streamlined Assessment Module – Small Area requires the assessment of species credit species and entities that are at risk of an SAII, including targeted surveys. Assessment under the Small Area streamlined module must still apply the hierarchy of avoiding and minimising impacts on biodiversity before considering offsetting residual impacts. This is addressed in Section 6 of this BDAR.

Note, currently BOAMs and the BAM calculator does not allow a case to be set up as both State Significant Development/Infrastructure and streamlined small area. Previous advice provided by the Biodiversity Offset Scheme (BOS) helpdesk on 8 May 2024 for another project completed by ELA stated that all candidate species that are not considered SAII entities do not require further assessment and can be manually removed from the BAM-C.

2.2. BAM Appendix D – Planted native vegetation

Appendix D of the BAM (DPIE 2020) outlines a streamlined assessment module for assessing planted native vegetation. A total of 0.64 ha of planted vegetation has been identified and mapped within the development footprint. The decision-making process for this module is outlined below in Table 7.

2.2.1. Description of planted native vegetation within the development footprint

Planted native vegetation is mapped as being present close to an existing dwelling in the centre of the proposed development footprint. A series of historic aerial photos is provided below to show the history of this area. Figure 4 from 1955 shows that north of Elizabeth Drive outside of the road reserve, the vegetation consisted of pasture/grassland. Shrubs and trees are absent. An earlier photo from 1947 (not included below) shows a similar situation.

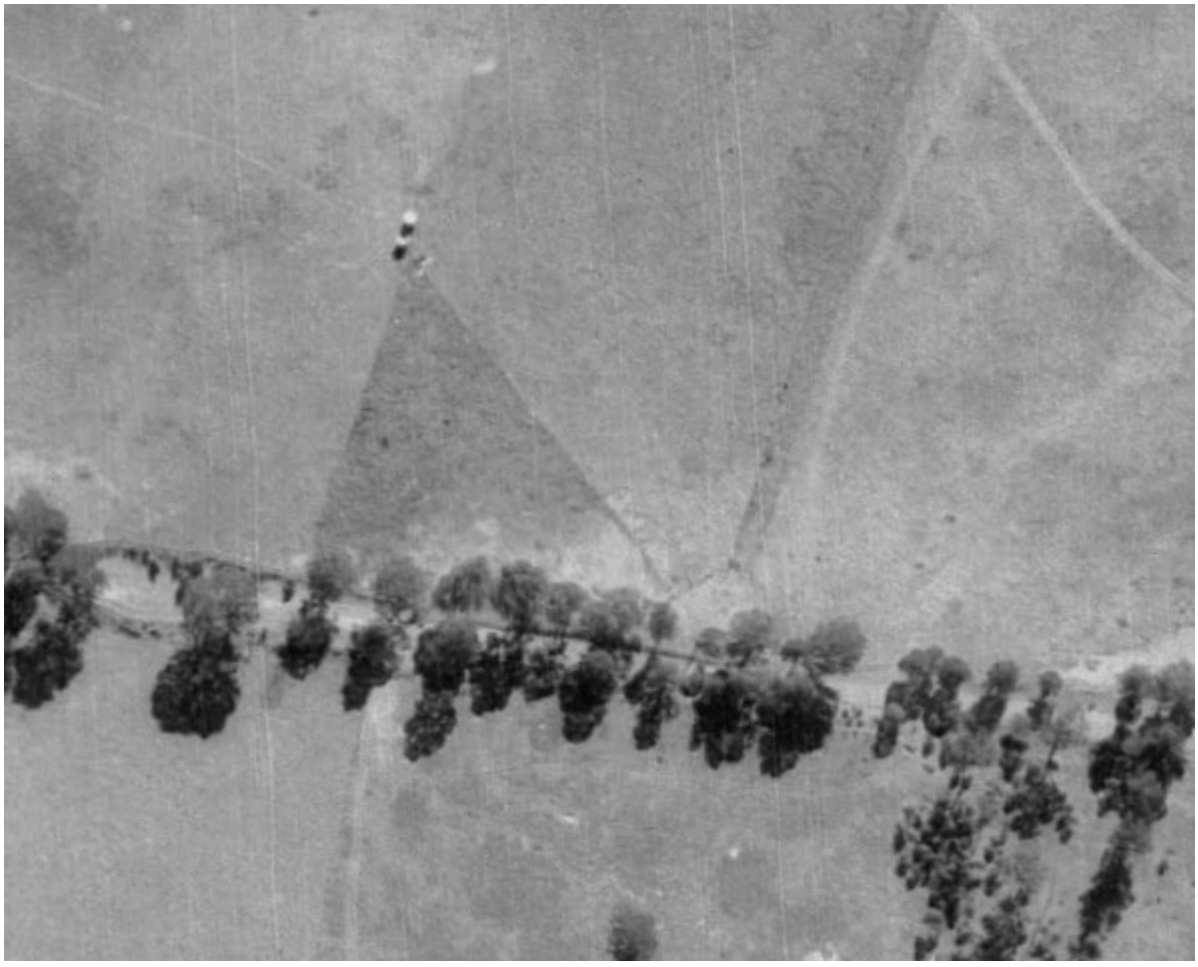

Figure 4. A photo of a section of Elizabeth Drive from 1955. Note the absence of trees and shrubs north of Elizabeth Drive.

Figure 5. A photo of the same section of Elizabeth Drive from 1975. A dwelling is visible and planted rows of trees and shrubs can be seen.

Figure 6. A photo of the same section of Elizabeth Drive from 1986. Note the growth of the planted rows of trees and shrubs.

Trees and shrubs were first planted sometime between 1955 and 1975. Species present include Sheoaks *Casuarina* sp. and *Eucalyptus* sp. The planted vegetation appears to provide functional (wind break), aesthetic or horticultural value for the dwelling. These areas appeared to be occasionally mown.

Table 7: Decision making tool for Planted Native Vegetation in accordance with Appendix D of the BAM 2020

Question	Response and justification
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? Yes – the planted native vegetation must be allocated to the best-fit PCT and the BAM must be applied. No – Go to 2.	No - Whilst the vegetation along the road corridor is a mosaic of both remnant vegetation and exotic vegetation, north of Elizabeth Drive, the vegetation historically was pasture/grassland. This area is not a mosaic. It is not reasonable to assume the planted native vegetation is part of a remnant PCT.
Is the planted native vegetation: 1. Planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and	No – the Planted native vegetation was not planted for the purpose of environmental rehabilitation or restoration or to replace

Question	Response and justification
2. The primary objective was to replace or regenerate a plant community type or a threatened plant species or its habitat? Yes – the planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM No – Go to 3.	or regenerate a PCT, threatened plant species or its habitat.
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: 1. A species recovery project 2. Saving our Species project 3. Other types of government funded restoration project 4. Condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat 5. Legal obligation as part of a condition of 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) 6. Ecological rehabilitation to re-establish a PCT or Threatened Ecological Community (TEC) that was, or is carried out under a mine operations plan, or 7. 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*)? Yes – the planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM No – Go to 4.	No.
Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration within a legal obligation to secure or provide for management of the native vegetation? Yes – Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied) No – Go to 5.	No.
Is the planted native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as; windbreaks in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or tea tree farms? Yes – Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied) No – Go to 6.	Yes.
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)? 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)	n/a

Question	Response and justification
No – There may be other types of occurrences of planted native vegetation that do not easily fit into the decision-making key above.	

3. Landscape features

The subject land is located in the Cumberland Interim Biogeographic Regionalisation for Australia (IBRA) subregion of the Sydney Basin IBRA region (Figure 1). Overall, the subject land is typical of the largely flat and predominantly cleared and developed Cumberland Plain IBRA subregion. The subject land is located within the Western Sydney Aerotropolis, an area of considerable existing development and planned future urban, industrial and infrastructure development (DPHI 2024).

The landscape features relevant to this BDAR as a site-based assessment includes the features identified in Table 8 for the subject land and an Assessment Area using a 1,500 m buffer surrounding the outside edge of the boundary of the subject land. The landscape features relevant to this assessment are shown in Figure 1 and Figure 2.

Table 8: Landscape features relevant to the subject land

Landscape feature	Subject Land	Assessment Area	Data source
IBRA Region(s)	Sydney Basin	Sydney Basin	Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (NSW Government 2024).
IBRA subregion(s)	Cumberland	Cumberland	IBRA, Version 7.
Rivers and streams	Parts of the western boundary of subject land contain the 4th order watercourse Cosgroves Creek overlapping into the subject land. An unnamed 1st order tributary associated with Cosgroves Creek is also located in the western part of the subject land. One unnamed 2nd order watercourse with multiple unnamed 1st order tributaries diverging from it are present running from the north-west to the south-east of the subject land. An additional unnamed 2nd order watercourse with two unnamed 1st order tributaries diverging from it is located in the north-east of the subject land.	The assessment footprint contains one 4th order watercourse (Cosgroves Creek) and a 3rd order tributary to Cosgroves Creek, Oaky Creek as well as an additional two unnamed 3rd order tributaries to Cosgroves Creek. A number of unnamed 2nd order and 1st order watercourses are also present within the assessment area. Field survey of mapped hydrolines confirmed that each 1st order watercourse, reach 1A through 1E, did not meet the definition of a 'river' under the WM Act (ELA 2024). Oaky Creek, Cosgroves creek and the unnamed 2nd order watercourse were validated and classed as rivers for the purposes of the WM Act (ELA 2024).	NSW LPI Waterway mapping (NSW Government 2024). ELA 2024
Estuaries and wetlands	The subject land does not contain any mapped important or local wetlands.	The assessment area does not contain any mapped important or local wetlands.	NSW directory of important wetlands (NSW Government 2024).

Landscape feature	Subject Land	Assessment Area	Data source
Connectivity of different areas of habitat	Limited connectivity exists within the subject land due to the limited amount of habitat and infrastructure present, which includes a major road in the south. Some of the immediate surrounding land contains cleared paddocks or road reserves. Potential habitat occurs within fragmented patches of native vegetation which are disjunct from each other. This vegetation may be potentially utilised by highly mobile species on occasion as temporary refuge. The western boundary contains riparian vegetation associated with Cosgroves Creek. This vegetation would act as an important area of connectivity between areas of vegetation located to the north and south of the subject land.	Connectivity occurs within the assessment area in the form of riparian vegetation associated with Cosgroves Creek to the west of the development footprint. These riparian areas act as corridors that would allow for species to disperse to the north and south from the assessment area. No continuous linear corridors of native vegetation that function as habitat corridors occur to the east of the assessment area.	Aerial imagery (Nearmap 2024).
Geological features of significance and soil hazard features	The subject land does not contain areas of geological significance (i.e. karst, caves, crevices, cliffs) or soil hazard features.	The assessment area does not contain areas of geological significance (i.e. karst, caves, crevices, cliffs) or soil hazard features. A road cutting is within the proposal footprint. In general, the earthen wall of the road cutting appears relatively stable.	Aerial imagery. Field survey.
Areas of Outstanding Biodiversity Value (AOBV)	There are no AOBV within the subject land.	There are no AOBV within the assessment area.	Register of Declared Areas of Outstanding Biodiversity Value (DPIE 2022).
NSW (Mitchell) Landscapes	Cumberland Plain and Hawkesbury-Nepean Channels and Floodplains, accounting for 65 % and 35 % respectively.	Cumberland Plain and Hawkesbury-Nepean Channels and Floodplains, accounting for 81 % and 19 % respectively.	NSW (Mitchell) Landscapes - version 3.1 (DPE 2016).
Percent (%) native vegetation extent	The subject land contains approximately 0.84 ha of native vegetation, which accounts for 0.75 % of the assessment area (1690 ha).	The assessment area is approximately 1690 ha and contains approximately 139.5 ha of native vegetation (8.25 %).	Calculated using aerial imagery and ArcGIS software.

4. Native Vegetation

Vegetation survey was undertaken within the subject land by Eco Logical Australia (ELA) Principal cologist Daniel McDonald on 4 October 2024. The field survey assisted with the identification and mapping of the spatial extent of PCTs present within the development footprint (Section 4.2), as well as any associated Threatened Ecological Communities (TECs) (Section 4.3). All vegetation mapping surveys were undertaken using geo-referenced mobile software (ESRI Field Maps) to allow for spatially accurate and real-time data collection. A total of two vegetation integrity plots (VI plots) were also completed to assess the composition, structure and function components of each vegetation zone, consistent with the BAM (Section 4.4), and assist in identifying PCTs and potential TECs present.

4.1. Vegetation community types and extent

The extent of vegetation communities, including native vegetation mapped as PCTs, present within the development footprint is outlined in Table 9 and displayed in Figure 7.

The majority of vegetation present within the development footprint is exotic vegetation, comprised mostly of exotic grassland, maintained as part of a road reserve. Areas cleared of vegetation in the form of a residential building and associated infrastructure and a main road are also located within the development footprint. Small patches of remnant native vegetation in the form of PCT 3320 Cumberland Shale Plains Woodland, was also present within the development footprint, along with a cleared main road containing no vegetation (Table 9).

Table 9: Extent of vegetation communities in the subject land and development footprint

PCT ID	PCT name	Development footprint (ha)
3320	*Cumberland Shale Plains Woodland*	0.84
	Planted native	0.10
-	Exotic vegetation	2.60
-	Cleared/road	1.18
	Total	**4.76**

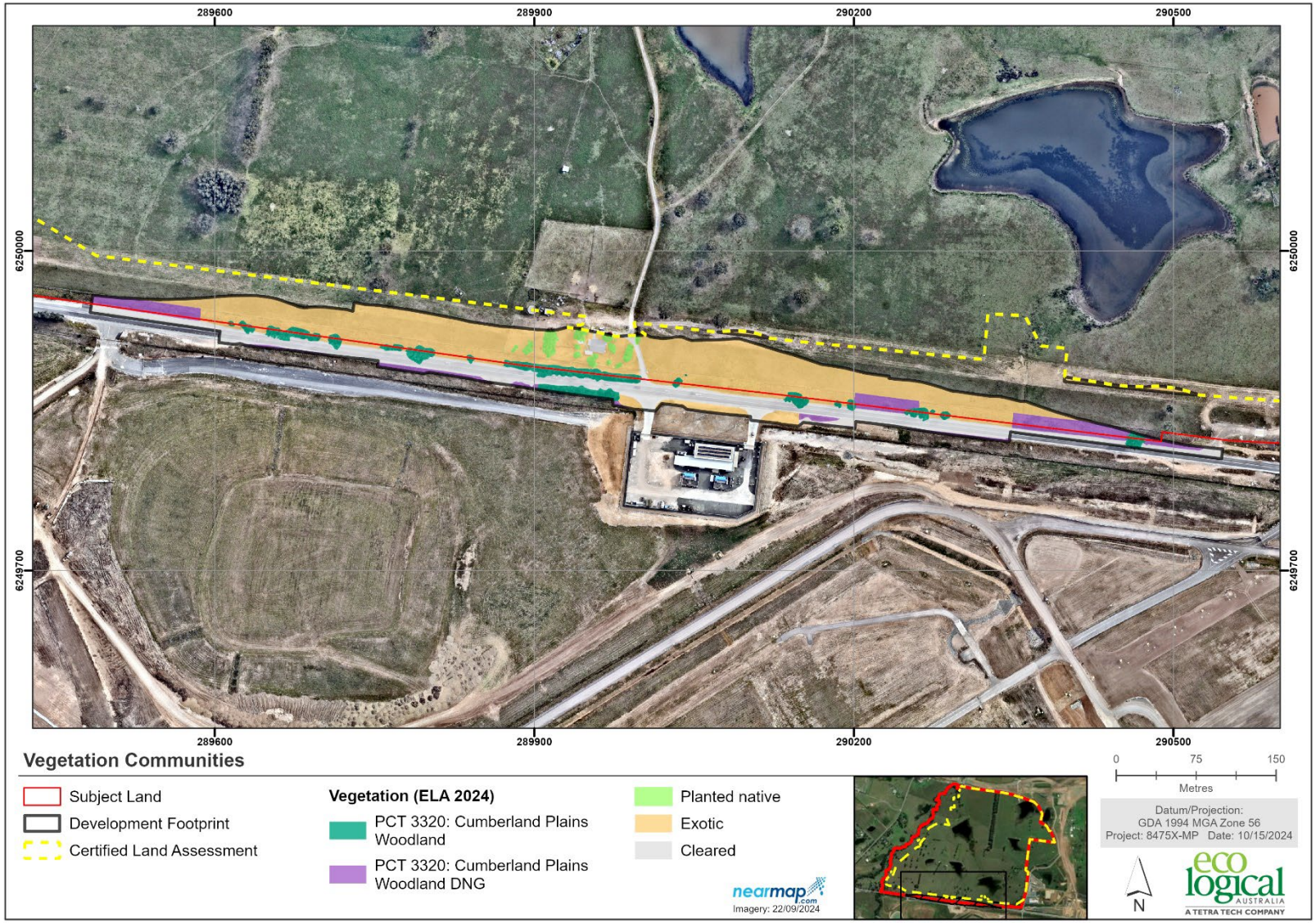

Figure 7: Plant community types present within the development footprint

4.2. Plant Community Types within the development footprint

One PCT, PCT 3320 *Cumberland Shale Plains Woodland*, was identified within the development footprint (Table 10, Figure 7).

Table 10: Plant Community Types

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Area (ha) in development footprint	Percent to be cleared (%)
3320	*Cumberland Shale Plains Woodland*	Coastal Valley Grassy Woodlands	Grassy Woodlands	0.84	100

4.2.1. Plant Community Type selection justification

Various attributes were considered in combination to assign vegetation to the best-fit PCT. Reference was made to the PCT descriptions in the BioNet Vegetation Classification (VIS) (NSW DCCEEW 2024a).

Attributes considered included dominant species in each stratum and relative abundance, floristic species and composition. If additional information about soil type and landscape position was available within the NSW VIS this was also reviewed. The NSW government website eSpade was reviewed to provide information about soil mapping and soil profiles.

Possible PCT options considered for the native vegetation within the development footprint are provided in Table 11 with justification for their exclusion.

Table 11: Potential PCTs

Selected PCT ID	PCT Name and reasons for selection	Other PCT options including considerations
3320	*Cumberland Shale Plains Woodland* Characteristic canopy species recorded within the vegetation zone include *Eucalyptus tereticornis* (Red Forest Gum) and *Corymbia maculata* (Spotted Gum). Characteristic shrubs and groundcovers recorded within this vegetation zone include *Bursaria spinosa* (Blackthorn), *Dillwynia sieberi, Themeda triandra* (Kangaroo Grass), *Dichelachne micrantha* (Shorthair Plumegrass), *Brunoniella australis* (Blue Trumpet) and *Asperula conferta* (Common Woodruff). eSpade indicated that the development footprint overlapped two different soil landscapes, Berkshire Park and Blacktown. Bershire Park can contain more sand and ironstone in comparison to Blacktown soils landscapes. While	3448 *Castlereagh Ironbark Forest* – While characteristic canopy species for this PCT was present (*Eucalyptus fibrosa*), this species is also recorded in PCT 3320. Additionally, *Corymbia maculata* (Spotted Gum) was recorded within the treed vegetation zone. Spotted Gum is typically absent in PCT3448. *Melaleuca* species commonly observed with this PCT were also not observed within the development footprint. The better quality remnant vegetation within this zone was similar to PCT3448. It is noted that a soil landscape associated with *Castlereagh Ironbark Forest* is mapped on part of the development footprint. While the species composition within the development footprint shows some similarities to PCT 3448, the species composition is a better match for PCT 3320. 4025 *Cumberland Red Gum Riverflat Forest* – Common canopy species in this PCT include *Eucalyptus tereticornis* (Forest Red Gum), *Angophora floribunda* (Rough-barked Apple) and *Eucalyptus amplifolia* (Cabbage Gum). While *Eucalyptus tereticornis* was present in the treed vegetation zone the other two species were absent. The VIS also provides the following information to describe the PCT: '*situated on the alluvial flats alongside streams that drain the Cumberland Plain or more rarely the broad alluvial flats of the*

Selected PCT ID	PCT Name and reasons for selection	Other PCT options including considerations
	all remnant native vegetation within the development footprint has been mapped as PCT 3320, the influence of Berkshire Park soil landscape was evident. There was a lack of a typical mix of *Eucalyptus tereticornis* and *Eucalyptus moluccana* that are seen in areas distant from soil type changes.	*Hawkesbury and Nepean River systems to the west of Sydney'.* Alluvial flats are nearby to the development footprint, but not within the development footprint. This PCT was considered to be a poor match for the remnant native vegetation within the development footprint.

PCT 3320 CUMBERLAND SHALE PLAINS WOODLAND

The occurrence of PCT 3320 *Cumberland Shale Plains Woodland* within the development footprint is present in a series of small, separated patches (Figure 7) primarily within the road reserve. PCT 3320 has been determined to occur in two condition types: moderate and derived native grassland (DNG). Both condition types show evidence of disturbance. Disturbance is significantly greater within the DNG vegetation zone (condition state) as there was a mostly absent native canopy and midstorey and often an exotic or *Cynodon dactylon* (Couch) dominated ground layer.

The patches of trees in PCT 3220 include remnant canopy, shrubs and ground covers. Where present within the PCT, the canopy consisted of an open tree layer including *Eucalyptus moluccana* (Grey Box), *Eucalyptus fibrosa* (Red Ironbark) and *Corymbia maculata* (Spotted Gum). Characteristic shrubs and groundcovers recorded within this vegetation zone include *Bursaria spinosa, Dillwynia sieberi, Themeda triandra, Dichelachne micrantha, Brunoniella australis* and *Asperula conferta.* Exotic species recorded within the PCT 3220 treed vegetation zone include *Olea africana* subsp. *cuspidata* (African Olive) and *Chloris gayana* (Rhodes Grass).

The PCT 3220 DNG vegetation zone generally lacked trees and shrubs, however, indigenous species were present in the ground layer such as *Themeda triandra* (Kangaroo Grass) and the native/planted native grass *Cynodon dactylon* (Couch). Common exotic species within this vegetation zone include *Chloris gayana* (Rhodes Grass) and *Cenchrus clandestinus* (Kikuyu).

4.3. Threatened Ecological Communities

A consideration of the TECs within the development footprint is detailed below and are presented in Table 12 and Figure 9.

Table 12: Threatened Ecological Communities within the development footprint

PCT ID	Area (ha)	Listing status under the BC Act	Listing status under the EPBC Act
3320	0.74	*Cumberland Plain Woodland in the Sydney Basin Bioregion*	Absent – does not meet the listing criteria.

4.3.1. Cumberland Plain Woodland in the Sydney Basin Bioregion

NSW Threatened Ecological Communities

PCT 3320 is listed in the BioNet Vegetation Classification (NSW DCCEEW 2024a) as associated with two TECs listed under the BC Act, *Cumberland Plain Woodland in the Sydney Basin Bioregion* (listed as Critically Endangered) and *Shale Gravel Transition Forest in the Sydney Basin Bioregion* (listed as Endangered). The final determinations for each TEC were reviewed and used to decide whether the occurrence of thePCT within the development footprint conforms to one of the listed TECs based on species assemblages and other characteristics such as geography, topography and soil type.

There are two vegetation zones associated with PCT 3320. Patches of PCT 3320 present on the development footprint were consistent with the final determination for the BC Act listed Critically Endangered Ecological Community (CEEC) *Cumberland Plain Woodland in the Sydney Basin Bioregion*.

PCT 3320 Moderate Condition

Of the species assemblage characteristic of the CEEC listed in the final determination, canopy species *Eucalyptus moluccana* (Grey Box) and *Eucalyptus tereticornis* (Forest Red Gum) were identified in the PCT 3320 Moderate Condition vegetation zone that included trees. Other species described in the final determination and which were recorded within patches of PCT 3320 Moderate include:

- *Asperula conferta*
- *Brunoniella australis*
- *Corymbia maculata*
- *Dianella longifolia*
- *Eucalyptus fibrosa*.

In addition, the final determination for the TEC states: '*Cumberland Plain Woodland is the name given to the ecological community in the Sydney Basin bioregion associated with clay soils derived from Wianamatta Group geology, or more rarely alluvial substrates, on the Cumberland Plain, a rainshadow area to the west of Sydney's Central Business District*.' The Blacktown Soil Landscape is present within the development footprint, with the landscape position for the Blacktown Soil Landscape being on '*gently undulating rises on Wianamatta Group shales'.*

PCT 3320 Derived Native Grassland (DNG)

The NSW final determination for Cumberland Plain Woodland in paragraph two states: *'The community also includes 'derived' native grasslands which result from removal of the woody strata from the woodlands and forests'.*

The DNG vegetation zone within the development footprint contained a mix of native grasses north of Elizabeth Drive and is considered to have once been consistent with the woodland form of Cumberland Plain Woodland prior to land clearing within the region. As the remnant trees within PCT3220 Moderate patches are consistent with the TEC, the DNG areas would likely have been part of PCT3220 prior to clearing. The patches of PCT3220 DNG north of Elizabeth Drive within the development footprint is considered to be consistent with the final determination and listing for the CEEC Cumberland Plain Woodland.

On the southern side of Elizabeth Drive, the most common native grass species was *Cynodon dactylon* (Couch). Couch is not included in the final determination for Cumberland Plain Woodland. Additionally,

Couch is listed as a widely cultivated native species in the NSW government's publication: '*Streamlined assessment module planted native vegetation'* (NSW DCCEEW 2024h). While very occasional individuals of species included in the NSW final determination for Cumberland Plain Woodland were present, they were in low number and their total cover is probably less than one (1) percent. Therefore, the patch of PCT3220 DNG south of Elizabeth Drive is not consistent with the CEEC.

Commonwealth Threatened Ecological Communities

PCT 3320 is also listed as a vegetation community that can conform to the *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* CEEC listed under the EPBC Act. To be classified as this TEC, a vegetation community is required to meet certain condition thresholds, provided in DEHWA 2010. Using the flowchart in Figure 5, only PCT3220 Moderate condition would meet the first criteria for listing under the EPBC Act; PCT3220 DNG does not have a projected foliage cover of 10%. However, as all patches of PCT 3320 Moderate present within the development footprint are less than 0.5 ha (criteria two of the flowchart), they do not meet the minimum patch size condition threshold required to conform to this CEEC (Figure 8). Therefore, the occurrence of PCT3220 does not conform to the EPBC Act listed CEEC.

Note there are significant differences between the *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest: A guide to identifying and protecting the nationally threatened ecological community Environment Protection and Biodiversity Conservation Act 1999 Policy Statement 3.31* (DEWHA 2010) definition of a **patch** and the NSW BAM 2020 definition of a **patch**.

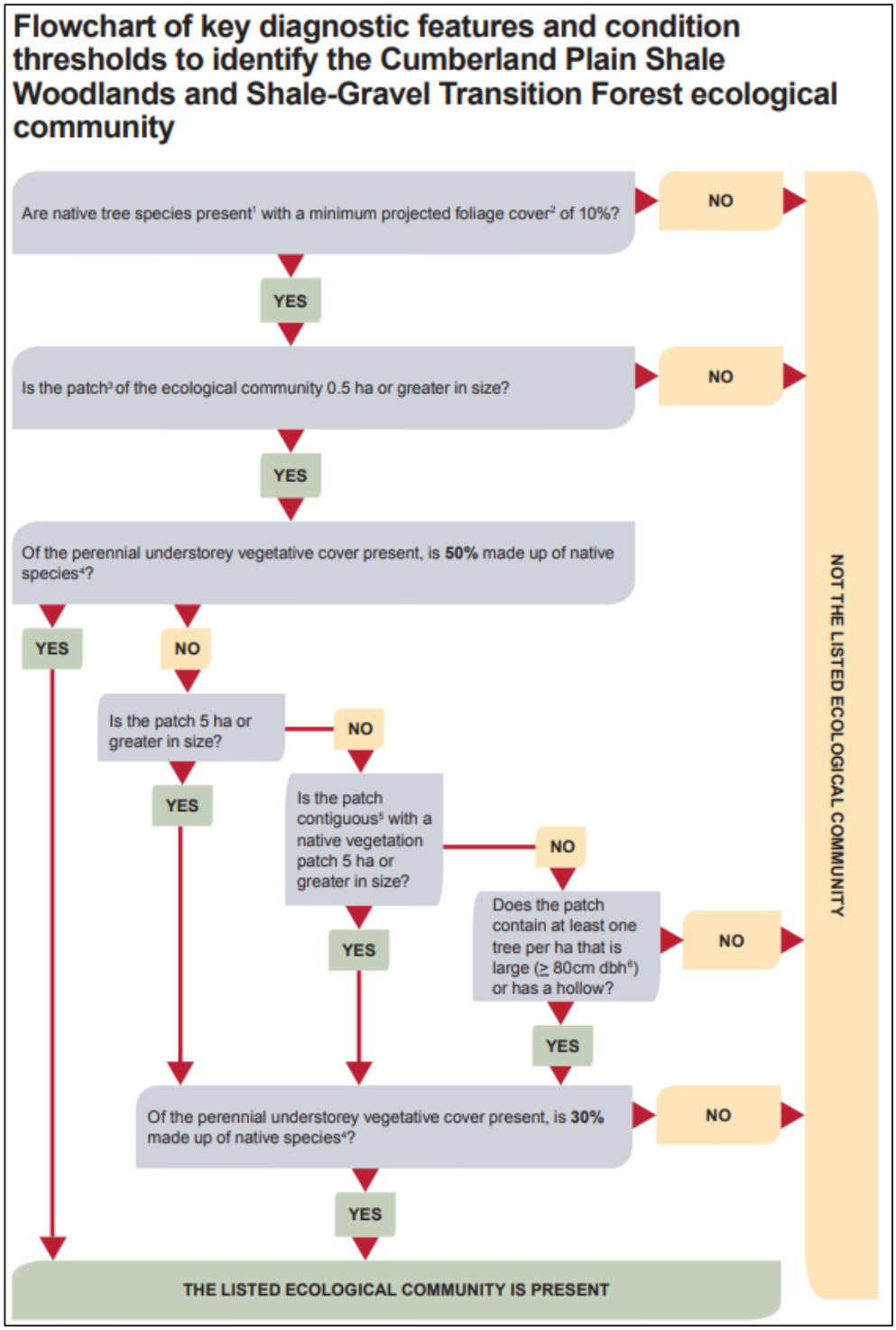

Figure 8: Condition thresholds to meet EPBC listed Cumberland Plain Shale Woodland and Shale-Gravel Transitional Forest TEC (DEWHA 2010).

Figure 9: Threatened Ecological Communities within the development footprint

4.4. Vegetation integrity assessment

4.4.1. Vegetation zones including presence of hollows

Two vegetation zones were identified within the development footprint, PCT 3320 – moderate condition and PCT 3320 –DNG (Table 13). A total of two VI plots were collected within the development footprint, consistent with the requirements of the BAM 2020 (DPIE 2020) (Figure 10).

Profiles of PCT 3320 – moderate condition and PCT 3320 – DNG are provided in Table 14 and Table 15. Vegetation zones and the location of BAM plots (of which VI plots are inclusive) are shown in Figure 10.

Table 13: Vegetation zones within the development footprint

Vegetation Zone	PCT ID	PCT Name	Condition	Area (ha) in development footprint	Vegetation Integrity Survey Plots required	Vegetation Integrity Survey Plots collected
1	3320	Cumberland Shale Plains Woodland	Moderate	0.38	1	1
2	3320	Cumberland Shale Plains Woodland	DNG	0.46	1	1
-	N/A	Planted native	N/A	0.10	0	0
-	N/A	Exotic	N/A	1.18	0	0
			TOTAL	**2.12**	**2**	**2**

Table 14: Vegetation Zone 1 PCT 3320 – moderate condition

3320 – *Cumberland Shale Plains Woodland* – moderate condition	
Vegetation formation/class	Grassy Woodlands/Coastal Valley Grassy Woodlands
Conservation status	NSW BC Act: Critically Endangered
	EPBC Act: Does not meet the listing criteria
Characteristic canopy trees	*Eucalyptus moluccana, E. tereticornis* and *E. fibrosa*
Characteristic midstorey species	*Bursaria spinosa* (Blackthorn) was relatively common within this vegetation zone.
Characteristic groundcover species	*Brunoniella australis* and *Themeda triandra*
Exotic species / High Threat Weed cover	*Olea europaea* subsp. *cuspidata, Briza subaristata, Cenchrus clandestinus, Chloris gayana, Eragrostis curvula* and *Paspalum dilatatum*.
Condition	Moderate
Variation and disturbance	Patches are semi-isolated and fragmented within the road reserve. Long term disturbance from edge effects is likely to be high.
BAM plots sampled	1
Threatened flora species	Two threatened flora species were identified:

3320 – *Cumberland Shale Plains Woodland* – moderate condition			
	• *Marsdenia viridiflora* subsp. *viridiflora* • *Pultenaea parviflora*		
Fauna habitats	The presence of a likely HBT (stag) was identified in surveyed plot. The HBT features a possible hollow (spout) on a branch, approximately 8 m off the ground, with an entrance diameter of approximately 5 – 10 cm. Hollows/cavities may have also present in other trees within this vegetation zone. However, from the ground the presence or absence of hollows could not be confirmed.		
Composition	**Structure**	**Function**	**Vegetation Integrity Score**
56.6	49.8	85.2	62.1

Table 15: Vegetation Zone 2 PCT 3320 – DNG

3320 – *Cumberland Shale Plains Woodland* – DNG	
Vegetation formation/class	Grassy Woodlands/Coastal Valley Grassy Woodlands
Conservation status	NSW BC Act: The patches on the northern side of Elizabeth Drive with abundant *Themeda triandra* (Kangaroo Grass) are considered to meet the listing criteria. The patches dominated by *Cynodon dactylon* on the southern side of Elizabeth Drive are not consistent with the Threatened Ecological Community.
	EPBC Act: Does not meet the listing criteria.
Characteristic canopy trees	No characteristic canopy species were identified within this vegetative zone.

3320 – *Cumberland Shale Plains Woodland* – DNG			
Characteristic midstorey species	Occasional midstorey species, such as *Bursaria spinosa* (Blackthorn) were present		
Characteristic groundcover species	*Dichondra repens* and *Themeda australis*		
Exotic species / High Threat Weed cover	*Cenchrus clandestinus, Chloris gayana, Paspalum dilatatum*		
Condition	Derived native grassland (DNG)		
Variation and disturbance	The road reserve vegetation has probably been periodically disturbed for more than a century. It is likely that in recent decades this vegetation zone is periodically slashed.		
BAM plots sampled	1		
Threatened flora species	No threatened flora species were identified		
Fauna habitats	Cover and foraging habitat for various native fauna species.		
Composition	**Structure**	**Function**	**Vegetation Integrity Score**
17.1	36.1	1.7	10.2

4.4.2. Assessing vegetation integrity

A vegetation integrity assessment using the BAM-C was undertaken for BAM plots located within the Vegetation Zones 1 and 2 and the results are outlined in Table 16. The locations of VI plots undertaken within the development footprint are displayed in Figure 10 (synonymous with the BAM plots). The

native vegetation within the road reserve was relatively narrow and patchy. Hence the standard BAM plot layout of 20 m x 50 m could not be located within either vegetation zone. Both plots were reconfigured so that the overall size was equivalent to a standard BAM plot. The plot undertaken in Vegetation Zone 1 was split into two sections on the north and south sides of Elizabeth Drive, having dimensions of 112 m x 7 m for the section located on the northern side, and 27 m x 8 m on the southern side. All field data collected at VI plots is included in Appendix B and Appendix E.

Table 16: Current vegetation integrity scores

Veg. Zone	PCT ID	Condition	Area (ha) in development footprint	Composition Condition Score	Structure Condition Score	Function Condition Score	Presence of HBTs	Current VI score
1	3320	Moderate	0.38	56.6	49.8	85.2	Yes	62.1
2	3320	DNG	0.46	17.1	36.1	1.7	No	10.2

4.4.3. Patch size

Patch size was calculated using available vegetation mapping for all patches of intact native vegetation on and adjoining the subject land. Patch size was assigned to one of four classes (<5 ha, 5-24 ha, 25-100 ha or ≥100 ha). A patch size class of > 100 ha was determined for the subject land. It should be noted that patch size class for vegetation within the development footprint was < 5 ha, and that the patch size for the subject land was a result of the riparian vegetation associated with Cosgroves Creek located to the west of the subject land. This vegetation will not be affected by the proposed development.

4.5. Use of local data

No local data from outside of the subject land was used in the preparation of this BDAR.

Figure 10: Vegetation Zones

5. Threatened species

5.1. Ecosystem credit species

Ecosystem credit species predicted to occur within the development footprint are generated by the BAM-C following the input of VI plot data for PCT 3320 Vegetation Zones 1 and 2. The list of relevant ecosystem credit species associated with PCT 3320, their associated habitat constraints, geographic limitations, State and Commonwealth listing status and sensitivity to gain class is presented in Table 17, along with a justification as to their inclusion or exclusion within this BAM assessment.

5.2. Species credit species

5.2.1. Identification of species credit species

As this BDAR is being assessed via the streamlined (small area) assessment (BAM 2020, Appendix C), only those candidate species at risk of a SAII or species recorded during the site survey require assessment.

Species credit species (i.e. candidate species) are included in Table 18, along with their associated habitat constraints, geographic limitations, State and Commonwealth listing status, sensitivity to gain class and whether they are SAII entities. The streamlined assessment module – small areas requires further assessment only for species listed as SAII.

5.2.2. Candidate species requiring further assessment

All of the candidate species generated by the BAM-C are presented in Table 18. Only entities at risk of a SAII or were observed during the field survey were required for further assessment. Justification for their inclusion or exclusion within this BAM assessment, including the requirement for targeted surveys and candidate species credit generation, for SAII and species identified during the field survey are presented in Table 19.

Table 17: Predicted ecosystem credit species

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act status	EPBC Act status	Justification for inclusion / exclusion
Anthochaera phrygia	Regent Honeyeater (Foraging)	-	-	High Sensitivity to Gain	Critically Endangered	Critically Endangered	Included Potential foraging habitat present
Artamus cyanopterus cyanopterus	Dusky Woodswallow	-	-	Moderate Sensitivity to Gain	Vulnerable	Not listed	Included Potential foraging habitat present
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo (Foraging)	Presence of *Allocasuarina* and *Casuarina* species	-	High Sensitivity to Gain	Vulnerable	Vulnerable	Excluded Potential foraging habitat not present in development footprint
Chthonicola sagittata	Speckled Warbler	-	-	High Sensitivity to Gain	Vulnerable	Not listed	Included Potential foraging habitat present
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	-	-	High Sensitivity to Gain	Vulnerable	Vulnerable	Included Potential foraging habitat present
Dasyurus maculatus	Spotted-tailed Quoll	-	-	High Sensitivity to Gain	Vulnerable	Endangered	Included No applicable habitat constraints
Ephippiorhynchus asiaticus	Black-necked Stork	Swamps Shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300m of these swamps.		Moderate Sensitivity to Gain	Endangered	Not listed	Excluded Potential habitat absent (waterbody/wetland)

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act status	EPBC Act status	Justification for inclusion / exclusion
		Shallow lakes, lake margins and estuaries within 300m of these waterbodies					
Falco subniger	Black Falcon	-	-	Moderate Sensitivity to Gain	Vulnerable	Not listed	Included Potential foraging habitat present
Glossopsitta pusilla	Little Lorikeet	-	-	High Sensitivity to Gain	Vulnerable	Not listed	Included Potential foraging habitat present.
Haliaeetus leucogaster	White-bellied Sea Eagle (Foraging)	Waterbodies Within 1km of rivers, lakes, large dams or creeks, wetlands and coastlines	-	High Sensitivity to Gain	Vulnerable	Not listed	Included Potential habitat present (within 1 km of large dams and creeks)
Hirundapus caudacutus	White-throated Needletail	-	-	High Sensitivity to Gain	Not listed	Vulnerable	Included Potential foraging habitat present
Lathamus discolor	Swift Parrot (Foraging)	-	-	Moderate Sensitivity to Gain	Endangered	Critically Endangered	Included Potential foraging habitat present
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	-	-	High Sensitivity to Gain	Vulnerable	Not listed	Included Potential foraging habitat present.
Miniopterus australis	Little Bent-winged Bat (Foraging)	-	-	High Sensitivity to Gain	Vulnerable	Not listed	Included Potential foraging habitat present

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act status	EPBC Act status	Justification for inclusion / exclusion
Miniopterus orianae oceanensis	Large Bent-winged Bat (Foraging)	-	-	High Sensitivity to Gain	Vulnerable	Not listed	Included Potential foraging habitat present
Pandion cristatus	Eastern Osprey (Foraging)	-	-	Moderate Sensitivity to Gain	Vulnerable	Not listed	Included Potential foraging habitat present
Petroica boodang	Scarlet Robin	-	-	Moderate Sensitivity to Gain	Vulnerable	Not listed	Included Potential foraging habitat present
Petroica phoenicea	Flame Robin	-	-	Moderate Sensitivity to Gain	Vulnerable	Not listed	Included Potential foraging habitat present
Pteropus poliocephalus	Grey-headed Flying-Fox (Foraging)	-	-	High Sensitivity to Gain	Vulnerable	Vulnerable	Included Potential foraging habitat present
Stagonopleura guttata	Diamond Firetail	-	-	Moderate Sensitivity to Gain	Vulnerable	Vulnerable	Included Potential foraging habitat present

Table 18: Candidate species credit species

Species	Common Name	Habitat Constraints/TBDC information	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	SAII entity
Acacia pubescens	Downy Wattle	-	-	High Sensitivity to Gain	Vulnerable	Vulnerable	No
Anthochaera phrygia	Regent Honeyeater (Breeding)	As per Important Habitat Map	-	High Sensitivity to Gain	Critically Endangered	Critically Endangered	No
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo (Foraging)	Presence of *Allocasuarina* and *Casuarina* species	-	High Sensitivity to Gain	Vulnerable	Vulnerable	No
Deyeuxia appressa	-	Given that *D. appressa* hasn't been seen in over 60 years, almost nothing is known of the species' habitat and ecology. Flowers spring to summer and is mesophytic (grows in moist conditions).	-	High Sensitivity to Gain	Endangered	Endangered	Yes
Dillwynia tenuifolia	-	-	-	Moderate Sensitivity to Gain	Vulnerable	Not listed	No
Eucalyptus benthamii	Camden White Gum	Requires a combination of deep alluvial sands and a flooding regime that permits seedling establishment. Recruitment of juveniles appears to be most successful on bare silt deposits in rivers and streams.	-	High Sensitivity to Gain	Critically Endangered	Vulnerable	Yes
Eucalyptus glaucina	Slaty Red Gum	-	-	High Sensitivity to Gain	Vulnerable	Vulnerable	No

Species	Common Name	Habitat Constraints/TBDC information	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	SAII entity
Grevillea juniperina subsp. *juniperina*	-	-	-	Moderate Sensitivity to Gain	Vulnerable	Not listed	No
Haliaeetus leucogaster	White-bellied Sea-Eagle (Breeding)	Living or dead mature trees within suitable vegetation within 1 km of rivers, lakes, large dams or creeks, wetlands and coastlines.	-	High Sensitivity to Gain	Vulnerable	Not listed	No
Hibbertia puberula	-	-	-	Moderate Sensitivity to Gain	Endangered	Not listed	No
Lathamus discolor	Swift Parrot (Breeding)	As Per Important Habitat Map	-	Moderate Sensitivity to Gain	Endangered	Critically Endangered	No
Litorea aurea	Green and Golden Bell Frog	Semi-permanent/ephemeral wet areas, or within 1 km of swamps or waterbodies	-	High Sensitivity to Gain	Endangered	Vulnerable	No
Marsdenia viridiflora subsp. *viridiflora*	-	-	Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	Moderate Sensitivity to Gain	Endangered Population	Not listed	No
Meridolum corneovirens	Cumberland Plain Land Sanil	-	-	High Sensitivity to Gain	Endangered	Not listed	No
Micromyrtus minutiflora	-	Grows in Castlereagh Scribbly Gum Woodland, Ironbark Forest, Shale/Gravel Transition Forest, open forest on tertiary alluvium and consolidated river sediments.	-	High Sensitivity to Gain	Endangered	Vulnerable	Yes

Species	Common Name	Habitat information	Constraints/TBDC	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	SAII entity
		Sporadic flowering, June to March. Response to fire and mechanical disturbance is uncertain. Regeneration may be due to resprouting or germination of soil-stored seed.						
Miniopterus australis	Little Bent-winged Bat (Breeding)	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' observation type code 'E nest-roost' with numbers of individuals >500 or from the scientific literature	-	Very High Sensitivity to Gain	Vulnerable	Not listed		No
Miniopterus orianae oceanensis	Large Bent-winged Bat (Breeding)	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'	-	Very High Sensitivity to Gain	Vulnerable	Not listed		No

Species	Common Name	Habitat Constraints/TBDC information	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	SAII entity
		observation type code 'E nest-roost' with numbers of individuals >500 or from the scientific literature					
Myotis macropus	Southern Myotis	Waterbodies with permanent pools/stretches 3m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200 m of the site	-	High Sensitivity to Gain	Vulnerable	Not listed	No
Pandion cristatus	Eastern Osprey (Breeding)	Presence of stick-nests in living and dead trees (> 15 m) or artificial structures within 100 m of a floodplain for resting	-	Moderate Sensitivity to Gain	Vulnerable	Not listed	No
Persoonia nutans	Nodding Geebung	-	-	Moderate Sensitivity to Gain	Endangered	Endangered	No
Petaurus norfolcensis	Squirrel Glider	-	-	High Sensitivity to Gain	Vulnerable	Not listed	No
Phascolarctos cinereus	Koala	Presence of koala use tree	-	High Sensitivity to Gain	Endangered	Endangered	No
Pimelea curviflora var. *curviflora*	-	-	-	High Sensitivity to Gain	Vulnerable	Vulnerable	No
Pimelea spicata	Spiked Rice-flower	-	-	High Sensitivity to Gain	Endangered	Endangered	No

Species	Common Name	Habitat information Constraints/TBDC	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	SAII entity
Pomaderris brunnea	Brown Pomaderris	-	-	High Sensitivity to Gain	Endangered	Vulnerable	No
Pomaderris prunifolia	-	-	Parramatta, Auburn, Strathfield and Bankstown local government areas	High Sensitivity to Gain	Endangered Population	Not listed	No
Pteropus poliocephalus	Grey-headed Flying-fox (Breeding)	Breeding camps	-	High Sensitivity to Gain	Vulnerable	Vulnerable	No
Pterostylis saxicola	Sydney Plains Greenhood	-	-	Moderate Sensitivity to Gain	Endangered	Endangered	No
Pultenaea parviflora	-			Moderate Sensitivity to Gain	Endangered	Vulnerable	No
Pultenaea pedunculata	Matted Bush-pea	-	-	High Sensitivity to Gain	Endangered	Not listed	No

Species	Common Name	Habitat information	Constraints/TBDC	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	SAII entity
Wahlenbergia multicaulis	Tadgell's Bluebell	-		Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield local government areas	High Sensitivity to Gain	Endangered Population	Not listed	No

Table 19: Justification for inclusion/exclusion of candidate SAII species credit species

Species	Common Name	BC Act listing status	EPBC Act Listing status	Justification for inclusion/exclusion
Deyeuxia appressa	-	Endangered	Endangered	**Excluded from Moderate zone:** Known from only two specimens collected pre-1942 well outside of the Development footprint and assessment area (Salt Pan Creek, south of Bankstown and Killara). The suitable habitat for this species is moist conditions. The Moderate zone occurred on the upper slopes or crests within the development footprint. These areas do not generally provide moist habitats. **Included in the DNG zone:** The TBDC states that suitable habitat for this species moist conditions. Some parts of the DNG zone included areas that could be described as moist.
Eucalyptus benthamii	Camden White Gum	Critically Endangered	Vulnerable	**Excluded:** Habitat within the development footprint is either unsuitable and/or degraded. Additionally, this species is relatively large and obvious. It was not recorded.
Marsdenia viridiflora subsp. *viridiflora*		Endangered Population	Not listed	**Included:** Recorded within the Moderate zone. **Excluded:** Habitat within the DNG zone is degraded: Excluded.
Micromyrtus minutiflora	-	Endangered	Vulnerable	**Excluded:** Neither the associated ecological communities as listed in the TBDC, nor the soil types (tertiary alluvium and consolidated river sediments) listed in the TBDC were present in the development footprint.
Pultenaea parviflora		Endangered	Vulnerable	**Included:** Recorded within the Moderate zone. **Excluded:** Habitat within the DNG zone is degraded: Excluded.

5.2.3. Targeted threatened species survey methodology

No targeted threatened species surveys were conducted as part of this assessment. Due to time constraints the client has chosen to assume presence for threatened species, rather than undertaking seasonal targeted threatened species surveys.

Field survey to validate vegetation and record BAM plots within the development footprint identified two threatened species, *Marsdenia viridiflora* subsp. *viridiflora* and *Pultenaea parviflora*.

5.2.4. Species Polygons

Species polygons were required for the threatened flora species recorded within the development site including *Marsdenia viridiflora* subsp. *viridiflora* and *Pultenaea parviflora*. Both species were identified in patches of PCT 3320 in moderate condition. Therefore, polygons for these species were allocated to all areas containing this vegetation zone within the development footprint. Additionally, as targeted surveys for *Deyeuxia appressa* were not completed, this species has been assumed present for areas of the development footprint that match its habitat requirements (i.e. PCT 3320 DNG). Polygons for these areas were also included. These areas are presented in Figure 11.

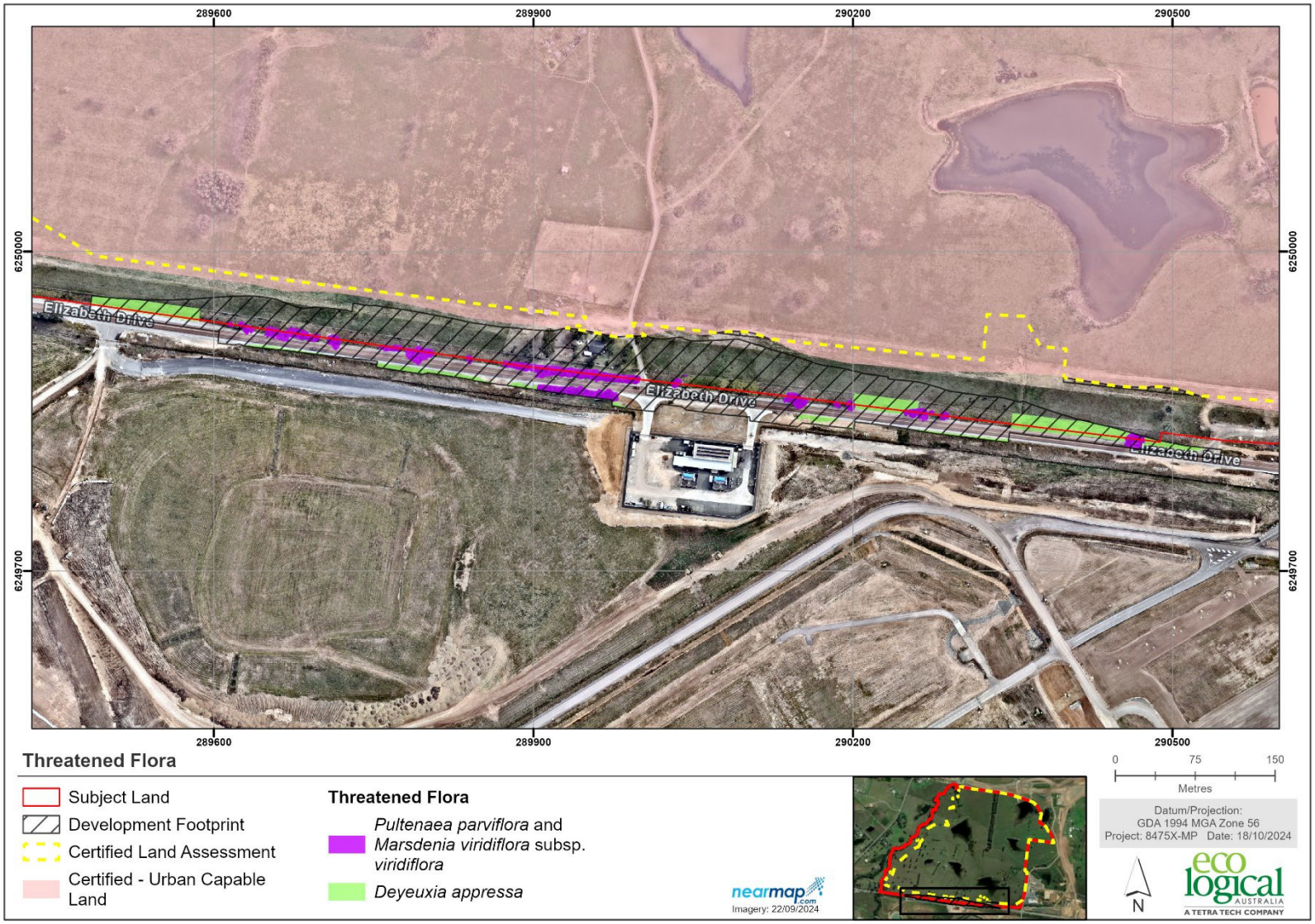

Figure 11: Species polygon for threatened flora species recorded within the development footprint

5.2.5. Expert reports

No expert reports have been used in place of targeted survey for this assessment.

5.3. Identification of prescribed additional biodiversity impact entities

Any additional prescribed impact entities relevant to the development footprint are outlined below.

5.3.1. Karst, caves, crevices, cliffs, rocks and other geological features of significance

The development footprint does not contain karst, caves, crevices, cliffs, rocks and other geological significance.

5.3.2. Human-made structures and non-native vegetation

The development footprint contains human-made structures in the form of a residential building and surrounding infrastructure. The building is currently occupied and in a good condition. It is not considered as potential habitat for threatened entities. The non-native vegetation is mostly present as cleared areas of disturbed exotic grassland as well as exotic shrubs including African Olive. Whilst some threatened bird species (e.g. Flame Robin and Speckled Warbler) do utilize exotic vegetation on occasion, it is considered unlikely that these species would utilize the development footprint due to the absence and lack of connectivity to areas of preferred higher quality habitat. Planted native vegetation, including *Eucalyptus* sp., may provide potential foraging habitat for the Grey-headed Flying-fox.

5.3.3. Habitat connectivity

Vegetation present within the development footprint is predominately ground cover with a high coverage of exotic species. Canopy species present occur in small, disjunct patches with limited canopy cover. The vegetation is only likely to provide a natural corridor for common species. It is unlikely to be utilized by any threatened species other than highly mobile fauna as temporary refuge or foraging resource while moving across the landscape.

5.3.4. Water bodies, water quality and hydrological processes

No water bodies occur within the development footprint.

5.3.5. Wind farm developments

The proposed development is not a wind farm development.

5.3.6. Vehicle strikes

The development footprint occurs within and adjacent to a main road. As such, vehicle strike is an existing threat to fauna. It is unlikely the proposed development will increase the risk of vehicle strike.

6. Avoiding and Minimising Impacts on Biodiversity Values

6.1. Locating a project to avoid and minimise impacts on biodiversity values

6.1.1. Direct and indirect impacts

The BAM requires proponents to avoid and minimise impacts on biodiversity values. The broader development for Burrah Park under SSD-70316465 has been located primarily on land identified for urban development under the Cumberland Plain Conservation Plan (CPCP), on certified-urban capable land (Figure 3). The land to which this BDAR applies is land excluded from the CPCP certification process, and for which biodiversity certification will not be sought. The current development assessed by this BDAR is for the construction of a signalised intersection from the proposed Burrah Park site onto Elizabeth Drive. There are other existing proposals to develop and widen Elizabeth Drive in order to facilitate traffic and access around the Western Sydney Aerotropolis. The current development has been largely sited on land with low to no biodiversity value, being an existing road reserve.

Biodiversity values in the form of PCT 3320 (Moderate and DNG conditions) and three threatened flora species, two of which were identified during the field survey (*Marsdenia viridiflora* subsp. *viridiflora* and *Pultenaea parviflora*) and one which has been assumed present (*Deyeuxia appressa*), are limited to an area of 0.84 ha within the development footprint and are unable to be avoided with respect to the proposed Elizabeth Drive widening proposal. Note the observed individuals of *Pultenaea parviflora* occur on both sides of the road with approximately 70 – 100 m between the populations on each side of the road. If road widening is to occur at least some individuals on one side of the road will require removal if the widened road is to retain a relatively straight alignment. Additionally, the existing road reserve is relatively narrow. Much of the remnant native vegetation including the threatened flora species could potentially be avoided if the road was rerouted into the land to the north, however that would require a significant realignment of the existing road corridor. Significant realignments on land outside the existing road corridor may require compulsory acquisition. A detailed consideration of the feasibility of significant realignment works beyond the existing road reserve to achieve avoidance of impacts on threatened biodiversity cannot be undertaken using existing information.

It should be noted that a significant constraint for the development proposal is that the intersection is required to link an existing road to a new proposed roadwork. The intersection must overlap Elizabeth Drive. The proposed location of the intersection allows the most direct connection between the existing road (Elizabeth Drive) and the proposed road network (See Figure 3).

Further detail as to how the proposed development has been located to avoid and minimise direct and indirect impacts is outlined in Table 20.

Table 20: Locating the project to avoid and minimise impacts on biodiversity values

Approach	How addressed and justification
Locating the project in areas lacking biodiversity values	The development footprint occurs in an area that is primarily composed of cleared areas, disturbed grassland containing high coverage of exotic species or areas of native vegetation of low value in the form of PCT 3320 DNG (VI score of 10.2).

Approach	How addressed and justification
Locating the project in areas where vegetation or threatened species habitat is in the poorest condition	The development footprint is dominated by an existing road and either exotic grassland or DNG. These areas generally contain potential threatened species habitat in the poorest condition. Some PCT 3320 within the development footprint occurs in a moderate condition and as DNG (0.84 ha), with a vegetation score of 62.1 and 10.2 respectively. Areas of PCT 3320 in moderate condition account for 8% of the development footprint, whilst PCT 3320 DNG accounts for 10%.
Locating the project (including ancillary facilities) in areas that avoid habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or native vegetation that is a TEC, a highly cleared PCT or an entity at risk of a serious and irreversible impact (SAII)	No threatened flora or fauna species identified as SAII was recorded during fieldwork. Two non-SAII threatened species with high risk weightings were recorded within the development footprint (*Marsdenia viridiflora* subsp. *viridiflora* and *Pultenaea parviflora*). Both of these will be impacted by the proposed development. The remnant vegetation in the form of PCT 3320 on site conforms to 0.74 ha of CEEC *Cumberland Plains Woodland in the Sydney Basin Bioregion*, which is a listed SAII community. This accounts for approximate 16% of the development footprint.
Locating the project outside of the buffer area around breeding habitat features such as nest trees or caves.	The development footprint does not contain caves or similar human-made structures which could be breeding habitat for threatened microbat species credit candidate species within the development footprint. Potential breeding habitat features are potentially present within the development footprint in the form of one putative hollow-bearing tree. No evidence of use of this HBT breeding was opportunistically identified during the field survey. This tree is proposed to be removed as part of the development.
Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained	Habitat connectivity between the development footprint and adjacent areas is limited due to the highly disturbed and modified nature of the surrounding landscape. The development footprint has been located directly adjacent to existing infrastructure in the form of a main road. The development is unlikely to have a significant effect on the movement of species or genetic material through the landscape.

6.1.2. Prescribed biodiversity impacts

The development footprint is located predominantly (approximately 80%) within exotic vegetation of limited habitat and connectivity value, or in existing cleared areas containing transport infrastructure (roadway). This location was selected to minimise prescribed impacts associated with non-native vegetation, habitat connectivity and vehicle strikes.

The development footprint does not include karst, caves, crevices, cliffs, rocks and other geological features of significance, water bodies and human made strictures likely to provide habitat for threatened species.

6.2. Designing a project to avoid and minimise impacts on biodiversity values

6.2.1. Direct and indirect impacts

The proposed development has been located predominately on certified-urban capable land. The remaining development footprint is 4.76 ha and will involve removal of vegetation and earthworks. Whilst the proposed development has been located to avoid and minimise impacts of biodiversity values as demonstrated in Section 6.1 above, given the nature of the development, being a road widening and

a signalled intersection to improve safety at the proposed intersection, there is minimal scope in the design of the proposed development to further avoid and minimise impacts. Native remnant vegetation to be cleared accounts for 0.84 ha of the development footprint (approximately 18 %).

7. Assessment of Impacts

7.1. Direct impacts

The direct impacts of the proposed development include direct impacts to native vegetation (Table 21), threatened species (Table 22) and prescribed biodiversity impacts (outlined below in Section 7.4).

Table 21: Direct impacts to native vegetation

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)
3320	*Cumberland Shale Plains Woodland*	Coastal Valley Grassy Woodlands	Grassy Woodlands	0.84

Table 22: Direct impacts to threatened flora species

Scientific Name	Common Name	Direct Impact area (ha)
Deyeuxia appressa	-	0.46
Marsdenia viridiflora subsp. *viridiflora*	-	0.38
Pultenaea parviflora	-	0.38

7.2. Change in vegetation integrity

The change in vegetation integrity as a result of the proposed development is detailed in Table 23 and assumes complete removal of all native vegetation within the development footprint.

Table 23: Change in vegetation integrity

Veg Zone	PCT ID	Condition	Area (ha)	Current vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity
1	3320	Moderate	0.38	62.1	0	-62.1
2	3320	DNG	0.46	10.2	0	-10.2

7.3. Indirect impacts

The indirect impacts of the development are outlined in Table 24. Indirect impact zones are shown on Figure 12 and assumes an indirect impact buffer of 10 m from all areas of the development footprint not adjacent to certified – urban capable land and hence requiring assessment under the BAM.

Table 24: Indirect impacts

Indirect impact	Description (nature, extent and frequency)	Biodiversity affected	Duration/Timing	Consequence
Inadvertent impacts on adjacent habitat or vegetation	Adjacent areas to the development footprint which are not certified-urban capable land and therefore require	N/A	N/A	N/A

Indirect impact	Description (nature, extent and frequency)	Biodiversity affected	Duration/Timing	Consequence
	assessment are either disturbed exotic vegetation or patches of native vegetation occurring within a road reserve, or existing man-made infrastructure or cleared areas in the form of roads and laydown areas. Indirect impacts to native vegetation or habitat are therefore unlikely and are proposed to be managed as detailed in Section 7.5.			
Reduced viability of adjacent habitat due to edge effects	Given the generally low habitat value (grassland vegetation and existing cleared land including a main road) or semi-isolated patches of remnant native vegetation of the assessable adjacent land, the proposed development is unlikely to create edge effects that will significantly reduce the viability of adjacent habitat.	N/A	N/A	N/A
Reduced viability of adjacent habitat due to noise, dust or light spill	Noise and dust from machinery movement during earthworks may affect some low to moderate value adjacent habitat. Noise impacts during the operational phase is unlikely to increase above already existing levels due to the adjacent area comprising of a main road.	Low quality habitat in the form of grassland.	During construction and operational phases.	Low
Transport of weeds and pathogens from the site to adjacent vegetation	Spread of weeds from the development footprint will have a negligible impact due to adjacent areas being grassland vegetation likely already containing weed species present within the development footprint.	Low quality habitat in the form of grassland.	During construction phase.	Low
Increased risk of starvation or exposure, and loss of shade or shelter	It is unlikely that critical shade or shelter habitat occurs within the grassland vegetation and existing	N/A	N/A	N/A

Indirect impact	Description (nature, extent and frequency)	Biodiversity affected	Duration/Timing	Consequence
	cleared land of the adjacent land.			
Loss of breeding habitat	It is unlikely that breeding habitat occurs within the grassland vegetation and existing cleared land of the assessable adjacent land. No remnant trees were identified as occurring within the indirect impact area.	N/A	N/A	N/A
Trampling of threatened flora species	Potential for trampling of threatened flora species in indirect impact area, with two threatened species in the form of *Pultenaea parviflora* and *Marsdenia viridiflora* identified within the development footprint.	Threatened flora species.	During construction phase.	High.
Inhibition of nitrogen fixation and increased soil salinity	It is unlikely the proposed development will result in increases to salinity or inhibit nitrogen fixation in soils in adjacent areas due to the high levels of disturbance already occurring.	N/A	N/A	N/A
Fertiliser drift	N/A	N/A	N/A	N/A
Rubbish dumping	Strict waste disposal measures and temporary construction fencing may minimise the risk of rubbish associated with earthworks leaving the development footprint in an uncontrolled manner. Proposed development unlikely to increase levels of rubbish dumping by the public with a main road already present in the development footprint.	Low quality habitat in the form of grassland.	During construction and operational phase.	Low
Wood collection	N/A	N/A	N/A	N/A
Removal and disturbance of rocks including bush rock	Not likely to occur as rock habitat is not present within the development footprint, unlikely to occur in assessable adjacent land.	N/A	N/A	N/A

Indirect impact	Description (nature, extent and frequency)	Biodiversity affected	Duration/Timing	Consequence
Increase in predators	Not likely to occur as a result of the proposed development.	N/A	N/A	N/A
Increase in pest animal populations	Potential increase of some highly mobile pest species such as *Columba livia* (Rock Dove) during construction phase. Unlikely to persist above existing levels following completion of development.	May cause competition with local native species.	During construction phase.	Low
Changed fire regimes	Not likely to occur due to predominant vegetation being grassland and existing cleared areas in an urban landscape.	N/A	N/A	N/A
Disturbance to specialist breeding and foraging habitat	The vegetation and existing cleared land of the assessable adjacent land are unlikely to constitute specialist breeding and foraging habitat.	N/A	N/A	N/A
Sedimentation and contaminated and/or nutrient rich run-off	Sedimentation and runoff is likely to occur during earthworks. Sediment and erosion control measures are proposed to be implemented within and surrounding the development footprint as per Section 7.5 below.	Low quality habitat in the form of exotic grassland, shrubs and trees and potentially adjacent waterbodies.	During construction phase.	Low

7.4. Prescribed biodiversity impacts

Potential prescribed biodiversity impacts associated with the proposed development footprint are assessed as per Section 8.3 of the BAM in Table 25 below.

Table 25: Impacts on prescribed biodiversity impacts

Prescribed biodiversity impact	Description (Nature, extent and frequency)	Consequences	Justification
Karst, caves, crevices, cliffs, rocks and other geological features of significance	N/A – no relevant geological features are present.	N/A	N/A
Human made structures or non-native vegetation	No human made structures likely to provide habitat (e.g. dilapidated buildings,	N/A	No additional potential habitat for threatened species is present within the

Prescribed biodiversity impact	Description (Nature, extent and frequency)	Consequences	Justification
	stormwater culverts) occur within the development footprint. Non-native vegetation is predominantly exotic grassland. No additional impacts outside of those addressed in the direct impacts in Section 7.1 apply to the proposal.		development footprint in the form of human-made structures or non-native vegetation.
Habitat connectivity	There is a lack of connectivity between patches containing canopy vegetation within the development footprint, with majority of the surrounding area being either grassland or cleared land such as roadways. As such, only highly mobile threatened species are likely to utilise habitat within the Development footprint.	Low	Habitat for threatened species within the development footprint is marginal and is not well connected with areas of large intact habitat outside of the Development footprint.
Water bodies, water quality and hydrological processes	N/A – no permanent waterbodies occur within the development footprint.	N/A	N/A
Wind turbine strikes on protected animals	N/A	N/A	N/A
Vehicle strikes	The development footprint occurs within an existing disturbed area of limited habitat value and connectivity, containing abundant transport infrastructure including a main road. As such, vehicle strike is an existing threat, and the proposed development is unlikely to increase the risk above the existing levels.	Low	Given the existing disturbed nature and limited habitat and connectivity value of the development footprint, any additional vehicle and machinery movements associated with the development is unlikely to substantially increase vehicles strikes above existing levels.

7.5. Mitigating and managing direct and indirect impacts

Measures proposed to mitigate and manage impacts as a result of the proposed development of the development footprint before, during and after construction are outlined in Table 26.

Table 26: Measures proposed to mitigate and manage direct and indirect impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Timing works to avoid critical life cycle events such as breeding or nursing.	Low	Negligible	Pre-clearance surveys to be undertaken by a suitably qualified ecologist prior to vegetation removal to identify any present fauna.	Ensuring animal welfare and protection.	Prior to and during vegetation removal.	Project Manager / Ecologist.
Instigating clearing protocols including pre-clearing surveys and staged clearing, the presence of a trained ecological or licensed wildlife handler during clearing events.	Moderate	Low	A suitably qualified ecologist should undertake pre-clearance surveys and remain on-site during the removal of any native vegetation. Should multiple clearing fronts be occurring concurrently, a suitably qualified ecologist is required to be present for each.	Risk to wildlife reduced.	Prior to and during vegetation removal.	Project Manager / Ecologist.
Installing artificial habitats for fauna in adjacent retained vegetation and habitat or human made structures to replace the habitat resources lost and encourage animals to move from the impacted site, e.g. nest boxes.	Low	Negligible	A single putative HBT is present within the development footprint in the form of a stag containing one hollow. Other large trees also contained putative, but unconfirmed hollows. Visibility of potential openings from the ground was difficult. A suitably qualified ecologist should undertake pre-clearance surveys and remain on-site during the removal the HBT. The Biodiversity Management Plan prepared by ELA has recommended relocating or supplementing the removal	Risk to wildlife reduced.	Prior to and during vegetation removal.	Project Manager / Ecologist.

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
			of any HBTs with by the development with nest boxes that are proposed to be impacted (ELA 2024a).			
Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chain-saw, rather than heavy machinery, is preferable in situations where partial clearing is proposed.	Low	Negligible	Clear delineation of development footprint should be outlined. Temporary protective fencing, high visibility bunting and erosion and sediment controls will be installed.	Clearing limited only to approved areas for clearing.	Prior to and during construction phase.	Project Manager / Contractor
Sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment.	Moderate	Low	Erect and maintain erosion and sediment controls.	Accidental incursions minimised.	Prior to and during construction phase.	Project Manager / Contractor.
Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise.	Low	Negligible	No noise barriers proposed as noise will be limited to the current operational areas of the site and would be temporary. Only conduct clearing and operation of machinery inside defined work hours.	Minimise noise disturbance to fauna and neighbouring communities.	During construction phase.	Project Manager / Contractor
Adaptive dust monitoring programs to control air quality.	Moderate	Low	Implement industry practice controls of dust during earthwork.	Dust impacts on adjacent land is minimised.	During construction phase.	Project Manager / Contractor.

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Programming construction activities to avoid impacts; for example, timing construction activities for when migratory species are absent from the site, or when particular species known to or likely to use the habitat on the site are not breeding or nesting.	Low	Negligible	Pre-clearance surveys to be undertaken by a suitably qualified ecologist prior to hollow bearing tree removal. No considerations for breeding or life cycles is required as habitat values associated with these cycles were not identified within the development footprint.	Ensuring animal welfare and protection.	Prior to and during construction phase.	Project Manager / Ecologist
Temporary fencing to protect significant environmental features such as riparian zones.	N/A – no environmental features to be retained. No significant environmental features in indirect impact area.	N/A	N/A	N/A	N/A	N/A
Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas.	Low.	Negligible.	Carry out site inductions to explain environmental significance of the subject land and adjacent habitat.	Accidental incursions minimised.	Prior to and during construction phase.	Project Manager / Contractor.
Staff training and site briefing to communicate environmental features to be protected and	Low.	Negligible.	Carry out site inductions to explain environmental significance of the subject land.	Accidental incursions minimised.	Prior to and during construction phase.	Project Manager.

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
measures to be implemented.						
Development control measures to regulate activity in vegetation and habitat adjacent to residential development including controls on pet ownership, rubbish disposal, wood collection, fire management and disturbance to nests and other niche habitats.	Low.	Negligible.	Development footprint clearly delineated and signage present to prevent trespassing by the general public. Rubbish bins provided during works and strict waste management procedures implemented.	Prevent litter occurring within the development footprint. Prevent unnecessary clearance / disturbance post-construction.	During construction and operational phases.	Project Manager / Contractor / Council.
Making provision for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on or adjacent to the subject land.	N/A – no native vegetation proposed to be retained.	N/A	N/A	N/A	N/A	N/A

7.6. Mitigating prescribed impacts

Measures proposed to mitigate and manage prescribed biodiversity impacts of the development footprint before, during and after construction are outlined in Table 27.

Table 27: Mitigation measures for prescribed biodiversity impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Scheduling timing of construction activities to avoid critical life cycle events.	Low	Negligible	Pre-clearance surveys to be undertaken by a suitably qualified ecologist prior to vegetation removal to identify any fauna.	Ensuring animal welfare and protection.	Prior to vegetation removal.	Project Manager / Ecologist.
Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, and using a trained ecological or licensed wildlife handler during clearing, construction and maintenance activities for human made structures and non-native vegetation.	Moderate	Low	An ecologist should be present to supervise removal of any unexpected finds located within non-native vegetation and ensure care and relocation of fauna (if present). This includes pre-clearance survey and clearance supervision of HBT.	Ensuring animal welfare and protection.	Prior to and during vegetation removal.	Project Manager / Ecologist.
Retaining habitat features within the subject land or relocating them to adjacent retained remnant vegetation.	N/A	N/A	No habitat features to be retained identified within development footprint.	N/A	N/A	N/A
Installing artificial	N/A	N/A	No significant habitat corridors are present	N/A	N/A	N/A

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
connectivity measures to re-establish connections between habitat and favoured transport corridors.			within the development footprint.			
Erecting temporary fencing to protect significant environmental features such as karst, caves, rock outcrops and water bodies.	N/A	N/A	No significant environmental features present within or directly adjacent to the development footprint.	N/A	N/A	N/A
Replacing habitat provided by human made structures and non-native vegetation with alternative habitat.	N/A	N/A	No habitat provided by human made structures or non-native vegetation within the development footprint.	N/A	N/A	N/A
Sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment.	Moderate	Low	Erect and maintain erosion and sediment controls.	Accidental incursions minimised.	Prior to and during construction phase.	Project Manager / Contractor.
Staff training and site briefing to communicate environmental features to be protected and measures implemented to protect them.	N/A	N/A	No environmental features requiring protection present within development footprint.	N/A	N/A	N/A

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Ecological restoration, rehabilitation actions and/or maintenance of retained native vegetation on or adjacent to the subject land.	N/A	N/A	N/A – no vegetation proposed to be retained.	N/A	N/A	N/A
Development control measures that regulate the types of activities that can occur in native vegetation and habitat adjacent to residential development including prohibiting the collection of bush rocks.	Moderate	Low	Development to occur throughout the subject land. Areas of biodiversity values in the indirect impact buffer should be clearly advertised to prevent activities which could have an impact on biodiversity values.	Protection of biodiversity values in landscape surrounding the development.	During construction and operational phases.	Project Manager / Council.

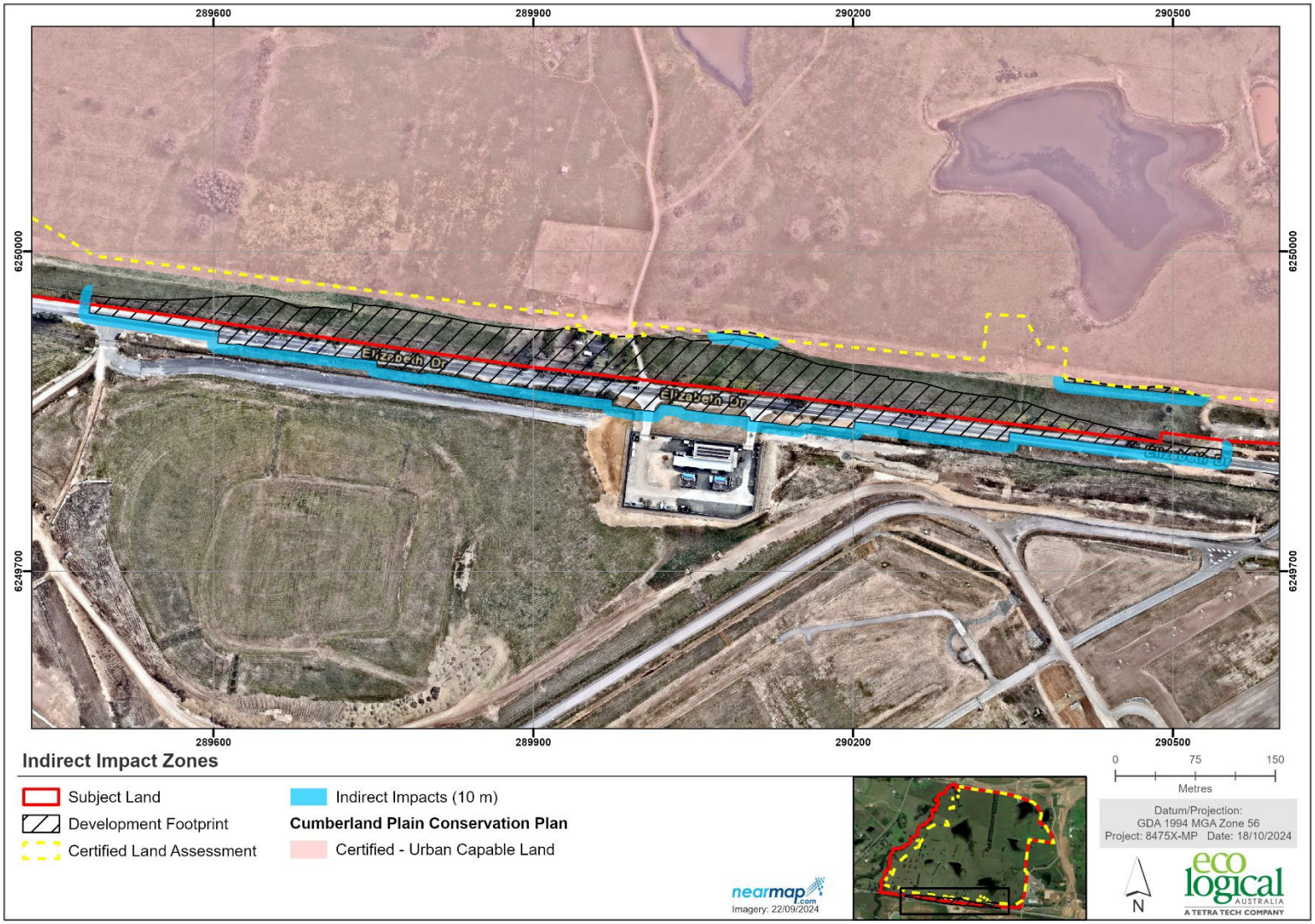

Figure 12: Indirect impact zones

8. Impact summary

Following implementation of the BAM as detailed in this BDAR and the input of relevant data into the BAM-C, the following impacts have been determined.

8.1. Serious and Irreversible Impacts (SAII)

The proposed development has candidate SAII values as outlined in Table 28. Detailed consideration of whether impacts on entities that are serious and irreversible is included in Table 29. Impacts to SAII entities are shown in Figure 13.

Table 28: Serious and Irreversible Impacts Summary

Species	Principle	Direct development footprint (ha)	Threshold
Cumberland Plain Woodland in the Sydney Basin Bioregion	1, 2	0.29	N/A

Table 29: Evaluation of an impact on a TEC

Impact Assessment Provisions	Assessment
1. the action and measures taken to avoid the direct and indirect impact on the potential entity for an SAII	Actions taken to avoid and minimise impacts are detailed in Section 6.
2a. evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal)	*Cumberland Plain Woodlands in the Sydney Basin Bioregion* has undergone substantial reduction in geographic distribution since European settlement. According to the Final Determination for this TEC (NSW Scientific Committee 2009), there has been a reduction in geographic distribution of >90%. Tozer (2003) estimated a total extent of 125,449 ha representing the TEC existed prior to European settlement. This had since reduced to 11,054 ha of woody vegetation representing the TEC in 1998. An update on Tozer (2003) in 2007 identified a further decline of 442 ha of the TEC.

Impact Assessment Provisions	Assessment
2b. extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by: **i. change in community structure** **ii. change in species composition** **iii. disruption of ecological processes** **iv. invasion and establishment of exotic species** **v. degradation of habitat, and** **vi. fragmentation of habitat**	Initial clearing occurred due to tree-felling for timber and clearing land for crops and pasture. Increased urban and industrial development from early to mid-20th century to present resulted in additional clearance of the TEC (NSW Scientific Committee 2009). In relation to the ecological function of the community: 1. the structure of the community has changed as a result of anthropogenic disturbances. It is suspected that a vast amount of the remaining area of the TEC is regrowth, with large trees observed sparsely within remnant patches or as isolated trees in paddocks or urban areas. Additional changes in structure include removal of fallen woody debris, removal of dead, standing trees, removal of woody understorey plants, and areas of regrowth having high levels of sapling or shrubs which may suppress ground flora. 2. the composition of the community has also changed over time. High densities of mid-storey species, in particular *Bursaria spinosa*, have resulted in a reduction in the composition of understorey species. Other areas are now devoid of woody plant species and are made up of a ground cover consisting of native grasses and herbs. Areas with increased fire frequencies have resulted in a reduced diversity of native species, with many areas also having an increased number of exotic species present in the community. 3. ecological processes are the interactions between biota and abiotic components such as water cycle, mineral cycle, decomposition and nutrient cycles, reproduction / pollination and food webs. Loss of large trees is associated with declines and local extinctions of fauna, effecting ecological processes. Fragmentation has also resulted in a reduction in fire frequencies for some patches, which may have had an adverse effect on native flora species viability. 4. invasion and establishment of exotic species has also been observed within the TEC. Several exotic species, particularly grasses, can form dense ground layers capable of smothering and inhibiting the regrowth of indigenous species. Exotic species can be spread into the community via stormwater, dumping of refuse, birds or wind. 5. degradation of the community has also occurred over time. Areas in which have historically been used for agriculture have seen degradation of soil chemistry and structure, as well as habitat degradation due to overgrazing. Fragmentation and increase of exotic species have also resulted in an increase in the degradation of the community. 6. fragmentation of *Cumberland Plain Woodlands* has also occurred over time. This is predominately associated with habitat clearance. Tozer (2003) mapping predicted that half of all remaining patches were less than 3 ha in size.

Impact Assessment Provisions	Assessment
2c. evidence of restricted geographic distribution (Principle 3, clause 6.7 (2) (c) BC Regulation), based on the TECs geographic range in NSW according to the: **i. extent of occurrence** **ii. area of occupancy, and** **iii. number of threat-defined locations**	Principle 3 does not apply to *Cumberland Plains Woodland in the Sydney Basin Bioregion* TEC.
2d. evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7 (2) (d) BC Regulation).	Principle 4 does not apply to *Cumberland Plains Woodland in the Sydney Basin Bioregion* TEC.
3. Where the TBDC indicated that data is 'unknown' or 'data deficient' for a TEC for a criterion listed in subsection 9.1.1(2), the assessor must record this in the BDAR or BCAR.	N/A
4a. the impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal: **i. in hectares, and** **ii. as a percentage of the current geographic extent of the TEC in NSW.**	1. The total area of *Cumberland Plains Woodland in the Sydney Basin Bioregion* affected by the proposed development would be 0.84 ha. 2. There is no current estimate available for this TEC in NSW. However, using the sum of the estimated current extents of the two PCTs (3319 and 3320) associated with this TEC, which are 3,312 ha and 7,841 ha respectively (based on the SVTM - DPIE 2022b), the proposed development would be impacting <0.01 % of the remaining extent of *Cumberland Plains Woodland in the Sydney Basin Bioregion*.

Impact Assessment Provisions	Assessment
4b. the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by: **i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the Development footprint or equivalent area for other types of proposals,** **ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:** ○ **distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and** ○ **estimated maximum dispersal distance for native flora species characteristic of the TEC, and** ○ **other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development,** **iii. describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.**	1. A total of six potential patches of *Cumberland Plains Woodland in the Sydney Basin Bioregion* TEC were identified within 500 m of the development site based on SVTM (NSW DCCEEW 2024g). The size of these patches ranged from 0.01 ha to 5.11 ha, with an average patch size of 1 ha. 2. The average distance between isolated patches of *Cumberland Plains Woodland in the Sydney Basin Bioregion* TEC within 500 m of the development footprint was 113.10 m. Should the proposed removal of the TEC within the development footprint occur, this will increase the minimum distances between patches to approximately 169.65 m. Dispersal for native flora species characteristic to *Cumberland Plains Woodland in the Sydney Basin Bioregion* within 500 m of the development is already likely to be limited due to the existing disturbed landscape. Furthermore, within the development footprint, dispersal is likely impacted by both the large areas of cleared exotic grassland and cleared land, as well as competition with exotic flora species observed. The small size of the patches within the development footprint would result in limited existing connectivity function for native flora species associated with the TEC. Removal is unlikely to substantially increase fragmentation or loss of connectivity above the existing levels. 3. Remnant patches of *Cumberland Plains Woodland in the Sydney Basin Bioregion* TEC within the development footprint are in moderate and DNG condition. These vegetation zones are described in Section 4.4.

Figure 13: Serious and Irreversible Impact candidate within the development site

8.2. Impacts requiring offsets

The impacts of the development requiring offset for native vegetation are outlined in Table 30 and displayed in Figure 14.

Table 30: Impacts to native vegetation that require offsets

Vegetation Zone	PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Condition	Direct impact (ha)
1	3320	*Cumberland Shale Plains Woodland*	Coastal Valley Grassy Woodlands	Grassy Woodlands	Moderate	0.38

8.3. Impacts not requiring offsets for ecosystem credits

The impacts of the development not requiring offset for ecosystem credits are outlined in Table 31 and displayed in Figure 15.

Table 31: Impacts to native vegetation that do not require offsets for ecosystem credits

Vegetation Zone	PCT ID	PCT Name	Condition	Direct impact (ha)	Rationale
2	3320	*Cumberland Shale Plains Woodland*	DNG	0.46	As this vegetation zone has a VI score of less than 15 (10.2), offsets are not required for vegetation mapped as this zone.
-	-	Planted Native Vegetation	-	0.10	The decision-making key for planted native vegetation outlined in Appendix D of BAM 2020 was reviewed and determined that the removal of planted native vegetation does not require offsets.

8.4. Areas not requiring assessment

Areas not requiring assessment are shown in Figure 16 and are comprised of:

- cleared areas containing no vegetation in the development footprint (e.g. roads, existing buildings and bare ground)
- exotic vegetation in the development footprint.

8.5. Credit summary

The number of ecosystem credits required for the development are outlined in Table 32. The number of species credits required for the development are outlined in Table 33. A biodiversity credit report is included in Appendix F.

Table 32: Ecosystem credits required

Vegetation Zone	PCT ID	PCT Scientific Name	Credit Class	Condition	Direct impact (ha)	Credits required
1	3320	*Cumberland Shale Plains Woodland*		Moderate	0.38	15
2	3320	*Cumberland Shale Plains Woodland*		DNG	0.46	0
					Total	**15**

Table 33: Candidate species credits required

Species	Common Name	Direct impact number of individuals / habitat (ha)	Credits required
Deyeuxia appressa		1 individual (assumed presence)	3
Marsdenia viridiflora subsp. *viridiflora* – endangered population		0.38 ha	12
Pultenaea parviflora		0.38 ha	12
		Total	**27**

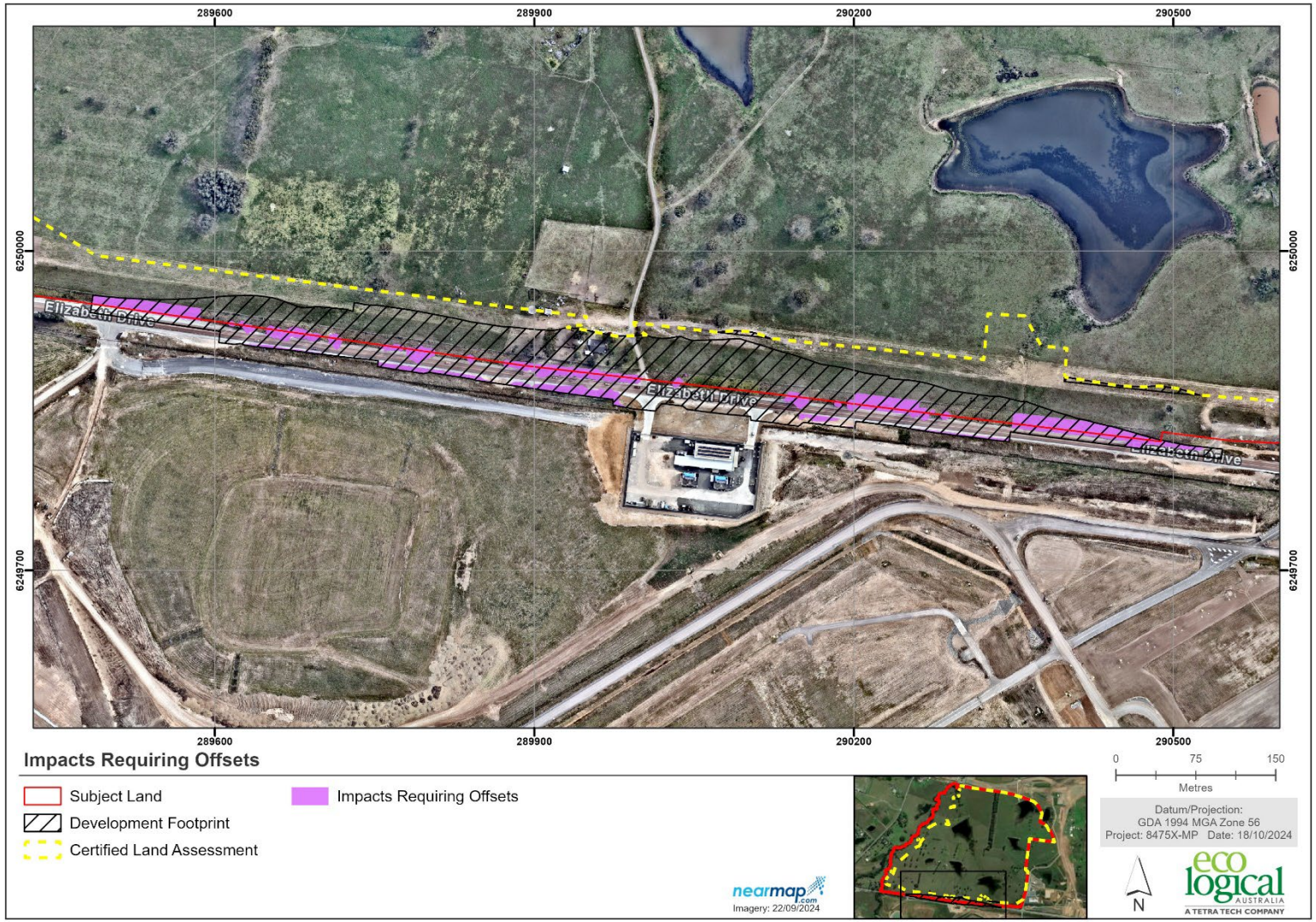

Figure 14: Impacts requiring offsets

Figure 15: Impacts not requiring offset

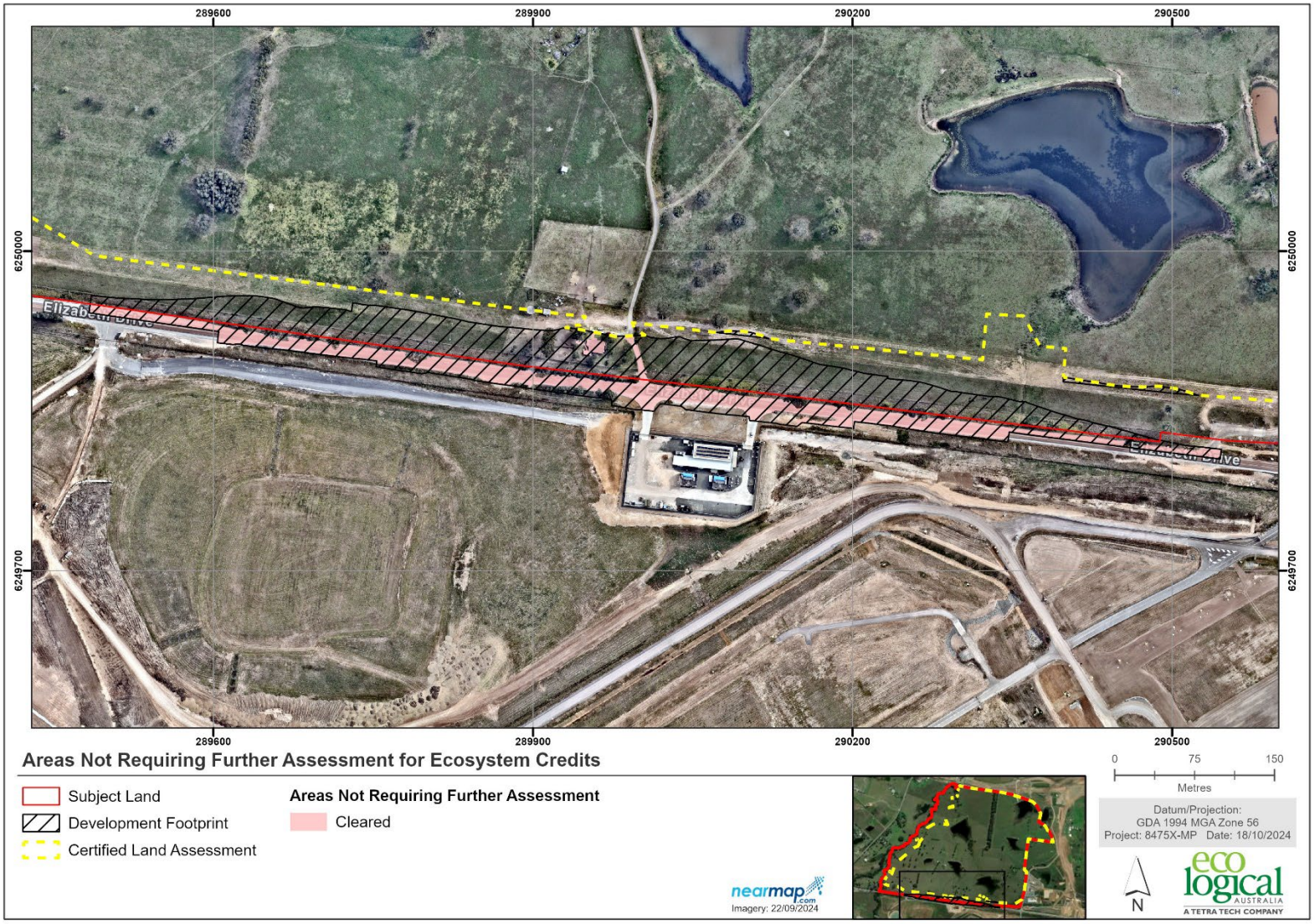

Figure 16: Impacts not requiring further assessment

9. 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 Matters of National Environmental Significance (MNES) relevant to the development footprint in accordance with the EPBC Act have been addressed below in Section 9.1. The likelihood of occurrence table for the EPBC Act listed species is provided in Appendix B.

9.1. 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 DCCEEW, which is responsible for administering the EPBC Act.

The process includes undertaking an Assessment of Significance for listed threatened species and ecological communities that represent a MNES that will be affected as a result of the proposed action. Significant impact guidelines that outline a number of criteria have been developed by the former Commonwealth Department of Agriculture, Water and Environment (DAWE) (2013) (now DCCEEW), to provide assistance in conducting the Assessments of Significance and deciding whether or not a referral to the Commonwealth is required.

Two MNES have been assessed as a part of this assessment:

- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Pultenaea parviflora.*

These assessments are presented in Appendix C and concluded that the proposed development within the development footprint, located on Excluded Land under the CPCP, is not likely to have a significant impact on MNES and therefore referral to the Commonwealth DCCEEW under the EPBC Act is not recommended.

10. Conclusion

This BDAR assesses the extent of non-certified Excluded Land, namely for an intersection with Elizabeth Drive, under the broader Burrah Park development under SSD-70316465. The intersection will connect Elizabeth Drive to a series of roads proposed within the subject land and the broader Burrah Park development. The SSD assessment area and proposed intersection is primarily (97%) located on certified-urban capable land under the CPCP and requiring no further assessment of biodiversity under the NSW BC Act or Commonwealth EPBC Act. The remaining non-certified (Excluded Land) portion of the development footprint, totalling 4.76 ha, has been assessed within this BDAR, which has been prepared using the Streamlined Assessment Module – Small Area.

The Elizabeth Drive intersection footprint is located within an existing disturbed and modified landscape along Elizabeth Drive and is characterised by existing agricultural and transport infrastructure land use. Accordingly, the majority of the development footprint (approximately 80%) contains exotic vegetation or built/cleared land (Figure 2). Native vegetation within the development footprint corresponds to PCT 3320 *Cumberland Shale Plains Woodland*, in moderate and DNG condition (Section 4.4). Areas of PCT 3320 in a moderate condition meet the description of the BC Act listed *Cumberland Plain Woodland in the Sydney Basin Bioregion* CEEC, however, do not meet the minimum thresholds for the equivalent EPBC Act listed CEEC.

The Streamlined Assessment Module – Small Area requires the assessment of species credit species that are at risk of SAII. Some SAII entities were excluded from further assessment based on the lack of suitable habitat. Additionally, Camden White Gum *Eucalyptus benthamii* is a large obvious species, it was not recorded during the field survey. The DNG provides marginal habitat for *Deyeuxia appressa,* so it was included as assumed present species within this vegetation zone. Two threatened flora species, *Marsdenia viridiflora* subsp. *viridiflora* and *Pultenaea parviflora,* were observed during the field survey.

Measures to avoid and minimise impacts to biodiversity values have been considered with regards to locating the proposed development within predominantly biodiversity certified land, which is comprised of mostly exotic vegetation and existing cleared land (see Section 6.1). The residual impacts of the development footprint which have not been avoided, require the retirement of ecosystem credits for impacts to associated biodiversity values. The application of the EPBC Act Significant Impact Criteria for impacts to potential habitat for *Pultenaea parviflora* and Grey-headed Flying-fox concluded that the proposed development is unlikely to result in a significant impact. Referral to the Commonwealth DCCEEW is not recommended.

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Appendix A Definitions

The following terminology has been used throughout this report for the purposes of describing the impacts of the proposal in the context of a biodiversity assessment in accordance with the NSW BAM 2020. This terminology may or may not align with other technical documents associated with the proposed development.

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 footprint, 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 NSW DCCEEW 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
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. The Development footprint specific to this BDAR is defined in Section 1.2 and displayed in Figure 2.
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 footprint and the gain in biodiversity values at a biodiversity stewardship site.
High threat weed	Plant species 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
Local wetland	Any wetland that is not identified as an important wetland (refer to definition of Important wetland).
NSW (Mitchell) landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.
Patch size	An area of intact native vegetation that: a) occurs on the Development footprint or biodiversity stewardship site, and b) includes native vegetation that has a gap of less than 100 m from the next

Terminology	Definition
	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 footprint or stewardship site.
Proponent	A person who intends to apply for consent to carry out development or for approval for an activity.
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.
Residual impact	An impact on biodiversity values after all reasonable measures have been taken to avoid, minimise or mitigate the impacts of development. Under the BAM, an offset requirement is determined 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 (biodiversity values map)	Development within an area identified on the map requires assessment using the BAM.
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 footprint, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement. The subject land specific to this BDAR is defined in Section 1.2 and displayed in Figure 2.
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 zone	A relatively homogenous area of native vegetation on a Development footprint, land to be biodiversity certified or a biodiversity stewardship site that is the same PCT and broad condition state.
Wetland	An area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle. Wetlands may exhibit wet and dry phases and may be wet permanently, cyclically or intermittently with fresh, brackish or saline water

Appendix B Likelihood of Occurrence Assessment

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the EPBC database search (DCCEEW 2024a). Five terms for the likelihood of occurrence of species are used in this report, if relevant. This likelihood of occurrence assessment was based on database or other records, the presence or absence of suitable habitat, features of the Development footprint, results of field surveys and professional judgement. Some migratory, marine and aquatic species identified from the Commonwealth database search have been excluded from the assessment, due to a definite 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 Development footprint and in the vicinity is unsuitable for the species.

A test of significance was conducted for threatened species or ecological communities that were recorded within the Development footprint or had a higher likelihood (potential, likely or known) of occurring and were not recorded during field surveys.

The records column refers to the number of records occurring within 5 km of the Development footprint, as provided by the NSW BioNet Atlas (NSW DCCEEW 2024b).

Scientific name	Common name	Habitat associations	EPBC Act status	BioNet records within 5 km	Likelihood of occurrence
THREATENED ECOLOGICAL COMMUNITIES					
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion		Dominated by *Eucalyptus parramattensis* subsp. *parramattensis, Angophora bakeri* and *E. 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 H. 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*. Occurs within the local government areas of Bankstown, Blacktown, Campbelltown, Hawkesbury, Liverpool and Penrith. Mainly found in the Castlereagh area of the Cumberland Plain, with small patches occurring at Kemps Creek and Longneck Lagoon; also present around Holsworthy.	E	-	No – dominant sclerophyllous species associated with this community are not present within the development footprint. Field survey did not identify this community within the development footprint.
Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community		This ecological community is associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Floodplains are level landform patterns on which there may be active erosion and aggradation by channelled and overbank stream flow with an average recurrence interval of 100 years or less. Swamp Oak Floodplain Forest generally occurs below 20 m (rarely above 10 m) elevation in the NSW North Coast, Sydney Basin and South East Corner bioregions. The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees. Typically, these forests, woodlands, scrubs and reedlands form mosaics with other floodplain forest communities and treeless wetlands, and often they fringe treeless floodplain lagoons or wetlands with semi-permanent standing water.	E	-	No – Development footprint is not located in a coastal region. Field survey did not identify this community within the development footprint. No open forests, low woodlands, scrubs or reedlands with scattered trees are present within the development footprint.

Scientific name	Common name	Habitat associations	EPBC Act status	BioNet records within 5 km	Likelihood of occurrence
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion		Ranges from open forest to low woodland, with a canopy dominated by *Eucalyptus fibrosa* (Broad-leaved Ironbark) and *Melaleuca decora* (Paperbark). The canopy may also include other eucalypts such as *E. longifolia* (Woolybutt). The dense shrubby understorey consists of *Melaleuca nodosa* (Prickly-leaved Paperbark) and *Lissanthe strigosa* (Peach Heath), with a range of 'pea' flower shrubs, such as *Dillwynia tenuifolia, Pultenaea villosa* (Hairy Bush-pea) and *Daviesia ulicifolia* (Gorse Bitter Pea). The sparse ground layer contains a range of grasses and herbs. Occurs in western Sydney, with the most extensive stands occurring in the Castlereagh and Holsworthy areas. Smaller remnants occur in the Kemps Creek area and in the eastern section of the Cumberland Plain.	CE	-	No – Development footprint is not consistent with an open forest to low woodland community. Forest/woodland canopy and shrub species associated with this community are not present within the development footprint.
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest		The Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest typically occurs on flat to undulating or hilly terrain, at elevations up to approximately 350 metres above sea level. Some occurrences may extend onto locally steep sites at slightly higher elevations. Predominantly associated with clay soils, that are derived from Wianamatta Shale geology.	CE	-	No – whilst some characteristic species of this community are present within the development footprint, field survey data and subsequent analysis confirmed that the extent of the community did not meet condition thresholds required for this TEC.
Elderslie Banksia Scrub Forest in the Sydney Basin Bioregion		A scrub community dominated by *Banksia integrifolia subsp. integrifolia* (Coastal Banksia). Other canopy species include *Angophora subvelutina* (Broad-leaved Apple). The shrubby understorey is diverse and includes species that usually occur in sandstone areas, such as *Ricinocarpus pinifolius* (Wedding Bush), *Pimelea linifolia subsp. linifolia* (Riceflower) and *Brachyloma daphnoides* (Daphne Heath). Intergrades with Cumberland Plain Woodland and river-flat forest communities. Occurs only in Elderslie area.	CE	-	No – vegetation within the development footprint not consistent with scrub community. Development footprint not located in the Elderslie area.
River-flat eucalypt forest on coastal floodplains of southern New		Found on the river flats of the coastal floodplains. Known from parts of the Local Government Areas of Port Stephens, Maitland, Singleton, Cessnock, Lake Macquarie, Wyong, Gosford, Hawkesbury, Baulkham Hills, Blacktown, Parramatta, Penrith, Blue Mountains, Fairfield, Holroyd, Liverpool, Bankstown, Wollondilly, Camden, Campbelltown, Sutherland,	CE	-	No – field survey and vegetation validation did not identify this community within the development footprint. There was also an absence of riparian forested areas within the development footprint.

Scientific name	Common name	Habitat associations	EPBC Act status	BioNet records within 5 km	Likelihood of occurrence
South Wales and eastern Victoria		Wollongong, Shellharbour, Kiama, Shoalhaven, Palerang, Eurobodalla and Bega Valley. Associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains.			
Shale Sandstone Transition Forest of the Sydney Basin Bioregion		Occurs on areas transitional between the clay soils derived from Wianamatta Shale and the sandy soils derived from Hawkesbury Sandstone on the margins of the Cumberland Plain. Occurs or has occurred in the Bankstown, Baulkham Hills, Blue Mountains, Campbelltown, Hawkesbury, Liverpool, Parramatta, Penrith, and Wollondilly Local Government Areas (LGAs). The floristic composition of the community includes species otherwise characteristic of, or occurring in, either sandstone or shale habitats. The structure of the community is forest or woodland.	CE	-	No – the woodland community (PCT 3320) present within the development footprint is not consistent with this CEEC.
Western Sydney Dry Rainforest and Moist Woodland on Shale		Typically, a low closed forest, slightly more open in the moist woodland form, with emergent trees up to 25 m high and a lower tree layer. In sheltered gullies and on lower slopes the canopy layer is typically dominated by *Melaleuca styphelioides* (prickly-leaved paperbark). Other diagnostic tree species include *Acacia implexa* (hickory wattle), *Alectryon subcinereus* (native quince), *Brachychiton populneus* (kurrajong), *Corymbia maculata* (spotted gum), *Melicope micrococca* (white euodia) and *Streblus pendulinus* (whalebone tree). Generally, on upper slopes to undulating terrain, or at more disturbed sites, the ecological community exhibits its moist woodland form with the canopy dominated by *Eucalyptus moluccana, Eucalyptus tereticornis, Eucalyptus crebra* and/or *Corymbia maculata*. Characteristic shrub species include *Breynia oblongifolia* (false coffee bush), *Clerodendrum tomentosum* (hairy clerodendrum) and *Notelaea longifolia f. longifolia* (large mock-olive). Vines and other climber species are typically common. The ground layer is variable and generally sparse with a diverse mix of	CE	-	No – Development footprint is not consistent with a dry rainforest or moist woodland community. Development footprint is not dominated by indicator species of this community.

Scientific name	Common name	Habitat associations	EPBC Act status	BioNet records within 5 km	Likelihood of occurrence
		forbs, ferns and shade-tolerant grasses. Cumberland Plain Sub-region of the Sydney Basin Bioregion.			
THREATENED FLORA					
Acacia bynoeana	Bynoe's Wattle	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. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple.	V	0	No – field surveys did not opportunistically identify this species within the development footprint. Habitat within the development footprint does not include associated overstorey species and vegetation is not a heath or dry sclerophyll forest. Soils are not sandy within the Development footprint.
Acacia pubescens	Downy Wattle	Restricted to Sydney region, most commonly observed around Bankstown-Fairfield-Rookwood and Pitt Town areas. Occurs in open woodland and forest including Coos River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Occurs on alluviums, shales and at the intergrade between shales and sandstones.	V	0	Unlikely – field surveys did not opportunistically identify this species within the development footprint. Limited potential habitat with high disturbance.
Allocasuarina glareicola		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*.	E	0	No – field surveys did not opportunistically identify this species within the development footprint. Development footprint not consistent with an open woodland, no associated species present.
Cynanchum elegans	White-flowered Wax Plant	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.	E	0	No – field surveys did not opportunistically identify this species within the development footprint. Development footprint not consistent with preferred habitat types.

Scientific name	Common name	Habitat associations	EPBC Act status	BioNet records within 5 km	Likelihood of occurrence
Eucalyptus aggregata	Black Gum	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. Grows on alluvial soils, on cold, poorly-drained flats and hollows adjacent to creeks and small rivers. Usually occurs in open woodland with a grassy ground layer.	V	0	No - field surveys did not opportunistically identify this species within the development footprint. Development footprint not consistent with open woodland adjacent to a creek line / small river.
Eucalyptus benthamii	Camden White Gum	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.	V	0	No – field surveys did not opportunistically identify this species within the development footprint. Development footprint not consistent with habitat consisting of deep alluvial sands with regular flooding.
Genoplesium baueri	Bauer's Midge Orchid	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.	E	0	No – field surveys did not opportunistically identify this species within the development footprint. Development footprint not consistent with dry sclerophyll forest or moss gardens on sandstone.
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	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. Found in heath and shrubby woodland to open forest on sandy or light clay soils usually over thin shales.	V	11	Unlikely – field surveys did not opportunistically identify this species within the development footprint. Development footprint not consistent with heath and shrubby woodland on sandy soils.
Haloragis exalata subsp. exalata	Square Raspwort	Disjunct distribution in the Central Coast, South Coast and North Western Slopes botanical subdivisions of NSW. Protected and shaded damp situations in riparian habitats.	V	0	No – field surveys did not opportunistically identify this species within the development footprint. Development footprint not consistent with riparian habitat.
Melaleuca deanei	Deane's Paperbark	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.	V	0	No – field surveys did not opportunistically identify this species within the development footprint. Development footprint does not contain heath on sandstone.

Scientific name	Common name	Habitat associations	EPBC Act status	BioNet records within 5 km	Likelihood of occurrence
Persicaria elatior	Tall Knotweed	In south-eastern NSW recorded from Mt Dromedary, Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). Beside streams and lakes, swamp forest or disturbed areas.	V	0	No – field surveys did not opportunistically identify this species within the development footprint. Development footprint not located within known populations occurrence.
Persoonia nutans	Nodding Geebung	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.	E	4	Unlikely – field surveys did not opportunistically identify this species within the development footprint. Development footprint not consistent with tertiary alluviums, shale sandstone transition communities or Cooks River / Castlereagh Ironbark Forest.
Pimelea curviflora var. curviflora	-	Confined to the coastal area of the Sydney and Illawarra regions between northern Sydney and Maroota in the north-west and Croom Reserve near Albion Park in the south. Occurs in woodland, mostly on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes.	V	0	No – field surveys did not opportunistically identify this species within the development footprint. Preferred soils not identified within the development footprint. Development footprint is not located in a coastal area.
Pimelea spicata	Spiked Rice-flower	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.	E	2	Unlikely – field surveys did not opportunistically identify this species within the development footprint. Development footprint not consistent with a Grey Box community.
Pomaderris brunnea	Brown Pomaderris	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.	V	0	No – field surveys did not opportunistically identify this species within the development footprint. Development footprint not consistent with moist woodland or forest.

Scientific name	Common name	Habitat associations	EPBC Act status	BioNet records within 5 km	Likelihood of occurrence
Pterostylis saxicola	Sydney Plains Greenhood	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. Small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines, adjacent to sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	E	0	No – field surveys did not opportunistically identify this species within the development footprint. Development footprint not consistent with shallow soil in depressions on sandstone rock shelves.
Pultenaea parviflora	Sydney Bush-pea	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.	V	468	Yes – field surveys identified this species within the development footprint.
Rhizanthella slateri	Eastern Australian Underground Orchid	In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Sclerophyll forest in shallow to deep loams.	E	0	No – field surveys did not opportunistically identify this species within the development footprint. Development footprint not located within known occurrence. Development footprint not consistent with sclerophyll forest.
Rhodamnia rubescens	Scrub Turpentine	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of *R. rubescens* typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	CE	0	No – field surveys did not opportunistically identify this species within the development footprint. Development footprint not consistent with a rainforest or wet, sclerophyll forest community.
Syzygium paniculatum	Magenta Lilly Pilly	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.	V	0	No – field surveys did not opportunistically identify this species within the development footprint. Development footprint not consistent with a rainforest community.
Thesium australe	Austral Toadflax	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.	V	0	Unlikely – field surveys did not opportunistically identify this species within the development footprint, which has been

Scientific name	Common name	Habitat associations	EPBC Act status	BioNet records within 5 km	Likelihood of occurrence
					subject to considerable historical and contemporary disturbance.
THREATENED FAUNA					
Actitis hypoleucos	Common Sandpiper	Summer migrant. In NSW, widespread along coastline and occurs in many areas inland. Coastal wetlands and some inland wetlands, especially muddy margins, or rocky shores. Also, estuaries and deltas, lakes, pools, billabongs, reservoirs, dams and claypans, mangroves.	M	0	No – Development footprint not located in a coastal area, and not consistent with riparian/wetland habitat preferences.
Anthochaera phrygia	Regent Honeyeater	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).	CE	0	Unlikely – Development footprint not consistent with preferred high quality eucalypt woodland and open forest communities. However, potential foraging habitat may occur in the surrounding area.
Aphelocephala leucopsis	Southern Whiteface	Inhabits drier open forests, woodlands and shrublands with an understorey of grasses or shrubs, where it often forages on the ground in small flocks. Breeds between July to October, with inland breeding time influenced by rainfall. Builds dome nest in hollow limbs or foliage as well as man-made infrastructure such as stumps, fence posts or in sheds.	V	0	Unlikely – Development footprint not consistent with drier open forest, woodlands or shrublands favoured by the species.
Aprasia parapulchella	Pink-tailed Worm-lizard, Pink-tailed Legless Lizard	In NSW, only known from Central and Southern Tablelands and the South Western Slopes. Sloping, open woodland areas with predominantly native grassy ground layers, rocky outcrops or scattered, partially-buried rocks. Commonly found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites.	V	0	No – Development footprint not consistent with sloping, open woodlands featuring rocky outcrops or partially-buried rocks.
Apus pacificus	Fork-tailed Swift	Non-breeding visitor to Australia, arriving in October and departing in April. Occur over riparian woodland, swamps, low scrub, heathland,	M	0	Unlikely – the species may potentially forage aerially above the development footprint however, is unlikely to utilise the site for

Scientific name	Common name	Habitat associations	EPBC Act status	BioNet records within 5 km	Likelihood of occurrence
		saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.			roosting given the minimal extent of woodland / forest habitat and its modified and disturbed nature.
Botaurus poiciloptilus	Australasian Bittern	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).	E	0	No – Development footprint not consistent with freshwater wetland containing tall vegetation.
Calidris acuminata	Sharp-tailed Sandpiper	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.	V, M	2	No – Development footprint not located in a coastal area. Development footprint not consistent with wetland habitat.
Calidris ferruginea	Curlew Sandpiper	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.	CE, M	0	No – Development footprint not located in a coastal area. Development footprint not consistent with littoral or estuarine habitats.
Calidris melanotos	Pectoral Sandpiper	Summer migrant to Australia. Widespread but scattered in NSW. East of the Great Divide, recorded from Casino and Ballina, south to Ulladulla. West of the Great Divide, widespread in the Riverina and Lower Western regions. Shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	M	0	No – Development footprint not consistent with wetland or coastal estuarine habitat.
Callocephalon fimbriatum	Gang-gang Cockatoo	In NSW, distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. Isolated records known from as far north as Coffs Harbour and as far west as Mudgee. Mature, tall mountain forests and woodlands with dense, shrubby understorey in summer; in winter, may occur at lower altitudes in open eucalypt forests and woodlands, occasionally in more urban areas. Critical habitat are HBTs occurring within stands of trees, dominated by Eucalypt species.	E	0	No – potential foraging and breeding habitat within the development footprint is degraded and limited in extent. No potential breeding habitat present within the development footprint. Poor connectivity to potential habitat in the surrounding landscape.

Scientific name	Common name	Habitat associations	EPBC Act status	BioNet records within 5 km	Likelihood of occurrence
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	In NSW, widespread along coast and inland to the southern tablelands and central western plains, with a small population in the Riverina. Open forest and woodlands of the coast and the Great Dividing Range where stands of she-oak occur, with the species normally relying on one or two species within a region. The species relies on HBTs as breeding habitat, with hollows most often occurring more than 8 m above ground, in branches > 30 cm in diameter and no more than 45° from vertical.	V	0	No – no foraging or breeding habitat within the development footprint. Poor connectivity to potential habitat in the surrounding landscape.
Chalinolobus dwyeri	Large-eared Pied Bat	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. Roosting habitat includes areas featuring cliffs, escarpments or rocky outcrops. Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	E	0	No – potential foraging habitat within the development footprint is degraded and extremely limited in extent. No roosting habitat present within the development footprint or a 2 km radius. Poor connectivity to potential habitat in the surrounding landscape.
Climacteris picumnus victoriae	Brown Treecreeper (south-eastern)	From eastern through central NSW, west to Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell. Eucalypt woodlands and dry open forest. Hollows in standing dead or live trees, and tree stumps are essential for nesting. Critical habitat includes areas with relatively undisturbed grassy woodland with a native understorey containing large living and dead trees for roosting and nesting, and fallen timber which provides essential foraging habitat.	V	0	Unlikely – Development footprint not consistent with undisturbed eucalypt woodlands or dry open forest communities. Open ground level featuring fallen timber not present in patches of remnant vegetation within the Development footprint.
Cuculus optatus	Oriental Cuckoo	Summer migrant to Australia. Mainly seen in northern Australia, occasionally they are sighted as far south as Sydney. They are more widespread in the Top End and coastal Queensland with the odd vagrant records south to the Pilbara. Oriental Cuckoos are found in more humid habitats such as monsoon forest, wet eucalypt forest, river margins and near mangroves.	M	0	No – Development footprint not consistent with monsoon forest, wet Eucalypt Forest, river margins or near mangroves.
Dasyurus maculatus maculatus	Spotted-tailed Quoll (SE	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. Solitary animals	E	0	No – no potential habitat within the development footprint. Poor connectivity to potential habitat in the surrounding landscape.

Scientific name	Common name	Habitat associations	EPBC Act status	BioNet records within 5 km	Likelihood of occurrence
	mainland population)	that occur in low densities. Rely on fallen logs, boulder piles, burrows and hollows for shelter.			
Erythrotriorchis radiatus	Red Goshawk	In NSW, range extends to approximately 30°S. Open woodland and forest, often along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, *Melaleuca* swamp forest and coastal riparian *Eucalyptus* forest.	E	0	No – Development footprint outside of known range for the species.
Falco hypoleucos	Grey Falcon	Arid and semi-arid zones. In NSW, found chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Shrubland, grassland and wooded watercourses, occasionally in open woodlands near the coast, and near wetlands.	V	0	Unlikely – Development footprint outside of known range for the species.
Gallinago hardwickii	Latham's Snipe	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.	V, M	4	No – Development footprint not consistent with a freshwater swamp, flooded grassland or heathland.
Grantiella picta	Painted Honeyeater	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. Specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias.	V	0	No – Development footprint not consistent with Box-Gum Woodlands or Box-Ironbark Forests. Field surveys did not opportunistically identify mistletoes within the development footprint.
Heleioporus australiacus	Giant Burrowing Frog	South eastern NSW and Victoria, in two distinct populations: a northern population in the sandstone geology of the Sydney Basin as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	V	0	No – Development footprint not consistent with sandstone geology; heath, woodland or open dry sclerophyll forest communities not present within development footprint.
Hirundapus caudacutus	White-throated Needletail	Non-breeding visitor to Australia. 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.	V, M	0	Unlikely – the species may potentially forage aerially above the development footprint, however, is unlikely to utilise the site for roosting given the minimal extent of woodland

Scientific name	Common name	Habitat associations	EPBC Act status	BioNet records within 5 km	Likelihood of occurrence
					/ forest habitat and its modified and disturbed nature.
Hoplocephalus bungaroides	Broad-headed Snake	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.	E	0	No – Development footprint not consistent with sandstone geology. Development footprint not consistent with dry and wet sclerophyll forests, riverine forests, coastal heath swamps, rocky outcrops, heaths or grassy woodlands.
Lathamus discolor	Swift Parrot	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. Favoured feed trees include winter flowering species such as *Eucalyptus robusta*, *E. tereticornis*, *Corymbia maculata*, *C. gummifera*, *E. sideroxylon* and *E. albens*.	CE	0	Unlikely – field surveys identified marginal potential foraging habitat in a disturbed state.
Litoria aurea	Green and Golden Bell Frog	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.	V	0	No – no marshes, dams or stream-sides identified within the development footprint.
Melanodryas cucullata cucullata	South-eastern Hooded Robin	Found throughout much of inland NSW, with the exception of the extreme north-west, where it is replaced by subspecies *picata*. Dry eucalypt woodland, acacia scrub and mallee with an open understorey. Rocks and fallen timber form essential foraging habitat.	E	0	Unlikely – eucalypt woodland within the development footprint degraded and limited in extent and does not contain an undisturbed, open understorey. Rocks and fallen timber suitable for foraging and perching are not present within the development footprint.
Motacilla flava	Yellow Wagtail	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 form preferred habitat, with	M	0	Unlikely – preferred wetland habitat not present within the development footprint.

Scientific name	Common name	Habitat associations	EPBC Act status	BioNet records within 5 km	Likelihood of occurrence
		the species also recorded from adjacent playing fields, airfields, ploughed land, lawns.			
Neophema chrysostoma	Blue-winged Parrot	Inhabits a range of habitats from coastal, sub-coastal and inland areas, right through to semi-arid zones. Favours grasslands, grassy woodlands and wetland habitats. Often found near wetlands both near the coast and in semi-arid zones. Blue-winged Parrots can also be seen in altered environments such as airfields, golf courses and paddocks.	V	0	Unlikely – Development footprint outside of the species typical range. No wetland habitat identified within development footprint.
Pandion haliaetus	Osprey	Common around the northern NSW coast, and uncommon to rare from coast further south. Some records from inland areas. Habitat includes rocky shorelines, islands, reefs, mouths of large rivers, lagoons and lakes. Breeds from July to September with nests made high up in dead trees or in dead crowns of lives trees.	M	0	Unlikely – Development footprint is not located in a coastal area.
Petauroides volans	Greater Glider	Eastern Australia, from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest). Eucalypt forests and woodlands. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows.	E	0	No – Development footprint not consistent with tall, old growth eucalypt forests or woodlands.
Petaurus australis australis	Yellow-bellied Glider (south-eastern)	Along the eastern coast to the western slopes of the Great Dividing Range, from southern Qld to Victoria. Tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils.	V	0	No – Development footprint is not consistent with a tall, mature eucalypt forest.
Petrogale penicillata	Brush-tailed Rock-wallaby	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.	V	0	No – Development footprint does not contain rocky escarpments, outcrops or cliffs.
Phascolarctos cinereus	Koala	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. Inhabits eucalypt woodlands and forests.	E	1	Unlikely – marginal potential foraging habitat within development footprint. Poor connectivity to potential habitat in the surrounding landscape.

Scientific name	Common name	Habitat associations	EPBC Act status	BioNet records within 5 km	Likelihood of occurrence
Pseudomys novaehollandiae	New Holland Mouse	Fragmented distribution across eastern NSW. Open heathlands, open woodland with a heathland understorey, tall, open forests with a grassy understorey, and vegetated sand dunes.	V	0	No – vegetation within the development footprint degraded and limited in extent and not consistent with open heathlands, woodlands with a healthland understorey, forests with a grassy understorey, or vegetated sand dunes.
Pteropus poliocephalus	Grey-headed Flying-fox	Along the eastern coast of Australia, from Bundaberg in Qld to Melbourne in Victoria. Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	V	15	Potential – field surveys identified presence of potential foraging habitat (*Eucalyptus moluccana, E. tereticornis, Corymbia maculata* and *Grevillea robusta*).
Pyncnoptilus floccosus	Pilotbird	The pilotbird is found from the Wollemi National Park and Blue Mountains National Park in New South Wales through to the Dandenong Ranges, near Melbourne in Victoria. Its natural habitat is temperate wet sclerophyll forests and occasionally temperate rainforest, where there is dense undergrowth with abundant debris. It is sedentary and common.	V	0	No – Development footprint not consistent with temperate wet sclerophyll forests or temperate rainforests.
Rostratula australis	Australian Painted Snipe	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.	E	0	No – Development footprint not consistent with swamps or marshy areas.
Stagonopleura guttata	Diamond Firetail	Grassy eucalypt woodlands, open forest, mallee, Natural Temperate Grassland, secondary derived grassland, riparian areas and lightly wooded farmland. Critical habitat is areas that have not had historical clearing, and are neither fragmented or degraded.	V	1	Unlikely – potential foraging and breeding habitat within the Development footprint is degraded and limited in extent. Vegetation within the development footprint lacks connectivity to surrounding habitat, particularly riparian corridors favoured by the species.
Tringa nebularia	Common Greenshank	Summer migrant to Australia. Recorded in most coastal regions of NSW; also, widespread west of the Great Dividing Range, especially between the Lachlan and Murray Rivers and the Darling River drainage basin, including the Macquarie Marshes, and north-west regions. Terrestrial wetlands	E, M	1	No – Development footprint not located in a coastal area. Development footprint not consistent with wetland or coastal habitats.

Scientific name	Common name	Habitat associations	EPBC Act status	BioNet records within 5 km	Likelihood of occurrence
		(swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans, saltflats, sewage farms and saltworks dams, inundated rice crops and bores) and sheltered coastal habitats (mudflats, saltmarsh, mangroves, embayment's, harbours, river estuaries, deltas, lagoons, tidal pools, rock-flats and rock platforms).			

Appendix C Assessment of Significance (EPBC Act)

This assessment has been prepared in accordance with the EPBC Act *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (CoA 2013). These guidelines have been established to assist proponents to determine whether a proposed action is likely to result in a significant impact on a MNES.

C1 *Pteropus poliocephalus* (Grey-headed Flying-fox)

The Grey-headed Flying-fox is listed as Vulnerable under the EPBC Act. The description and habitat associations of this species are presented in Appendix D. This species was not observed during field survey. The proposed action would impact a total of 0.38 ha of potential foraging habitat for the Grey-headed Flying-fox with myrtaceous species identified within the development footprint that can be utilised as feed trees. No camps will be affected by the proposed development. The closest Nationally Important Camp is located approximately 18.5 km south-east of the development footprint in Macquarie Fields. Other Flying-fox Camps nearby are located at Minchinbury (approximately 12.6 km north) and Wetherill Park (approximately 17.6 km north-east) (DCCEEW 2024b).

Table 34: Grey-headed Flying-fox (EPBC Act Assessment of Significance)

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	lead to a long-term decrease in the size of an important population of a species	The Grey-headed Flying-fox is considered to be a single, mobile population with individuals distributed across the entirety of its range in eastern Australia (DAWE 2021). No roosting habitat (camps) will be affected by the proposed action, with the closest Nationally Important Grey-headed Flying-fox camp located approximately 18.5 km away to the south-east. The proposed action would affect a combined total of 0.38 ha of potential foraging habitat for the Grey-headed Flying-fox which occurs in an existing modified and disturbed landscape. The Grey-headed Flying-fox is recorded as travelling long distances (up to 40 km) on nightly feeding forays. Given the availability of habitat within the species range and the small areas of potential habitat to be impacted within the Development footprint, the removal of this potential foraging habitat would not lead to the long-term decrease in the size of an important population of Grey-headed Flying-fox.
2)	reduce the area of occupancy of an important population	The proposed action would affect 0.38 ha of potential foraging habitat for this species. The Grey-headed Flying-fox is not known to occupy the Development footprint in the form of a camp but on the rare occasion may forage within the Development footprint. The Grey-headed Flying-fox is recorded as travelling long distances on feeding forays and could utilise similar foraging habitat outside of the Development footprint. Due to these reasons, the proposed action would not

Criterion	Question	Response
		reduce the area of occupancy of an important population of this species.
3)	fragment an existing important population into two or more populations	The National Recovery Plan for the Grey-headed Flying-fox (DAWE 2021) notes that the Grey-headed Flying-fox is considered to be a single, mobile population with individuals distributed across the entirety of its range in eastern Australia. Given the small area of potential foraging habitat to be impacted, the proposed action would not fragment an existing important population into two or more populations.
4)	adversely affect habitat critical to the survival of a species	The National Recovery Plan for the Grey-headed Flying-fox (DAWE 2021) identifies habitat critical to the survival of the species as containing winter and spring flowering myrtaceous plants including several species present in the Development footprint. The proposed action would affect 0.38 ha of potential foraging habitat. Habitat critical to the survival of the species may also include native species used for foraging within 20 km of a Nationally Important camp, with the nearest Nationally Important camp located 18.5 km to the south-east. Given this, the Development footprint contains habitat critical to the survival of the species. However, removal of this habitat is considered unlikely to have a significant impact on the species, given the minimal extent of potential foraging habitat to be impacted, the likely occurrence of higher quality foraging habitat available outside of the Development footprint and the species high mobility and large range.
5)	disrupt the breeding cycle of an important population	The proposed action would not disrupt the breeding cycle of the Grey-headed Flying-fox given that no camps would be affected by the development.
6)	modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action would remove 0.38 ha of potential foraging habitat for the Grey-headed Flying-fox. It is unlikely that the extent of this vegetation removal would cause the species to decline due to its small extent and the occurrence of larger expanses of foraging habitat likely available outside of the Development footprint.
7)	result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The proposed action is unlikely to result in the establishment of an invasive species that is harmful to the Grey-headed Flying-fox. Furthermore, the National Recovery Plan for the Grey-headed Flying-fox (DAWE 2021) does not have invasive species listed as a key threatening process for Grey-headed Flying-fox.
8)	introduce disease that may cause the species to decline, or	Grey-headed Flying-fox are reservoirs for several diseases, including the Australian bat Lyssavirus, which can cause clinical disease and mortality in Grey-headed Flying-fox. The risk of disease transmission is extremely low and rare, particularly outside of large camps and

Criterion	Question	Response
		therefore, the proposed action would not likely increase the incidence of this disease.
9)	interfere substantially with the recovery of the species.	The proposed action would remove 0.38 ha of potential foraging habitat for this species. However, given its small extent and the absence of any camps for the species, the proposed action is not expected to interfere substantially with recovery objectives listed in the National Recovery Plan for the Grey-headed Flying-fox (DAWE 2021).
Conclusion	Is there likely to be a significant impact?	No. The proposed action is unlikely to have a significant impact on the Grey-headed Flying-fox for the following reasons: • No camps would be disturbed by the proposed action. • Potential foraging habitat within the Development footprint is small in extent (0.38 ha) and occurs as isolated patches of remnant native vegetation in an existing modified environment. • Larger areas of higher quality, relatively undisturbed potential foraging habitat are likely still available within 20 km of the nearest Nationally Important camp. Therefore, it is not recommended that an EPBC Act referral be sought for Grey-headed Flying-fox.

C2 *Pultenaea parviflora*

Pultenaea parviflora is listed as Vulnerable under the EPBC Act. The description and habitat associations of this species are presented in Appendix B. This species was observed during the field survey and historical records occur within the Development footprint. Potential *P. parviflora* habitat within the development footprint includes patches of native vegetation conforming to PCT 3320 in moderate condition, totalling 0.38 ha.

The Commonwealth provides the following information about the definition of an important population:

> *What is an important population of a species?*
>
> *An 'important population' is a population that is necessary for a species' long-term survival and recovery.*
>
> *This may include populations identified as such in recovery plans, and/or that are:*
>
> - *key source populations either for breeding or dispersal*

- *populations that are necessary for maintaining genetic diversity, and/or*
- *populations that are near the limit of the species range.*

The individuals of *Pultenaea parviflora* within the development footprint are unlikely to be part of an important population.

Table 35: *Pultenaea parviflora* (EPBC Act – Assessment of Significance)

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	lead to a long-term decrease in the size of an important population of a species	The Conservation Advice for *Pultanaea parviflora* does not list any important populations for the species (DEWHA 2008). Areas within the Development footprint where species is predicted to occur (PCT 3320 Moderate) account for 0.38 ha. This vegetation occurs as isolated patches within an existing highly developed and modified environment. Populations can consist of anywhere between 10 to 5000+ individuals, with the population abundance an indication of previous disturbance, often due to fire (DEWHA 2008). A total of 36 recent historical records occur within 10 km of the Development footprint. Only two individuals were observed during field surveys, although targeted searches were not completed. Given the small extent of marginal habitat within the development footprint, the surrounding area consisting of highly modified land including transport infrastructure in the form of a roadway, and the presence of historical records in the surrounding landscape, the proposed action is not likely to lead to the long-term decrease in the size of an important population of the species.
2)	reduce the area of occupancy of an important population	The proposed action would affect 0.38 ha of potential habitat for *P. parviflora*. No vegetation is proposed to be retained within the Development footprint. However, given that the vegetation in the Development footprint is isolated within a highly modified environment, the potential area of occupancy for the species is restricted. Additionally, there are recent historical records of the species occurring in the surrounding landscape. Therefore, due to the small extent of habitat to be removed and the records of the species in the surrounding landscape, the proposed action is not likely to reduce the area of occupancy for an important population of *P. parviflora*.
3)	fragment an existing important population into two or more populations	The proposed development will not retain any vegetation within the Development footprint. As the potential habitat within the Development footprint is isolated in a highly modified environment, the proposed action is unlikely to fragment an existing important population into two or more populations.
4)	adversely affect habitat critical to the survival of a species	*Pultenaea parviflora* preferred habitat consists of scrubby or dry heaths within Castlereagh Ironbark Forest (DEWHA 2008). This vegetation community was not identified within the Development footprint. The species was observed as occurring in PCT 3320 *Cumberland Shale Plains Woodland* in a moderate condition which accounted for 0.38 ha of the development footprint. The impact is considered unlikely to have significant impact on habitat critical to the survival of the species given the minimal extent of potential habitat and the modified and disturbed landscape in which it is located. Additionally, larger areas of intact vegetation which may serve as potential habitat are located outside of the development footprint.
5)	disrupt the breeding cycle of an important population	The species relies upon disturbance by fire to reestablish and germinate in areas. Due to the development footprint being located in an area containing residential and transport infrastructure, it is predicted that natural fire events would occur

Criterion	Question	Response
		rarely. The proposed action is unlikely to result in the disruption of a breeding cycle for an important population of *P. parviflora*.
6)	modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action will remove 0.38 ha of potential habitat for *P. parviflora*. Given that the Development footprint is isolated in a highly modified environment alongside transport infrastructure in the form of a major roadway, and recent historical records of the species occurs within the surrounding landscape outside of the development footprint, it is unlikely that the proposed action would cause a decline in *P. parviflora*.
7)	result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Given the Development footprint is already in an existing highly modified environment adjacent to residential areas and transport infrastructure, as well as the fact that exotic species already occur adjacent to patches of potential habitat for *P. parviflora*, the proposed action is unlikely to result in the establishment of invasive species.
8)	introduce disease that may cause the species to decline, or	The Conservation Advice does not list any disease that is currently considered a threat to *P. parviflora*. It is unlikely the proposed action would introduce disease that could cause decline to *P. parviflora*.
9)	interfere substantially with the recovery of the species.	The proposed action would remove 0.38 ha of potential habitat for the *P. parviflora*. Given the small extent of potential habitat to be removed, its isolated location within a highly modified environment which includes a major roadway, and that recent historical records of the species occurs outside of the development footprint, it is unlikely that the proposed action would substantially interfere with the recovery of the *P. parviflora*.
Conclusion	Is there likely to be a significant impact?	No. The proposed action is unlikely to have a significant impact on the *P. parviflora* for the following reasons: • The small extent (0.38 ha) of potential habitat to be impacted. • The Development footprint vegetation is isolated in a highly modified environment which includes a major roadway. • The land uses and vegetation areas adjacent to potential habitat for the species, which includes large areas containing high coverage of exotic species, likely already restricts or inhibits ecological processes of the species such as the breeding cycle and dispersal. Therefore, it is not recommended that an EPBC Act referral be sought for *P. parviflora*.

Appendix D Floristic Plot Data

Family	Species	Common Name	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2		
								Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Fabaceae (Mimosoideae)	*Acacia baileyana*	Cootamundra Wattle	,				Shrub (SG)	M	2	2			
Fabaceae (Mimosoideae)	*Acacia falcata*		,				Shrub (SG)	M	1	20			
Apocynaceae	*Araujia sericifera*	Moth Vine	,		*	1		M	0.2	20	M	0.1	10
Rubiaceae	*Asperula conferta*	Common Woodruff	,				Forb (FG)				G	0.5	50
Poaceae	*Avena fatua*	Wild Oats	,		*						G	0.1	5
Poaceae	*Briza subaristata*		,		*	1					G	0.1	20
Acanthaceae	*Brunoniella australis*	Blue Trumpet	,				Forb (FG)	G	2	50			
Pittosporaceae	*Bursaria spinosa subsp. spinosa*	Native Blackthorn	,				Shrub (SG)	M	20	100	M	0.1	2
Poaceae	*Cenchrus clandestinus*	Kikuyu Grass	,		*	1		G	20	500	G	4	20
Poaceae	*Chloris gayana*	Rhodes Grass	,		*	1		G	20	1000	G	40	100
Anthericaceae	*Chlorophytum spp.*		,		*			G	0.2	20			
Asteraceae	*Cirsium vulgare*	Spear Thistle	,		*			G	0.1	10	G	0.5	10
Ranunculaceae	*Clematis glycinoides var. glycinoides*		,				Other (OG)	G	1	5			
Myrtaceae	*Corymbia maculata*	Spotted Gum	,				Tree (TG)	U	4	3			
Apiaceae	*Cyclospermum leptophyllum*	Slender Celery	,		*						G	0.1	20
Poaceae	*Cynodon dactylon*	Common Couch	,				Grass & grasslike (GG)	G	10	100	G	20	100

Family	Species	Common Name	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2		
								Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Phormiaceae	*Dianella longifolia var. longifolia*	A Blue Flax Lily	,				Forb (FG)	G	2	50	G	0.1	10
Poaceae	*Dichelachne micrantha*	Shorthair Plumegrass	,				Grass & grasslike (GG)	G	2	10			
Convolvulaceae	*Dichondra repens*	Kidney Weed	,				Forb (FG)	G	1	20			
Fabaceae (Faboideae)	*Dillwynia sieberi*		,				Shrub (SG)	M	0.5	20			
Poaceae	*Ehrharta erecta*	Panic Veldtgrass	,		*	1		G	1	50			
Chenopodiaceae	*Einadia hastata*	Berry Saltbush	,				Forb (FG)	G	0.2	10			
Chenopodiaceae	*Einadia nutans subsp. nutans*	Climbing Saltbush	,				Forb (FG)	G	3	20			
Celastraceae	*Elaeodendron australe var. australe*		,				Shrub (SG)	M	2	1			
Poaceae	*Eragrostis curvula*	African Lovegrass	,		*	1		G	5	20			
Myoporaceae	*Eremophila debilis*	Amulla	,				Shrub (SG)						
Myrtaceae	*Eucalyptus fibrosa*	Red Ironbark	,				Tree (TG)	U	8	1			
Myrtaceae	*Eucalyptus moluccana*	Grey Box	,				Tree (TG)	U	15	5			
Fabaceae (Faboideae)	*Glycine clandestina*	Twining glycine	,				Other (OG)				G	0.1	10
Fabaceae (Faboideae)	*Glycine tabacina*	Variable Glycine	,				Other (OG)	G	0.1	5	G	0.1	10
Proteaceae	*Grevillea spp.*		,				Shrub (SG)	M	5	4			
Fabaceae (Faboideae)	*Hardenbergia violacea*	False Sarsaparilla	,				Other (OG)	G	0.2	10			
Asteraceae	*Hypochaeris radicata*	Catsear	,		*						G	0.1	20
Fabaceae (Faboideae)	*Indigofera australis*	Australian Indigo	,				Shrub (SG)	M	5	20			

Family	Species	Common Name	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2		
								Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Linaceae	*Linum marginale*	Native Flax	,				Forb (FG)				G	0.1	10
Linaceae	*Linum trigynum*	French Flax	,		*						G	0.1	5
Poaceae	*Lolium spp.*	A Ryegrass	,		*			G	0.1	10	G	0.1	10
Fabaceae (Faboideae)	*Lotus spp.*		,				Forb (FG)				G	0.1	20
Primulaceae	*Lysimachia arvensis*	Scarlet Pimpernel	,		*						G	0.2	50
Apocynaceae	*Marsdenia viridiflora subsp. viridiflora*	Native Pear	,				Other (OG)	M	0.1	1			
Oleaceae	*Olea europaea subsp. cuspidata*	African Olive	,		*			M	5	50	M	3	10
Asteraceae	*Olearia viscidula*	Wallaby Weed	,				Shrub (SG)	M	0.2	2			
Oxalidaceae	*Oxalis spp.*		,				Forb (FG)	G	0.2	10			
Poaceae	*Paspalum dilatatum*	Paspalum	,		*	1					G	10	100
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	,		*						G	0.5	50
Fabaceae (Faboideae)	*Pultenaea parviflora*		BC E, EPBC V				Shrub (SG)	M	0.1	1			
Poaceae	*Rytidosperma monticola*	Mountain Wallaby Grass	,				Grass & grasslike (GG)	M	0.1	5			
Asteraceae	*Senecio madagascariensis*	Fireweed	,		*	1		G	0.2	50	G	0.1	50
Asteraceae	*Senecio pterophorus*		,		*			G	0.1	5			
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	,		*			G	0.1	20	G	0.1	10
Solanaceae	*Solanum sisymbriifolium*		,		*			G	0.2	20	G	0.1	5
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	,		*			G	0.2	20	G	0.1	20

Family	Species	Common Name	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2		
								Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Asteraceae	*Sonchus spp.*	Sowthistle	,				Forb (FG)				G	0.1	10
Poaceae	*Themeda triandra*		,				Grass & grasslike (GG)	G	5	100	G	20	100
Verbenaceae	*Verbena bonariensis*	Purpletop	,		*						G	0.1	5
Fabaceae (Faboideae)	*Vicia sativa subsp. sativa*	Common Vetch	,		*						G	2	100

*Indicates exotic species

Appendix E Vegetation Integrity Plot Data

PLOT 1

Eco Logical Australia – BAM Plot Data Sheet	
Plot number / name	1
Project number	24SYD8475X
Date (DD/MM/YY)	4/10/2024
Recorder(s)	Daniel McDonald
Zone (In Collector, 56, 55)	56
Easting (Unless recorded in Collector)	289995
Northing (Unless recorded in Collector)	6249881
Plot orientation	280°
Slope (degrees and direction)	2° slope, 10° N

Growth form groups	Total number of species	Total Cover (%)
Tree (TG)	3	27.0
Forb (FG)	7	9.4
Shrub (SG)	10	35.9
Grass & grasslike (GG)	3	17.0
Other (OG)	4	1.4
Fern (EG)	0	0.0
High Threat Weeds	6	46.4

Litter sub plots	Average (%)	5m	15m	25m	35m	45m
Litter cover %	31	10	40	40	15	50

Stem size classes (DBH)	
5-9 cm	1
10-19 cm	1
20-29 cm	1
30-49 cm	1

Stem size classes (DBH)	
50-79 cm	1
80 cm +	1
Number of large trees	3

Other Integrity Attributes	
Number of trees with hollows	1
Regeneration (stems <5 cm)	1
Total length fallen logs >10 cm width (m)	14

PLOT 2

Eco Logical Australia – BAM Plot Data Sheet	
Plot number / name	2
Project number	24SYD8475X
Date (DD/MM/YY)	4/10/2024
Recorder(s)	Daniel McDonald
Zone (In Collector, 56, 55)	56
Easting (Unless recorded in Collector)	289581
Northing (Unless recorded in Collector)	6249940
Plot orientation	280°
Slope (degrees and direction)	2° slope, 10° N

Growth form groups	Total number of species	Total Cover (%)
Tree (TG)	0	0.0
Forb (FG)	5	0.9
Shrub (SG)	1	0.1
Grass & grasslike (GG)	2	40.0
Other (OG)	2	0.2
Fern (EG)	0	0.0
High Threat Weeds	6	54.3

Litter sub plots	Average (%)	5m	15m	25m	35m	45m
Litter cover %	9	10	15	5	5	10

Stem size classes (DBH)	
5-9 cm	0
10-19 cm	0
20-29 cm	0
30-49 cm	0
50-79 cm	0
80 cm +	0

Stem size classes (DBH)	
Number of large trees	0

Other Integrity Attributes	
Number of trees with hollows	0
Regeneration (stems <5 cm)	0
Total length fallen logs >10 cm width (m)	0

Appendix F Credit Summary

BAM Credit Summary Report

Proposal Details

Assessment Id
00052142/BAAS18064/24/00052143

Proposal Name
Burrah Park - Elizabeth Drive Intersection

BAM data last updated *
24/10/2024

Assessor Name
Michelle Frolich

Report Created
25/10/2024

BAM Data version *
Current classification (live - default) (74)

Assessor Number
BAAS18064

BAM Case Status
Finalised

Date Finalised
25/10/2024

Assessment Revision
0

Assessment Type
Major Projects

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

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Cumberland Shale Plains Woodland												
1	3320_Moderate	Cumberland Plain Woodland in the Sydney Basin Bioregion	62.1	61.1	0.38	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	15
2	3320_DNG	Cumberland Plain Woodland in the Sydney Basin Bioregion	10.2	9.2	0.46	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	0
											Subtotal	**15**
											Total	**15**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Deyeuxia appressa / Deyeuxia appressa (Flora)									
3320_DNG	N/A	N/A	1	Geographic Distribution	Ecology or response to management is poorly known	Endangered	Endangered	True	3
								Subtotal	**3**

Marsdenia viridiflora subsp. viridiflora - endangered population / Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas (Flora)									
3320_Moderate	61.1	61.1	0.38	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered Population	Not Listed	False	12
								Subtotal	**12**
Pultenaea parviflora / Pultenaea parviflora (Flora)									
3320_Moderate	61.1	61.1	0.38	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	12
								Subtotal	**12**

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00052142/BAAS18064/24/00052143

Proposal Name
Burrah Park - Elizabeth Drive Intersection

BAM data last updated *
24/10/2024

Assessor Name
Michelle Frolich

Assessor Number
BAAS18064

BAM Data version *
Current classification (live - default) (74)

Proponent Names

Report Created
25/10/2024

BAM Case Status
Finalised

Assessment Revision
0

Assessment Type
Major Projects

Date Finalised
25/10/2024

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

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered Ecological Community	3320-Cumberland Shale Plains Woodland

Species
Deyeuxia appressa / Deyeuxia appressa

BAM Biodiversity Credit Report (Like for like)

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo
Ephippiorhynchus asiaticus / Black-necked Stork

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3320-Cumberland Shale Plains Woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion	0.8	15	0	15

BAM Biodiversity Credit Report (Like for like)

3320-Cumberland Shale Plains Woodland	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 3319, 3320	-	3320_Moderate	Yes	15	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 3319, 3320	-	3320_DNG	No	0	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Deyeuxia appressa / Deyeuxia appressa	**3320_DNG**	1.0	3.00
Marsdenia viridiflora subsp. viridiflora - endangered population / Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	**3320_Moderate**	0.4	12.00
Pultenaea parviflora / Pultenaea parviflora	**3320_Moderate**	0.4	12.00

Credit Retirement Options

Like-for-like credit retirement options

Deyeuxia appressa / Deyeuxia appressa	Spp	IBRA subregion
	Deyeuxia appressa / Deyeuxia appressa	Any in NSW
Marsdenia viridiflora subsp. viridiflora - endangered population / Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	Spp	IBRA subregion
	Marsdenia viridiflora subsp. viridiflora - endangered population / Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	Any in NSW
Pultenaea parviflora / Pultenaea parviflora	Spp	IBRA subregion
	Pultenaea parviflora / Pultenaea parviflora	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00052142/BAAS18064/24/00052143

Proposal Name

Burrah Park - Elizabeth Drive Intersection

BAM data last updated *

24/10/2024

Assessor Name

Michelle Frolich

Assessor Number

BAAS18064

BAM Data version *

Current classification (live - default) (74)

Proponent Name(s)

Report Created

25/10/2024

BAM Case Status

Finalised

Assessment Revision

0

Assessment Type

Major Projects

Date Finalised

25/10/2024

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

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered Ecological Community	3320-Cumberland Shale Plains Woodland

Species
Deyeuxia appressa / Deyeuxia appressa

Additional Information for Approval

PCT Outside Ibra Added

None added

BAM Biodiversity Credit Report (Variations)

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo
Ephippiorhynchus asiaticus / Black-necked Stork

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3320-Cumberland Shale Plains Woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion	0.8	15	0	15.00

3320-Cumberland Shale Plains Woodland

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 3319, 3320	-	3320_Moderate	Yes	15	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 3319, 3320	-	3320_DNG	No	0	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Deyeuxia appressa / Deyeuxia appressa	**3320_DNG**	1.0	3.00
Marsdenia viridiflora subsp. viridiflora - endangered population / Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	**3320_Moderate**	0.4	12.00
Pultenaea parviflora / Pultenaea parviflora	**3320_Moderate**	0.4	12.00

Credit Retirement Options

Like-for-like options

Deyeuxia appressa/ Deyeuxia appressa

Spp	IBRA region
Deyeuxia appressa/Deyeuxia appressa	Any in NSW

Variation options

Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

	Flora	Endangered	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Marsdenia viridiflora subsp. viridiflora - endangered population/ Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	Spp	IBRA region	
	Marsdenia viridiflora subsp. viridiflora - endangered population/Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Flora	Endangered Population	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Pultenaea parviflora/ Pultenaea parviflora	Spp	IBRA region	
	Pultenaea parviflora/Pultenaea parviflora	Any in NSW	
	Variation options		

	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Flora	Endangered	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Appendix G Staff CVs

Daniel McDonald

Principal Ecologist

Daniel is an ecologist with over 25 years of experience in both ecological and arboricultural consulting and research sectors. He is Principal Ecologist and Senior Arborist in Eco Logical Australia's Sydney Office.

Daniel has post-graduate qualifications in plant science and extensive experience in plant surveys, particularly within the general Central Coast, Sydney, Wollongong and Blue Mountains regions. He has worked widely across NSW and has experience in rainforests, both dry and wet sclerophyll forests, grassy woodlands, grasslands, heathlands, alpine areas, forested, freshwater and saline wetlands and in semi-arid and arid vegetation.

His work has focused on biodiversity impact assessment and experience in negotiations both with clients and government consent authorities.

His arboricultural work includes both tree impact assessment and the risks associated with trees.

Daniel has an ongoing interest in population biology of both plants and animals.

QUALIFICATIONS

- PhD (Plant genetics and plant reproductive biology), The University of Sydney
- Diploma of Arboriculture (AQF5), Ryde TAFE
- M.Agr (Genetics, plant and fungal biology), The University of Sydney
- B. Sc. Agr, The University of Sydney
- Cert IV (Spatial Information Systems – GIS), National Environment Centre, TAFE NSW
- Accredited Biobanking Assessor (0075)
- Accredited BAM Assessor (BAAS17056)
- Quantified Tree Risk Assessment (QTRA) registered user No. 4107
- Senior First Aid (remote areas)
- Work Health and Safety General Construction Induction (SafeWork NSW) White card
- National Licence To Perform High Risk Work (SafeWork NSW) (Classes and Description: WP = Boom Type Elevating Work Platform)
- Rail Industry Worker Card (Australian Railway Association) – Similar to a RISI card

PROJECT EXPERIENCE

- Negotiation on behalf of clients with organisations including: DPIE (Department of Planning, Industry and Environment, previously OEH), NSW National Parks & Wildlife Service (part of DPIE), NSW Department of Planning, NSW Office of Water, NSW Fisheries, NSW CMAs (now Local Land Services), the Commonwealth and local governments. The aim of the negotiations is to secure an outcome for the client while securing a neutral or net benefit to the local and regional biodiversity.
- Expert witness work for both ecological matters and arboricultural matters.
- Project sizes: small up to $800 million.
- Project types: commercial & industrial, linear infrastructure – powerlines, roads, telecommunication and pipelines, residential dwelling through to high rise, retirement villages, campsites, agricultural areas, sporting areas, subdivisions and land rezoning, waste management centres, mining, surveys of areas to be considered for biodiversity conservation.

- Report types completed include: Biodiversity Development Assessment Reports (BDARs), Flora, Fauna and Vegetation Impact Assessments, Vegetation Management Plans, Arboricultural Reports, Specialist Flora, Fauna or Vegetation Assessments, REFs, SEEs, Environmental Work Plans, Biodiversity Plans, Biobanking Assessments, Basic Bushfire Assessments, Biodiversity Assessments for inclusion in the reserve system and Landscape Plans, Background development work for BSSARs (Biodiversity StewardShip Assessment Report).

Michelle Frolich

Principal Consultant/Ecologist

Biodiversity Offsets & Ecology Lead

Michelle is a Principal Consultant, Ecologist and Biodiversity Offset Specialist with over 14 years' experience in BioBanking, Biocertification, Biodiversity Assessments, ecological impact assessment, Geographic Information Systems and ecological surveys.

She has a thorough understanding and detailed technical knowledge of the NSW Biodiversity Assessment Method (BAM), BioBanking Assessment Methodology (BBAM), Biodiversity Certification Assessment Methodology (BCAM) and the Framework for Biodiversity Assessment (FBA) for Major Projects. She has also completed the Biodiversity Assessment Method (BAM) training course and is a BAM Accredited Assessor under the NSW *Biodiversity Conservation Act 2016*.

Michelle also has experience in Geographic Information Systems such as ESRI ArcGIS and MapInfo Professional. Michelle is an experienced project manager with skills in field surveys, vegetation stratification, data analysis, mapping, ecological assessments and reporting. She has developed and delivered internal training to staff and mentors junior and senior staff on biodiversity assessment using the BAM.

Michelle has also participated in seminars, delivering presentations on the NSW Biodiversity Offsets Scheme to the Australian Institute of Administrative Law (NSW) and the Environment and Planning Law Association NSW. She also has highly developed communication and organisation skills, which she applies when dealing with project teams, clients and government agencies. Michelle has previously worked in other ecological consultancies and NSW Government agencies.

QUALIFICATIONS

- Bachelor of Science (Marine Science Honours), University of Sydney, 2007
- BioBanking and Bio-Certification Assessors Training Courses, 2010 and 2013
- Biodiversity Offset Scheme and Biodiversity Assessment Method Training Course, 2017
- BAM Accredited Assessor (BAAS #18064)
- BAM Re-accreditation Course, 2022
- BioBanking, Bio-certification and Framework for Biodiversity Assessment

PROJECT EXPERIENCE

BIODIVERSITY STEWARDSHIP AGREEMENT ASSESSMENTS

Michelle has extensive knowledge and experience in preparing Biodiversity Stewardship Agreement assessments and applications and has prepared seven Biodiversity Stewardship Site Assessments in accordance with the Biodiversity Assessment Methodology and Biodiversity Conservation Act 2016 including:

- A 200 ha site near Crookwell in the Lachlan Shire for a rural land owner (registered)
- A 30 ha site at Picton in the Wollondilly Shire for a rural land owner (registered)
- A 25 ha site in the Camden LGA for Camden Council
- A 40 ha site at Brownlow Hill (Stage 5) in the Wollondilly Shire for a rural land owner (registered)
- A 160 ha site at Brownlow Hill (Stage 6) in the Wollondilly Shire for a rural land owner (registered)
- A 30 ha site at Alpine, southern highlands, for a rural land owner
- A 560 ha site at Rye Park in the Hilltops Shire for a rural land owner (registered).

She is also currently preparing several Biodiversity Stewardship Site Assessments for landowners including:

- A 160 ha site in Western Sydney in the Wollondilly Shire
- A 20 ha site in Western Sydney in the Campbelltown City Council Local Government Area
- A 30 ha site in the Jervis Bay region
- A 40 ha site in the Jervis Bay region
- A 4,000 ha site in the Murray-Darling Region
- A 3,000 ha site in the Murray-Darling Region
- A 7,000 ha site in the Murray-Darling Region.

BIOBANKING AGREEMENT ASSESSMENTS

- Michelle has prepared several Biobanking assessments under the now repealed *Threatened Species Conservation Act 1999* for several sites including:
- A 350 ha site at Crooked Corner (Glenara) for Glenara Pastoral Pty Ltd (Agreement No. 353 May 2018)
- A 150 ha site at Oaklands (Hardwicke Stage 2) in Wollondilly Shire Council (Agreement No. 213, registered November 2018)
- A 80 ha site at Coal Cliff (Illawarra Coke) for the Illawarra Coking Company (Agreement No. 349, registered February 2019)
- A 184 ha site (Tangari) near Glenn Innes for White Rock Windfarm (Agreement No. 453, registered February 2019)
- A 40 ha site at Elderslie (Gundungurra Reserve) for Camden Council Council (Agreement No. 397, registered May 2019).

BIODIVERSITY CERTIFICATION ASSESSMENTS (TSC ACT)

- Michelle has assisted with the preparation of several Biodiversity Certification Assessments under the now repealed *Threatened Species Conservation Act 1999* including:
- Port Macquarie Airport and Area 13 Urban Release Area (Port Macquarie Hastings Council). Biodiversity Certification conferred October 2018
- Tuncurry State Significant Site (Urban Growth NSW). Application reviewed by OEH with exhibition scheduled in 2020
- Jacaranda Ponds Urban Release Area, Glossodia (Hawkesbury City Council). Certification conferred in 2020
- Mount Gilead Urban Release Area Stage 2 (Campbelltown City Council) Application submitted to DPIE August 2019

She has also assisted with Biodiversity Certification Assessments for mines in the Upper Hunter Valley as part of the Upper Hunter Strategic Assessment including:

- Bengalla Mine
- Mt Pleasant Mine
- Dartbrook Mine.

FRAMEWORK FOR BIODIVERSITY ASSESSMENT FOR MAJOR PROJECTS (TSC ACT)

- Assessment of State Significant Developments using the Framework for Biodiversity Assessment (FBA) for Major Projects including projects in the Greater Sydney, Central West, South Coast and Northern Tablelands for large-scale infrastructure projects, wind farms and utility services.

ECOLOGICAL IMPACT ASSESSMENT

- Biodiversity Development Assessment Reports for developments and Major Projects under the BAM
- Preparation of Biodiversity Development Assessment Report Waivers for Major Projects under the Biodiversity Conservation Act 2016
- Flora and Fauna Assessments for proposed developments in the Greater Sydney region and across NSW
- Species Impact Statements for proposed developments in Western Sydney and the Lower Hunter Valley

ECOLOGICAL SURVEYS

- Botanical surveys in the Greater Sydney, Southern Highlands, Upper and Lower Hunter Valley, Northern Tablelands and Southern Slopes regions, including vegetation and Plant Community Type mapping and condition stratification
- Plant Community Type and vegetation condition mapping in the Murray-Darling Depression and Riverina Bioregions

- Floristic surveys including biometric plot data collection in accordance with the BBAM
- Floristic and vegetation integrity survey plot collection in accordance with the BAM in Western Sydney, Far South-west region (Murray-Darling and Riverina), Southern Highlands and Southern Tablelands.
- Targeted surveys for threatened flora and fauna species in the Far South-west, Southern Highlands, Hunter Valley, Central West and Greater Sydney regions
- Feral animal monitoring for a mine within the Hunter Valley
- Pre-clearing and clearing supervision.

OTHER EXPERTISE

- Geographic Information Systems using ArcGIS ArcMap and ArcPro
- Complex analysis of field collected data
- Data management.

Hamish Pritchard

Ecologist

Hamish is an Ecologist and part of our Sydney team, who has a focus on fauna. Hamish has developed a range of skills from his previous professional experience including targeted threatened species surveys, ecological surveys, weed management, surface and ground water sampling, and soil sampling.

Hamish has been involved in a number of projects over his career which have involved survey and management of bird species, including for threatened species, and has undertaken dawn/dusk surveys, dusk call playback, fauna habitat searches and pre- and post-clearance surveys. Additionally, Hamish has also volunteered with conservation organizations including Bush Heritage and Bird Life Australia to undertake bird census and threatening species survey.

A graduate of University of Wollongong with a Bachelor of Conservation Biology degree, Hamish is looking to further improve his skill set and experience in the ecology space with ELA.

QUALIFICATIONS

- Bachelor of Conservation Biology (Honours), University of Wollongong
- Provide Cardiopulmonary Resuscitation (HLTAID001)

PROJECT EXPERIENCE

- Campbelltown Road, Glenfield: Landcom (2024) – vegetation survey following BAM, targeted threatened flora survey, weed survey, Koala survey following SAT methodology, data analysis and preparation of reports including a BDAR, BMP, biodiversity approvals report and Koala activity report.
- Sydney Zoo SSD Modification: Sydney Zoo (2024) – vegetation survey following BAM, data analysis and preparation of a BDAR.
- Majura Lane, Canberra (2024) – targeted threatened species survey including bird dusk/dawn surveys, dusk call playback and spotlighting surveys.
- Barwon River Tree Survey: DPE (2024) – condition assessment of riparian ecological communities along the Barwon River.
- Waterloo Road SSD: NextDC (2024) – vegetation survey following BAM, data analysis and preparation of a BDAR.
- Manly Dam Link Trail REF: Northern Beaches Council (2024) – vegetation survey and preparation of a review of environmental factors.
- Rowan Village, South Wagga (2024) – remote camera setup and image analysis.
- Huntlee Primary School and High School Due Diligence: SINSW (2024) – preparation of a constraints report.
- SWBTA ASMTI: Laing O'Rourke (2021-2023) – threatened species surveys, ecological surveys, pre-clearance surveys, fauna spotter catcher services including for dewatering works, weed surveys, surface water sampling, groundwater sampling, soil sampling, bore hole installation, environmental management plan reviews, environmental auditing.
- Fitzroy river and tributaries surveys: Fitzroy Basin Association (2021-2023) – fish surveys, macroinvertebrate sampling, environmental DNA sampling, riparian vegetation surveys, surface water sampling.

- Rockhampton Ring Road proposal: Transport and Main Roads (2022) – ecological surveys, pre-clearance surveys, fauna spotter catcher services, weed surveys.
- Mount Mackenzie mine proposal: Mount Mackenzie Mines (2021) – targeted threatened species surveys, flora surveys, weed surveys.
- Compliance surveys: Rockhampton Regional Council (2022-2023) – surface water sampling, groundwater sampling, soil sampling, waste auditing.
- Mine site work: QMAG (2021-2023) – pre-clearance surveys, fauna spotter catcher services, weed management.
- Wet weather overflow abatement program: Sydney Water (2019-2021) – macroinvertebrate sampling and identification, environmental DNA sampling, riparian vegetation surveys, polar organic chemical integrative sampler installation and collection, surface water sampling.

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