



Eastern Creek Recycling Ecology Park Recycling Infrastructure Optimisation Project

Appendix P Biodiversity Development Assessment Report



June 2022

EASTERN CREEK REP: RECYCLING INFRASTRUCTURE OPTIMISATION PROJECT

Biodiversity Development Assessment Report -Final

DECEMBER 2021

Incorporating



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EASTERN CREEK RECYCLING INFRASTRUCTURE OPTIMISATION PROJECT

Biodiversity Development Assessment Report - FINAL

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GLOSSARY AND ACRONYMS

Term	Meaning
Acronyms	
BAM	Biodiversity Assessment Method as specified under the BC Act
BAMC	Biodiversity Assessment Method Calculator
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BC Reg	NSW <i>Biodiversity Conservation Regulation 2017</i>
BC (Savings and Transitional) Reg	NSW <i>Biodiversity Conservation (Savings and Transitional) Regulation 2017</i>
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
CEMP	Construction Environmental Management Plan
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DPI	NSW Department of Primary Industries
DPE (EES)	NSW Department of Planning and Environment (Environment, Energy and Science)
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FM Act	NSW <i>Fisheries Management Act 1994</i>
GDE	Groundwater Dependent Ecosystem
IBRA	Interim Biogeographically Regionalisation of Australia
MNES	Matters of National Environmental Significance
OEH	NSW Office of Environment and Heritage (now DPE (EES))
PCT	Plant Community Type
SAII	Serious and Irreversible Impact
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SSI	Stage Significant Infrastructure
Subject land	The area of land subject to investigation and defined in BAM (DPE 2020)
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
VIS	Vegetation Information System

EXECUTIVE SUMMARY

Dial-A-Dump (EC) (DADEC) Pty Ltd, (the Applicant) (as owned by Bingo Industries Pty Ltd (Bingo)) operate the Eastern Creek Recycling Ecology Park (REP), located at 1 Kangaroo Avenue, Eastern Creek (formerly known as the Genesis Waste Management Facility) ('the Proposal Site'). The current approval allows for a total throughput of 2 million tonnes per annum (Mtpa), of which up to 1 Mtpa may be landfilled (excluding residual chute waste) with the remaining 1 Mtpa processed for resource recovery. The Eastern Creek REP comprises of a number of resource recovery facilities and activities including:

- Two materials processing centres known as Materials Processing Centre 1 (MPC1) and Materials Processing Centre 2 (MPC2) which predominantly process dry construction and demolition (C&D) and commercial and industrial (C&I) waste
- A Segregated Materials Area (SMA) which is principally used for the receipt, processing dispatch and stockpiling of inert C&D materials, such as sand, dirt, concrete, bricks and asphalt.

The Eastern Creek REP is approaching the current 2 Mtpa throughput limit, with this limit to be reached within the next few years.. The Applicant is therefore proposing to increase the total throughput of the Eastern Creek REP by 950,000 tonnes per annum (tpa) and carry out minor infrastructure upgrades works across the Proposal Site (the Proposal). The Proposal aims to further unlock the potential of the strategically significant Eastern Creek REP, with benefits of scale and optimal location within the Sydney transport network to respond to market demand and the policies of both the NSW and Commonwealth governments for expanded and enhanced resource recovery infrastructure. The Proposal would consist of predominantly dry C&D and C&I waste, consistent with existing waste streams received at the Eastern Creek REP.

The Proposal is considered State Significant Development (SSD) under Clause 23 (waste and resource management facilities) of Schedule 1 of the *State Environmental Planning Policy (Planning Systems) 2021*. As a result, this environmental impact statement (EIS) is seeking approval, under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the construction and operation of the proposed throughput increase and required supporting infrastructure. This Biodiversity Development Assessment Report (BDAR) has been prepared by Arcadis to support the preparation of the EIS and assess the Proposal's impact on the biodiversity of the Proposal Site and immediate surrounds.

Proposal overview

The Proposal would include the upgrade and construction of supporting infrastructure to optimise the current operations at the Eastern Creek REP and facilitate the increased throughput proposed to be received at the Proposal Site. It is proposed to develop the Proposal in three stages:

- **Stage 1: Initial throughput and on site upgrades:** Stage 1 would comprise 500,000 tpa of additional throughput to be received at the Eastern Creek REP to enhance resource recovery outcomes by increasing utilisation of onsite processing capabilities
- **Stage 2: Internal site optimisation:** Stage 2 would facilitate the remaining throughput increase (an additional 450,000 tpa of the total 950,000 tpa proposed) to be received and processed across the Eastern Creek REP and operation of one of two proposed new exit connections. It would also include:
 - The construction and operation of a new exit connection to the Honeycomb Drive extension and installation of two associated outbound weighbridges and a dedicated weighbridge office
 - The construction and operation of a new exit connection to Kangaroo Avenue in the north east of the Proposal Site and the installation of two associated outbound weighbridges and a dedicated weighbridge office
 - Upgrade of existing internal roads as required
 - Earthworks for Stage 3 site establishment
 - Additional carparking and amenities

- **Stage 3: Installation of supporting infrastructure:** Stage 3 would comprise the redevelopment of the north-eastern corner of the Proposal Site. This would comprise:
 - Construction and operation of a Site Workshop (relocating this activity from elsewhere within the Proposal Site to a dedicated enclosed facility)
 - Construction and operation of a skip bin Maintenance and Manufacturing Workshop
 - Installation of landscaping, signage, security fencing and finishing works.

Purpose of this assessment

This BDAR has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) as they relate to biodiversity, including:

- 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, except where a waiver for preparation of a BDAR has been granted.

The Proposal meets the criteria for SSD under the *Environmental Planning and Assessment Act 1979*, triggering the need for a BDAR under the *Biodiversity Conservation Act 2016* and entry into the Biodiversity Offsets Scheme (BOS).

Existing environment

The subject land (being the Proposal Site and the area of land that would be directly impacted by the Proposal) contains approximately 22.88 hectares of vegetation which consists of native (0.4 hectares) and non-native (22.48 hectares) vegetation. The native vegetation required to be cleared is consistent with the Plant Community Type 849 - *Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion*.

Surveys were undertaken on and included vegetation plot data, fauna habitat assessment, targeted threatened flora and fauna surveys, modified Koala Spot Assessment Technique and microbat echolocation call analysis.

The vegetation within the subject land comprises one Plant Community Type (PCT) and two vegetation zones within the Cumberland subregion of the Sydney Basin Interim Biogeographic Regionalisation for Australia (IBRA) region. The only native vegetation to be removed is 0.28 hectares of PCT 849 planted. Two non-native vegetation communities that are not equivalent to a PCT are also present in the subject land. Vegetation zones within the subject land, their PCT and their calculated vegetation integrity scores are summarised in Table E-01-1 below.

Table E-0-1: PCTs and vegetation zones identified in the subject land

PCT ID	PCT Name	Vegetation zone	Vegetation integrity score	Extent in the subject land (ha)	Extent in the impact area (ha)
849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	849_planted	32.1	0.38	0.28
849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	849_moderate/good	58.4	0.02	0
Other vegetation types		Exotic grassland	N/A	20.85	7.36
		Exotic/planted trees and shrubs	N/A	1.63	0.98
Total area native vegetation (ha)				0.4	0.28

PCT ID	PCT Name	Vegetation zone	Vegetation integrity score	Extent in the subject land (ha)	Extent in the impact area (ha)
Total area vegetation (native and non-native) (ha)				22.88	8.62

The areas of PCT 849 within the subject land are consistent with the Cumberland Plain Woodland in the Sydney Basin Bioregion Threatened Ecological Community (TEC), listed as critically endangered under the NSW *Biodiversity Conservation Act 2016* (BC Act). It does not meet the condition criteria to be listed under Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

One threatened flora species, the Wallangarra White Gum (*Eucalyptus scoparia*), was tentatively identified within the subject land. This species is locally indigenous to the Tenterfield region within the New England Tablelands and is not native to the Sydney area. Therefore, the individual tree identified in the subject land should be treated as planted vegetation and is not considered to be of conservation significance. No additional threatened flora species were recorded within the subject land during targeted surveys as part of this assessment.

Fifty three threatened fauna species have the potential to occur on the subject land and were assessed for potential occurrence and impact as part of this assessment. An additional ten migratory species, listed under the EPBC Act were also assessed. One migratory species was observed on the subject land (Rufous Fantail (*Rhipidura rufifrons*)). Potential impacts from construction and operation of the Proposal on this species are considered to be minimal, given the habitat that will be cleared is highly modified and consists of only a small area, which does not constitute important habitat for this species. Therefore, a referral to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) is not recommended. No other threatened species listed under the EPBC Act were recorded or considered likely to occur.

Two microbat species listed as vulnerable under the BC Act were recorded as possibly occurring using echolocation call analysis – the Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*) which is an ecosystem species and Large Bent-wing Bat (*Miniopterus orianae oceanensis*) which is a dual credit species under the Biodiversity Assessment Method (BAM). As no breeding habitat for Large Bent-wing Bat would be impacted by the Proposal, offsets for these species comprise ecosystem credits and are accounted for in the vegetation offsets for the Proposal in accordance with the Biodiversity Assessment Method Calculator (BAMC).

Offsets for the Proposal were calculated using the BAMC- Six ecosystem credits are required to offset the removal of 0.28 hectares of the *PCT 849 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion*.

BAM (STAGE 1): BIODIVERSITY ASSESSMENT

1 INTRODUCTION

Dial-A-Dump (EC) (DADEC) Pty Ltd, (the Applicant) (as owned by Bingo Industries Pty Ltd (Bingo) operate the Eastern Creek Recycling Ecology Park (REP), located at 1 Kangaroo Avenue, Eastern Creek (formerly known as the Genesis Waste Management Facility) ('the Proposal Site'). The current approval allows for a total throughput of 2 million tonnes per annum (Mtpa), of which up to 1 Mtpa may be landfilled (excluding residual chute waste) with the remaining 1 Mtpa processed for resource recovery. The Eastern Creek REP comprises of a number of resource recovery facilities and activities including:

- Two materials processing centres known as Materials Processing Centre 1 (MPC1) and Materials Processing Centre 2 (MPC2) which predominantly process dry construction and demolition (C&D) and commercial and industrial (C&I) waste
- A Segregated Materials Area (SMA) which is principally used for the receipt, processing dispatch and stockpiling of inert C&D materials, such as sand, dirt, concrete, bricks and asphalt.

The Eastern Creek REP is approaching the current 2 Mtpa throughput limit, with this limit to be reached within the next few years. The Applicant is therefore proposing to increase the total throughput of the Eastern Creek REP by 950,000 tonnes per annum (tpa) and carry out minor infrastructure upgrades works across the Proposal Site (the Proposal). The Proposal aims to further unlock the potential of the strategically significant Eastern Creek REP, with benefits of scale and optimal location within the Sydney transport network to respond to market demand and the policies of both the NSW and Commonwealth governments for expanded and enhanced resource recovery infrastructure. The Proposal would consist of predominantly dry C&D and C&I waste, consistent with existing waste streams received at the Eastern Creek REP.

The Proposal is considered State Significant Development (SSD) under Clause 23 (waste and resource management facilities) of Schedule 1 of the *State Environmental Planning Policy (Planning Systems) 2021*. As a result, this environmental impact statement (EIS) is seeking approval, under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the construction and operation of the proposed throughput increase and required supporting infrastructure. This Biodiversity Development Assessment Report (BDAR) has been prepared by Arcadis to support the preparation of the EIS and assess the Proposal's impact on the biodiversity of the Proposal Site and immediate surrounds.

This BDAR has been prepared by Elvira Lanham, an Accredited Person (BAAS20012) under the New South Wales (NSW) *Biodiversity Conservation Act 2016* (BC Act).

1.1 Proposal overview

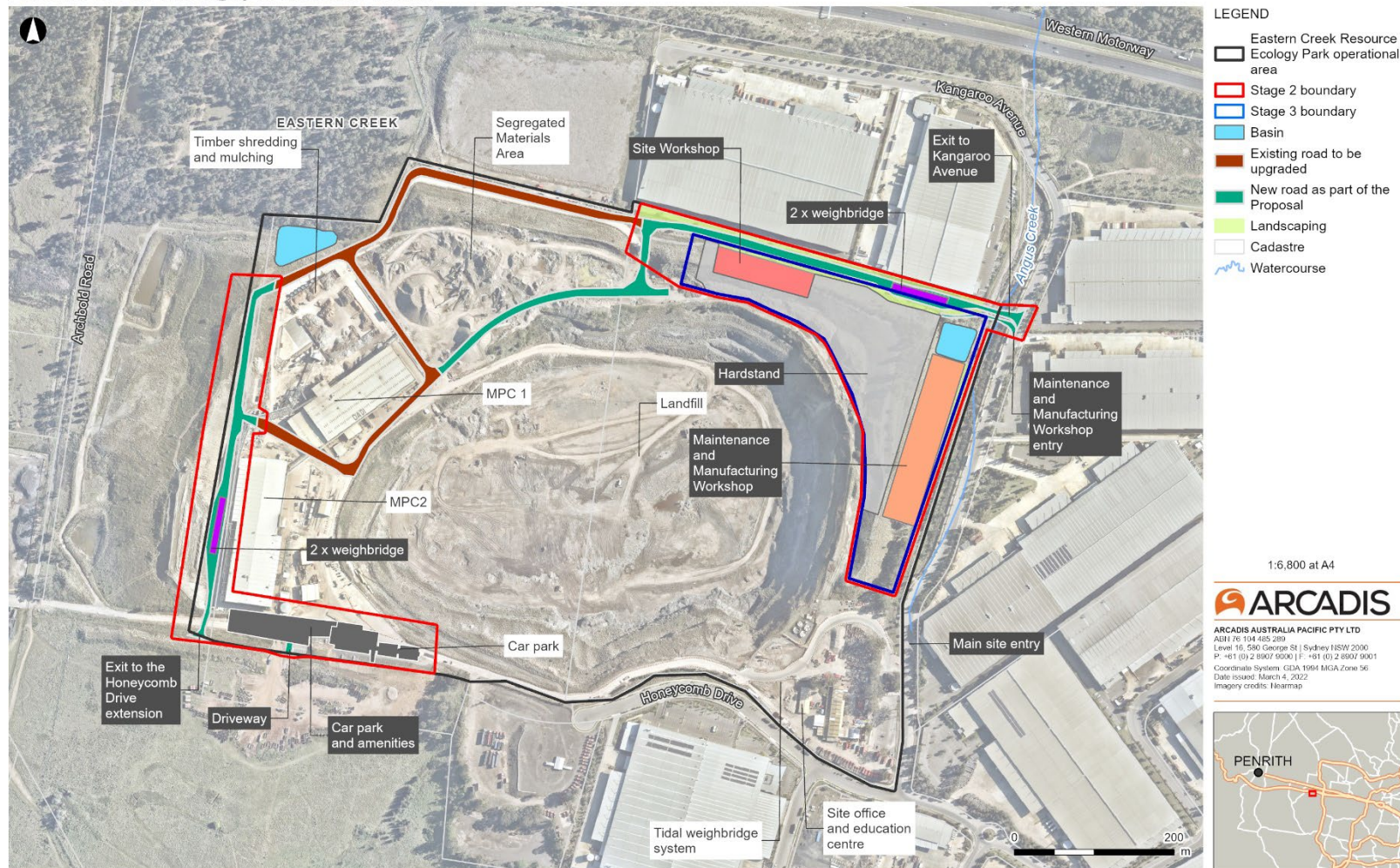
Bingo are proposing to enhance resource recovery outcomes across the Greater Sydney area by increasing throughput at the Eastern Creek REP to capitalise on the underutilised state-of-the-art processing facilities (namely MPC2), and plant and equipment within the Eastern Creek REP. The Proposal would include the upgrade and construction of supporting infrastructure to optimise the current operation at Eastern Creek REP and facilitate the increased throughput proposed to be received at the Proposal Site. It is proposed to develop the Proposal in three stages:

- **Stage 1: Initial throughput:** Stage 1 would comprise 500,000 tpa of additional throughput to be received at the Eastern Creek REP to enhance resource recovery outcomes by increasing utilisation of onsite processing capabilities
- **Stage 2: Internal site optimisation:** Stage 2 would facilitate the remaining throughput increase (an additional 450,000 tpa of the total 950,000 tpa proposed) to be received and processed across the Eastern Creek REP and operation of one of two proposed new exit connections. It would also include:
 - The construction and operation of a new exit connection to the Honeycomb Drive extension and installation of two associated outbound weighbridges and a dedicated weighbridge office

- The construction and operation of a new exit connection to Kangaroo Avenue in the north east of the Proposal Site and the installation of two associated outbound weighbridges and a dedicated weighbridge office
- Upgrade of existing internal roads as required
- Earthworks for Stage 3 site establishment
- Additional carparking and amenities
- **Stage 3: Installation of supporting infrastructure:** Stage 3 would comprise the redevelopment of the north-eastern corner of the Proposal Site. This would comprise:
 - Construction and operation of a Site Workshop (relocating this activity from elsewhere within the Proposal Site to a dedicated enclosed facility)
 - Construction and operation of a skip bin Maintenance and Manufacturing Workshop
 - Installation of landscaping, signage, security fencing and finishing works.

An overview of the Proposal is shown on Figure 1-1 below.

Eastern Creek Throughput Increase BDAR



Date: 4/03/2022 Path: C:\Users\tk85103\ARCADIS\30065850 - EC Throughput Increase - C-GISA_Current\B_Maps\BDAR\BDAR.aprx
 Created by : TK
 QA by : GC

Figure 1-1: The Proposal

1.2 Proposal Site location

The Eastern Creek REP key operational area comprises two parcels of land totalling around 54 hectares (ha) at 1 Kangaroo Avenue, Eastern Creek (Lot 1 DP1145808 and Lot 2 DP1247691), shown in Figure 1-1. The Proposal Site is located within the Eastern Creek industrial precinct / M7 business hub and is surrounded by a large range of industrial developments, primarily to the east. These industrial developments include Techtronic Industries, H&M distribution warehouse, Kuehne + Nagel (Australia) Pty Ltd warehouse, Kmart distribution centre, Bunnings distribution centre and DB Schenker warehouse. Immediately to the west of the operational area of the Eastern Creek REP is vacant land that form part of the broader Eastern Creek REP. Further, to the west of the Eastern Creek REP is the Fulton Hogan asphalt batching plant and a vacant area of undeveloped land.

The Eastern Creek REP is bounded by the Western Motorway (M4) to the north, Kangaroo Avenue to the east and Honeycomb Drive to the south. The planned future Archbold Road extension will run parallel to the western boundary of the Proposal Site (Transport for NSW (TfNSW), 2019). The Eastern Creek REP is enclosed by commercial and industrial buildings to the immediate north, east and south. The closest residential receivers are located across the M4 Motorway approximately 400 m to the north in the suburb of Minchinbury and approximately 1.2 km west in the suburb of Erskine Park.

Existing access to the Eastern Creek REP is from Kangaroo Avenue which connects to Honeycomb Drive to the south and provides access to the broader arterial road network including the M4 and M7 motorways.

The surrounding area has generally low relief with no major hills or ridgelines, other than amenity berms adjacent to the landfill that were created from quarry overburden. Angus Creek, a small ephemeral drainage line is located immediately east of the Eastern Creek REP (between the landfill area and Kangaroo Avenue) which drains to the north into Eastern Creek. There are several other ephemeral drainage lines west of the Eastern Creek REP which drain towards Ropes Creek, which is approximately 700 m west of the Eastern Creek REP.

The Eastern Creek REP is located within the Blacktown Local Government Area however is not zoned under the *Blacktown Local Environmental Plan 2015* as it falls within the boundary of the *State Environmental Planning Policy (Industry and Employment) 2021*. Further detail on the proposal description and planning framework can be found in Chapters 2 & 3 of the EIS.

1.3 Proposal Site history

During the 1800s, the Eastern Creek REP site was used for both agricultural and breccia quarrying purposes. The quarrying activities had expanded by the 1930s and were then operated by the Ray Fitzpatrick Quarriers in the 1950s. Quarrying activities continued until September 2006, with the final quarry void estimated to be 12 million cubic metres (m³).

In November 2009, Dial-A-Dump Industries (DADI) acquired the Eastern Creek REP site and gained approval for the construction and operation of the Genesis Xero Waste Management Facility (WMF) (now named the Eastern Creek REP) (MP 06_0139), comprising a resource recovery facility and non-putrescible landfill with a material handling capacity of 700,000 tpa. This facility commenced operations in 2012.

Bingo acquired DADI in February 2019, including all its NSW waste and recycling assets. Bingo took over the operation of the Eastern Creek REP following completion of the acquisition process.

The Eastern Creek REP was originally approved (MP 06_0139) under Part 3A (now repealed) of the EP&A Act in 2009 and commenced operations in 2012 (Project Approval). Following the repeal of Part 3A of the EP&A Act on 1 October 2011, the project was subject to the transitional arrangements provided by the *Environmental Planning and Assessment Regulations 2000* (EP&A Regs). The transitional arrangements provided by EP&A Regs have now ceased, and the project was transitioned to a State Significant Development (SSD) on 2 October 2020.

Since the original project approval, eight modifications have been subsequently submitted and approved, the most recent of which was approved in March 2022. Most recently, Modification 10 which pertains to the installation of a gas collection system and permanent landfill gas flares to support the operations of the Eastern Creek REP. A further modification was submitted to DPE in March 2017 but was subsequently withdrawn. One modification to MP06_139 is also currently being sought. Modification 9 seeks to expand the operational area of the Eastern Creek REP into part Lot 2 DP1145808.

The Proposal would constitute a standalone SSD application.

1.4 Purpose of this report

This BDAR supports the EIS for the Proposal and has been prepared as part of an SSD Application for which approval is sought under Part 4, Division 4.7 of the EP&A Act.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) (SSD 11606719) for the Proposal, issued by NSW Department of Planning and Environment (DPE) on 1 October 2021.

Table 1-1 provides a summary of the relevant SEARs which relate to biodiversity and where these have been addressed in this report.

Table 1-1: SEARs

SEARs	Where Addressed
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, except where a waiver for preparation of a BDAR has been granted.	This report

Further to the above, Department of Planning, Industry and Environment (Environment, Energy and Science Group) require further details on specific requirements relating to their authority. These requirements are discussed throughout the report as indicated in Table 1-2.

Table 1-2: Local and State authority requirements and relevant report sections

Biodiversity	Where Addressed
Department of Planning, Industry and Environment (Environment, Energy and Science Group)	
Biodiversity impacts related to the proposed development are to be assessed in accordance with Section 7.9 of the Biodiversity Conservation Act 2017 the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR).	This report
The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the Biodiversity Assessment Method.	Sections 9 and 10
The BDAR must include details of the measures proposed to address the offset obligations.	Sections 12 and 13
The BDAR must be submitted with all spatial data associated with the survey and assessment as per the BAM.	This report
The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the <i>Biodiversity Conservation Act 2016</i> .	Section 1.5
The EIS must map the following features relevant to water and soils including rivers, streams, wetlands, estuaries (as described in s4.2 of the Biodiversity Assessment Method), Wetlands as described in s4.2 of the Biodiversity Assessment Method and Groundwater dependent ecosystems.	This report

1.5 Personnel and qualifications

Table 1-3 below lists the personnel and their roles in preparation of this BDAR.

Table 1-3: Relevant personnel

Personnel	Qualifications	Experience/Role
Elvira Lanham	B. Environmental Science (Life Sciences) (Hons.) PhD Reptile Ecology – Flinders University of South Australia BAM Accredited Assessor (BAAS20012)	Elvira has been involved in ecological consultancy and research for the past 25 years and has completed projects throughout Australia and overseas, including QLD, NSW, Victoria and South Australia. She has been the project manager and primary author on more than 400 reports ranging from Environmental Impact Assessments, Review of Environmental Factors (REFs) and a range of biodiversity assessments. She has recently been the primary author on several Commonwealth EPBC referrals. She is an accredited Biodiversity Assessment Method (BAM) assessor and is overseeing the development of this BDAR as part of the ecological assessment for the project. Elvira wrote the fauna section of the BDAR and provided oversight and project management.
Meredith Leal	Bachelor of Environmental Management/Arts (Ecology)	Meredith Leal is an Ecologist with four years of ecological consulting experience and has delivered biodiversity assessments for a range of projects across NSW. She has undertaken extensive flora and fauna surveys with a focus on targeted threatened flora surveys, BAM vegetation plots and PCT and TEC identification. Meredith has completed numerous technical biodiversity reports under the BAM including BDARs and is informed in current biodiversity acts and legislation. Meredith wrote the flora component of the BDAR.
Kate Carroll	Bachelor of Science (Honours) (Ecology)	Kate has led and delivered biodiversity assessments for a range of projects, with a focus on linear infrastructure, including road, rail,

Personnel	Qualifications	Experience/Role
	BAM Accredited Assessor (BAAS17070)	renewable energy, gas, urban development and waste during the past 13 years as an environmental consultant. With over 19 years of experience in ecological surveys, Kate has extensive knowledge of the flora and fauna of New South Wales. Kate is an Accredited Assessor for the Biodiversity Assessment Method (BAM) under the <i>Biodiversity Conservation Act 2016</i> . Kate provided technical review and input, field survey and also analysed the microbat echolocation call recordings.

2 METHODS

2.1 Subject land

The land in which biodiversity values have been assessed by this BDAR is known as the subject land. The subject land is defined in DPE (2020a) and shown in Figure 2-1. It is made up of the construction (temporary) and operational footprint. These are also described in the EIS.

The subject land consists of land that would be directly impacted by construction and operation of the Proposal, including activities such as vegetation clearing, earthworks, establishment of access roads and operation of facilities (subject to this EIS) within the Proposal Site.

2.2 Assessment area

The assessment area is also a requirement under the BAM (DPE 2020a) for a BDAR and consists of the subject land and adjacent areas within a 1,500 metre buffer of the subject land, which may be subject to indirect impacts. The assessment area for the Proposal is shown in Figure 4-2.

Eastern Creek Throughput Increase BDAR



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Figure 2-1: Subject land

2.3 Assessment guidelines and information sources

The assessment presented in this BDAR was carried out in accordance with the requirements of the BAM (DPE, 2020a). Other assessment guidelines used to inform this BDAR include:

- Biodiversity Assessment Method Calculator (BAMC) (DPE, 2021e)
- Biodiversity Assessment Method (BAM) (DPIE, 2020a)
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities working draft (DEC, 2004)
- NSW Surveying threatened plants and their habitats (DPIE, 2020b)
- Survey Guidelines for Australia's Threatened Birds (CoA, 2010a), Mammals (CoA, 2011) and Bats (CoA, 2010b)
- Matter of National Environmental Significance Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia, 2013)
- 'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method (OEH, 2018)
- Remnant Vegetation of the western Cumberland subregion, 2013 update (DPIE, 2015b)
- Key Fish Habitat Mapping (DPI, n.d.)
- DPIs Fisheries Portal
- NSW Soil and Land Information eSPADE (DPIE, 2021c).

2.4 Database searches

Database searches were undertaken by Arcadis in July 2021 to identify State and Commonwealth records of threatened entities and Commonwealth Matters of National Environmental Significance (MNES) that occur or have the potential to occur within 10 kilometres of the subject land. Databases and reports interrogated for this purpose are listed below in Table 2-1.

Table 2-1: Database searches carried out by Arcadis in July 2021

Database	Purpose of search	Date of database search
NSW BioNet Wildlife Atlas (DPIE EES, 2021a) <i>Managed by the NSW Department of Planning, Industry and Environment (DPIE) Environment, Energy and Science (EES) branch (formerly the Office of Environment and Heritage (OEH))</i>	Used to compile a list of threatened species records listed under the BC Act to within 10 km of the subject land (Appendix D, Appendix E).	23 July 2021
Bureau of Meteorology's Ground Water Dependent Ecosystem Atlas	Used to map any Groundwater Dependent Ecosystems (GDE) within the subject land.	23 July 2021
Protected Matters Search Tool (DAWE, 2021) <i>Managed by the Commonwealth Department of Agriculture, Water and the Environment (DAWE)</i>	Used to compile a list of potentially occurring MNES listed under the EPBC Act to within 10 km of the subject land (Appendix C).	23 July 2021

Database	Purpose of search	Date of database search
NSW BioNet Vegetation Information System (VIS) Classification database (DPIE, 2021b) <i>Managed by DPIE (EES)</i>	Provides information on Plant Community Types (PCTs) and their relationship to a vegetation formation and vegetation class (managed and maintained in the Vegetation Information Systems (VIS) Classification database).	Referenced throughout
NSW BioNet Threatened Biodiversity Data Collection (TBDC) (DPIE, 2021g) <i>Managed by DPIE (EES)</i>	Contains information for all listed threatened species, populations, and communities.	Referenced throughout
NSW WeedWise (DPIE, 2021f) <i>Managed by NSW Department of Primary Industries (DPI)</i>	Identifies species listed as priority weeds for a LGA and their control requirements.	August 2021

2.5 Native vegetation

Key activities carried out as part of the BDAR relating to the identification and assessment of native vegetation are discussed below and include:

- Mapping the extent of native vegetation cover
- Identifying plant community types

2.5.1 Definition of native vegetation

Under the BAM, native vegetation has the same meaning as in Section 1.6 of the BC Act which states that native vegetation and clearing native vegetation have the same meanings as in Part 5A of the Local Land Services Act 2013. Part 5A 60B of the Local Land Services Act 2013 defines the meaning of native vegetation as any of the following types of plants native to New South Wales:

- a) Trees (including any sapling or shrub or any scrub)
- b) Understorey plants
- c) Groundcover (being any type of herbaceous vegetation)
- d) Plants occurring in a wetland.

A plant is native to New South Wales if it was established in New South Wales before European settlement. This includes planted vegetation which is important as the subject land and assessment area contains several native species plantings.

2.6 Field surveys

2.6.1 Survey timing

Field-based vegetation surveys of the subject land were carried out by Arcadis ecologists on 15 April 2021.

2.6.2 Mapping extent of native vegetation cover

Field-based vegetation surveys of the subject land were carried out by Arcadis ecologists on 15 April 2021. The extent of native vegetation in the subject land was ground truthed and mapped using up to

date aerial imagery. Vegetation within the subject land and landscape buffer was mapped at a regional scale using the following regional vegetation mapping for the area:

- Remnant Vegetation of the western Cumberland subregion, 2013 Update (OEH, 2013)

Recent aerial imagery was used to validate and refine the native vegetation extent within the assessment area where required.

2.7 Vegetation surveys

2.7.1 Vegetation mapping and PCT identification

During this assessment, vegetation within the subject land was initially stratified based on the composition of the canopy and vegetation structure (key elements in PCT assignment). It was then compared to recognised and accepted PCTs, as described in the BioNet Vegetation Classification (DPIE, 2021b). The identification of PCTs and vegetation types in the subject land was predominantly based on:

- Structure and species composition consistent with descriptions in the BioNet Vegetation Classification and other published references
- Characteristic tree species present
- Previous regional mapping as an equivalent vegetation type
- Landscape position.

In accordance with the BioNet Vegetation Classification System (DPIE, 2021b), field surveys were used to collect information on geology, dominant canopy species, native species richness, vegetation structure and condition. This information was used to validate and refine the existing vegetation mapping to determine the associated PCTs present on the subject land. Where applicable, PCTs were assigned to the relevant corresponding Threatened Ecological Community (TEC).

Once the vegetation present within the subject land was assigned to a PCT, the vegetation broad condition states (as defined in the BAM) were applied to determine vegetation zones within the subject land.

2.7.2 BAM plots

Two BAM plots were used to sample the vegetation of the subject land. This quantitative survey was conducted in accordance with the methodology described in the BAM Section 4.2 as summarised in Table 2-2 below. Figure 2-2 illustrates the plot layout of nested 20 metres by 50 metres, 20 metres by 20 metres and 1 metre by 1 metre sub-quadrats used for the assessment of condition attributes at the plot.

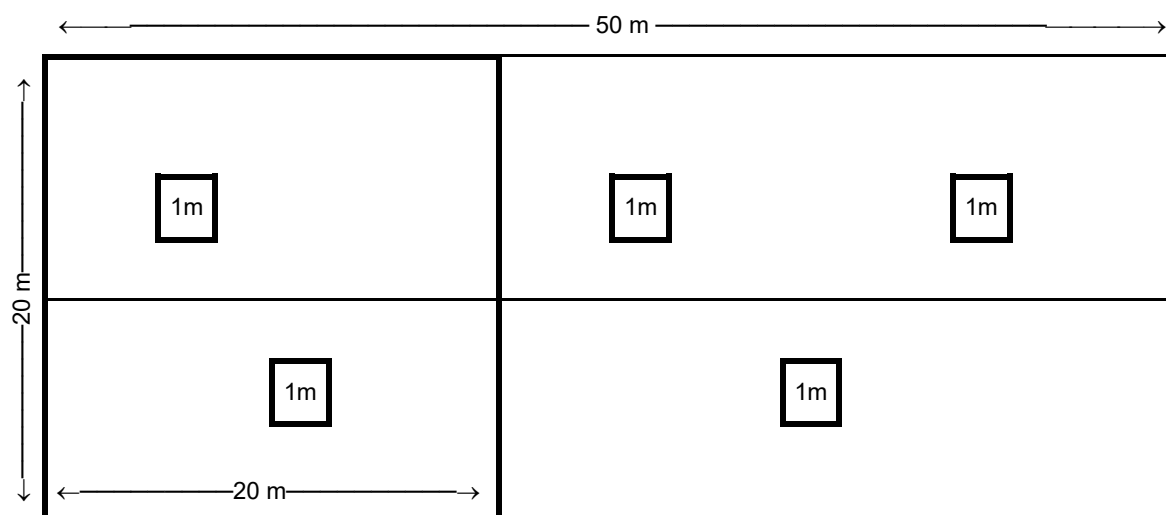


Figure 2-2: Schematic diagram illustrating the BAM vegetation plot layout

Flora species identified in the BAM vegetation plot are listed in the flora species inventory provided in Appendix A. The location of the BAM vegetation plots is shown in Figure 2-3.

Table 2-2: Data collected from the BAM vegetation plots

Attribute	Data collected
Location	Geographic co-ordinates (easting and northing; grid type MGA 94, Zone 56) – collected using GPS.
Native and exotic species richness and cover	<p>All plant species identified within the 20-metre x 20-metre nested quadrat were recorded.</p> <p>The cover (percentage of area of quadrat covered) and abundance of each species present was estimated.</p> <p>The growth form, stratum/layer and whether each species was native, exotic, or a high threat weed was recorded.</p>
Number of trees with hollows	<p>The number of living and dead trees with hollows within the 50-metre x 20-metre quadrat was recorded.</p> <p>A hollow was only recorded if: (a) the entrance could be seen; (b) the estimated entrance width was at least five centimetres; (c) the hollow appeared to have depth; (d) the hollow was at least one metre above the ground; and the (e) the centre of the tree was located within the sampled quadrat.</p>
Tree stem size diversity and number of large trees	<p>Tree stem size diversity was recorded by measuring the diameter at breast height (dbh) (i.e. 1.3 metres from the ground) of living trees (greater than five centimetres dbh) within each 50-metre x 20-metre quadrat. For multi-stemmed living trees, only the largest stem was included in the count.</p> <p>The number of large trees was determined by counting all trees with a dbh greater than the specified dbh of large trees for each vegetation formation, as noted in the VIS Classification Database (DPIE, 2021b).</p>
Evaluation of regeneration:	Presence/absence of overstorey species present at the subject land that were regenerating (defined as seedlings or saplings with a dbh less than or equal to five centimetres).
Total length of fallen logs	Cumulative total of logs within each 50-metre x 20-metre quadrat with a diameter of at least 10 centimetres and a length of at least 0.5 metres.

Attribute	Data collected
Litter cover	Estimation of the average percentage groundcover of litter (i.e., leaves, seeds, twigs, branchlets and branches with a diameter less than 10 centimetres which is detached from a living plant) from within five sub-plots that measured one metre x one metre square spaced evenly on either side of the 50 metre central transect.

2.7.3 Survey effort

Native vegetation within the subject land was classified into PCTs and then separated into vegetation zones based on broad condition classes. The size of each vegetation zone determines the sampling effort required, as outlined in Table 3.1 of the BAM. Table 2-3 below provides a summary of the vegetation zones present within the subject land and the sampling effort that was applied. Two BAM vegetation plots were completed. Due to the small area of one vegetation zone within the subject land, 849_moderate/good, this vegetation zone was sampled with a plot undertaken just outside the subject land in adjoining vegetation (Figure 2-3).

Table 2-3: Comparison of number of transects/plots required and completed per vegetation zone

Vegetation Zone name and number	Plant community type ID No.	Plant community type name	Broad condition class	Vegetation zone area in subject land (ha)	Minimum number of plots required under the BAM	Number of plots completed
1) 849_moderate/good	849	Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate/good	0.02	1	1 (EC01)
2) 849_planted	849	Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Poor	0.38	1	1 (EC02)

Eastern Creek Throughput Increase BDAR



Figure 2-3: Vegetation survey effort

2.7.4 Vegetation integrity assessment

The vegetation integrity score is a measure of the condition of native vegetation and is assessed for each vegetation zone by calculating the scores for the composition, structure and function attributes collected in plots within the vegetation zone against the benchmark values for the associated PCT. Benchmark data was obtained from the BioNet Vegetation Classification.

The vegetation plot data was entered into the BAMC to generate vegetation integrity scores.

According to Section 9.2.1 of the BAM (DPIE, 2020a) the assessor must determine an offset for all impacts of proposals on PCTs that are associated with a vegetation zone that has a vegetation integrity score of:

- ≥ 15 , where the PCT is representative of an EEC or a CEEC
- ≥ 17 , where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community
- ≥ 20 , where the PCT does not represent a TEC and is not associated with threatened species habitat.

All native vegetation has an integrity score above 15 and therefore requires offsets to be calculated where impacts occur (refer to Section 5.4 for more information).

2.8 Threatened species habitat assessment – determining candidate species

The candidate threatened species for assessment in this BDAR were identified using the BAMC (DPE, 2021e). A review of database searches (BioNet, PMST) was also undertaken in July 2021 to identify threatened species and habitat with potential to occur in the subject land (refer to Section 2.4 for more information). These database searches informed the targeted threatened species surveys.

As outlined in Section 6.4.1.3 of the BAM, the following criteria (a – f) were used to predict the threatened species that require assessment:

- a. The distribution of the species includes the IBRA subregion which the development site is, in the opinion of the assessor, mostly located within, and
- b. The development site is within any geographic constraints of the distribution of the species within the IBRA subregion, and
- c. The species is associated with any of the PCTs identified by the assessor as occurring within the development site, and
- d. The native vegetation cover within an assessment area 1,500 metres wide surrounding the boundary of the subject land as determined by the assessor in accordance with subsection 4.3.2 of the BAM is equal to or greater than the minimum class that is required for the species (unless the development is, or is part of, a linear shaped development), and
- e. The patch size which the vegetation zone is part of, as identified in subsection 5.3.2 of the BAM is equal to or greater than the minimum specified for that species, and
- f. The species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection.

A threatened species was predicted as requiring assessment if that species meets all the criteria (a to f) that are relevant to the species. The BAMC was used to derive the list of candidate species based on criteria a to f. If any one of the criteria (a to f) relevant to a species was not met, the subject land was considered not to be suitable habitat for the threatened species and no further assessment was undertaken for that species.

The results of the BioNet and PMST searches were also used to inform development of the candidate species list. Some species returned from the database searches (i.e., BioNet and PMST) were removed from the assessment due to the absence of suitable habitat in the subject land. The majority

of the subject land is highly modified and developed, and as a result, lacks large areas of high quality natural habitats. Based on the lack of these high quality habitats, some species which are known to no longer occur in the Sydney area were removed from the assessment.

The threatened species suitability assessment and candidate list of threatened species for assessment is included in Section 6.1.

2.9 Targeted threatened species surveys

Targeted threatened species surveys were conducted for all species identified in Section 6.1 of this BDAR as requiring survey. In total, this comprised three threatened flora species and eight threatened fauna species.

2.9.1 Targeted threatened flora surveys

Targeted threatened flora surveys were undertaken over one day in April 2021. These surveys follow the methods described in *NSW Surveying threatened plants and their habitats* (DPIE, 2020b) and comprised parallel field traverses. Targeted flora surveys were completed for all threatened flora species considered likely to occur in the subject land, including species returned by the BAMC and require survey in accordance with Section 5.2 of the BAM.

These threatened flora species and the survey effort undertaken are detailed below in Table 2-4. Locations of threatened flora surveys are displayed in Figure 6-1.

2.9.1.1 Parallel field traverses

Areas of potential habitat for threatened flora species considered likely to occur within the subject land were surveyed using the parallel field traverse technique. This survey technique consists of walking in parallel traverses using both a GPS and tablet. The spacing between traverses is determined in accordance with Table 1 of the *NSW Surveying threatened plants and their habitats* (DPIE, 2020b).

Table 2-4: Targeted threatened flora species survey details

Scientific name	BC Act status	EPBC Act status	Minimum survey requirements	Associated PCTs within the subject land	Survey method	Seasonal survey requirements	Survey timing	Adequacy against guidelines
<i>Acacia pubescens</i>	V	V	For a medium shrub in open vegetation, the recommended maximum distance between traverses is 20 metres	PCT 849	Parallel field traverses at 5 metres spacing	All year	15 April 2021	Adequate
<i>Grevillea juniperina</i> subsp. <i>juniperina</i>	V	-	For a sub-shrub in open vegetation, the recommended maximum distance between traverses is 15 metres	PCT 849	Parallel field traverses at 5 metres spacing	All year	15 April 2021	Adequate
<i>Marsdenia viridiflora</i> subsp. <i>Viridiflora</i>	EP	-	For a climber in open vegetation, the recommended maximum distance between traverses is 10 metres	PCT 849	Parallel field traverses at 5 metres spacing	November - February	15 April 2021	Adequate. While surveys were undertaken outside recommended timing, species can be detected and identified outside this timing based on other identifying features (e.g., leaves, stem). To further increase detectability, the width of traverses was reduced to 5 metres.

V = vulnerable, EP= endangered population

2.9.2 Threatened fauna surveys

2.9.2.1 Fauna habitat assessment

Fauna habitat assessments were conducted in the subject land which included an assessment of the following fauna habitat features:

- Vegetation type, structure and extent
- Identification of any, watercourses, natural and artificial ponds, dams, soaks and drainage channels
- Adjacent habitats and barriers (natural or artificial) between the subject land and adjacent lands
- Arboreal resources including nectar, fruit and presence of mistletoe
- Artificial microbat roosts (culverts, bridges and buildings)
- Terrestrial shelter habitat such as coarse woody debris, rocky outcrops and artificial shelter (i.e., corrugated iron sheets, building refuse, rubbish) for invertebrates, amphibians, reptiles and small terrestrial mammals.

During fauna habitat assessments, the following general fauna surveys were also undertaken to detect threatened species and/or important fauna habitat:

- **Hollow-bearing tree surveys:** hollow-bearing trees were recorded opportunistically across the subject land to detect potential sheltering, roosting and/or breeding habitat for threatened and non-threatened fauna. Hollow-bearing tree surveys involved traversing the subject land and identifying tree hollows with the naked eye and binoculars.
- **Canopy searches:** canopy searches were undertaken across the subject land to detect individual Koalas (in addition to targeted surveys for the species, see below). Canopy searches were also undertaken to detect the presence of important fauna habitat features such as large stick nests. Canopy searches involved carefully inspecting the canopy of all trees with the naked eye and binoculars to detect presence of Koalas and/or important fauna habitat features.

2.9.2.2 Incidental fauna surveys

Field surveys also included incidental searches for indirect evidence of fauna, such as scats, nests, burrows, tracks, scratches, chewed cones and diggings. Incidental diurnal fauna surveys also involved recording all fauna species opportunistically seen or heard during surveys (Appendix B).

2.9.2.3 Targeted threatened fauna surveys

Targeted threatened fauna surveys were undertaken for all species credit/dual credit threatened fauna species likely to occur in the subject land, including species returned by the BAMC and requiring survey in accordance with Section 5.2 of the BAM.

Targeted fauna surveys were designed to address the requirements outlined in the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities Working Draft* (DEC, 2004). The following guidelines were also used to determine appropriate survey requirements for threatened fauna:

- *Threatened Biodiversity Data Collection* (DPIE, 2021g)
- EPBC Act referral guidelines for the vulnerable koala (CoA, 2014)
- Species credit threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method (OEH, 2018).

The methodologies applied for each targeted threatened fauna species within the subject land are described below. Specifically, survey effort and threatened fauna targeted during field surveys are

summarised in Table 2-5. Table 2-5 also outlines each species reason for inclusion, that is, generated by the BAMC and assessed in Section 6.1 as requiring survey, or determined through database searches as likely to occur in the subject land. Locations of threatened species surveys are displayed in Figure 2-4.

Anabat survey

Passive ultrasonic recording of echolocation calls of microchiropteran bats (microbats) was carried out using an Anabat detector deployed within native vegetation in the subject land. The detector was positioned to sample a potential fly way near the eastern boundary of the subject land adjacent to Angus Creek.

Bat call analyses was completed by Kate Carroll of Arcadis. *The Australasian Bat Society: Bat Calls of New South Wales: region-based guide to the echolocation calls of microchiropteran bats* (Pennay et al., 2004) was used as a reference collection for bat call identification. The level of confidence for call identification was identified as Definite or Possible (complex), where the call could not be distinguished between two species.

All 'definite' bat calls were identified with a high degree of confidence as they were typical call frequencies and shapes for each species identified and within the known distribution and habitat types for these species. Species identified through Anabat recordings including the confidence for call identification is presented in Appendix B.

Koala scat survey

Targeted searches for Koala (*Phascolarctos cinereus*) scats were undertaken within PCT vegetation and at the base of planted eucalypts on the northern boundary of the subject land. Searches were conducted at the base of eucalyptus trees, searching beneath bark and leaf litter accumulations.

Cumberland Plain Land Snail survey

Targeted searches for Cumberland Plain Land Snail (*Meridolum corneovirens*) were undertaken within PCT vegetation and at the base of planted eucalypts on the northern boundary of the subject land. Searches for live snails or empty shells were conducted at the base of trees and undertaken in conjunction with Koala scat surveys.

Diurnal roost searches

Diurnal roost searches were conducted across the subject land in initial habitat assessments to identify roosting and/or breeding habitat for the Grey-headed Flying-fox. The subject land was traversed to identify individuals and/or potential habitat. Initial database searches were also undertaken to identify breeding camps. No breeding camps were located within the subject land.

Table 2-5: Species credit threatened fauna species (including dual credit species) targeted in surveys and methods

Scientific name	Common name	BC Act status	EPBC Act status	Minimum survey requirements	Seasonal survey requirements	Survey timing and effort appropriate?
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Habitat assessment and diurnal searches for Flying-fox camps in areas of suitable habitat.	All year (optimal October – December)	Yes
<i>Phascolarctos cinereus</i>	Koala	V	V	Survey effort should be determined on a case-by-case basis and can include both direct and indirect survey methods. Methods could include targeted scat searches and diurnal searches of trees for individuals in areas of suitable habitat.	All year (scat searches) August to January (searches for individuals)	Yes
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V	-	Ultrasonic call detectors for a minimum of four nights.	October – March (optimal December – February)	Yes for size of subject land and impact. This species was possibly detected.
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Ultrasonic call detectors for a minimum of four nights. Minimum total effort of 16 detector nights in areas <50ha (e.g. four detectors deployed for four nights).	October – March (optimal November – January)	Yes for size of subject land and impact. This species was possibly detected.
<i>Miniopterus australis</i>	Little Bent-winged Bat	V	-	Ultrasonic call detectors for a minimum of four nights.	October – March (optimal December – February)	Yes for size of subject land and impact.
<i>Myotis macropus</i>	Southern Myotis	V	-	Ultrasonic call detectors for a minimum of four nights. Minimum total effort of 16 detector nights in areas <50ha (e.g., four detectors deployed for four nights).	October – March	Yes for size of subject land and impact.

Scientific name	Common name	BC Act status	EPBC Act status	Minimum survey requirements	Seasonal survey requirements	Survey timing and effort appropriate?
<i>Meridolum corneovirens</i>	Cumberland Plain Land Snail	E	-	Targeted searches at the base of trees and beneath rocks and debris for live snails or empty shells within areas of suitable habitat. Number of surveys is dependent upon size and amount of potential habitat present within the subject land.	All year and weather conditions	Yes
<i>Pommerhelix duralensis</i>	Dural Land Snail	E	E	N/A no specific survey guidelines. Cumberland Plain Land Snail surveys have been used for this species.	All year and weather conditions	Yes

V = vulnerable, E= Endangered

2.9.3 Survey limitations

Field surveys and survey effort was conducted in accordance with the BAM and relevant guidelines where possible.

As some species are only present or apparent at certain times of the year (e.g., migratory birds), species recorded in the subject land should be treated as an indication of species presence at the time of field surveys, not a fully comprehensive list. Further, some species require specific conditions for optimum detection. For example, owls can be detected year-round however the optimal seasonal timing to detect breeding is between May and August, during nesting. In addition, peak activity periods for fauna can also be correlated with weather conditions.

The conclusions of this report are based upon available data and field surveys and are therefore indicative of the environmental condition of the subject land at the time of the survey. It should be recognised that conditions, including the presence of threatened species, could change with time. To address this limitation, a precautionary approach has been used which aimed to identify the presence and suitability of the habitat for threatened species (Appendix D and Appendix E).

Eastern Creek Throughput Increase BDAR



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Figure 2-4: Threatened species survey effort

3 LEGISLATIVE CONTEXT

3.1 Overview

Field surveys and the preparation of this assessment have been undertaken in accordance with, or with reference to, the legislative acts and guidelines listed within this section. All work was carried out under the appropriate licenses, including scientific licenses as required under Section 2 of the BC Act (license number SL100646) and in accordance with the NSW DPI Animal Ethics Committee (AEC) (licence TRIM 13/339).

The Secretary's Environment Assessment Requirements (SEARs), which set out the requirements of the EIS, were issued on 1 October 2021 for the Eastern Creek REP Throughput Increase (now the Recycling Infrastructure Optimisation Project). SEARs relating to biodiversity, and where they are addressed within this report, are listed below in Table 3-1.

Table 3-1: SEARs (Biodiversity) for the Eastern Creek REP Recycling Infrastructure Optimisation Project

Agency Requirement	Details	Where addressed within this report
DPIE	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, except where a waiver for preparation of a BDAR has been granted.	This report

3.2 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, and heritage places, defined in the EPBC Act as MNES. MNES identified in the Act include:

- World heritage properties
- National heritage places
- Wetlands of international importance (listed under the Ramsar Convention)
- Threatened species and communities
- Migratory species protected under international agreements
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mines).

In accordance with Sections 67 and 67A of the EPBC Act, any works that have the potential to result in an impact on any MNES or on Commonwealth land are considered 'controlled actions' and require a referral to the Federal Minister for the Environment for approval. Consideration of the potential for the proposal to result in a significant impact to MNES has been addressed in Section 7 of this report.

3.3 Biodiversity Conservation Act 2016

The BC Act seeks to establish a framework for assessment and offsetting of development impacts as well as investment in biodiversity conservation, specifically:

- The NSW BOS (established under Part 6 of the BC Act)

- The BAM (established under Section 6.7 of the BC Act).

Entry to the NSW BOS is triggered by developments, projects and activities that meet one or more of the following thresholds for significant impacts:

- Local development assessed under Part 4 of the NSW EP&A Act that triggers the BOS threshold or is likely to significantly affect threatened species based on the 'Test of significance' outlined in Section 7.3 of the BC Act
- SSD and State Significant Infrastructure (SSI) projects, unless the Secretary of the DPIE and the environment agency head determine that the project is not likely to have a significant impact
- Biodiversity certification proposals
- Clearing of native vegetation in urban areas and areas zoned for environmental conservation that exceeds the BOS threshold and does not require development consent
- Clearing of native vegetation that requires approval by the Native Vegetation Panel under the *Local Land Services Act 2013*
- Activities assessed and determined under Part 5 of the EP&A Act (generally, proposals by government entities) if proponents choose to 'opt in' to the Scheme.

Under the NSW BOS, an accredited assessor must apply the BAM in assessing the proposed impacts of the development. The purpose of the BAM is to assess certain impacts on threatened species and Threatened Ecological Communities (TECs), and their habitats, and the impact on biodiversity values, where required under the BC Act.

The Proposal is considered to meet the definition of an SSD and on this basis, the Proposal would trigger entry into the BOS. The Proposal therefore needs to be supported by a BDAR, prepared in accordance with the requirements of the BAM (DPIE, 2020a) as outlined in the corresponding sub-section below.

Given the small area of native vegetation impacted, the Proposal may meet the criteria as a small area and be eligible for a streamlined assessment (Appendix C of the BAM (DPE, 2020a)). However, as there is not clarity on minimum lot sizes for the subject land and surrounds, we have elected to provide a full assessment.

3.4 Fisheries Management Act 1994

The NSW *Fisheries Management Act 1994* (FM Act) provides for the protection, conservation, and recovery of threatened species defined under the Act. It also makes provision for the management of threats to threatened species, populations, and ecological communities, as well as the general protection of fish and fish habitat.

Consideration of entities listed under the FM Act, and potential impacts as a result of the Proposal, have been addressed in Section 7.4 of this report.

3.5 Biosecurity Act 2015

The primary objective of the *Biosecurity Act 2015* is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers, or potential carriers. Division 2 of the *Biosecurity Act 2015* defines local control authorities for weeds. Schedule 1 of the *Biosecurity Act 2015* outlines special provisions relating to weeds, including the duty of land occupiers to control and manage weeds.

Section 5.7 of this report outlines weeds of significance recorded within the subject land.

3.6 State Environmental Planning Policy (Biodiversity and Conservation) 2021

On 1 March 2020, the *State Environmental Planning Policy (Koala Habitat Protection) 2019* (Koala SEPP 2019) came into effect, repealing the former *State Environmental Planning Policy No. 44 – Koala Habitat Protection* (SEPP 44). In November 2020, the NSW Government replaced and repealed the Koala SEPP 2019 and introduced the *State Environmental Planning Policy (Koala Habitat Protection) 2020* (Koala SEPP 2020) which largely reinstated the former SEPP 44. However, as of 17 March 2021, a new policy the *State Environmental Planning Policy (Koala Habitat Protection) 2021* (Koala SEPP 2021) came into effect to apply to certain lands. The Koala SEPP 2021 reinstates the policy framework of the Koala Habitat Protection SEPP (2019). Ultimately, as of 1 March 2022, both Koala SEPP 2020 and Koala SEPP 2021 were consolidated by the NSW Government into the *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity and Conservation SEPP), respectively to Chapters 3 and 4.

Blacktown LGA is not within the LGAs covered by the Biodiversity and Conservation SEPP and as such, does not apply to this Proposal.

3.7 Biodiversity Assessment Method requirements

The BAM (DPIE, 2020a) is the assessment manual that outlines how an accredited person assesses impacts on biodiversity at subject lands. The BAM provides:

- A consistent method for the assessment of biodiversity on a proposed development, major project, or clearing subject land
- Guidance on how a proponent can avoid and minimise potential biodiversity impacts
- The number and class of biodiversity credits that need to be offset to achieve a standard of 'no net loss' of biodiversity.

An accredited assessor must document the results of the BAM in a BDAR. The BDAR identifies how the proponent proposes to avoid and minimise impacts, any potential impact that could be characterised as serious and irreversible (according to specified principles) and the offset obligation required to offset the likely biodiversity impacts of the development or clearing proposal, expressed in biodiversity credits.

The requirements for a BDAR are listed in Appendix 10 (Table 25 and Table 26) of the BAM. Table 3-2 below identifies where each requirement has been met within this report.

Table 3-2: Minimum information requirements for a BDAR (DPIE, 2020a)

Biodiversity Assessment Method Requirement		Where addressed in this BDAR
Section	Information to be included	
Introduction	Introduction to the biodiversity assessment including: <ul style="list-style-type: none"> • Brief description of the proposal • Identification of the subject land boundary including: <ul style="list-style-type: none"> – Operational footprint – Construction footprint indicating clearing associated with temporary construction facilities and infrastructure. 	Section 1.1
	General description of subject land.	Section 1.2
	Sources of information used in the assessment, including reports and spatial data.	Section 2.3
Landscape features	Identification of subject land context components and landscape features, including:	Section 4

Biodiversity Assessment Method Requirement		Where addressed in this BDAR
Section	Information to be included	
	<ul style="list-style-type: none"> General description of subject land topographic and hydrological setting, geology and soils Percent native vegetation cover in the assessment area IBRA bioregions and subregions Rivers and streams classified according to stream order Wetlands within, adjacent to and downstream of the subject land Connectivity of different areas of habitat Karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features Areas of outstanding biodiversity value occurring on the subject land and assessment area Any additional landscape features identified in any SEARs for the proposal NSW (Mitchell) landscape on which the subject land occurs. 	
Native vegetation	Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery.	Section 5
	Provide justification for all parts of the subject land that do not contain native vegetation.	Section 5
	Review of existing information on native vegetation including references to previous vegetation maps of the subject land and assessment area.	Section 5
	Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2.	Section 2.7
	Where relevant, describe the use of more appropriate local data, provide reasons that support the use of more appropriate local data and include the written confirmation from the decision-maker that they support the use of more appropriate local data.	N/A
	Describe PCTs within the subject land.	Section 5.3
	Describe the vegetation integrity assessment of the subject land.	Section 5.4
Threatened species	Identify ecosystem credit species likely to occur on the subject land.	Section 6.1
	Identify species credit species likely to occur on the subject land.	Section 6.1
	From the list of candidate species credit species, identify:	Section 6.1
	<ul style="list-style-type: none"> Species assumed present within the subject land (if relevant) Species present within the subject land on the basis of being identified on an important habitat map for a species Species for which targeted surveys are to be completed to determine species presence Species for which an expert report is to be used to determine species presence. 	
	Present the outcomes of species credit species assessments from:	Section 6.2
	<ul style="list-style-type: none"> Threatened species survey Expert reports (if relevant). 	

Biodiversity Assessment Method Requirement		Where addressed in this BDAR
Section	Information to be included	
	Where survey has been undertaken include detailed information on survey method, effort and timing and justification of this method, effort and timing in relation to the requirements in the TBDC or the Department's taxa-specific survey guides. Information on survey personnel, relevant experience and any limitations on the surveys must also be provided.	Section 2.9
	Species polygon completed for species credit species present within the subject land (assumed present or determined on the basis of survey, expert report or important habitat map).	N/A
	Identify the biodiversity risk weighting for each species credit species identified as present within the subject land.	N/A
Prescribed impacts	Identify potential prescribed biodiversity impacts on threatened entities.	Section 8
	Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts.	N/A
	Describe the importance of habitat features to the species including, where relevant, impacts on life-cycle or movement patterns.	N/A
Avoid and minimise impacts	Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7.	Section 9
	Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design.	Section 9.1
	Identification of any other subject land constraints that the proponent has considered in determining the location and design of the proposal.	Section 9.1.1 and 9.1.2
Assessment of impacts	Determine the impacts on native vegetation and threatened species habitat.	Section 10.1
	Assessment of indirect impacts on vegetation and threatened species and their habitat.	Section 10.2
	Assessment of prescribed biodiversity impacts.	N/A
Mitigation and management of impacts	Identification of measures to mitigate or manage impacts.	Section 11
Impact summary	Identification and assessment of impacts on TECs and threatened species that are at risk of a serious and irreversible impacts.	Section 10.1.4
	Identification of impacts requiring offsets.	Section 12.1
	Identification of impacts not requiring offsets.	Section 0
	Identification of areas not requiring further assessment.	Section 12.3
	Ecosystem credits and species credits that measure the impact of the development on biodiversity values.	Section 12.1
Biodiversity credit report	Description of credit classes for ecosystem credits and species credits at the development or clearing subject land.	Section 13

4 LANDSCAPE CONTEXT

4.1 Native vegetation cover

Regional vegetation mapping (OEH, 2013) has been used for the purposes of mapping native vegetation within the assessment area. Recent aerial imagery was used to validate and refine the native vegetation extent within the assessment area where required. The area of native vegetation cover within the assessment area is outlined below in Table 4-1 and shown in Figure 4-2. Native vegetation in the landscape is in the '<30 per cent cover' class.

Table 4-1: Native vegetation cover within the assessment area

Location	Extent of assessment area (ha)	Native vegetation extent within assessment area (ha)	Per cent native vegetation cover within assessment area
Assessment area (refer to Figure 4-2)	1169	191.63	16.39

4.2 IBRA bioregions and subregions

The Interim Biogeographic Regionalisation for Australia (IBRA) bioregion and subregion associated with the subject land is mapped below in Figure 4-1. The subject land is located within the Cumberland IBRA subregion of the Sydney Basin IBRA bioregion.

4.3 Rivers and streams

Angus Creek, a first order stream, runs adjacent to the subject land along the eastern boundary and traverses the north east corner of the subject land (Figure 4-1). Angus Creek is an ephemeral, partially defined waterway which sits within a modified concreted channel and is approximately one to three metres wide (Photograph 1). Ropes Creek is the next nearest waterway to the subject land and is located approximately 700 metres to the west of the subject land.



Photograph 1 Angus Creek running adjacent to the subject land

4.4 Wetlands

There are no wetlands listed under the *State Environment Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazard SEPP) or important wetlands listed in the Directory of Important Wetlands in Australia (DIWA) within the assessment area. No wetlands of international importance (Ramsar) are located within the assessment area. The closest Ramsar wetland is located approximately 25 km to the east at Sydney Olympic Park, which contains a waterbird refuge listed under Ramsar.

4.5 Connectivity features

Connectivity features within the subject land are limited. Although some limited connectivity exists for flying species (such as birds and bats), the subject land has little direct connectivity with vegetated corridors.

Areas of native vegetation are located immediately adjacent to the south and north west of the subject land. However, these areas of native vegetation are isolated, and surrounded by industrial and commercial development (including the subject land), the M4 Motorway and cleared and disturbed lands.

Approximately 700 metres to the west of the subject land is Ropes Creek, which provides a vegetated corridor running in a north-south orientation. This corridor is also identified as a biodiversity corridor of regional significance within the Biodiversity Investment Opportunities Map (BIO Map) for the Cumberland subregion (DPIE, 2015a) (Figure 4-2).

To the east, the study area is cut off from the Western Sydney Parklands by the M7 Motorway and a large section of commercial and industrial development and the M4 Motorway is located immediately to the north of the subject land. The Western Sydney Parklands is also identified as a biodiversity corridor of regional significance (DPIE, 2015a).

4.6 Areas of geological significance and soil hazard features

The subject land does not contain any areas of geological significance, including crevices, cliffs, karst, or caves. There are no areas of geological significance in close proximity to the subject land.

The subject land is not mapped as containing acid sulfate soils or potential acid sulfate soils.

The subject land is located on two soil landscape types 'Blacktown' and 'Disturbed Terrain' (DPIE, 2021c). The Blacktown soil landscape covers the south-western portion of the subject land, while the remainder is on land mapped as Disturbed Terrain. Table 4-2 below summarises landscape, soil, and hazard features of each soil landscape type within the subject land.

Table 4-2 below summarises landscape, soil, and hazard features of each soil landscape type within the subject land.

Table 4-2: Summary of soil landscape types within the subject land and their associated descriptions

Soil landscape type	Landscape	Soils	Hazards
Blacktown	Gently undulating rises on Wianamatta Group shales. Local relief to 30 metres, slopes usually >5%. Broad rounded crests and ridges with gently inclined slopes. Cleared Eucalypt woodland and tall open-forest (dry sclerophyll forest).	Shallow to moderately deep (>100 cm) hardsetting mottled texture contrast soils, red and brown podzolic soils on crests grading to yellow podzolic soils on lower slopes and in drainage lines.	Moderately reactive high plastic subsoil, low soil fertility, poor soil drainage and seasonal waterlogging.
Disturbed Terrain	Varies from level plains to undulating terrain and has	N/A	Dependent on nature of fill material which may include

Soil landscape type	Landscape	Soils	Hazards
	been disturbed by human activity to a depth of at least 100 cm. The original soil has been removed, greatly disturbed, or buried. Most of these areas have been levelled to slopes of <5%. Landfill includes a wide variety of soil, rock, building and waste material. The original vegetation has been completely cleared.		mass movement hazard (subsidence), soil impermeability leading to poor drainage, low fertility and toxic material. Care must be taken when the subject land is developed. The management of this soil type is outside the scope of this report.

4.7 Areas of Outstanding Biodiversity Value (AOBVs)

Areas of Outstanding Biodiversity Value (AOBVs) are defined under the BC Act. No AOBVs occur within or surrounding the subject land.

4.8 NSW Landscape regions (Mitchell Landscapes)

The majority of the subject land is situated within the Cumberland Plains NSW Landscape (DPIE, 2016) (Figure 4-1). The Cumberland Plains NSW Landscape is an over cleared landscape with 89 per cent of the landscape currently cleared. It consists of low rolling hills and valleys in a rain shadow area between the Blue Mountains and the coast on horizontal Triassic shales and lithic sandstones forming a down-warped block on the coastal side of the Lapstone monocline with a general elevation 30 to 120 metres, and a local relief of 50 metres (DPIE, 2016).

An area in the east of the subject land is situated within the Sydney Basin Diatremes NSW Landscape. This landscape is associated with circular volcanic vents filled with layered, brecciated country rock cemented by a fine-grained basaltic matrix. It is estimated to be 32 per cent cleared (DPIE, 2016).

Eastern Creek Throughput Increase BDAR



Figure 4-1: Site map

Eastern Creek Throughput Increase BDAR



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Figure 4-2: Location map

5 NATIVE VEGETATION

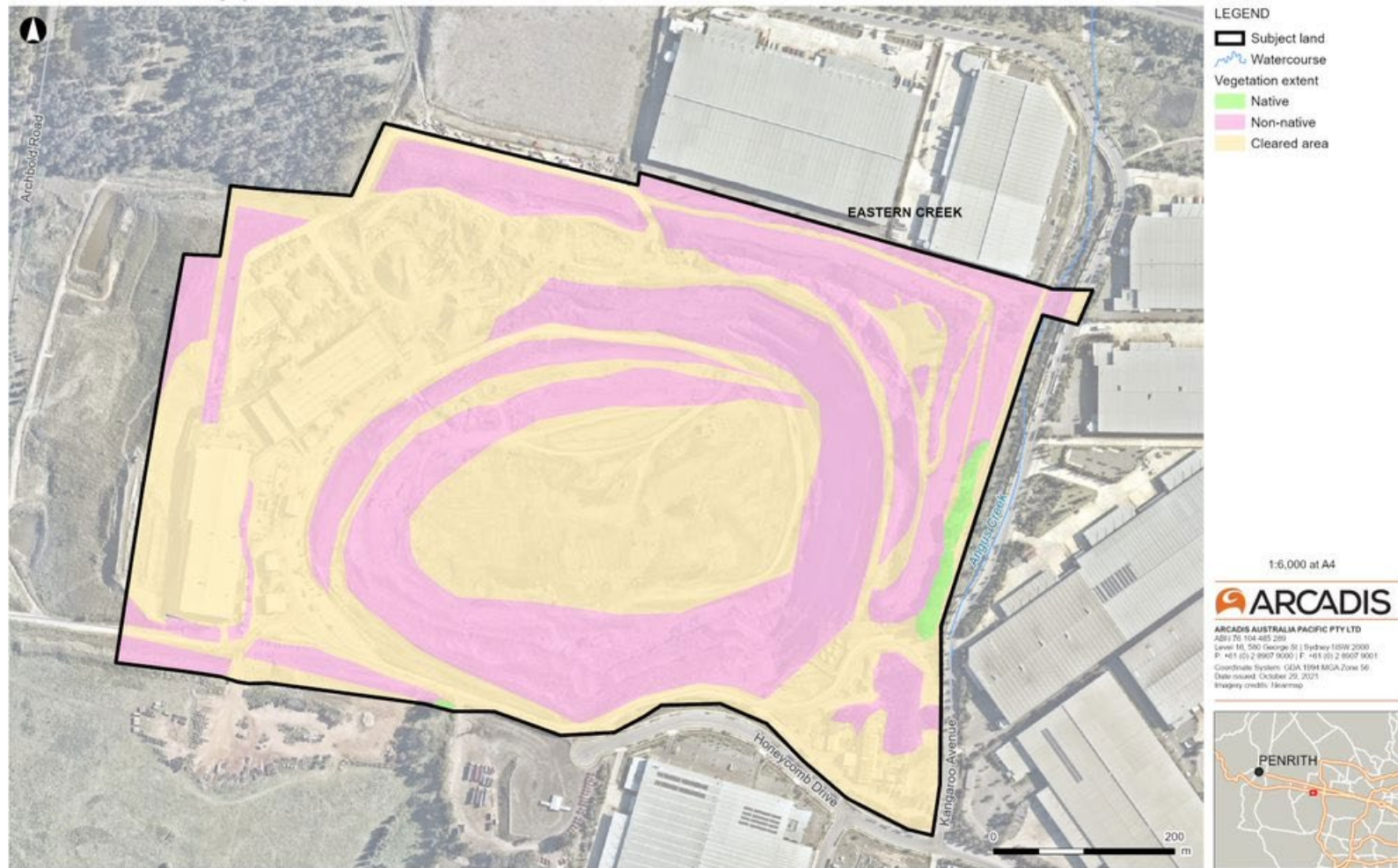
5.1 Native vegetation extent

Areas of native vegetation within the subject land are shown on Figure 5-1. Other vegetated areas within the subject land consist of non-native grassland and shrubs on highly disturbed soil as described in Section 5.6. Remaining areas on the subject land are cleared and comprise infrastructure related to the waste facility. These areas are shown on Figure 5-1 and their extent listed in Table 5-1.

Table 5-1: Vegetation extent within the subject land

Vegetation extent	Area (ha)
Native vegetation	0.4
Non-native vegetation	22.48
Cleared areas	30.97

Eastern Creek Throughput Increase BDAR



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Figure 5-1: Native vegetation extent

5.2 Regional vegetation mapping

Regional vegetation mapping (*Remnant Vegetation of the western Cumberland subregion, 2013 Update* (OEH, 2013)) identified one Plant Community Type (PCT) as occurring within the subject land:

- PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion

5.3 Plant Community Type within the subject land

Following the field surveys, one PCT; PCT 849 (Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion) was identified as occurring within the subject land. The location of this PCT as identified from the ground truthed vegetation mapping is shown in Figure 5-2 and its extent within the subject land is listed in Table 5-2. A summary of its attributes is provided in Table 5-3 and a more detailed description on condition within the section below.

Table 5-2: PCTs within the subject land from ground-truthed vegetation mapping

PCT No.	PCT Name	Area within subject land (ha)
849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	0.4

Table 5-3: Attribute information for PCT 849 in the subject land

Attribute	PCT 849 in the subject land
Vegetation formation	Grassy Woodlands
Vegetation class	Coastal Valley Grassy Woodlands
PCT Name	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
PCT	849
Conservation status	BC Act: Critically endangered – forms Cumberland Plain Woodland in the Sydney Basin Bioregion EPBC Act: Critically endangered – patches that meet size and condition thresholds form Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest.
Estimate of percent cleared	93 per cent
Condition	Planted to moderate/good
Extent in the subject land (ha)	0.4
Quadrats completed in vegetation zones	Two (EC01, EC02)
Species relied upon for PCT identification	<i>Eucalyptus moluccana</i> , <i>Eucalyptus tereticornis</i> , <i>Corymbia maculata</i> , <i>Brunoniella australis</i> , <i>Themeda triandra</i> , <i>Microlaena stipoides</i>

Description: Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849) is an open grassy woodland found on the gentle topography associated with the shale plains of western Sydney. This PCT is dominated by *Eucalyptus moluccana*, *Eucalyptus tereticornis* and ironbarks such as *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Eucalyptus fibrosa*, with localised patches of *Corymbia maculata* (Spotted Gum). The understorey is typified by a sparse to moderate cover of shrubs and a high cover of grasses and forbs (DPIE, 2021b).

Within the subject land, PCT 849 is present in isolated patches and is subject to ongoing disturbances. The subject land comprises two PCT 849 vegetation zones; 849_moderate/good and 849_planted. These are described below and shown on Figure 5-4.

Vegetation zone 1 – PCT 849_moderate/good

Vegetation Zone 1 – PCT 849_moderate/good is present in a small patch along the southern boundary of the subject land. This patch is largely situated outside the subject land except for the overhanging canopy of mature Eucalyptus species. In order to assess this vegetation, a vegetation plot was conducted within the patch but outside the subject land. 0.02 hectares of this patch is situated within the subject land.

Vegetation Zone 1 – PCT 849_moderate/good is characterised by a canopy of *Eucalyptus moluccana* and *Eucalyptus tereticornis*. A shrub layer is absent, while the ground layer is dominated by the native grass *Microlaena stipoides* (Weeping grass) (Photograph 2). Other commonly occurring native species present within the ground layer include *Themeda triandra*, *Brunoniella australis* (Blue Pincushion), *Commelina cyanea*, *Cynodon dactylon* (Couch) and *Dichanthium sericeum* (Queensland Bluegrass). Exotic species are also present within the ground layer with a total cover of approximately 18 per cent, and include *Setaria parviflora*, *Pennisetum clandestinum* (Kikuyu), *Paspalum dilatatum* (Paspalum) and *Sida rhombifolia* (Paddy's Lucerne).

The canopy of Vegetation Zone 1 – PCT 849_moderate/good is consistent with PCT 849 as described in the Vegetation Classification Database. Furthermore, many of the ground layer species recorded are also associated with PCT 849, including *Microlaena stipoides* which is dominant in the ground layer with a cover of 65 per cent. The 0.02 hectares of this patch which is situated within the subject land is considered to be of low biodiversity value as the native vegetation present is largely limited to the overhanging Eucalyptus canopy, and the groundcover is dominated by exotic species.

Vegetation zone 2 – PCT 849_planted

Vegetation zone 2 - PCT 849_planted forms a narrow strip of vegetation near the eastern boundary of the subject land (Figure 5-4). This vegetation is situated on the batter and is likely planted, consisting of *Corymbia maculata* (Spotted Gum) trees with a sparse occurrence of other commonly planted trees in the Sydney region, including *Lophostemon confertus* (Brush Box) and *Eucalyptus cinerea* (Argyle Apple) (Photograph 3). *Eucalyptus tereticornis*, a species associated with Cumberland Plain Woodland, was also recorded within this vegetation zone.

A shrub layer is largely absent in this vegetation zone, while the ground layer is dominated by exotic species. Native groundcover is very low (approximately one per cent) within Vegetation Zone 2 – PCT 849_planted, and comprises *Dichondra repens* (Kidney Weed), *Brunoniella australis* (Blue Trumpet), *Cynodon dactylon* (Couch), *Microlaena stipoides* and *Oxalis perennans*. Exotic species particularly abundant within this vegetation zone include *Hydrocotyle bonariensis*, *Pennisetum clandestinum* (Kikuyu), *Eragrostis curvula* (African Lovegrass) and *Chloris gayana* (Rhodes Grass).

While this vegetation zone has a low cover of native species, particularly in the ground layer, and a largely planted canopy, it has been identified as PCT 849 on a precautionary basis. This is because, while the canopy is planted, the dominant Eucalyptus species present are associated with PCT 849 (*Corymbia maculata* and *Eucalyptus tereticornis*). All the native species recorded within the ground layer are also associated with PCT 849. Therefore, while in low condition and heavily modified, this vegetation zone can be assigned to PCT 849.



Photograph 2 PCT 849_moderate/good at plot EC01 just outside the subject land



Photograph 3 PCT 849_planted with a canopy dominated by planted Corymbia maculata

Eastern Creek Throughput Increase BDAR



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Figure 5-2: Plant Community Types (Arcadis, 2021)

5.4 Vegetation integrity assessment

Details of how the vegetation integrity scores are calculated are outlined in Section 2.7.4. The results of the BAMC and composition, structure, function and vegetation integrity scores for each vegetation zone is shown in Table 5-4.

All native vegetation has an integrity score above 15 and therefore requires offsets to be calculated where impacts occur, in accordance with Section 9.2.1 of the BAM.

Table 5-4: Vegetation integrity scores for vegetation zones within the subject land

	Vegetation zone 1 - PCT 849_moderate/good	Vegetation zone 2 - PCT 849_planted
PCT ID/ name	Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849)	
Broad condition class	Moderate/good	planted
Patch size	6	1
Composition condition score	33	16.9
Structure condition score	82.5	35.4
Function condition score	73.3	55.5
Presence of hollow bearing trees	No	No
Vegetation integrity score	58.4	32.1

5.5 Threatened Ecological Community assessment

Section 5.3 identifies that one PCT, PCT 849 (Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion), was recorded within the subject land. The BioNet Vegetation Classification database (DPIE, 2021b) provides a description of each approved PCT within NSW, including its equivalence with NSW and Commonwealth listed TECs. Notwithstanding, these equivalences must be treated with caution as they are applied at a high level and do not necessarily capture the nuance of every TEC permutation. Instead, the Final Determination (BC Act) and Commonwealth Conservation Advice/Listing Advice (EPBC Act) must be relied upon when determining whether an observed PCT is consistent with the legal definition of that TEC.

PCT 849 is associated with the TEC Cumberland Plain Woodland in the Sydney Basin Bioregion, listed as critically endangered under the BC Act, and Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest, listed as critically endangered under the EPBC Act.

Table 5-5 provides a comparison of the location, structure and floristics of PCT 849 in the subject land with the Final Determination for Cumberland Plain Woodland in the Sydney Basin Bioregion as listed under the BC Act.

Although in a degraded form and altered structure, the vegetation of PCT 849 within the subject land is consistent with the floristic composition, distribution, landscape position and soil associations detailed in the Final Determination for Cumberland Plain Woodland in the Sydney Basin Bioregion (DPIE, 2010) (Figure 5-3).

The NSW Scientific Committee does not exclude patches of vegetation as Cumberland Plain Woodland on the basis of condition or structure thresholds. Therefore, all the vegetation within the subject land identified as PCT 849 is considered Cumberland Plain Woodland in the Sydney Basin Bioregion under the BC Act.

This community also forms part of the critically endangered Cumberland Plain Shale Woodland and Shale-Gravel Transition Forest under the EPBC Act. This is discussed in Section 7.1.

Table 5-5: Comparison of areas mapped as PCTs 849 in the subject land with final determination for Cumberland Plain Woodland in the Sydney Basin bioregion

Extract from Final Determination (DPIE, 2010)	Comparison with areas of PCT 849 in the subject land
Paragraph 2: Located in the Sydney Basin bioregion on the Cumberland Plain, a rainshadow area to the west of Sydney's Central Business District.	The subject land is on the Cumberland Plain in the Sydney Basin bioregion.
Paragraph 2: associated with clay soils derived from Wianamatta Group geology, or more rarely alluvial substrates. Typically occurs on flat to undulating or hilly terrain up to about 350 m elevation but may also occur on locally steep subject lands and at slightly higher elevations.	Areas of PCT 849 in the subject land are situated on the Blacktown soil landscape which is associated with the gently undulating rises on Wianamatta Group shales. The elevation of PCT 849 in the subject land is between 74 and 80 metres.
Paragraph 3: Cumberland Plain Woodland is characterised by the following assemblage of species: 112 species listed.	Of the 112 species listed in the Final Determination, 15 were recorded within PCT 849 within the subject land.
Paragraph 5: characterised by an upper-storey that is usually dominated by <i>Eucalyptus moluccana</i> (Grey Box) and <i>E. tereticornis</i> (Forest Red Gum), often with <i>E. crebra</i> (Grey Ironbark), <i>E. eugenioides</i> (Narrow-leaved Stringybark), <i>Corymbia maculata</i> (Spotted Gum) or other less frequently occurring eucalypts, including <i>Angophora floribunda</i> , <i>A. subvelutina</i> (Broad-leaved Apple), <i>E. amplifolia</i> (Cabbage Gum) and <i>E. fibrosa</i> (Broad-leaved Ironbark).	Areas mapped as PCT 849 within the subject land are characterised by a canopy of <i>Eucalyptus moluccana</i> and <i>Eucalyptus tereticornis</i> , or <i>Corymbia maculata</i> with sparse <i>Eucalyptus tereticornis</i> cover.
Paragraph 6: The structure of the community varies depending on past and current disturbances, particularly clearing, fire and grazing. Contemporary tree-dominated stands of the community are largely relics or regrowth of originally taller forests and woodlands, which are likely to have had scattered shrubs and a largely continuous grassy groundcover. After total or partial clearing, the tree canopy may remain sparse or may regrow to form dense stands of saplings and small trees, which are typically associated with a ground layer of reduced cover and diversity. Either or both of the upper-storey and mid-storey may be absent from the community. Native grasslands derived from clearing of the woodland and forest are also part of this community if they contain characteristic non-woody species listed in paragraph 3.	Areas of PCT 849 within the subject land are subject to historical and ongoing disturbances, resulting in an altered structure of the community. All areas of PCT 849 within the subject land have an absent mid-storey. The area of 849_planted has a ground layer which is dominated by exotic species and a planted canopy, although the native species present are associated with Cumberland Plain Woodland.

Eastern Creek Throughput Increase BDAR



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Figure 5-3: Threatened ecological communities

5.6 Non-native vegetation

Non-native vegetation within the subject land forms two vegetation zones, exotic grassland and exotic/planted shrubs and trees (Figure 5-4). These vegetation zones predominantly consist of exotic vegetation and do not conform to the definition of any PCTs as listed in the BioNet Vegetation Classification Database.

5.6.1 Exotic grassland

Exotic grassland covers 20.85 hectares of the subject land and is situated within disturbed areas which have been historically cleared or positioned on areas of fill (Figure 5-4). These areas are dominated by the exotic grass *Cenchrus setaceus* (Fountain Grass) (Photograph 4). Other exotic grasses frequently present include *Cortaderia selloana* (Pampas Grass), *Alternanthera pungens* (Khaki Weed) and *Melinis repens* (Red Natal Grass). Exotic forbs and shrubs present include *Ricinus communis* (Castor Oil Plant), *Verbena bonariensis* (Purpletop) and *Foeniculum vulgare* (Fennel).

All areas of this vegetation zone are heavily disturbed and are largely situated on the slopes of the berm associated with the landfill. Here the soils comprise fill material which have become conducive to the establishment of exotic species.

This vegetation zone is therefore not consistent with any PCTs as defined in the BioNet Vegetation Classification Database and does not conform with the definition of any TECs listed under the BC Act or EPBC Act.



Photograph 4 Exotic grassland along the slopes of the berm

5.6.2 Exotic/planted shrubs and trees

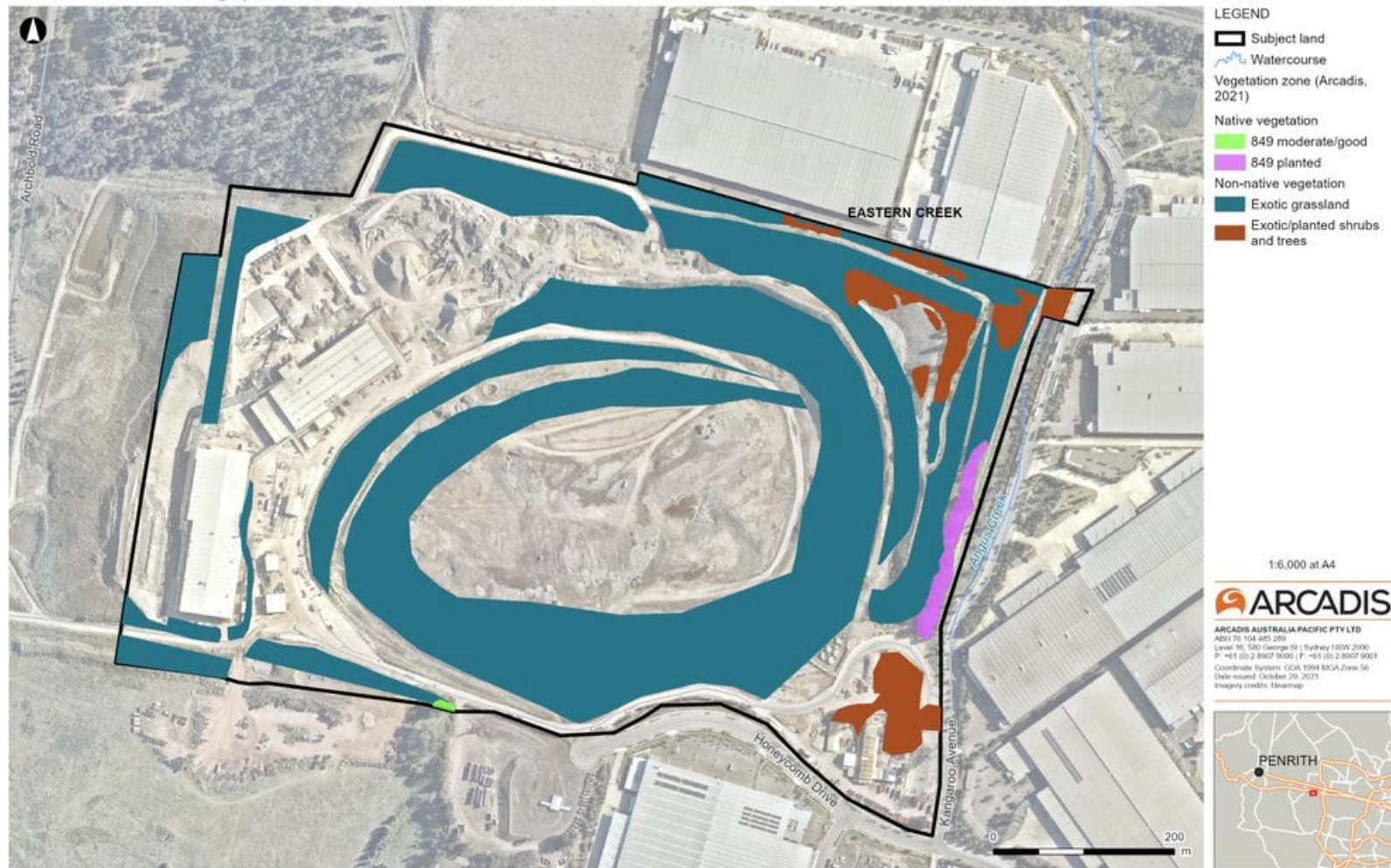
This vegetation zone is situated in the north eastern corner of the subject land and covers a total of 1.63 hectares. The vegetation here is largely situated on the top of the berm associated with the landfill in areas of highly disturbed soils from the use of fill. The exotic/planted shrubs and trees vegetation zone comprise a sparse canopy of *Corymbia maculata* with an exotic shrub layer of *Olea europaea* subsp. *cuspidata* (African Olive), and *Acacia saligna* (Golden Wreath Wattle). The ground layer was dominated by exotic grasses mainly *Cenchrus setaceus* (Photograph 5).

While there are sparse occurrences of the native tree *Corymbia maculata* within this vegetation zone, there are no additional native species in the shrub or ground layer. This vegetation zone is therefore not consistent with any PCTs as defined in the BioNet Vegetation Classification Database and does not conform with the definition of any TECs listed under the BC Act or EPBC Act.



Photograph 5 Exotic/planted shrubs and trees at the top of the berm

Eastern Creek Throughput Increase BDAR



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Figure 5-4: Vegetation zones (Arcadis, 2021)

5.7 Weeds

Of the 22 exotic species recorded in the subject land, five are listed as Priority Weeds (DPIE, 2021f) under the NSW *Biosecurity Act 2015* for the Blacktown region, which includes the Blacktown LGA. Of these species, three are also listed as Weeds of National Significance (WoNS) (DPIE, 2021f). Exotic species recorded in the subject land are detailed in Table 5-6.

In addition, 15 species recorded within the subject land are recognised as High Threat Weeds (Table 5-6). High Threat Weeds are exotic species which are likely to have a significantly detrimental effect on native vegetation and are used when determining vegetation condition.

Exotic species were located in all vegetation zones across the subject land, with particularly high abundance in non-PCT vegetation zones.

Table 5-6: Exotic plant species recorded in the subject land

Scientific name	Common name	Listed as a WoNS?	Listed as a HTW?	Priority Weed category
<i>Acacia saligna</i>	Golden Wreath Wattle	No	No	N/A
<i>Ageratina adenophora</i>	Crofton Weed	No	Yes	N/A
<i>Alternanthera pungens</i>	Khaki Weed	No	Yes	N/A
<i>Araujia sericiflora</i>	Moth Vine	No	No	N/A
<i>Asparagus asparagoides</i>	Bridal Creeper	Yes	Yes	Prohibition on certain dealings Must not be imported into the state, sold, bartered, exchanged or offered for sale.
<i>Bidens pilosa</i>	Cobbler's Pegs	No	Yes	N/A
<i>Cenchrus setaceus</i>	Fountain Grass	No	Yes	N/A
<i>Chloris gayana</i>	Rhodes Grass	No	Yes	N/A
<i>Cirsium vulgare</i>	Spear Thistle	No	No	N/A
<i>Conyza bonariensis</i>	Flaxleaf Fleabane	No	No	N/A
<i>Cortaderia selloana</i>	Pampas Grass	No	Yes	Regional Recommended Measure Land managers mitigate the risk of the plant being introduced to their land. Land managers prevent spread from their land where feasible. Land managers reduce the impact on priority assets. The plant or parts of the plant are not traded, carried, grown or released into the environment.
<i>Eragrostis curvula</i>	African Lovegrass	No	Yes	N/A
<i>Foeniculum vulgare</i>	Fennel	No	No	N/A
<i>Gomphocarpus fruticosus</i>	Narrow-leaved Cotton Bush	No	No	N/A
<i>Hydrocotyle bonariensis</i>		No	No	N/A
<i>Hypochoeris radicata</i>	Catsear	No	No	N/A

Scientific name	Common name	Listed as a WoNS?	Listed as a HTW?	Priority Weed category
<i>Ligustrum lucidum</i>	Large-leaved Privet	No	Yes	N/A
<i>Lycium ferocissimum</i>	African Boxthorn	Yes	Yes	Prohibition on certain dealings Must not be imported into the state, sold, bartered, exchanged or offered for sale
<i>Melinus repens</i>	Red Natal Grass	No	No	N/A
<i>Olea europaea</i> <i>subsp. cuspidata</i>	African Olive	No	Yes	Regional Recommended Measure An exclusion zone is established for all lands in Blue Mountains City Council local government area and in Penrith local government area west of the Nepean River. The remainder of the region is classified as the core infestation area. Whole region: The plant or parts of the plant are not traded, carried, grown or released into the environment. Exclusion zone: The plant is eradicated from the land and the land kept free of the plant. Core infestation area: Land managers prevent spread from their land where feasible. Land managers reduce impacts from the plant on priority assets.
<i>Paspalum dilatatum</i>	Paspalum	No	Yes	N/A
<i>Pennisetum clandestinum</i>	Kikuyu Grass	No	No	N/A
<i>Pennisetum setaceum</i>	Fountain Grass	No	No	N/A
<i>Phoenix canariensis</i>	Canary Island Date Palm	No	Yes	N/A
<i>Plantago lanceolata</i>	Lamb's Tongues	No	No	N/A
<i>Ricinus communis</i>	Castor Oil Plant	No	Yes	N/A
<i>Senecio madagascariensis</i>	Fireweed	Yes	Yes	Prohibition on certain dealings Must not be imported into the state, sold, bartered, exchanged or offered for sale.
<i>Setaria parviflora</i>		No	No	N/A
<i>Setaria pumila</i>	Pale Pigeon Grass	No	No	N/A
<i>Sida rhombifolia</i>	Paddy's Lucerne	No	No	N/A
<i>Solanum sisymbriifolium</i>		No	No	N/A
<i>Verbena bonariensis</i>	Purpletop	No	No	N/A
<i>Verbena rigida</i>	Veined Verbena	No	No	N/A

5.8 Groundwater dependent ecosystems

Groundwater dependent ecosystems (GDEs) are ecological communities that are dependent, either entirely or in part, on the presence of groundwater for their health or survival.

As part of this assessment, The Bureau of Meteorology's GDE Atlas was reviewed to determine the occurrence of potential groundwater dependent ecosystems within and surrounding the subject land. The results of the review show that there are no potential terrestrial or subterranean GDEs within the subject land. There is one high potential terrestrial GDE directly northwest of the subject land and three more terrestrial GDEs in close proximity to the subject land. The GDEs in close proximity to the subject land are shown below in Figure 5-5.

Eastern Creek Throughput Increase BDAR

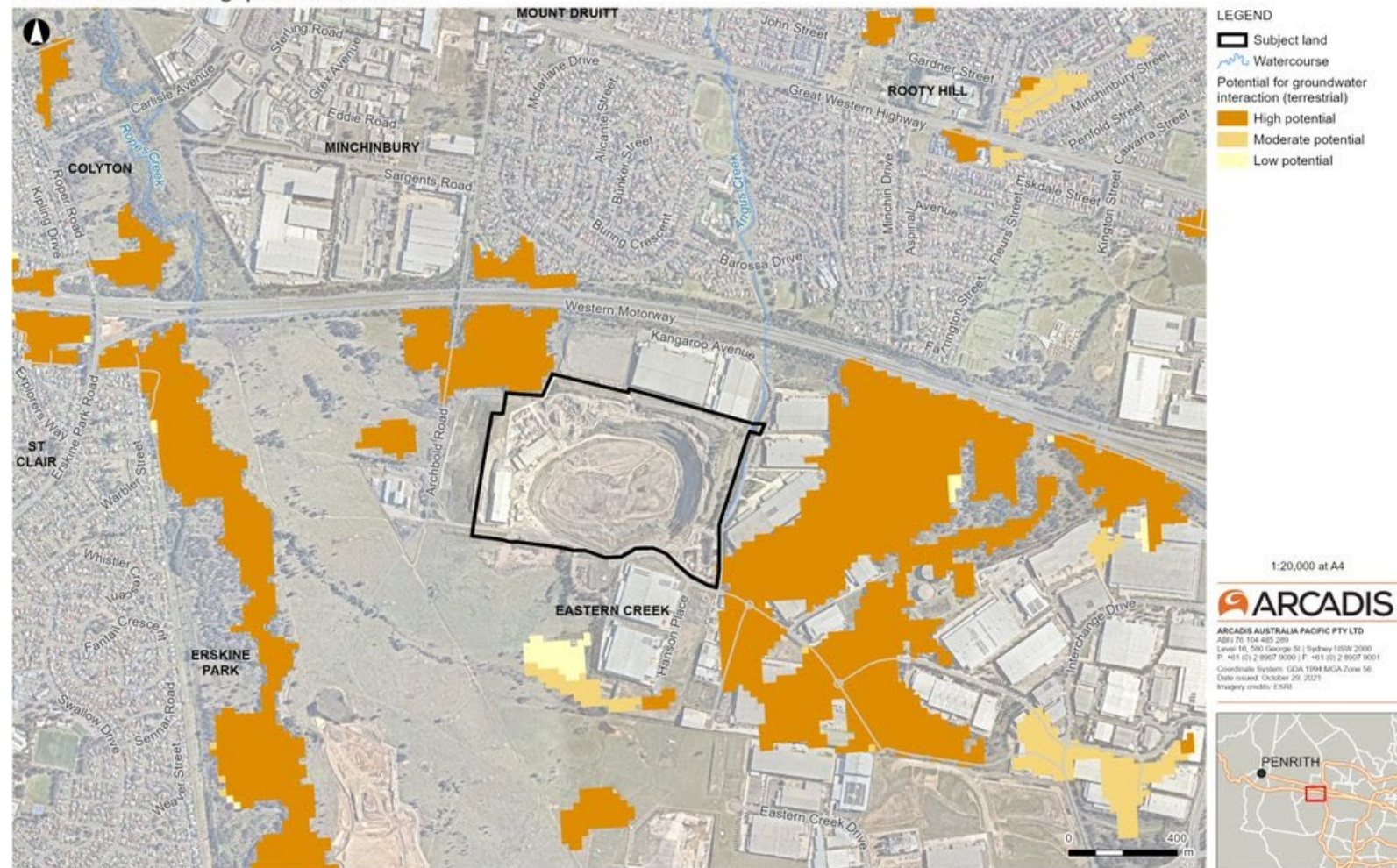


Figure 5-5: Potential groundwater dependent ecosystems (GDEs) in the vicinity of the subject land

6 THREATENED SPECIES

The candidate threatened species for assessment in this BDAR were identified using the BAMC (DPE, 2021e). A review of database searches (BioNet, PMST) was also undertaken in July 2021 to identify threatened species and habitat with potential to occur in the subject land. These database searches informed the field surveys.

Threatened fauna species

A search of the Commonwealth Protected Matters Search Tool (PMST) undertaken in July 2021 identified 18 threatened fauna species and 15 migratory fauna species listed under the EPBC Act known or with the potential to occur within a 10 kilometre radius of the subject land (Appendix D).

A search of BioNet identified 63 species listed under the BC Act within a 10 kilometre radius of the subject land (Appendix D).

The BAMC identified a total of 39 threatened fauna species with potential to occur within the subject land. This includes 22 species or dual credit species. Assessment of candidate threatened fauna species is outlined in Section 6.1.2 below.

Threatened flora species

Database searches (BioNet, PMST) undertaken in July 2021 identified records (or potential occurrence) for 31 threatened flora species listed under the BC Act and/or EPBC Act within a 10 kilometre radius of the subject land (Appendix E).

The BAMC identified a total of 15 candidate threatened flora species credit species. Assessment of candidate threatened flora species is outlined in Section 6.1.2 below.

6.1 BAMC results and habitat suitability assessment

This section outlines the species returned by the BAMC including ecosystem credit species, species credit species, and dual credit species. An assessment of these species in accordance with Section 5.2 of the BAM has been undertaken where appropriate, to identify species for targeted surveys.

6.1.1 Ecosystem credit species

Ecosystem credit species represent fauna species that can be readily predicted to occur by the type and condition of vegetation present at the subject land (i.e. within a PCT based on the attributes of a given vegetation zone). The ecosystem credit species that are predicted to occur within the subject land, their associated habitat constraints, geographic limitations, and sensitivity to potential gain class are outlined below in Table 6-1. Dual credit species are those for which there is specialist foraging or breeding habitat that form species credits.

Sensitivity to gain scores consider the ability of a species to respond to management actions implemented at a biodiversity stewardship site and for ecosystem credit species, help to determine ecosystem credits for vegetation zones. The predicted ecosystem species with the highest sensitivity to gain score and the sensitivity to lose score for the relevant vegetation zone determines the biodiversity risk weighting for the vegetation zone. Ecosystem credits required for this vegetation zone are then calculated using this biodiversity risk weighting. This is outlined in Appendix I of the BAM.

All ecosystem credit species identified in the BAMC are considered to have the potential to occur within the subject land and have therefore been retained as predicted species within the BAMC.

Table 6-1: Ecosystem credit species, including ecosystem component of dual credit species, predicted to occur within the subject land

Common name	Scientific name	Ecosystem or dual credit species	BC Act Status	EPBC Act Status	Sensitivity to potential gain
Threatened fauna species					
Barking Owl	<i>Ninox connivens</i>	Dual	V	-	High
Black-chinned Honeyeater (eastern subspecies)	<i>Melithreptus gularis gularis</i>	Ecosystem	V	-	Moderate
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	Ecosystem	V	-	High
Diamond Firetail	<i>Stagonopleura guttata</i>	Ecosystem	V	-	Moderate
Dusky Woodswallow	<i>Artamus cyanopterus cyanopterus</i>	Ecosystem	V	-	Moderate
Eastern Coastal Free-tailed Bat	<i>Micronomus norfolkensis</i>	Ecosystem	V	-	High
Flame Robin	<i>Petroica phoenicea</i>	Ecosystem	V	-	Moderate
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	Dual	V	-	Moderate (foraging) High (breeding)
Grey-headed Flying- fox	<i>Pteropus poliocephalus</i>	Dual	V	V	High
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata cucullata</i>	Ecosystem	V	-	Moderate
Koala	<i>Phascolarctos cinereus</i>	Dual	V	V	High
Large Bent-winged Bat	<i>Miniopterus orianae oceanensis</i>	Dual	V	-	High (foraging) Very High (breeding)
Little Bent-winged Bat	<i>Miniopterus australis</i>	Dual	V	-	High (foraging) Very High (breeding)
Little Eagle	<i>Hieraaetus morphnoides</i>	Dual	V	-	Moderate

Common name	Scientific name	Ecosystem or dual credit species	BC Act Status	EPBC Act Status	Sensitivity to potential gain
Little Lorikeet	<i>Glossopsitta pusilla</i>	Ecosystem	V	-	High
Masked Owl	<i>Tyto novaehollandiae</i>	Dual	V	-	High
Painted Honeyeater	<i>Grantiella picta</i>	Ecosystem	V	V	Moderate
Powerful Owl	<i>Ninox strenua</i>	Dual	V	-	High
Regent Honeyeater	<i>Anthochaera phrygia</i>	Dual	CE	CE	High
Scarlet Robin	<i>Petroica boodang</i>	Ecosystem	V	-	Moderate
Speckled Warbler	<i>Chthonicola sagittata</i>	Ecosystem	V	-	High
Spotted Harrier	<i>Circus assimilis</i>	Ecosystem	V	-	Moderate
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	Ecosystem	V	E	High
Square-tailed Kite	<i>Lophoictinia isura</i>	Dual	V	-	Moderate
Swift Parrot	<i>Lathamus discolor</i>	Dual	E	CE	Moderate
Turquoise Parrot	<i>Neophema pulchella</i>	Ecosystem	V	-	High
Varied Sittella	<i>Daphoenositta chrysoptera</i>	Ecosystem	V	-	Moderate
White-bellied Sea- Eagle	<i>Haliaeetus leucogaster</i>	Dual	V	-	High
Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>	Ecosystem	V	-	High

V = vulnerable, E = endangered, CE = critically endangered

6.1.2 Species credit species

Species credit species represent species that cannot be readily predicted to occur within the subject land based on the PCTs present (i.e., suitable habitat cannot be confidently predicted by vegetation surrogates or landscape features) and must therefore be surveyed for where potential habitat is considered to be present.

An assessment of the species credit species returned by the BAMC has been undertaken to determine whether they have the potential to occur based on the presence of necessary habitat components or habitat constraints, in accordance with BAM Section 5.2.2.

Table 6-2 provides the full list of candidate species credit species returned by the BAMC and additional species considered likely to occur in the subject land and outlines their associated habitat constraints and the presence or absence of these habitat constraints within the subject land. Table 6-2 also provides requirements to conduct threatened species surveys, and where relevant the justification for targeted surveys not being conducted, in accordance with BAM Section 5.2.

Table 6-2: Species credit species (including dual credit species) predicted to occur within the subject land from the BAMC or from database searches

Species	BC Act Status	EPBC Act Status	Species or dual credit species	Reason for inclusion	Habitat degraded	Geographic and/or habitat constraint (BAMC)	Survey undertaken or justification for removal
Threatened flora species							
<i>Acacia bynoeana</i>	E	V	Species	BAMC	Yes	-	Species removed. Potential habitat within the subject land is degraded such that the species is unlikely to use the subject land.
<i>Acacia pubescens</i>	V	V	Species	BAMC	-	-	Species surveyed. Only marginal habitat present but species surveyed due to tolerance to disturbance.
<i>Caladenia tessellata</i>	E	V	Species	BAMC	-	-	Species removed. No suitable habitat present within subject land.
<i>Cynanchum elegans</i>	E	E	Species	BAMC	-	-	Species removed. No suitable habitat present within subject land.
<i>Dillwynia tenuifolia</i>	V	-	Species	BAMC	-	-	Species removed. No suitable habitat present within subject land
<i>Dillwynia tenuifolia</i> - Endangered population	EP	-	Species	BAMC	-	Bounded by Western Road, Elizabeth Drive, Devonshire Road and Cross Street, Kemps Creek in the Liverpool LGA	Species removed. Geographic constraint not present within the subject land.
<i>Eucalyptus benthamii</i>	V	V	Species	BAMC	-	-	Species removed. No suitable habitat present within subject land.
<i>Grevillea juniperina</i> subsp. <i>juniperina</i>	V	-	Species	BAMC	-	-	Species surveyed. Only marginal habitat present but species surveyed due to tolerance to disturbance.
<i>Marsdenia viridiflora</i> subsp. <i>Viridiflora</i>	EP	-	Species	BAMC	-	Blacktown, Camden, Campbelltown, Canterbury-Bankstown, Cumberland, Fairfield, Liverpool and	Species surveyed. Only marginal habitat present but species surveyed due to tolerance to disturbance.

Species	BC Act Status	EPBC Act Status	Species or dual credit species	Reason for inclusion	Habitat degraded	Geographic and/or habitat constraint (BAMC)	Survey undertaken or justification for removal
						Penrith LGAs (as amended from the Determination))	
<i>Persoonia bargoensis</i>	E	V	Species	BAMC	-	-	Species removed. No suitable habitat present within subject land.
<i>Pimelea curviflora</i> var. <i>curviflora</i>	V	V	Species	BAMC	-	-	Species removed. No suitable habitat present within subject land.
<i>Pimelea spicata</i>	E	E	Species	BAMC	Yes	-	Species removed. Potential habitat within the subject land is degraded such that the species is unlikely to use the subject land.
<i>Pterostylis saxicola</i>	E	E	Species	BAMC	-	-	Species removed. No suitable habitat present within subject land.
<i>Pultenaea pedunculata</i>	E	-	Species	BAMC	Yes	-	Species removed. Potential habitat within the subject land is degraded such that the species is unlikely to use the subject land.
<i>Thesium australe</i>	V	V	Species	BAMC	Yes	-	Species removed. Potential habitat within the subject land is degraded such that the species is unlikely to use the subject land.
Threatened fauna species							
<i>Burhinus grallarius</i> Bush Stone-curlew	E	-	Species	BAMC	Yes	-	Species removed. No suitable habitat present within subject land.
<i>Meridolum corneovirens</i> Cumberland Plain Land Snail	E	-	Species	BAMC	Yes	-	Species surveyed. Targeted surveys were conducted.

Species	BC Act Status	EPBC Act Status	Species or dual credit species	Reason for inclusion	Habitat degraded	Geographic and/or habitat constraint (BAMC)	Survey undertaken or justification for removal
<i>Pommerhelix duralensis</i> Dural Land Snail	E	E	Species	BAMC	Yes	-	Species surveyed. Targeted surveys were conducted.
<i>Cercartetus nanus</i> Eastern Pygmy-possum	V	-	Species	BAMC	Yes	-	Species removed. Habitat, especially suitable foraging habitat (i.e., Banksia species) is not present. See Appendix E for further justification.
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo	V	-	Dual	BAMC	Yes	-	Species removed. This species relies on appropriate nesting resources (hollows greater than 9cm diameter), such resources are not present. Foraging is limited/minimal. Further justification in Appendix E.
<i>Litoria aurea</i> Green and Golden Bell Frog	E	V	Species	BAMC	N/A	-	Species removed. Habitat does not occur for this species within the area of impact.
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox	V	V	Dual	BAMC	Yes	-	Species surveyed. Targeted diurnal (roost) surveys were conducted.
<i>Phascolarctos cinereus</i> Koala	V	V	Dual	BAMC	Yes	-	Species surveyed. Modified SAT surveys were conducted.
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat	V	-	Dual	BAMC	Yes	-	Species removed. No suitable habitat present within subject land that is associated with species credits.

Species	BC Act Status	EPBC Act Status	Species or dual credit species	Reason for inclusion	Habitat degraded	Geographic and/or habitat constraint (BAMC)	Survey undertaken or justification for removal
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat	V	V	Species	BAMC	Yes	-	Species removed. No suitable habitat present within subject land.
<i>Miniopterus australis</i> Little Bent-winged Bat	V	-	Dual	BAMC	Yes	-	Species removed. No suitable habitat present within subject land that is associated with species credits.
<i>Hieraaetus morphnoides</i> Little Eagle	V	-	Dual	BAMC	Yes	-	Species removed. This species relies on large, old trees which are not present. See Appendix E for further justification.
<i>Tyto novaehollandiae</i> Masked Owl	V	-	Dual	BAMC	Yes	-	Species removed. Suitable foraging and breeding habitat does not occur (e.g., hollows of at least 20cm diameter). Further justification is provided in Appendix E.
<i>Ninox strenua</i> Powerful Owl	V	-	Dual	BAMC	Yes	-	Species removed. Suitable foraging and breeding habitat does not occur (e.g., hollows of a depth of at least 50cm). Further justification is provided in Appendix E.
<i>Myotis macropus</i> Southern Myotis	V	-	Species	BAMC	Yes	-	Species removed. Suitable foraging and roosting habitat does not occur. Further justification is provided in Appendix E.
<i>Lophoictinia isura</i> Square-tailed Kite	V	-	Dual	BAMC	Yes	-	Species removed. The subject land is in a disturbed area that would not be suitable for nesting. Foraging resources are scarce and it is considered unlikely this species would rely on this subject land for resources. Further justification is provided in Appendix E.

Species	BC Act Status	EPBC Act Status	Species or dual credit species	Reason for inclusion	Habitat degraded	Geographic and/or habitat constraint (BAMC)	Survey undertaken or justification for removal
<i>Petaurus norfolcensis</i> Squirrel Glider	V	-	Species	BAMC	Yes	-	Species removed. The Squirrel Glider is widely though sparsely distributed in eastern Australia. The species inhabits mature or old growth Box, Box-Ironbark woodlands and Blackbutt-Bloodwood forest with heath understorey in coastal areas. It prefers mixed species stands with a shrub or <i>Acacia</i> midstorey. The species requires an abundance of mature tree hollows for refuge and nest sites and relies on these trees being <50m apart for movement and dispersal. Suitable vegetation (e.g., <i>Acacia</i> midstorey) is largely absent from the subject land. Further, the subject land does not support substantial foraging resources (e.g., sap, nectar, honeydew) or suitable trees and tree hollows required for dispersal, sheltering and breeding.
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	V	-	Dual	BAMC	Yes	-	Species removed. The White-bellied Sea-Eagle is a dual credit species. The species credit component is based on presence of suitable breeding habitat (e.g., living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines).
<i>Lathamus discolor</i> Swift Parrot	E	CE	Dual	BAMC	Yes	-	Species removed. The Swift Parrot migrates to the Australian south-east mainland between February and October, occurring in areas where eucalypts are flowering profusely or where there are abundant lerp infestations. The Swift Parrot is a dual credit species. The species credit component is based on areas of important habitat as described and mapped by DPE (EES). There are no areas of important habitat within the subject land or immediate surrounds. Suitable foraging habitat is

Species	BC Act Status	EPBC Act Status	Species or dual credit species	Reason for inclusion	Habitat degraded	Geographic and/or habitat constraint (BAMC)	Survey undertaken or justification for removal
							minimal. Further justification is provided in Appendix E.
<i>Anthochaera phrygia</i> Regent Honeyeater	CE	CE	Dual	BAMC	Yes	-	Species removed. The Regent Honeyeater inhabits temperate woodlands and open forests of the inland slopes of south-east Australia, feeding on nectar, fruit, lerps, honeydew and insects. Breeding habitat is confined to three known areas, two of them in NSW (Capertee Valley and Bundarra-Barraba regions). The Regent Honeyeater is a dual credit species. The species credit component is based on areas of important habitat as described and mapped by DPE(EES). The subject land is outside of this area of important habitat and therefore this species habitat is covered as ecosystem species.

V = vulnerable, E = endangered, CE = critically endangered, EP = endangered population

Eastern Creek Throughput Increase BDAR



Figure 6-1: Threatened species survey effort

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 QA by: EH

6.2 Threatened species survey results

6.2.1 Threatened fauna species

Targeted surveys resulted in the detection of two possible threatened microbat species on the subject land:

- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*) which is an ecosystem species
- Large Bent-wing Bat (*Miniopterus orianae oceanensis*) which is a dual credit species. Breeding habitat does not occur and this is the species component of the credits. Therefore, the potential occurrence of this species does not trigger offset requirements.

6.2.2 Threatened flora species

One threatened flora species, *Eucalyptus scoparia* (Wallangarra White Gum) was precautionarily recorded within the subject land. *Eucalyptus scoparia* is listed as endangered under the BC Act and vulnerable under the EPBC Act and in NSW is locally indigenous to the Tenterfield region within the New England Tablelands. It is also a commonly planted urban tree in Sydney.

Within the subject land, two individuals of suspected *Eucalyptus scoparia* were recorded. As no identifying features of buds or fruit could be obtained to confirm the identification, the individuals have been conservatively identified as *Eucalyptus scoparia* based on the bark and leaf size of the individuals. *Eucalyptus scoparia* is not native to the Sydney area and therefore these individuals should be treated as planted vegetation and not of conservation significance.

7 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Matters of National Environmental Significance (MNES) are environmental values that require approval from the Commonwealth Minister for the Environment if an action that may have a significant impact on one or more of these values is proposed. There are nine MNES categories listed under the EPBC Act:

- World heritage properties
- National heritage places
- Wetlands of international importance (listed under the Ramsar Convention)
- Listed threatened species and ecological communities
- Migratory species protected under international agreements
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mines)
- A water resource, in relation to coal seam gas development and large coal mining development.

The only relevant MNES to the Proposal is the assessment of potential occurrence of threatened and migratory species.

Other MNES, including World heritage places, National heritages places and Wetlands of international importance (declared Ramsar wetlands) are not relevant to the Proposal.

7.1 Threatened ecological communities

PCT 849 is associated with the TEC Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest, listed as critically endangered under the EPBC Act. An analysis of PCT 849 in the subject land against the condition and extent criteria required to be the listed TEC under the EPBC Act was undertaken. This analysis is outlined in Table 7-1 and concluded that PCT 849 within the subject land does not meet the criteria to be Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest under the EPBC Act.

Table 7-1: Condition criteria for EPBC Act listed TECs within the subject land

TEC name (EPBC Act)	EPBC Act status	Summary of EPBC Act condition criteria	Meets criteria?
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	Critically Endangered	<ul style="list-style-type: none"> • Native tree species present with a minimum projected foliage cover of 10 per cent. • Patch 0.5 ha or greater in size. • One of the below applies: <ul style="list-style-type: none"> – Over 50 per cent of perennial understorey vegetative cover is made up of native species. – Patch greater than 5 ha in size and has over 30 per cent native perennial understorey vegetative cover. – Patch contiguous with a native vegetation patch greater than 5 ha in size and 	<p>No.</p> <p>All patches of PCT 849 within the subject land are less than 0.5 hectares in size. The patch of 849_moderate/good is 0.28 hectares and 849_planted is 0.38 hectares.</p> <p>Therefore, the patches do not meet the size criteria of the EPBC Act listing.</p>

TEC name (EPBC Act)	EPBC Act status	Summary of EPBC Act condition criteria	Meets criteria?
		<p>has over 30 per cent native perennial understorey vegetative cover.</p> <ul style="list-style-type: none"> — Patch contains at least one tree per ha that is large (>80 cm dbh) or has a hollow and has over 30 per cent native perennial understorey vegetative cover (CoA, 2010). 	

7.2 Threatened species

7.2.1 Flora

Database searches included the Protected Matters and Threats (PMST) database which lists EPBC listed threatened species, identified 23 threatened flora species predicted to occur within 10 kilometres of the subject land (Appendix D). No species were considered likely to occur within the subject land during desktop research based on available information on the PCT present and other habitat information.

One threatened flora species listed under the EPBC Act, *Eucalyptus scoparia*, was tentatively identified within the subject land. As described in Section 6.2.2, *Eucalyptus scoparia* is not native to the Sydney area and therefore the individuals of this species should be treated as planted vegetation in this context and not of conservation significance.

7.2.2 Fauna

Database searches included the Protected Matters and Threats (PMST) database which lists EPBC listed threatened species was used to identify 53 listed threatened fauna species predicted to occur within 10 kilometres of the subject land. This consisted of 33 birds, 16 mammals, three amphibians and one snail (Appendix D). No fauna species listed under the EPBC Act were recorded during surveys and none were considered to have a moderate or higher likelihood of occurrence or impact.

7.3 Migratory species

The PMST and BioNet database searches identified 10 additional bird species with the potential to occur within 10 kilometres of the subject land that are listed as migratory only under the EPBC Act (which covers all species listed under the Bonn, CAMBA, JAMBA and/or ROKAMBA conventions) The likelihood of occurrence of listed migratory species within the subject land is provided in Table 7-2.

One migratory species, the Rufous Fantail (*Rhipidura rufifrons*), was recorded within the subject land during the fauna surveys. Further assessment is provided for this species in Section 8.4. Following surveys, all other migratory species identified during database searches were determined to have a low likelihood of occurrence in the subject land (Table 7-2).

Table 7-2: Likelihood of occurrence of listed migratory species within the subject land (see Appendix D for all threatened fauna)

Common name	Scientific name	Habitat requirements	Number of records and source	Potential occurrence and/or impact
Fork-tailed Swift	<i>Apus pacificus</i>	In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. They sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines (Higgins 1999). They forage aerially, up to hundreds of metres above ground, but also less than 1 m above open areas or over water. They often occur in areas of updraughts, especially around cliffs.	BioNet – 6 (2019)	Low. This species may occasionally fly over the subject land but is unlikely to utilise habitat within the subject land.
White-throated Needletail	<i>Hirundapus caudacutus</i>	Migratory and usually seen in eastern Australia from October to April. Breeds in forests in south-eastern Siberia, Mongolia, the Korean Peninsula and northern Japan June-August. Most often seen in eastern Australia before storms, low pressure troughs and approaching cold fronts and occasionally bushfire. These conditions are often used by insects to swarm (e.g., termites and ants) or tend to lift insects away from the surface which favours sighting of White-throated Needletails as they feed. More common in coastal areas, less so inland.	BioNet – 2 (2018) PMST	Low. This species may occasionally fly over the subject land but is unlikely to utilise habitat within the subject land.
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, salt pans and hypersaline salt lakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgeland and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves. They tend to occupy coastal mudflats mainly after ephemeral terrestrial wetlands have dried out, moving	BioNet – 1 (2018) PMST	Very low. No suitable habitat will be impacted.

Common name	Scientific name	Habitat requirements	Number of records and source	Potential occurrence and/or impact
		back during the wet season. Sometimes they occur on rocky shores and rarely on exposed reefs (Higgins & Davies 1996).		
Latham's Snipe	<i>Gallinago hardwickii</i>	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2,000 m above sea-level (Chapman 1969; Naarding 1981). They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies) (Frith et. al. 1977; Naarding 1983; Weston 2006, pers. comm.). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity (Frith et al. 1977; Naarding 1983).	BioNet – 11 (2018)	Very low. No suitable habitat will be impacted.
Common Greenshank	<i>Tringa nebularia</i>	The Common Greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms. The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats. It will also use artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores. The edges of the wetlands used are generally of mud or clay, occasionally of sand, and may be bare or with emergent or fringing vegetation, including short sedges and saltmarsh, mangroves, thickets of rushes, and dead or live trees.	BioNet – 1 (2006)	Very low. No suitable habitat will be impacted.
Curlew Sandpiper	<i>Calidris ferruginea</i>	It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. It roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast seaweed, or on rocky shores.	PMST	Very low. No suitable habitat will be impacted.

Common name	Scientific name	Habitat requirements	Number of records and source	Potential occurrence and/or impact
Eastern Curlew	<i>Numenius madagascariensis</i>	It generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. It roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. May also roost on wooden oyster leases or other similar structures.	PMST	Very low. No suitable habitat will be impacted.
Oriental Cuckoo	<i>Cuculus optatus</i>	The Oriental Cuckoo usually frequents various forest types including coniferous, deciduous and mixed forests. It also occurs in farmland with scattered trees. In the winter range, it can be occasionally found in swamps, mangroves and plantations.	PMST	Very low. No suitable habitat will be impacted.
Black-faced Monarch	<i>Hirundapus caudacutus</i>	The Black-faced Monarch mainly occurs in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrubland, warm temperate rainforest, dry (monsoon) rainforest and (occasionally) cool temperate rainforest. The species also occurs in selectively logged and 20—30 years old regrowth rainforest (Laurance et al. 1996). It is also sometimes found in nearby open eucalypt forests (mainly wet sclerophyll forests), especially in gullies with a dense, shrubby understorey as well as in dry sclerophyll forests and woodlands, often with a patchy understorey. The species especially occurs in 'marginal' habitats during winter or during passage (migration).	PMST	Low. Minimal suitable habitat occurs. Unlikely to occur and even less likely to be impacted.
Yellow Wagtail	<i>Motacilla flava</i>	The yellow wagtail likes damp marshes, meadows and farmland, and spends much of its time running about on the ground, chasing insects disturbed by the feet of livestock. Yellow wagtails nest on the ground or in	PMST	Low. Minimal suitable habitat occurs. Unlikely to occur and even less likely to be impacted.

Common name	Scientific name	Habitat requirements	Number of records and source	Potential occurrence and/or impact
		long grass, using plants, grasses and stems to build a cup-shape which they line with fur.		
Satin Flycatcher	<i>Myiagra cyanoleuca</i>	Satin Flycatchers mainly inhabit eucalypt forests, often near wetlands or watercourses. They generally occur in moister, taller forests than the Leaden Flycatcher, <i>Myiagra rebecula</i> , often occurring in gullies. They also occur in eucalypt woodlands with open understorey and grass ground cover, and are generally absent from rainforest. In south-eastern Australia, they occur at elevations of up to 1,400 m above sea level, and in the ACT, they occur mainly between 800 m above sea level and the treeline.	PMST	Low. Minimal suitable habitat occurs. Unlikely to occur and even less likely to be impacted
Rufous Fantail	<i>Rhipidura rufifrons</i>	In east and south-east Australia, the Rufous Fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (<i>Eucalyptus microcorys</i>), Mountain Grey Gum (<i>E. cypellocarpa</i>), Narrow-leaved Peppermint (<i>E. radiata</i>), Mountain Ash (<i>E. regnans</i>), Alpine Ash (<i>E. delegatensis</i>), Blackbutt (<i>E. pilularis</i>) or Red Mahogany (<i>E. resinifera</i>); usually with a dense shrubby understorey often including ferns.	PMST	Recorded. Further assessment is provided.
Eastern Osprey	<i>Pandion haliaetus</i>	Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia. They require extensive areas of open fresh, brackish or saline water for foraging. They frequent a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes. They exhibit a preference for coastal cliffs and elevated islands in some parts of their range, but may also occur on low sandy, muddy or rocky shores and over coral cays. They may occur over atypical habitats such as heath, woodland or forest when travelling to and from foraging subject lands.	PMST	Low. Minimal habitat occurs and even less will be impacted. Surveys found no sign of nesting material on or near the site.

7.4 Aquatic habitat and threatened species

Angus Creek is a first order ephemeral stream that runs down the eastern boundary of the subject land from a pipe culvert that passes under Kangaroo Avenue at the southern end of the subject land (Photograph 6). It flows in a northerly direction, as a modified, partially concreted channel. The channel width is on average 1.5 metres with a depth of about 30 cm. There was slow flow at the time of the field survey which occurred after some rain and small pools of water were present. The channel is partially fringed by grasses and sedges and emergent aquatic vegetation (*Typha orientalis*) is present (Photograph 7).

It is Type 3 – Minimally sensitive key fish habitat and Class 3 – Minimal key fish habitat, in accordance with DPI's *Policy and guidelines for fish habitat conservation and management*. It is not mapped as Key Fish Habitat or habitat for any threatened species on DPI's Fisheries Spatial Portal. Angus Creek does not provide habitat for any threatened species listed under the FM Act.



Photograph 6 Angus Creek at the Kangaroo Avenue culvert



Photograph 7 Channel of Angus Creek with *Typha orientalis* in view

8 PRESCRIBED BIODIVERSITY IMPACTS

Chapter 6 of the BAM (DPIE, 2020a) identifies the prescribed biodiversity impacts which must be assessed as part of the BOS. These prescribed impacts and their relevance to the Proposal are described below in Table 8-1. As no prescribed impacts are relevant to this Proposal, they have not been assessed further as part of this BDAR.

Table 8-1: Prescribed impacts as identified in the BAM (DPIE, 2020a)

Prescribed impact	Relevance to the subject land
Impacts on the habitat of threatened entities including: <ul style="list-style-type: none"> Karst, caves, crevices, cliffs and other geological features of significance 	None
<ul style="list-style-type: none"> Human-made structures 	None
<ul style="list-style-type: none"> Non-native vegetation 	None – while there is non-native vegetation within the subject land, it does not provide habitat to threatened entities.
Impacts on areas connecting threatened species habitat, such as movement corridors	None
Impacts that affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining)	None
Impacts on threatened and protected animals from turbine strikes from a wind farm	None
Impacts on threatened species or fauna that are part of a TEC from vehicle strikes	None

BAM (STAGE 2): IMPACT ASSESSMENT (BIODIVERSITY VALUES)

9 AVOID AND MINIMISE IMPACTS

9.1 Measures to avoid and minimise impacts on native vegetation and habitat

The principles in Section 7.1 of the BAM (DPIE, 2020a) have been considered to avoid and minimise impacts on native vegetation and habitat, where possible, through the development process for the Proposal.

9.1.1 Locating the Proposal

As stated in Section 7.1.1 of the BAM (DPIE, 2020a), Proposal location decisions should be informed by knowledge of biodiversity values. Table 9-1 demonstrates how the Proposal has avoided and minimised impacts through decisions on the Proposal's location.

Table 9-1: Avoidance and minimisation measures implemented in determining the Proposal location

BAM principles	How addressed
(a) Locating the project in areas where there are no biodiversity values	Approximately 99 per cent of the subject land has been cleared of native vegetation and is currently used for industrial purposes. Biodiversity values within the subject land are limited to a small area of degraded, planted vegetation consistent with PCT 849 and areas of non-native vegetation consisting of exotic grassland and exotic/planted shrubs and trees.
(b) Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a low vegetation integrity score)	Most of the subject land is situated in cleared areas and areas containing non-native vegetation. PCT 849 is present within the subject land in two vegetation zones; Vegetation Zone 1 – PCT 849_planted and Vegetation Zone 2 – PCT 849_moderate/good. Vegetation Zone 1 – PCT 849_planted has a vegetation integrity score of 32.1 while Vegetation Zone 2 – PCT 849_moderate/good has a score of 58.4. The area of Vegetation Zone 2 – PCT 849_moderate/good vegetation has been avoided and will not be directly impacted by the Proposal.
(c) Locating the project 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 or a highly cleared PCT.	0.28 hectares of the TEC Cumberland Plain Woodland listed under the BC Act will be removed as a result of the proposal. This TEC does not meet the condition threshold to be listed under the EPBC Act. No areas mapped on an important habitat map will be impacted by the Proposal. Potential foraging habitat for two threatened fauna species will be impacted by the Proposal; the Eastern Coastal Free-tailed Bat and Large Bent-winged Bat. As only the ecosystem credit component of these species would be impacted by the proposal, there is no associated biodiversity risk weighting.
(d) Locating the project outside of the buffer area around breeding habitat features such as nest trees or caves.	No breeding habitat including nest trees, caves or hollow bearing trees are present within the subject land.

The BAM (DPIE, 2020a) also states that when selecting a Proposal's location, alternatives need to be considered. The consideration of these alternatives, and justification in determining the final location is outlined below in Table 9-2.

Table 9-2: Alternatives considered in determining the Proposal location

BAM principles	How addressed
(a) alternative modes or technologies that would avoid or minimise impacts on biodiversity values	The modes, technologies and activities associated with the Proposal are required. There are no appropriate alternatives.
(b) alternative routes that would avoid or minimise impacts on biodiversity values	Existing roads within the subject land are being used and upgraded as part of the Proposal where possible.
(c) alternative locations that would avoid or minimise impacts on biodiversity values	By locating the Proposal in this location as opposed to a new or undeveloped site, impacts to biodiversity values are minimised, as the existing landfill and associated infrastructure is already present.
(d) alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values.	As most of the subject land is already cleared with existing infrastructure present, alternative sites within the subject land are limited.

9.1.2 Designing the Proposal

As stated in Section 7.1.2 of the BAM (DPIE, 2020a), project design (including the location of temporary and permanent ancillary construction and maintenance facilities) should avoid and minimise clearing of native vegetation and threatened species habitat. How these BAM principles have been addressed during design of the Proposal is outlined in Table 9-3.

Table 9-3: Avoidance and minimisation measures implemented during project design

BAM principles	How addressed
(a) Reducing the clearing footprint of the project by minimising the number and type of facilities	The number and type of facilities has been limited to what is required for the Proposal. Where possible, existing buildings and infrastructure are being used for operation of the Proposal.
(b) Locating ancillary facilities in areas where there are no biodiversity values	No ancillary facilities are located in areas of biodiversity value.
(c) locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas with the lowest vegetation integrity scores)	No ancillary facilities are located in areas of native vegetation or threatened species habitat.
(d) locating ancillary facilities in areas that avoid habitat for species and vegetation that has a high threat status (e.g. an endangered ecological community (EEC) or critically endangered ecological community (CEEC) or is an entity at risk of a serious and irreversible impact (SAIL))	No ancillary facilities are located in areas of native vegetation or threatened species habitat.
(e) actions and activities that provide for rehabilitation, ecological restoration and/or ongoing maintenance of retained areas of native vegetation, threatened species, threatened ecological communities and their habitat on the subject land.	A small area of native vegetation will be retained by the Proposal (Figure 12-1). A Construction Flora and Fauna Management Plan will be prepared which will outline the management of this area of vegetation to avoid and minimise any potential impacts to this vegetation.

10 ASSESSMENT OF IMPACTS

10.1 Direct impacts

The Proposal aims to improve site operations and vehicle movements through the Proposal Site by delivering new egress roads and utilising existing and approved operational areas. This will be done through the following infrastructure modifications:

- Construction of a new exit road to the Honeycomb Drive extension and installation of two associated outbound weighbridges
- Construction of a new exit connection to Kangaroo Avenue in the north east of the subject land and the installation of two associated outbound weighbridges and a dedicated weighbridge office
- Construction of additional carparking and amenities adjacent to MPC2
- Construction of a workshop and maintenance shed (relocating this activity from elsewhere within the subject land to a dedicated enclosed facility)
- Construction of a skip bin manufacturing and repair workshop
- Modified operations to include reorganisation of existing building use and storage areas combined with the construction of new associated road network to support improved operations and vehicle movements;
- Undertake associated environmental management works to include modified stormwater management devices combined with the relocation and modification of the approved western amenity berm; and
- Realignment of the western boundary of existing Lot 1 in DP1145808.

In order to carry out these modifications, the removal of native and non-native vegetation is required, as outlined below. This includes removal of threatened ecological communities and threatened species habitat.

10.1.1 Native vegetation

Clearing of 0.28 hectares of native vegetation, classified as PCT849 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion is required for the Proposal. The areas of PCT 849 to be cleared are listed in Table 10-1.

Table 10-1: Direct impacts to native vegetation within the subject land

PCT ID	PCT Name	Vegetation zone	Vegetation integrity score	Extent in the subject land (ha)	Extent in the construction footprint (ha)
849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	849_moderate/good	58.4	0.02	0
		849_planted	32.1	0.38	0.28
Total area native vegetation				0.4	0.28

10.1.2 Threatened flora and their habitat

No threatened flora species were recorded within the subject land or determined likely to occur within the subject land. Therefore, no further assessment of impacts to threatened flora are required as part of this assessment.

10.1.3 Threatened fauna and their habitat

Two threatened microbat species may occur in the subject land: Eastern Coastal Free-tailed Bat and Large Bent-winged Bat. Eastern Coastal Free-tailed Bat is an ecosystem credit species and Large Bent-winged Bat is a dual credit species with only ecosystem credit habitat present. No species credits are required for either species. No other species were considered likely to occur or be impacted (Appendix E).

10.1.4 Serious and irreversible impacts

The DPE (2019) *Guidance to assist a decision-maker to determine a serious and irreversible impact* identifies threatened species and ecological communities most at risk of serious and irreversible impacts. To assist the consent authority to evaluate the nature of an impact on a potential entity at risk of a serious and irreversible impact (SAIL), the BDAR must contain details of the assessment of serious and irreversible impact, in accordance with the assessment criteria set out in Section 9.1 of the BAM.

Cumberland Plain Woodland in the Sydney Basin Bioregion is identified in the TBDC as a serious and irreversible impact entity and has been recorded within the subject land. The location of this SAIL entity is shown in Figure 5-3.

The following information addresses criteria set out in Section 9.1.1 of the BAM, which must be provided to assist the decision maker to evaluate the extent and severity of the impact on the SAIL. Information used in this assessment is described in the following documents:

- Recovering Bushland on the Cumberland Plain: Best Practice guidelines for management and restoration of bushland (DEC, 2005)
- The native vegetation of the Cumberland Plain, western Sydney; systematic classification and field identification of communities (Tozer, 2003)
- *Cumberland Plain Recovery Plan* (DECCW, 2011)
- Cumberland Plain Woodland in the Sydney Basin Bioregion - critically endangered ecological community listing (DPIE, 2010)
- *DRAFT Cumberland Plain Conservation Plan - A Conservation Plan for Western Sydney to 2056* (DPIE, 2020)

It should be noted that under the *Draft Cumberland Plain Conservation Plan* (DPIE, 2020), the subject land is not included in the Plan Area.

1. The action and measures taken to avoid the direct and indirect impact on the potential entity for an SAIL

Areas of PCT 849 that would be cleared as a result of the Proposal are relatively small and isolated patches of low condition vegetation. A larger area of higher quality PCT 849 is present adjacent to the north-west of subject land and outside of the area of direct impact within a conservation area. Measures to avoid and minimise impacts on Cumberland Plain Woodland are discussed further in Section 9.

2. Current status of the SAIL

- a) *Evidence of reduction in geographic distribution (Principle 1, Clause 6.7(2)(a) BC Reg, as the current geographic extent of the TEC in NSW and the estimated reduction since 1970 (excluding impacts from proposed development):*

The reduction in geographic extent of Cumberland Plain Woodland from pre-European to present day is outlined below in Table 10-2. No data was available for the extent of Cumberland Plain Woodland in 1970.

Table 10-2: Geographic extent of Cumberland Plain Woodland

PCT	Estimated extent (ha)		Percent reduction	Source
	Pre-European	Current		
849	44,000	6,800	84.5%	Bionet Vegetation Classification 2021
850	27,200	4,400	83.8%	
Total (CPW)	71,200	11,200	84.2%	

b) Extent of reduction in ecological function (describing the degree of environmental degradation or disruption of biotic processes (Principle 2, Clause 6.7(2)(b) BC Reg)

Responses to the ecological functions listed in Section 9.1.1 of the BAM are provided below in Table 10-3.

Table 10-3: Evidence of reduced ecological function

Indicator	Extent/degree of reduction in ecological functions
Change in community structure	<p>Changes in community structure are a large contributing factor in the reduction of ecological function of Cumberland Plain Woodland in the Sydney Basin. Almost all of the remaining Cumberland Plain Woodland is regrowth forest and woodland as a result of past clearing activities. Large trees representing the stature of the community prior to European settlement occur very sparsely within the remnant patches of vegetation or remain as isolated individuals within paddocks or urban areas. Mean tree densities in contemporary stands of the community have been found to be substantially higher than historical estimates and tree sizes thought to be smaller (DPIE, 2010).</p> <p>Other structural changes to the Cumberland Plain Woodland community include removal of fallen woody debris and standing dead trees, removal of woody understorey plants, or the development of regrowth stands with very high density of shrubs and eucalypt saplings, including <i>Bursaria spinosa</i>, which may suppress ground flora (DPIE, 2010).</p>
Change in species composition	<p>Changes in species composition are referred to above in changes in community structure. Change in species composition can also occur as a result of invasion and establishment of exotic species. In particular, these changes may include weed infestations leading to decreased native shrub layer and increased exotic shrub layer, increased pastoral grasses, and reduced genetic diversity as a result of fragmentation and disruption to pollinations and dispersal of fruits or seeds.</p>
Invasion and establishment of exotic species	<p>The Cumberland Plain Woodland is particularly vulnerable to weed invasion and establishment of exotic species given its grassy understorey, relatively fertile soils and past land uses. Weeds such as Bridal Veil Creeper, Paddy's Lucerne, African Olive, Boxthorn, Rhodes Grass and African Lovegrass, have been able to establish widely in Cumberland Plain Woodland and displaced native plants, affecting the regeneration of communities (DECCW, 2011).</p>
Degradation of habitat	<p>Areas of Cumberland Plain Woodland have become heavily degraded, largely as a result of altered land uses including clearing, logging and grazing. These have resulted in structural changes to remnant patches of Cumberland Plain Woodland, such as absence of large old trees, woody debris, dead trees and woody understorey plants. Agricultural use of Cumberland Plain Woodland has also caused a decline in palatable plant species and compaction and erosion of topsoil as well as chemical modification of the soils. These agricultural practices continue to contribute to the habitat degradation of Cumberland Plain Woodland. Urban land use also contributes to habitat degradation across the Cumberland Plain, as urban run off into remnant patches of Cumberland Plain Woodland is increased, leading to nutrient enrichment of soils and replacement of native flora by exotic species (DPIE, 2010).</p>

Indicator	Extent/degree of reduction in ecological functions
	The degradation of habitat of Cumberland Plain Woodland as a result of these land uses results in the community being able to support fewer native flora and fauna species and provide the specific habitat features and microhabitats many species require (DPIE, 2010).
Fragmentation of habitat	Clearing has resulted in remaining areas of Cumberland Plain Woodland becoming severely fragmented. More than half of the remaining tree cover mapped by Tozer (2003) occurring in patches of less than 80 ha and half of all mapped patches being smaller than 3 ha.

c) Evidence of restricted geographic distribution (Principle 3. Clause 6.7(2)(c) BC Reg) based on the TEC's geographic range in NSW according to the:

- i. Extent of occurrence*
- ii. Area of occupancy*
- iii. Number of threat-defined locations*

Cumberland Plain Woodland is restricted to the Cumberland Plain within the Sydney Basin IBRA bioregion. It is currently known from the local government areas of Auburn, Bankstown, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Wollondilly (DPIE, 2010). The extent of occurrence of Cumberland Plain Woodland is estimated to be 2810 square kilometres, and the area of occupancy of under 2100 square kilometres (DPIE, 2010).

The NSW Scientific Committee published guidelines for interpreting listing criteria for species, populations and ecological communities under the BC Act and define a threat-defined location as a geographically or ecologically distinct area in which a single threatening event can rapidly affect all occurrences of an ecosystem type. The threshold for the number of threat-defined locations for an entity to be listed as critically endangered is one location. The threats defined in Section 2 of this assessment are likely to apply to most areas of Cumberland Plain Woodland, with the potential exception of areas of Cumberland Plain Woodland which are retained within conservation areas.

d) Evidence that the TEC is unlikely to respond to management (Principle 4. Clause 6.7(2)(d) BC Regulation)

The Final Determination for Cumberland Plain Woodland outlines that efforts to conserve the community through management of previously disturbed areas have had some success. These efforts have suggested that the community is capable of some recovery, provided the soils has not been disturbed by earthworks, cultivation, fertiliser application or other means of nutrient or moisture enrichment (DPIE, 2010). Where areas have undergone this soil disturbance, the community is unlikely to have a significant response to management. As most areas of the former distribution of Cumberland Plain Woodland have been subject to soil disturbance through agricultural use, or are now occupied by urban development, opportunities for successful restoration of the community are limited.

3. Record where the TBDC indicates data is 'unknown' or 'data deficient' for a TEC for a criterion.

The TBDC currently indicates that all SAIL thresholds and condition of Cumberland Plain Woodland is still in progress.

4. In relation to the impacts from the proposal on the TEC at risk of an SAIL, the following data and information is required:

- e) 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*

Cumberland Plain Woodland covers a total of 0.4 hectares within the subject land within two vegetation zones, Vegetation zone 1 – PCT 849_moderate/good and Vegetation Zone 2 – PCT 849_planted. 0.28 hectares of Vegetation Zone 2 – PCT 849_planted would be directly impacted as a result of the Proposal. As stated in Table 10-2, there is currently approximately 11,200 hectares of Cumberland Plain Woodland within NSW. The area of Cumberland Plain Woodland to be impacted by the Proposal equates to 0.0034 per cent of the estimated geographic extent of Cumberland Plain Woodland within NSW.

f) *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:*

iii. *Estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 metres of the development footprint or equivalent area for other types of proposals*

One small patch (0.38 hectares) of PCT 849 located in the north east of the subject land would be impacted as a result of the proposal. This patch consists of planted native *Corymbia maculata* and a largely exotic ground layer. 0.28 hectares of this patch would be removed as part of the Proposal, leaving an area of approximately 0.1 hectares remaining. There are other patches of Cumberland Plain Woodland surrounding the subject land, particularly to the north west of the subject land within a conservation area and a small patch directly to the south of the subject land as shown in Figure 2-3. No additional areas of Cumberland Plain Woodland would be impacted by the Proposal and therefore the Proposal would not result in the any patches becoming isolated.

iv. *Describing the impacts on connectivity and fragmentation of the remaining area 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*
- *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*

Patches of Cumberland Plain Woodland within 500 metres of the Proposal are on average at a distance of approximately 393 metres from each other with the patch of PCT 849 within the subject land retained. With the removal of most of the patch of PCT 849 from within the subject land, the retained areas of Cumberland Plain Woodland will be on average 508 metres from each other. Due to the low habitat value of the Cumberland Plain Woodland within the subject land it is not anticipated to contribute significantly to dispersal of flora and fauna associated with Cumberland Plain Woodland.

As a large portion of the small patch of Cumberland Plain Woodland would be removed as a result of the Proposal, there would likely be an increase in the perimeter to area ratio of the remaining area. Furthermore, due to the small size of the remaining patch it is not anticipated to contribute significantly to connectivity in the area.

v. *Describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s)*

The vegetation integrity scores for the Cumberland Plain Woodland vegetation zone to be cleared is 32.1 (Vegetation Zone 2 – PCT 849_planted). Table 10-4 provides a summary of the attributes that contributed to the integrity score compared against the benchmark data for PCT 849.

Table 10-4: Vegetation integrity scores for PCT 849

Attribute	Benchmark	849_planted
Tree richness	5	4
Shrub richness	8	0

Attribute	Benchmark	849_planted
Grass and Grass Like Richness	12	2
Forb Richness	14	4
Fern Richness	2	0
Other Richness	5	0
Tree Cover	53	61.5
Shrub Cover	16	0
Grass and grass Like Cover	58	0.3
Forb Cover	9	0.5
Fern Cover	1	0
Other Cover	4	0
Total length of fallen logs	40	6
Litter Cover	40	56
Number of Large Trees	3	1
High Threat Weed Cover	0	2.9

10.2 Indirect impacts

The BAM (Section 8.2.2) identifies potential indirect impacts that, as a minimum, must be considered as a part of a BDAR. Of these potential indirect impacts, 12 are not relevant to the Proposal and are therefore not considered further (Table 10-5). The remaining five potential indirect impacts can be minimised using standard management and mitigation measures that will be included in a CEMP for the project.

Table 10-5: Potential indirect impacts of the Proposal

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Impacts of the proposal on TECs/PCTs and/or threatened species and their habitat beyond the construction area, including but not limited to: (a) Inadvertent impacts on adjacent habitat or vegetation	Surrounding areas outside of the subject land are largely lacking in native vegetation, with either cleared and disturbed land or non-native vegetation. A small area to the south of the landfill area (and outside of the subject land) is native vegetation, but it is not adjacent to the area of vegetation clearance as part of the Proposal (Figure 12-1). There is also a larger area of native vegetation within a conservation area immediately to the northwest of the subject land which is likely to comprise the Cumberland Plain Woodland TEC. With the appropriate mitigation measures implemented as outlined in Section 11.1, inadvertent impacts to this area are unlikely and considered to be minimal. Risks to surrounding vegetation as a result of the Proposal is therefore considered to be low.	Adjacent non-native and native vegetation	During construction activities, mainly at the beginning during vegetation clearing	Throughout the construction period	Temporary
(b) Reduced viability of adjacent habitat due to edge effects	Surrounding areas are largely lacking in native vegetation. Native vegetation is present in a small area in the east and to the south of the landfill area (and outside of the subject land), as well as a larger area of native vegetation to the northwest. These areas are currently subject to high levels of edge effects. As little adjoining vegetation is to be removed, and construction and operational activities are fairly consistent with current activities of the site, edge effects are not anticipated to be enhanced by the Proposal. Risks to surrounding vegetation are considered to be low. Appropriate mitigation measures as outlined in Section 11.1 will also be implemented and include updating the currently approved EMS and LVMP to include new areas of PCT which are to be protected and managed once construction is complete.	Adjacent non-native and native vegetation	On-going	Throughout construction and operation	Permanent (if they occur, risk is minimal)
(c) Reduced viability of adjacent habitat due to noise, dust or light spill	Adjacent habitat is primarily disturbed/cleared areas or non-native vegetation, providing limited resources for common flora and fauna. There is also an area of higher quality native vegetation to the northwest of the subject land. Construction activities within the subject land will temporarily result in an	Adjacent non-native and native vegetation	During construction activities, mainly at the beginning during vegetation clearing	Throughout the construction period	Temporary

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
	increase in dust. However, impacts to surrounding vegetation are not likely to be significant, given the short term nature of the construction and the existing impacts from the operational landfill experienced within the subject land. Standard dust and noise management will be part of the CEMP developed for the project.				
(d) Transport of weeds and pathogens from the site to adjacent vegetation	This is a risk, since the subject land contains at least 22 weed species, five of which are priority weeds. Areas at risk are most likely to be areas of native vegetation offsite, or native vegetation adjacent to the construction footprint. This risk can be reduced significantly with the inclusion of weed and pathogen management protocols to prevent contaminated material inadvertently being taken off site, in vehicles, boots or topsoil.	Areas off-site of native vegetation	During construction activities, mainly at the beginning during vegetation clearing	Vegetation clearing component of construction	Potentially permanent if not managed adequately.
(e) Increased risk of starvation, exposure and loss of shade or shelter	N/A. Impact is small and unlikely to impact any significant fauna habitat	N/A	N/A	N/A	N/A
(f) Loss of breeding habitat	N/A. Impact is small and unlikely to impact any significant fauna habitat	N/A	N/A	N/A	N/A
(g) Trampling of threatened flora species	N/A. No threatened flora species detected or likely within adjacent vegetation.	N/A	N/A	N/A	N/A
(h) Inhibition of nitrogen fixation and increased soil salinity	N/A. The Proposal is not expected to result in any inhibition of nitrogen fixation.	N/A	N/A	N/A	N/A
(i) Fertiliser drift	N/A. The Proposal is not expected to result in any fertiliser drift.	N/A	N/A	N/A	N/A
(j) Rubbish dumping	N/A. The Proposal is not expected to result in any additional rubbish dumping.	N/A	N/A	N/A	N/A
(k) Wood collection	N/A. The Proposal is not expected to result in any wood collection.	N/A	N/A	N/A	N/A

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
(l) Removal and disturbance of rocks, including bush rock	N/A. The Proposal is not expected to result in any bush rock removal or disturbance.	N/A	N/A	N/A	N/A
(m) Increase in predators	N/A. The Proposal is not expected to result in any increase in predatory species populations	N/A	N/A	N/A	N/A
(n) Increase in pest animal populations	Due to its current use as a landfill, pest species are already attracted to the subject land. The proposed modification is not expected to result in any increase in pest animal populations.	N/A	N/A	N/A	N/A
(o) Changed fire regimes	N/A. The Proposal is not expected to result in any increased risk of fire.	N/A	N/A	N/A	N/A
(p) Disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	N/A. The Proposal is not expected to result in any disturbance to specialist breeding and foraging habitat.	N/A	N/A	N/A	N/A
(q) Injury and/or mortality of fauna	There is a risk the Proposal may result in the injury and/or mortality of fauna species during the construction and operation. However, with the measures outlined in Section 11.1, the likelihood of this occurring is reduced.	Fauna species within the subject land	During construction and operation, particularly during vegetation clearing	Throughout construction and operation	Permanent

10.3 Aquatic Impacts

Angus Creek will be modified as part of the Proposal through the inclusion of a culvert / bridge structure at the new site exit to Kangaroo Avenue. Risks to aquatic biodiversity are considered to be minimal as the creek has been assessed as providing minimal habitat. No threatened aquatic species listed under the FM Act would be impacted by the Proposal. Standard mitigation and management measures, especially erosion and sedimentation minimisation will be employed to reduce the risks of indirect impacts to any surrounding waterways, mainly in reducing run off from the subject land. Indirect impacts are discussed further in Section 10.2.

10.4 Matters of National Environmental Significance

10.4.1 Overview

One EPBC Act listed migratory species was recorded within the subject land (Rufous Fantail). No additional threatened species, TECs or other MNES or their habitats were recorded within the subject land or considered likely to occur within the subject land.

Significant Impact Assessment using the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Significant Impact Guidelines 1.1 (DoE 2013) is provided below.

10.4.2 Significant impact assessment for Rufous Fantail

The Rufous Fantail occurs throughout coastal Australia from Adelaide around the east coast to Port Hedland in Western Australia. They also occur in the Solomon Islands, Guam and New Guinea, where they often spend the Australian winter. It is a small, insectivorous bird that gleans insects from rainforests, swamp woodlands, mangroves and wet sclerophyll forests throughout its range (BirdLife Australia 2021). It is similar to the Grey Fantail (*Rhipidura albiscapa*) but has a distinctive reddish brown rump and bright red eyebrow.

The Rufous Fantail builds a small, compact cup nest of grasses, bound with spider webs that is built in the fork of a tree, about 5 m from the ground. Both sexes share nest building, feeding and incubation duties, and one or two broods are raised each year (BirdLife Australia 2021).

Significant impact criteria as set out in the EPBC Significant Impact Guidelines 1.1 for migratory species - Rufous Fantail:

- a. An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:
 - i. substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species

Important habitat for Rufous Fantail is considered to include moist, dense mangroves, rainforest, riparian areas and wet eucalypt forests with a dense understorey (DoE, 2015). The high modified vegetation that occurs would be unlikely to constitute important habitat for this species. In addition, the threshold of area of important habitat impacted that may result in a significant impact to the species and require a referral to DAWE is 750 hectares.

The area of habitat for this species to be cleared for the Proposal is 0.28 hectares, and given the lack of potential habitat in the immediate area, it is unlikely that any areas of important habitat will be indirectly impacted. Given the small size, and highly modified nature of the habitat to be cleared, it is considered very unlikely that the project will significantly impact important habitat for this species. Areas of potentially important habitat for this species will remain along the riparian areas of Ropes Creek to the north of the subject land, and Western Sydney Parklands to the south east.

- ii. result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species,

The immediate surrounding areas are already highly disturbed and unlikely to provide significant habitat for this species. Therefore, there will be no important habitat impacted by indirect impacts as a result of the Proposal. Further, standard measures to revegetate and manage weeds will form part of the construction environmental management plan for the Proposal, which will minimise the risk of an increase in invasive species as a result of the Proposal.

- iii. seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

Breeding usually begins in September- October and occurs in humid places, such as dense creekside vegetation. The subject land does not contain this type of habitat and it is likely that the individual observed was foraging. Foraging resources within the subject land will be removed as part of clearing, however this represents only 0.28 hectares of habitat to be cleared. Alternative habitat is available nearby along Ropes Creek. The Proposal would not seriously disrupt the life cycle of the species.

In summary, it is considered highly unlikely that the Proposal will result in a significant impact on this species and a referral is not recommended.

11 MITIGATION OF IMPACTS

11.1 Mitigation measures

While the Proposal will have relatively minor impacts on biodiversity, appropriate mitigation and management can reduce these further. The measures in Table 11-1 have been developed to mitigate any remaining impacts as part of construction and operation.

Table 11-1: Measures to be implemented to minimise impacts on biodiversity

Mitigation measure	Outcome	Timing	Responsibility
<p>A Flora and Fauna Management sub-plan to the CEMP would be prepared. Clearing of native vegetation within the subject land would not occur until the CEMP, including the Flora and Fauna Management sub-plan was approved. The Flora and Fauna sub-plan would include, but not be limited to, the following:</p> <ul style="list-style-type: none"> Plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas Pre-clearing survey requirements for PCTs within and around the impact area Procedures for unexpected threatened species finds and fauna handling Protocols to manage weeds and pathogens. 	Flora and fauna would be managed in accordance with the requirements of the CFFMP; prevention of over clearing of vegetation; prevention of weed establishment and invasion.	Pre-construction and construction	Construction contractor
Pre-clearing survey will be undertaken by an ecologist in the areas of identified as PCT 849 and the eucalypt trees to be cleared in the north-east corner of the construction footprint.	Minimise fauna mortality and injury.	Pre-construction	Construction contractor Project ecologist
Site inductions for construction staff will include a briefing regarding the potential presence of, and protocols to be undertaken, if fauna are encountered.	Protect fauna species	Construction	Construction contractor
Directional lighting will be used where lighting is required in construction areas to reduce impacts on the local fauna.	Minimise disturbance to local native fauna.	Construction	Construction contractor
Mitigation measures to minimise the unnecessary generation of noise during construction will be incorporated in the CEMP.	Minimise disturbance to local native fauna.	Construction	Construction contractor
Any pits/trenches which may remain open overnight adjacent to native vegetation will be securely covered (if possible), or alternatively, fauna ramps (e.g., logs or wooden planks) will be installed to provide an escape for trapped fauna.	Prevent fauna injury/starvation/mortality	Construction	Construction contractor Project ecologist
ERSED (erosion and sediment) controls will be installed prior to the commencement of earthworks and construction, to minimise sediment	Protect waterways and retained vegetation	Construction	Construction contractor

Mitigation measure	Outcome	Timing	Responsibility
laden run-off into adjoining vegetation and waterways including Angus Creek.			
Where possible, earthworks would be undertaken during dry weather conditions.	Prevent erosion and downstream water quality impacts	Construction	Construction contractor
Clearing of vegetation should be avoided during overland flow events, if possible.	Prevent erosion and downstream water quality impacts	Construction	Construction contractor
<p>If any animal is injured, contact the relevant local wildlife rescue agency (e.g., WIRES) and/or veterinary surgery as soon as practical.</p> <p>Until the animal can be cared for by a suitably qualified animal handler, if possible, minimise stress to the animal and reduce the risk of further injury by:</p> <ul style="list-style-type: none"> • Handling fauna with care and as little as possible • Covering larger animals with a towel or blanket and placing in a large cardboard box • Placing small animals in a cotton bag, tied at the top • Keeping the animal in a quiet, warm, ventilated and dark location. 	Minimise fauna mortality and injury	All stages	Construction contractor Project ecologist
The currently approved EMS and LVMP will be updated to include the new areas of PCT which are to be protected and managed once construction is complete.	Protect areas of retained native vegetation	Post construction / operation	Construction contractor

12 IMPACT SUMMARY AND OFFSETS

The following section summarises the impacts of the Proposal and outlines the offsets required in accordance with the BAM.

12.1 Impacts requiring offset

12.1.1 Impacts on native vegetation

The impacts of the Proposal on native vegetation that require offset (in accordance with Section 9.2 of the BAM and as determined using the BAMC) are outlined below in Table 12-1 and Figure 12-1. The full biodiversity offset credit reports are provided in Appendix F of this report.

Table 12-1: Impact summary for PCTs requiring offsets and the associated ecosystem credit requirements

Vegetation Zone	PCT Name	Area to be impacted (ha)	Change in vegetation integrity score	Ecosystem credits required
849_planted	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	0.28	32.1	6

12.1.2 Impacts on threatened species

Impacts to species credit species as a result of the Proposal require offsetting in accordance with Section 10.1.1 of the BAM. As no threatened species credit species were recorded or assumed present within the subject land, no credits for threatened species are required for the Proposal. A dual credit species was recorded, the Large Bent-wing Bat (*Miniopterus orianae oceanensis*), however this species only requires species credits when breeding habitat is to be removed. Breeding habitat is not present within the subject land, only foraging habitat.

12.2 Impacts not requiring offset

All impacts on native vegetation as a result of the Proposal require offsetting in accordance with Section 9.2.1 of the BAM.

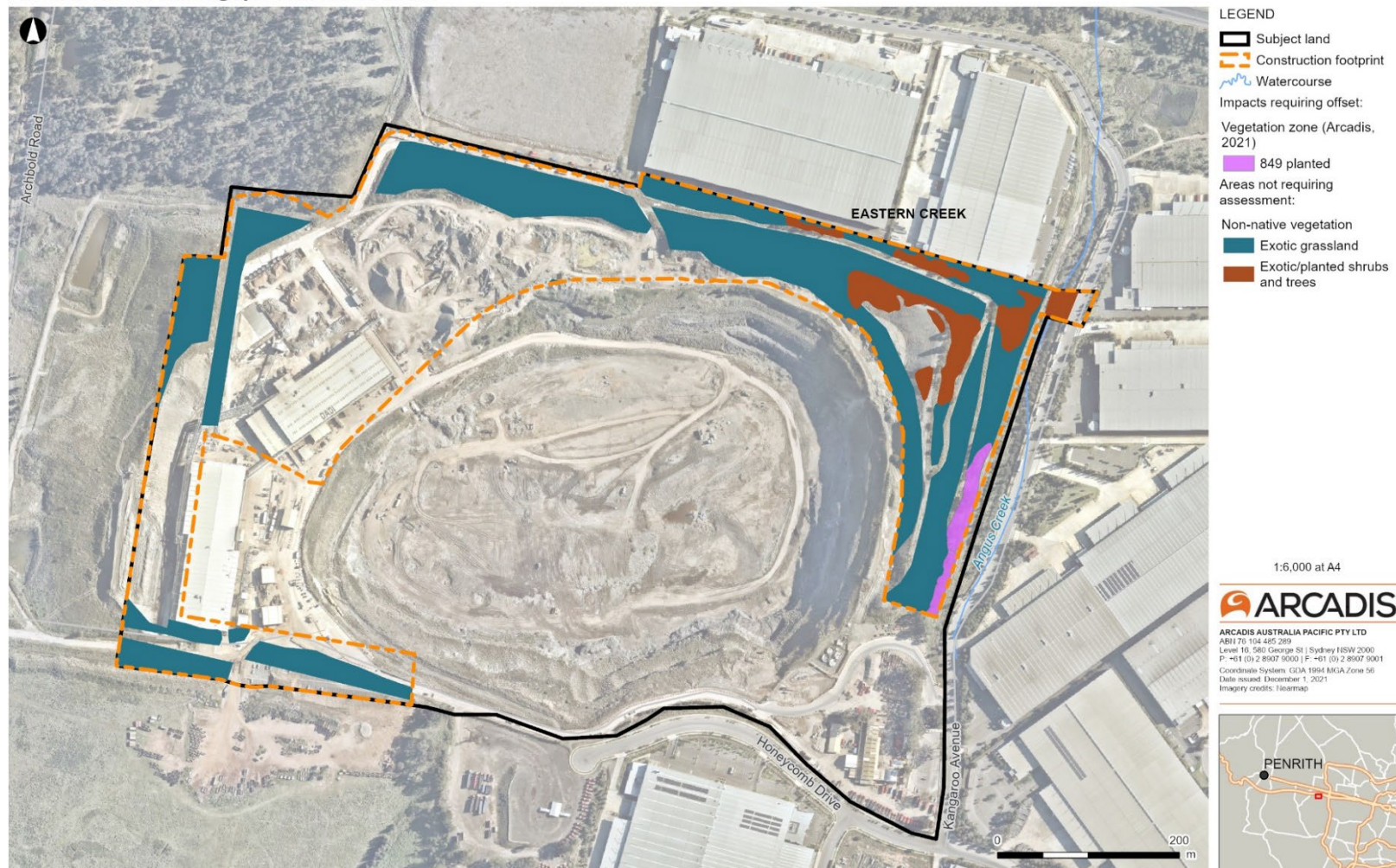
12.3 Areas not requiring assessment

Two vegetation zones recorded within the subject land are dominated by exotic species and do not conform to the definition of any PCT listed in the Vegetation Classification database. These areas comprise of exotic grassland and exotic/planted trees and shrubs as listed in Table 12-2 and do not require further assessment or offsetting in accordance with Section 9.3 of the BAM.

Table 12-2: Areas not requiring assessment

Vegetation zone	Extent in the subject land (ha)	Extent in the construction footprint (ha)
Exotic grassland	20.85	7.36
Exotic/planted trees and shrubs	1.63	0.98
Total area non-native vegetation	22.48	8.34

Eastern Creek Throughput Increase BDAR



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 QA by : GC

Figure 12-1: Impact summary

13 OFFSET STRATEGY

The impacts of the Proposal have been assessed in accordance with the BC Act and the BAM. As such, the offset requirement presented in Section 13 of this BDAR are in the form of BAM credits.

13.1 Biodiversity Conservation Fund

The available options for delivery of offsets under the BOS are as follows:

- An appropriate number and class of like-for-like biodiversity credits may be retired.
- If all the required like-for-like biodiversity credits cannot be sourced, an appropriate number and class of variation biodiversity credits may be retired. The use of variation offset rules must be approved by the consent authority. The use of variation offset rules cannot be approved unless an applicant can demonstrate that they have taken reasonable steps to secure like-for-like biodiversity credits.
- Alternatively, the Offsets Payment Calculator may be used to determine the cost of all or part of the credit obligations, and a payment may be made to the Biodiversity Conservation Fund (BCF).

For the purpose of this BDAR, it has been assumed that a future offset requirement would be met through a contribution to the BCF. The BCF is administered by the Biodiversity Conservation Trust (BCT) who take on responsibility for sourcing the requisite land offsets from a proponent once the payment to the BCF has been made.

Table 13-1 below outlines the necessary financial contribution for offsets required by the Proposal based on the impacts requiring offset (identified in Table 12-1).

Table 13-1: BCF contribution for ecosystem credits required by the Proposal (see Appendix I)

PCT	Impact (ha)	Price per credit	Credits required	Total price (excl. GST)
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849)	0.28	\$33,697.42	6	\$202,184.53

14 CONCLUSION

Arcadis has been commissioned to prepare a BDAR to support the preparation of a State Significant Development (SSD) Environmental Impact Statement (EIS) under Part 4, Division 4.7 of the of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the upgrade and construction of supporting infrastructure to optimise the current operation at Eastern Creek REP and facilitate the increased throughput proposed to be received at the Proposal Site.

The subject land contains approximately 22.88 hectares of vegetation which consists of native (0.4 hectares) and non-native vegetation (22.48 hectares). The native vegetation required to be cleared is consistent with the Plant Community Type 849 - *Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion*

The vegetation within the subject land comprises one PCT and two vegetation zones within the Cumberland subregion of the Sydney Basin Interim Biogeographic Regionalisation for Australia (IBRA) region. Two non-native vegetation communities that are not equivalent to a PCT are also present in the subject land. Vegetation zones within the subject land, their associated PCT and their calculated vegetation integrity scores are as follows:

PCT ID	PCT Name	Vegetation zone	Vegetation integrity score	Extent in the subject land (ha)	Extent in the impact area (ha)
849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	849_planted	32.1	0.38	0.28
849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	849_moderate/good	58.4	0.02	0
Other vegetation types		Exotic grassland	N/A	20.85	7.36
		Exotic/planted trees and shrubs	N/A	1.63	0.98
Total area native vegetation				0.4	0.28
Total area vegetation				22.88	8.62

The areas of PCT 849 present in the subject land are consistent with the Threatened Ecological Community (TEC), Cumberland Plain Woodland in the Sydney Basin Bioregion, listed as critically endangered under the NSW *Biodiversity Conservation Act 2016* (BC Act). It does not meet the condition criteria to be listed under Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Offsets for the Proposal were calculated using the BAMC. Six ecosystem credits are required to offset the removal of 0.28 hectares of the PCT Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion.

One threatened flora species, *Eucalyptus scoparia*, was tentatively identified within the subject land. This species is locally indigenous to the Tenterfield region within the New England Tablelands and is not native to the Sydney area and therefore individuals should be treated as planted vegetation and not of conservation significance. No additional threatened flora species were recorded within the subject land during targeted surveys.

Fifty-three threatened fauna species have the potential to occur on the subject land and were assessed for potential occurrence and impact. An additional ten migratory species, listed under the EPBC Act were also assessed. One migratory species was identified on subject land (Rufous Fantail (*Rhipidura rufifrons*)). Potential impacts of the Proposal on this species are considered to be minimal,

therefore a referral to the Commonwealth Department of Environment is not recommended. No threatened species listed under the EPBC Act were recorded or considered likely to occur.

Two microbat species listed as vulnerable under the BC Act were recorded as possibly occurring using echolocation call analysis – the Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*) which is an ecosystem species and Large Bent-wing Bat (*Miniopterus orianae oceanensis*) which is a dual credit species under the BAM scheme. No species credit habitat is on the subject land for this species. Offsets for these species are accounted for in the vegetation offsets above. No species credits are required for the Proposal. No threatened species listed under the FM Act would be impacted by the Proposal.

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APPENDIX A: FLORA RECORDED IN THE SUBJECT LAND (ARCADIS, 2021)

Family	Scientific name	Common name	BC Act status	EPBC Act status	Cover in each plot	
					EC01	EC02
Acanthaceae	<i>Brunoniella australis</i>	Blue Trumpet	-	-	0.2	0.1
Amaranthaceae	<i>Alternanthera pungens</i>	Khaki Weed	-	-		
Apiaceae	<i>Foeniculum vulgare</i>	Fennel	-	-		
Apiaceae	<i>Hydrocotyle bonariensis</i>		-	-		25.0
Apocynaceae	<i>Araujia sericiflora</i>	Moth Vine	-	-	0.5	
Apocynaceae	<i>Gomphocarpus fruticosus</i>	Narrow-leaved Cotton Bush	-	-	0.1	
Arecaceae	<i>Phoenix canariensis</i>	Canary Island Date Palm	-	-		
Asparagaceae	<i>Asparagus asparagoides</i>	Bridal Creeper	-	-		0.1
Asteraceae	<i>Ageratina adenophora</i>	Crofton Weed	-	-		
Asteraceae	<i>Bidens pilosa</i>	Cobbler's Pegs	-	-	0.2	0.2
Asteraceae	<i>Cirsium vulgare</i>	Spear Thistle	-	-	0.2	0.1
Asteraceae	<i>Conyza bonariensis</i>	Flaxleaf Fleabane	-	-	0.1	

Family	Scientific name	Common name	BC Act status	EPBC Act status	Cover in each plot	
					EC01	EC02
Asteraceae	<i>Hypochoeris radicata</i>	Catsear	-	-	0.2	0.1
Asteraceae	<i>Senecio madagascariensis</i>	Fireweed	-	-	0.1	
Asteraceae	<i>Senecio spp.</i>	Groundsel, Fireweed	-	-	5.0	0.1
Chenopodiaceae	<i>Einadia nutans</i>	Climbing Saltbush	-	-		
Commelinaceae	<i>Commelina cyanea</i>	Native Wandering Jew	-	-	0.5	
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed	-	-	0.2	0.2
Cyperaceae	<i>Carex spp.</i>		-	-	0.1	
Euphorbiaceae	<i>Ricinus communis</i>	Castor Oil Plant	-	-		
Fabaceae (Faboideae)	<i>Glycine clandestina</i>	Twining glycine	-	-	0.2	
Fabaceae (Mimosoideae)	<i>Acacia saligna</i>	Golden Wreath Wattle	-	-		0.1
Geraniaceae	<i>Geranium homeanum</i>		-	-		
Geraniaceae	<i>Geranium solanderi</i>	Native Geranium	-	-	0.5	
Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne	-	-	1.0	0.1

Family	Scientific name	Common name	BC Act status	EPBC Act status	Cover in each plot	
					EC01	EC02
Myrtaceae	<i>Corymbia maculata</i>	Spotted Gum	-	-		59.0
Myrtaceae	<i>Eucalyptus cinerea</i>	Argyle Apple	-	-		1.0
Myrtaceae	<i>Eucalyptus moluccana</i>	Grey Box	-	-	30.0	
Myrtaceae	<i>Eucalyptus scoparia</i>	Wallangarra White Gum	Endangered	Vulnerable		
Myrtaceae	<i>Eucalyptus tereticornis</i>	Forest Red Gum	-	-	25.0	0.5
Myrtaceae	<i>Lophostemon confertus</i>	Brush Box	-	-		1.0
Oleaceae	<i>Ligustrum lucidum</i>	Large-leaved Privet	-	-		0.1
Oleaceae	<i>Olea europaea subsp. cuspidata</i>	African Olive	-	-	0.5	
Oxalidaceae	<i>Oxalis perennans</i>		-	-	0.1	0.1
Plantaginaceae	<i>Plantago lanceolata</i>	Lamb's Tongues	-	-	0.2	0.2
Poaceae	<i>Cenchrus setaceus</i>	Fountain Grass	-	-		
Poaceae	<i>Chloris gayana</i>	Rhodes Grass	-	-		0.5
Poaceae	<i>Cortaderia selloana</i>	Pampas Grass	-	-		

Family	Scientific name	Common name	BC Act status	EPBC Act status	Cover in each plot	
					EC01	EC02
Poaceae	<i>Cymbopogon refractus</i>	Barbed Wire Grass	-	-		
Poaceae	<i>Cynodon dactylon</i>	Common Couch	-	-	5.0	0.2
Poaceae	<i>Dichanthium sericeum</i>	Queensland Bluegrass	-	-	1.0	
Poaceae	<i>Dichanthium setosum</i>	Bluegrass	-	-		
Poaceae	<i>Dichelachne micrantha</i>	Shorthair Plumegrass	-	-	0.1	
Poaceae	<i>Eragrostis curvula</i>	African Lovegrass	-	-	0.2	2.0
Poaceae	<i>Melinus repens</i>	Red Natal Grass	-	-		
Poaceae	<i>Microlaena stipoides</i>	Weeping Grass	-	-	65.0	0.1
Poaceae	<i>Paspalum dilatatum</i>	Paspalum	-	-	5.0	
Poaceae	<i>Pennisetum clandestinum</i>	Kikuyu Grass	-	-	5.0	10.0
Poaceae	<i>Pennisetum setaceum</i>	Fountain Grass	-	-		1.0
Poaceae	<i>Setaria parviflora</i>		-	-	5.0	
Poaceae	<i>Setaria pumila</i>	Pale Pigeon Grass	-	-		

Family	Scientific name	Common name	BC Act status	EPBC Act status	Cover in each plot	
					EC01	EC02
Poaceae	<i>Themeda triandra</i>		-	-	5.0	
Polygonaceae	<i>Rumex brownii</i>	Swamp Dock	-	-		
Solanaceae	<i>Lycium ferocissimum</i>	African Boxthorn	-	-	0.1	
Solanaceae	<i>Solanum sisymbriifolium</i>		-	-	0.1	0.1
Verbenaceae	<i>Verbena bonariensis</i>	Purpletop	-	-		0.1
Verbenaceae	<i>Verbena rigida</i>	Veined Verbena	-	-		0.1

APPENDIX B: FAUNA RECORDED IN THE SUBJECT LAND (ARCADIS, 2021)

Common name	Scientific name	Status (BC Act)	Status (EPBC Act)	Observation type	Introduced (Yes/No)
Birds					
Australian Raven	<i>Corvus coronoides</i>	-	-	W	No
Welcome Swallow	<i>Hirundo neoxena</i>	-	-	O	No
Willie Wagtail	<i>Rhipidura leucophrys</i>	-	-	W	No
Rufous Fantail	<i>Rhipidura rufifrons</i>	-	Mi	O	No
Mammals					
Gould's Wattle Bat	<i>Chalinolobus gouldii</i>	-	-	U – Confident	No
Large Bent-winged Bat	<i>Miniopterus orianae oceanensis</i>	V	-	U – Possible (species complex)	No
Eastern Coastal Free-tailed Bat	<i>Micronomus norfolkensis</i>	V	-	U – Possible (species complex)	No
Ride's Free-tailed Bat	<i>Ozimops ridei</i>	-	-	U – Possible (species complex)	No
Southern Forest Bat	<i>Vespadelus regulus</i>	-	-	U – Possible (species complex)	No
Fox	<i>Vulpes vulpes</i>	-	-	P	Yes
Rabbit	<i>Oryctolagus cuniculus</i>	-	-	P	Yes
Domestic Cat	<i>Felis catus</i>	-	-	O	Yes
Amphibians					
Common Froglet	<i>Crinia signifera</i>	-	-	W	No
Invertebrates					
Garden Snail	<i>Helix aspersa</i>	-	-	O	Yes

W – Heard, O – Observed, U – Ultrasonic recording, P - Scat

APPENDIX C: PMST REPORT



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

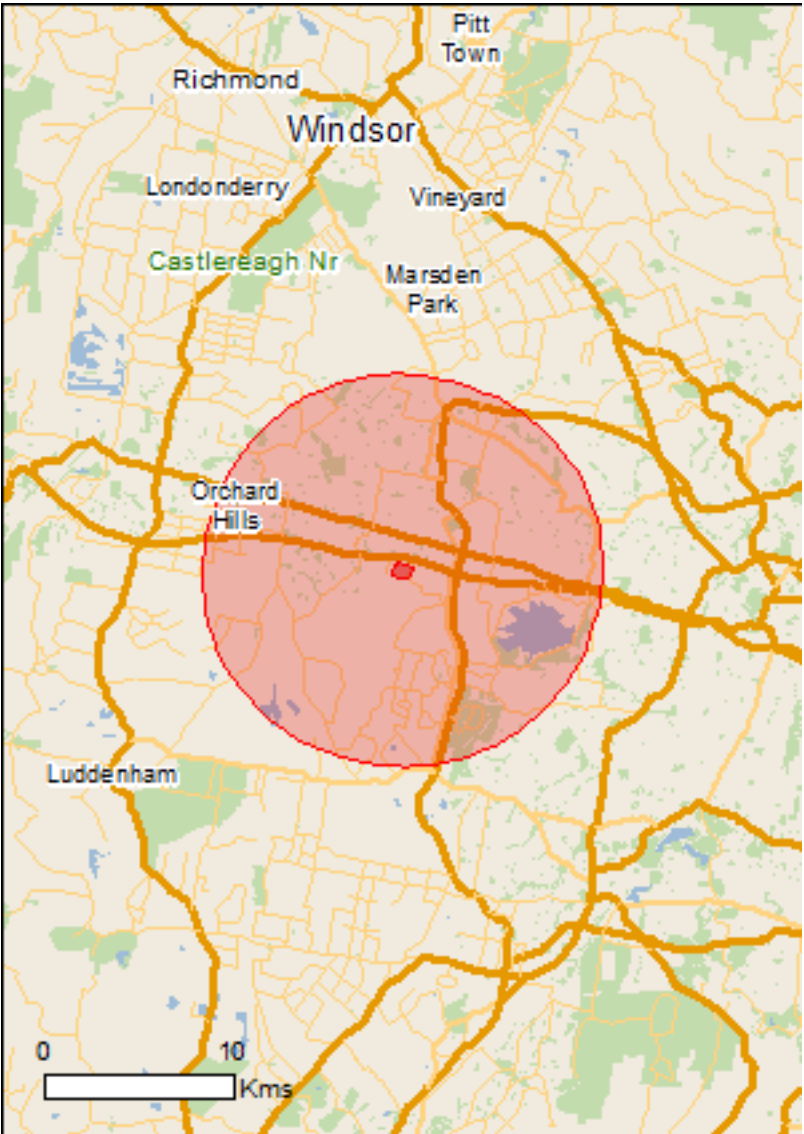
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 23/07/21 13:20:41

- [Summary](#)
- [Details](#)

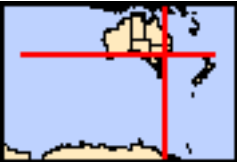
[Matters of NES](#)[Other Matters Protected by the EPBC Act](#)[Extra Information](#)
- [Caveat](#)
- [Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

[Coordinates](#)

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	7
Listed Threatened Species:	45
Listed Migratory Species:	15

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	16
Commonwealth Heritage Places:	2
Listed Marine Species:	20
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	50
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities

[Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	Endangered	Community likely to occur within area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	Critically Endangered	Community likely to occur within area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	Critically Endangered	Community may occur within area
Western Sydney Dry Rainforest and Moist Woodland on Shale	Critically Endangered	Community likely to occur within area

Listed Threatened Species

[Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species

Name	Status	Type of Presence
Rostratula australis Australian Painted Snipe [77037]	Endangered	habitat may occur within area Species or species habitat known to occur within area
Fish		
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat may occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Acacia bynoeana Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat likely to occur within area
Acacia pubescens Downy Wattle, Hairy Stemmed Wattle [18800]	Vulnerable	Species or species habitat known to occur within area
Allocasuarina glareicola [21932]	Endangered	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat known to occur within area
Genoplesium baueri Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528]	Endangered	Species or species habitat may occur within area
Grevillea parviflora subsp. parviflora Small-flower Grevillea [64910]	Vulnerable	Species or species habitat known to occur within area
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat may occur within area
Melaleuca deanei Deane's Melaleuca [5818]	Vulnerable	Species or species habitat may occur within area
Micromyrtus minutiflora [11485]	Vulnerable	Species or species habitat known to occur within area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area
Persoonia hirsuta Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat likely to occur within area
Persoonia nutans Nodding Geebung [18119]	Endangered	Species or species habitat known to occur within area
Pimelea curviflora var. curviflora [4182]	Vulnerable	Species or species habitat known to occur within area
Pimelea spicata Spiked Rice-flower [20834]	Endangered	Species or species habitat known to occur within area
Pomaderris brunnea Rufous Pomaderris, Brown Pomaderris [16845]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat may occur within area
Pterostylis saxicola Sydney Plains Greenhood [64537]	Endangered	Species or species habitat likely to occur within area
Pultenaea parviflora [19380]	Vulnerable	Species or species habitat known to occur within area
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat may occur within area
Rhodomyrtus psidioides Native Guava [19162]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species

[[Resource Information](#)]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land	[Resource Information]
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The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Airservices Australia
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Australian Telecommunications Corporation
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Deputy Director of War Service Homes
Commonwealth Land - Director of Defence Service Homes
Commonwealth Land - Director of War Service Homes
Commonwealth Land - Telstra Corporation Limited
Defence - 1CAD ORCHARD HILLS KINGSWOOD
Defence - AIRTC ST MARYS
Defence - BLACKTOWN TRAINING DEPOT
Defence - HMAS NIRIMBA
Defence - SIGNAL STRS DEPOT-KINGSWOOD

Commonwealth Heritage Places	[Resource Information]
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Name	State	Status
Natural		
Orchard Hills Cumberland Plain Woodland	NSW	Listed place
Shale Woodland Llandilo	NSW	Listed place

Listed Marine Species	[Resource Information]
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* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]	Critically Endangered	Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]	Endangered*	Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves		[Resource Information]
Name		State
Prospect		NSW
Wianamatta		NSW

Invasive Species	[Resource Information]
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Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species

Name	Status	Type of Presence
Streptopelia chinensis Spotted Turtle-Dove [780]		habitat likely to occur within area Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171] Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat likely to occur within area Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii		
Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta		
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis		
Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus		
Gorse, Furze [7693]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus		
Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.793666 150.825763,-33.794344 150.828552,-33.794237 150.828681,-33.79545 150.833488,-33.798748 150.832114,-33.799266 150.832114,-33.799087 150.831063,-33.799961 150.830205,-33.799658 150.829647,-33.799551 150.829497,-33.799551 150.829261,-33.799551 150.829067,-33.79964 150.828552,-33.799711 150.828145,-33.799818 150.827694,-33.798588 150.822115,-33.79438 150.823553,-33.794611 150.824754,-33.793684 150.825763,-33.793666 150.825763

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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APPENDIX D: DATABASE SEARCH RESULTS - FLORA

Scientific name	Common name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence
<i>Acacia byoeana</i>	Bynoe's Wattle	E	V	PMST	Occurs in 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.	Species assessed in Section 6.1.2 as part of BAMC species assessment.
<i>Acacia pubescens</i>	Downy Wattle	V	V	Bionet – 118 (2019) PMST	Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravelly soils, often with ironstone. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Longevity is unknown, but clonal species have been known to survive for many decades. Flowers from August to October. Pollination of Acacia flowers is usually by insects and birds. The pods mature in October to December.	Species assessed in Section 6.1.2 as part of BAMC species assessment.
<i>Allocasuarina glareicola</i>		E	E	Bionet – 1 (2018) PMST	Grows in Castlereagh woodland on lateritic soil. Found in open woodland with <i>Eucalyptus parramattensis</i> , <i>Eucalyptus fibrosa</i> , <i>Angophora bakeri</i> , <i>Eucalyptus sclerophylla</i> and <i>Melaleuca decora</i> . Common associated understorey species include <i>Melaleuca nodosa</i> , <i>Hakea dactyloides</i> , <i>Hakea sericea</i> , <i>Dillwynia tenuifolia</i> , <i>Micromyrtus minutiflora</i> , <i>Acacia elongata</i> , <i>Acacia brownei</i> , <i>Themeda australis</i> and <i>Xanthorrhoea minor</i> . Not killed outright by fire but resprouts from the rootstock. Spreads by vegetative	Low – No suitable habitat present within the subject land.

Scientific name	Common name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence
					means, such that clumps of up to 100s of stems may be a single individual. The time taken for the plants to flower and set seed is not known, but only those plants growing in areas unburnt for some time produced substantial numbers of fruit.	
<i>Callistemon linearifolius</i>	Netted Bottle Brush	V	Not Listed	Bionet – 1 (2013)	Grows in dry sclerophyll forest on the coast and adjacent ranges. Flowers spring – summer.	Low – No suitable habitat present within the subject land.
<i>Cryptostylis hunteriana</i>	Leafless Tongue-orchid	V	V	PMST	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (<i>Eucalyptus sclerophylla</i>), Silvertop Ash (<i>E. sieberi</i>), Red Bloodwood (<i>Corymbia gummifera</i>) and Black Sheoak (<i>Allocasuarina littoralis</i>); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (<i>C. subulata</i>) and the Tartan Tongue Orchid (<i>C. erecta</i>).	Low – No suitable habitat present within the subject land.
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E	E	Bionet – 1 (1993) PMST	The White-flowered Wax Plant usually occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest; Coastal Tea-tree <i>Leptospermum laevigatum</i> – Coastal Banksia <i>Banksia integrifolia</i> subsp. <i>integrifolia</i> coastal scrub; Forest Red Gum <i>Eucalyptus tereticornis</i> aligned open forest and woodland; Spotted Gum <i>Corymbia maculata</i> aligned open forest and woodland; and Bracelet Honeymyrtle <i>Melaleuca armillaris</i> scrub to open scrub. Flowering occurs	Species assessed in Section 6.1.2 as part of BAMC species assessment.

Scientific name	Common name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence
					between August and May, with a peak in November.	
<i>Dillwynia tenuifolia</i>	Dillwynia tenuifolia, Kemps Creek	V	Not Listed	Bionet – 1025 (2020)	In western Sydney, may be locally abundant particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland. At Yengo, is reported to occur in disturbed escarpment woodland on Narrabeen sandstone. <i>Eucalyptus fibrosa</i> is usually the dominant canopy species. <i>Eucalyptus globoidea</i> , <i>E. longifolia</i> , <i>E. parramattensis</i> , <i>E. sclerophylla</i> and <i>E. sideroxylon</i> may also be present or codominant, with <i>Melaleuca decora</i> frequently forming a secondary canopy layer. Associated species may include <i>Allocasuarina littoralis</i> , <i>Angophora bakeri</i> , <i>Aristida</i> spp. <i>Banksia spinulosa</i> , <i>Cryptandra</i> spp. <i>Daviesia ulicifolia</i> , <i>Entolasia stricta</i> , <i>Hakea sericea</i> , <i>Lissanthe strigosa</i> , <i>Melaleuca nodosa</i> , <i>Ozothamnus diosmifolius</i> and <i>Themeda australis</i> . <i>D. tenuifolia</i> is often found in association with other threatened species such as <i>Dodonaea falcata</i> , <i>Grevillea juniperina</i> , <i>Micromyrtus minutiflora</i> , <i>Pultenaea parviflora</i> and <i>Styphelia laeta</i> .	Species assessed in Section 6.1.2 as part of BAMC species assessment.
<i>Genoplesium baueri</i>	Yellow Gnat-orchid	E	E	PMST	Grows in dry sclerophyll forest and moss gardens over sandstone. Flowers February to March.	Low – No suitable habitat present within the subject land.
<i>Grevillea juniperina</i>	Juniper-leaved Grevillea	V	Not Listed	Bionet – 2808 (2020)	Grows on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium	Species assessed in Section 6.1.2 as part of BAMC species assessment.

Scientific name	Common name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence
<i>subsp. juniperina</i>					(often with shale influence), typically containing lateritic gravels. Recorded from Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest. Associated canopy species within Cumberland Plain Woodland and Shale/Gravel Transition Forest include <i>Eucalyptus tereticornis</i> , <i>E. moluccana</i> , <i>E. crebra</i> , <i>E. fibrosa</i> and <i>E. eugenioides</i> . Understorey species include <i>Bursaria spinosa</i> , <i>Dillwynia sieberi</i> , <i>Ozothamnus diosmifolius</i> , <i>Daviesia ulicifolia</i> , <i>Acacia falcata</i> , <i>Acacia parramattensis</i> , <i>Themeda australis</i> , <i>Aristida ramosa</i> , <i>Cymbopogon refractus</i> , <i>Eragrostis brownii</i> , <i>Cheilanthes sieberi</i> , <i>Dianella revoluta</i> and <i>Goodenia hederacea</i> .	
<i>Grevillea parviflora subsp. parviflora</i>	Small-flower Grevillea	V	V	Bionet – 17 (2018) PMST	Grows in dry sclerophyll forest on the coast and adjacent ranges. Flowers spring – summer.	Low – No suitable habitat present within the subject land.
<i>Haloragis exalata subsp. Exalata</i>	Wingless Raspwort	V	V	PMST	Square Raspwort appears to require protected and shaded damp situations in riparian habitats. Flowering specimens in NSW are recorded from November to January.	Low – No suitable habitat present within the subject land.
<i>Hibbertia puberula</i>		E	Not Listed	Bionet – 3 (2018)	Flowering time is October to December, sometimes into January. Occurs on sandy soil often associated with sandstone, or on clay. Habitats are typically dry sclerophyll woodland communities, although heaths are also occupied. One of the recently (2012) described subspecies also favours upland swamps.	Low – No suitable habitat present within the subject land.

Scientific name	Common name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence
<i>Macadamia integrifolia</i>	Macadamia Nut	Not Listed	V	Bionet – 3 (2017)	Not known to occur naturally in the wild in NSW.	Low - Not known to occur naturally in the wild in NSW.
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i>	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	EP	Not Listed	Bionet – 72 (2018)	Grows in vine thickets and open shale woodland. Recent records are from Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Previously known north from Razorback Range.	Species assessed in Section 6.1.2 as part of BAMC species assessment.
<i>Melaleuca deanei</i>	Deane's Melaleuca	V	V	PMST	The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone. Flowers appear in summer but seed production appears to be small and consequently the species exhibits a limited capacity to regenerate.	Low – No suitable habitat present within the subject land.
<i>Micromyrtus minutiflora</i>		E	V	Bionet – 6 (2004) PMST	Grows in Castlereagh Scribbly Gum Woodland, Ironbark Forest, Shale/Gravel Transition Forest, open forest on tertiary alluvium and consolidated river sediments. 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.	Low – No suitable habitat present within the subject land.
<i>Persicaria elatior</i>	Knotweed	V	V	PMST	This species normally grows in damp places, especially beside streams and lakes.	Low – No suitable habitat present within the subject land.

Scientific name	Common name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence
					Occasionally in swamp forest or associated with disturbance.	
<i>Persoonia hirsuta</i>	Hairy Geebung	E	E	PMST	The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. It is usually present as isolated individuals or very small populations. It is probably killed by fire (as other Persoonia species are) but will regenerate from seed.	Low – No suitable habitat present within the subject land.
<i>Persoonia nutans</i>	Nodding Geebung	E	E	Bionet – 31 (2018) PMST	Northern populations are confined to aeolian and alluvial sediments and occur in a range of sclerophyll forest and woodland vegetation communities, with the majority of individuals occurring within Agnes Banks Woodland or Castlereagh Scribbly Gum Woodland and some in Cooks River / Castlereagh Ironbark Forests. Southern populations also occupy tertiary alluvium, but extend onto shale sandstone transition communities and into Cooks River / Castlereagh Ironbark Forest.; ¹ Peak flowering is from November to March with sporadic flowering all year round.	Low – No suitable habitat present within the subject land.
<i>Pilularia novae-hollandiae</i>	Austral Pillwort	E	Not Listed	Bionet – 1 (1966)	Austral Pillwort grows in shallow swamps and waterways, often among grasses and sedges. It is most often recorded in drying mud as this is when it is most conspicuous. Most of the records in the Albury-Urana area were from table drains on the sides of roads. The ACT record was from a subalpine grassy plain. This species is probably ephemeral (especially in the drier parts of its range), appearing when soils are moistened by rain.	Low – No suitable habitat present within the subject land.

Scientific name	Common name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence
<i>Pimelea curviflora</i> var. <i>curviflora</i>		V	V	Bionet – 3 (2018) PMST	Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowland Grassy Woodland habitat at Albion Park on the Illawarra coastal plain. Flowers October to May. Has an inconspicuous cryptic habit as it is fine and scraggly and often grows amongst dense grasses and sedges. It may not always be visible at a site as it appears to survive for some time without any foliage after fire or grazing, relying on energy reserves in its tuberous roots.	Low – No suitable habitat present within the subject land.
<i>Pimelea spicata</i>	Spiked Rice-flower	E	E	PMST	In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils. On the Cumberland Plain sites it is associated with Grey Box communities (particularly Cumberland Plain Woodland variants and Moist Shale Woodland) and in areas of ironbark. The co-occurring species in the Cumberland Plain sites are grey box (<i>Eucalyptus moluccana</i>), forest red gum (<i>E. tereticornis</i>) and narrow-leaved ironbark (<i>E. crebra</i>). Blackthorn (<i>Bursaria spinosa</i>) is often present at sites (and may be important in protection from grazing) and kangaroo grass (<i>Themeda australis</i>) is usually present in the groundcover (also indicative of a less intense grazing history).	Species assessed in Section 6.1.2 as part of BAMC species assessment.
<i>Pomaderris brunnea</i>	Rufous Pomaderris	E	V	PMST	Brown Pomaderris grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines. Flowers appear in September and October. The species is expected to live for	Low – No suitable habitat present within the subject land.

Scientific name	Common name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence
					10 - 20 years, while the minimum time to produce seed is estimated to be 4 - 6 years. The species has been found in association with <i>Eucalyptus amplifolia</i> , <i>Angophora floribunda</i> , <i>Acacia parramattensis</i> , <i>Bursaria spinosa</i> and <i>Kunzea ambigua</i> .	
<i>Pterostylis gibbosa</i>	Illawarra Greenhood	E	E	PMST	All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. In the Illawarra region, the species grows in woodland dominated by Forest Red Gum <i>Eucalyptus tereticornis</i> , Woollybutt <i>E. longifolia</i> and White Feather Honey-myrtle <i>Melaleuca decora</i> . Near Nowra, the species grows in an open forest of Spotted Gum <i>Corymbia maculata</i> , Forest Red Gum and Grey Ironbark <i>E. paniculat</i> . In the Hunter region, the species grows in open woodland dominated by Narrow-leaved Ironbark <i>E. crebra</i> , Forest Red Gum and Black Cypress Pine <i>Callitris endlicheri</i> . The Illawarra Greenhood is a deciduous orchid that is only visible above the ground between late summer and spring, and only when soil moisture levels can sustain its growth.	Low – No suitable habitat present within the subject land.
<i>Pterostylis saxicola</i>	Sydney Plains Greenhood	E	E	Bionet – 1 (no date) PMST	Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where <i>Pterostylis saxicola</i> occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils. All species of <i>Pterostylis</i> are deciduous and die back to fleshy, rounded underground tuberoids. The time of emergence	Low – No suitable habitat present within the subject land.

Scientific name	Common name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence
					and withering has not been recorded for this species, however flowering occurs from October to December and may vary due to climatic conditions. The above ground parts of the plant wither and die following seed dispersal and the plant persists as a tuberoid until the next year. Typically occurs as scattered individuals or in small groups.	
<i>Pultenaea parviflora</i>		E	V	Bionet – 552 (2019) PMST	May be locally abundant, particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland. <i>Eucalyptus fibrosa</i> is usually the dominant canopy species. <i>Eucalyptus globoidea</i> , <i>E. longifolia</i> , <i>E. parramattensis</i> , <i>E. sclerophylla</i> and <i>E. sideroxylon</i> may also be present or co-dominant, with <i>Melaleuca decora</i> frequently forming a secondary canopy layer. Associated species may include <i>Allocasuarina littoralis</i> , <i>Angophora bakeri</i> , <i>Aristida</i> spp., <i>Banksia spinulosa</i> , <i>Cryptandra</i> spp., <i>Daviesia ulicifolia</i> , <i>Dodonaea falcata</i> , <i>Entolasia stricta</i> , <i>Hakea sericea</i> , <i>Lissanthe strigosa</i> , <i>Melaleuca nodosa</i> , <i>Ozothamnus diosmifolius</i> , <i>Styphelia laeta</i> and <i>Themeda australis</i> . Often found in association with other threatened species such as <i>Dillwynia tenuifolia</i> , <i>Grevillea juniperina</i> , <i>Micromyrtus minutiflora</i> and <i>Persoonia nutans</i> .	Low – No suitable habitat present within the subject land.

Scientific name	Common name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence
<i>Rhizanthella slateri</i>	Eastern Underground Orchid	V	E	PMST	Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore, usually located only when the soil is disturbed. Flowers September to November.	Low – No suitable habitat present within the subject land.
<i>Rhodamnia rubescens</i>	Scrub Turpentine	CE	Not Listed	PMST	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. This species is characterised as highly to extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.	Low – No suitable habitat present within the subject land.
<i>Rhodomyrtus psidiodes</i>	Native Guava	CE	Not Listed	PMST	Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines. This species is characterised being extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.	Low – No suitable habitat present within the subject land.
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E	V	PMST	On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	Low – No suitable habitat present within the subject land.
<i>Thesium australe</i>	Austral Toadflax	V	V	PMST	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo	Species assessed in Section 6.1.2 as part of BAMC species assessment.

Scientific name	Common name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence
					Grass (<i>Themeda australis</i>). A root parasite that takes water and some nutrient from other plants, especially Kangaroo Grass.	

V – Vulnerable, E – Endangered CE – Critically endangered, EP – Endangered population, X - Extinct

APPENDIX E: DATABASE SEARCH RESULTS - THREATENED FAUNA

Descriptions from Environment, Energy and Science www.environment.nsw.gov.au. Excludes migratory only species which are shown in Table xx.

Common name	Scientific name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence/further assessment required?
BIRDS						
White-throated Needletail	<i>Hirundapus caudacutus</i>	Not Listed	V, Mi	BioNet – 2 (2018) PMST	Migratory and usually seen in eastern Australia from October to April. Breeds in forests in south-eastern Siberia, Mongolia, the Korean Peninsula and northern Japan June-August. Most often seen in eastern Australia before storms, low pressure troughs and approaching cold fronts and occasionally bushfire. These conditions are often used by insects to swarm (e.g., termites and ants) or tend to lift insects away from the surface which favours sighting of White-throated Needletails as they feed. More common in coastal areas, less so inland.	Low. May occasionally fly over but roosting habitat does not occur.
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	E	Not Listed	BioNet – 1 (2006)	Floodplain wetlands (swamps, billabongs, watercourses and dams) of the major coastal rivers are the key habitat in NSW for the Black-necked Stork. Secondary habitat includes minor floodplains, coastal sandplain wetlands and estuaries. Storks usually forage in water 5-30cm deep for vertebrate and invertebrate prey. Black-necked Storks build large nests high in tall trees close to water. Trees usually provide clear observation of the surroundings and are at low elevation (reflecting the floodplain habitat). In NSW, breeding activity occurs May - January; incubation May - October; nestlings July - January; fledging from September.	Low. Suitable habitat does not occur.
Black Bittern	<i>Ixobrychus flavicollis</i>	V	Not Listed	BioNet – 2 (2016)	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night. During the day, roosts in trees or on the ground amongst dense reeds. Generally solitary, but occurs in pairs during the breeding season, from December to March.	Low. Suitable habitat does not occur.

Common name	Scientific name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence/further assessment required?
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	V	Not Listed	BioNet – 9 (2020)	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat.	Low. Suitable habitat does not occur.
Little Eagle	<i>Hieraaetus morphnoides</i>	V	Not Listed	BioNet – 25 (2019)	Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.	Low. May flyover occasionally but breeding habitat does not occur and foraging habitat is minimal.
Square-tailed Kite	<i>Lophoictinia isura</i>	V	Not Listed	BioNet – 3 (2021)	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.	Low. Suitable habitat does not occur.
Black Falcon	<i>Falco subniger</i>	V	Not Listed	BioNet – 1 (1991)	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be referable to the Brown Falcon. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres (Marchant & Higgins 1993). The Black Falcon occurs as solitary individuals, in pairs, or in family groups of parents and offspring.	Low. Outside of favoured range and minimal habitat is available on the subject land.

Common name	Scientific name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence/further assessment required?
Bush Stone-curlew	<i>Burhinus grallarius</i>	E	Not Listed	BioNet – 1 (1996)	Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch. Two eggs are laid in spring and early summer.	Low. Suitable habitat is not available.
Australian Painted Snipe	<i>Rostratula australis</i>	E	E	BioNet – 1 (2015) PMST	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves. Breeding is often in response to local conditions; generally occurs from September to December. Incubation and care of young is all undertaken by the male only. Forages nocturnally on mud-flats and in shallow water.	Low. Suitable habitat is not available.
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	V	Not Listed	BioNet – 1 (2007)	In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. May also occur in sub-alpine Snow Gum (<i>Eucalyptus pauciflora</i>) woodland and occasionally in temperate rainforests. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 9 cm in diameter or larger and at least 9 m above the ground in eucalypts.	Low. Minimal habitat occurs within or surrounding the subject land.
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	V	Not Listed	BioNet – 1 (2001)	Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (<i>Allocasuarina littoralis</i>) and Forest Sheoak (<i>A. torulosa</i>) are important foods. Inland populations feed on a wide range of sheoaks, including Drooping Sheoak, <i>A. diminuta</i> , and <i>A. gymnathera</i> . Belah is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak, but also recorded in open woodlands dominated by Belah (<i>Casuarina cristata</i>). Feeds almost exclusively on the seeds of several species of she-oak (<i>Casuarina</i> and <i>Allocasuarina</i> species), shredding	Low. No foraging or breeding habitat occurs.

Common name	Scientific name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence/further assessment required?
					the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites.	
Little Lorikeet	<i>Glossopsitta pusilla</i>	V	Not Listed	BioNet – 7 (2020)	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g., paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards.	Low. Minimal habitat occurs.
Swift Parrot	<i>Lathamus discolor</i>	E	CE	BioNet – 50 (2019) PMST	Migrates to the Australian south-east mainland between February and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Forest Red Gum <i>E. tereticornis</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> . Commonly used lerp infested trees include Inland Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> , Blackbutt <i>E. pilularis</i> , and Yellow Box <i>E. melliodora</i> . Return to some foraging sites on a cyclic basis depending on food availability. Following winter, they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum <i>Eucalyptus globulus</i> .	Low. Minimal habitat occurs
Turquoise Parrot	<i>Neophema pulchella</i>	V	Not Listed	BioNet – 1 (2018)	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Usually seen in pairs or small, possibly family, groups and have also been reported in flocks of up to thirty individuals. Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants or browsing on vegetable matter. Forages quietly and may be quite tolerant of disturbance. However, if flushed it will fly to a nearby tree and then return to the ground to browse as soon as the danger has passed. Nests in tree hollows, logs or posts, from August to December.	Low. Minimal habitat occurs

Common name	Scientific name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence/further assessment required?
Barking Owl	<i>Ninox connivens</i>	V	Not Listed	BioNet – 1 (1996)	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey found on these fertile riparian soils. Roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as Acacia and Casuarina species.	Low. Minimal habitat occurs
Powerful Owl	<i>Ninox strenua</i>	V	Not Listed	BioNet – 12 (2018)	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine <i>Syncarpia glomulifera</i> , Black She-oak <i>Allocasuarina littoralis</i> , Blackwood Acacia <i>melanoxylon</i> , Rough-barked Apple <i>Angophora floribunda</i> Cherry Ballart <i>Exocarpus cupressiformis</i> and a number of eucalypt species. Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. While the female and young are in the nest hollow the male Powerful Owl roosts nearby (10-200 m) guarding them, often choosing a dense "grove" of trees that provide concealment from other birds that harass him.	Low. Minimal habitat occurs
Masked Owl	<i>Tyto novaehollandiae</i>	V	Not Listed	BioNet – 3 (2018)	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	Low. Minimal habitat occurs
Brown Treecreeper	<i>Climacteris picumnus victoriae</i>	V	Not Listed	BioNet – 1 (2019)	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or	Low. Minimal habitat occurs

Common name	Scientific name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence/further assessment required?
(eastern subspecies)					more shrub species; also found in mallee and River Red Gum (<i>Eucalyptus camaldulensis</i>) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains. Sedentary, considered to be resident in many locations throughout its range; present in all seasons or year-round at many sites; territorial year-round, though some birds may disperse locally after breeding.	
Speckled Warbler	<i>Chthonicola sagittata</i>	V	Not Listed	BioNet – 11 (2006)	The Speckled Warbler lives in a wide range of eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area.	Low. Minimal habitat occurs
Regent Honeyeater	<i>Anthochaera phrygia</i>	CE	CE	BioNet – 19 (2019) PMST	The Regent Honeyeater is a flagship threatened woodland bird whose conservation will benefit a large suite of other threatened and declining woodland fauna. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast. In the last 10 years Regent Honeyeaters have been recorded in urban areas around Albury where woodlands tree species such as Mugga Ironbark and Yellow Box were planted 20 years ago.	Low. Minimal habitat occurs. Lacks large numbers of similar species that can produce prolific flowering that this bird prefers to forage on.

Common name	Scientific name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence/further assessment required?
Black-chinned Honeyeater (eastern subspecies)	<i>Melithreptus gularis gularis</i>	V	Not Listed	BioNet – 1 (2007)	The Black-chinned Honeyeater has two subspecies, with only the nominated (<i>gularis</i>) occurring in NSW. The other subspecies (<i>laetior</i>) was formerly considered a separate species (Golden-backed Honeyeater) and is found in northern Australia between central Queensland west to the Pilbara in Western Australia. It is generally rare east of the Great Dividing Range, except for in parts of the north coast of NSW. It occupies the upper levels of drier open forests or woodlands that usually include box and ironbark eucalypts. Gregarious, usually in pairs or small groups.	Low. Outside of preferred range and minimal habitat occurs.
Varied Sittella	<i>Daphoenositta chrysoptera</i>	V	Not Listed	BioNet – 27 (2018)	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years. Generation length is estimated to be 5 years.	Low. Minimal habitat occurs.
Dusky Woodswallow	<i>Artamus cyanopterus cyanopterus</i>	V	Not Listed	BioNet – 30 (2018)	Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland. Depending on location and local climatic conditions (primarily temperature and rainfall), the dusky woodswallow can be resident year round or migratory. In NSW, after breeding, birds migrate to the north of the state and to southeastern Queensland, while Tasmanian birds migrate to southeastern NSW after breeding. Migrants generally depart between March and May, heading south to breed again in spring.	Low. Minimal habitat occurs
Scarlet Robin	<i>Petroica boodang</i>	V	Not Listed	BioNet – 4 (2008)	The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps.	Low. Minimal habitat occurs.

Common name	Scientific name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence/further assessment required?
					Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. The Scarlet Robin breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions; this species is occasionally found up to 1000 metres in altitude. The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees.	
Flame Robin	<i>Petroica phoenicea</i>	V	Not Listed	BioNet – 1 (1996)	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense. Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgeland at high altitudes. In winter, birds migrate to drier more open habitats in the lowlands (i.e. valleys below the ranges, and to the western slopes and plains). Often occurs in recently burnt areas; however, habitat becomes unsuitable as vegetation closes up following regeneration. In winter lives in dry forests, open woodlands and in pastures and native grasslands, with or without scattered trees. In winter, occasionally seen in heathland or other shrublands in coastal areas.	Low. Minimal habitat occurs
Diamond Firetail	<i>Stagonopleura guttata</i>	V	Not Listed	BioNet – 2 (2012)	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum <i>Eucalyptus pauciflora</i> Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland.	Low. Minimal habitat occurs
Australasian Bittern	<i>Botaurus Phrygia</i>	E	E	PMST	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.). Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains.	Very low. No habitat occurs

Common name	Scientific name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence/further assessment required?
Curlew Sandpiper	<i>Calidria ferruginea</i>	E	CE, Mi	PMST	It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. It roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast seaweed, or on rocky shores.	Low. Minimal habitat occurs
Grey Falcon	<i>Falco hypoleucos</i>	E	V	PMST	Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey.	Low. Outside of favoured geographic area. Minimal habitat occurs.
Painted Honeyeater	<i>Grantiella picta</i>	V	V	PMST	Inhabits Boree/ Weeping Myall (<i>Acacia pendula</i>), Brigalow (<i>A. harpophylla</i>) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus <i>Amyema</i> . Insects and nectar from mistletoe or eucalypts are occasionally eaten. Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.	Low. Minimal habitat occurs
Eastern Curlew	<i>Numenius madagascariensis</i>	Not Listed	CE, Mi	PMST	It generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. It roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. May also roost on wooden oyster leases or other similar structures.	Low. Minimal habitat occurs
Black-faced Monarch	<i>Hirundapus caudactis</i>	Not Listed	V, Mi	PMST	The Black-faced Monarch mainly occurs in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf)	Low. Minimal habitat occurs

Common name	Scientific name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence/further assessment required?
					<p>thicket/shrubland, warm temperate rainforest, dry (monsoon) rainforest and (occasionally) cool temperate rainforest.</p> <p>The species also occurs in selectively logged and 20—30 years old regrowth rainforest (Laurance et al. 1996). It is also sometimes found in nearby open eucalypt forests (mainly wet sclerophyll forests), especially in gullies with a dense, shrubby understorey as well as in dry sclerophyll forests and woodlands, often with a patchy understorey. The species especially occurs in 'marginal' habitats during winter or during passage (migration).</p>	
Eastern Osprey	<i>Pandion haliaetus</i>	V	Mi	PMST	<p>Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia. They require extensive areas of open fresh, brackish or saline water for foraging. They frequent a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes. They exhibit a preference for coastal cliffs and elevated islands in some parts of their range, but may also occur on low sandy, muddy or rocky shores and over coral cays. They may occur over atypical habitats such as heath, woodland or forest when travelling to and from foraging sites.</p>	Low. Minimal habitat occurs
MAMMALS						
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	V	E	BioNet – 7 (2005) PMST	<p>Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Quolls use hollow-bearing trees, fallen logs, other animal burrows, small caves and rock outcrops as den sites. Mostly nocturnal, although will hunt during the day; spend most of the time on the ground, although also an excellent climber and will hunt possums and gliders in tree hollows and prey on roosting birds. Use communal 'latrine sites', often on flat rocks among boulder fields, rocky cliff-faces or along rocky stream beds or banks. Such sites may be visited by multiple individuals and can be</p>	Low. Minimal habitat occurs

Common name	Scientific name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence/further assessment required?
					recognised by the accumulation of the sometimes characteristic 'twisty-shaped' faeces deposited by animals.	
Koala	<i>Phascolarctos cinereus</i>	V	V	BioNet – 4 (2018) PMST	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Inactive for most of the day, feeding and moving mostly at night. Spend most of their time in trees, but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	Low. Minimal habitat occurs
Yellow-bellied Glider	<i>Petaurus australis</i>	V	Not Listed	BioNet – 1 (2018)	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein.	Low. Minimal habitat occurs
Squirrel Glider	<i>Petaurus norfolcensis</i>	V	Not Listed	BioNet – 1 (2011)	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Live in family groups of a single adult male one or more adult females and offspring. Require abundant tree hollows for refuge and nest sites.	Low. Minimal habitat occurs
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	V	V	BioNet – 532 (2021) PMST	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young. Annual mating commences in January and conception occurs in April or May; a single young is born in October or November. Site fidelity to camps is high; some camps	Low- moderate. May occasionally forage, but the removed vegetation is unlikely to be important to this species.

Common name	Scientific name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence/further assessment required?
					have been used for over a century. Can travel up to 50 km from the camp to forage; commuting distances are more often 20 km.	
Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>	V	Not Listed	BioNet - 6 (2019)	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.	Low. Minimal habitat occurs
Eastern Coastal Free-tailed Bat	<i>Micronomus norfolkensis</i>	V	Not Listed	BioNet – 59 (2020)	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous.	May occur. Assessed further in Section 4.1.
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V	BioNet – 2 (2003) PMST	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Petrochelidon ariel</i>), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies.	Low. Minimal habitat occurs
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	V	Not Listed	BioNet – 21 (2018)	Prefers moist habitats, with trees taller than 20 m. Generally, roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. Hibernates in winter. Females are pregnant in late spring to early summer.	Low. Minimal habitat occurs
Southern Myotis	<i>Myotis macropus</i>	V	Not Listed	BioNet – 46 (2020)	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish	Low. Minimal habitat occurs

Common name	Scientific name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence/further assessment required?
					by raking their feet across the water surface. In NSW females have one young each year usually in November or December.	
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	V	Not Listed	BioNet – 24 (2020)	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young.	Low. Minimal habitat occurs
Little Bent-winged Bat	<i>Miniopterus australis</i>	V	Not Listed	BioNet – 10 (2019)	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. In NSW the largest maternity colony is in close association with a large maternity colony of Eastern Bentwing-bats (<i>Miniopterus schreibersii</i>) and appears to depend on the large colony to provide the high temperatures needed to rear its young. Maternity colonies form in spring and birthing occurs in early summer. Males and juveniles disperse in summer. Only five nursery sites /maternity colonies are known in Australia.	Low. Minimal habitat occurs
Large Bent-winged Bat	<i>Miniopterus orianae oceanensis</i>	V	Not Listed	BioNet (89 (2020)	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations	May have been recorded. Further assessment is provided in Section 4.1.

Common name	Scientific name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence/further assessment required?
					disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. Hunt in forested areas, catching moths and other flying insects above the treetops.	
Greater Glider	<i>Petauroides volans</i>	Not Listed	V	PMST	Greater Gliders are forest dependent and prefer older tree age classes in moist forest types. They are obligate users of hollow-bearing trees for shelter and nesting, with each family group using multiple den trees within its home range (Lindenmayer et al. 2004). Greater Glider density varies proportionally to the availability of hollow-bearing trees and do not persist in areas of forest where such trees are absent.	Very low. Habitat does not occur on subject land.
Brush-tailed Rock-wallaby	<i>Petrogale penicillate</i>	E	V	PMST	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night when foraging. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees.	Very low. Habitat does not occur on subject land.
New Holland Mouse	<i>Pseudomys novaehollandiae</i>	Not Listed	V	PMST	Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes. It is a social animal, living predominantly in burrows shared with other individuals. Distribution is patchy in time and space, with peaks in abundance during early to mid stages of vegetation succession typically induced by fire.	Low. Minimal habitat occurs
AMPHIBIANS AND INVERTEBRATES						
Green and Golden Bell Frog	<i>Litoria aurea</i>	E	V	BioNet – 21 (2012) PMST	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (<i>Typha</i> spp.) or spikerushes (<i>Eleocharis</i> spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (<i>Gambusia holbrooki</i>), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet. Males call	Very low. Habitat does not occur on subject land.

Common name	Scientific name	BC Act status	EPBC Act status	Database records	Habitat requirements	Likelihood of occurrence/further assessment required?
					while floating in water and females produce a raft of eggs that initially float before settling to the bottom, often amongst vegetation.	
Cumberland Plain Land Snail	<i>Meridolum corneovirens</i>	E	Not Listed	BioNet – 495 (2021)	Primarily inhabits Cumberland Plain Woodland (a CE ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. It is also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest, which are also listed communities. Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish. Can dig several centimetres into soil to escape drought. Is a fungus specialist.	Low. Minimal habitat occurs, searches were carried out and no snails were found.
Giant Burrowing Frog	<i>Heleioporus australiacus</i>	V	V	PMST	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. Individual frogs occupy a series of burrow sites, some of which are used repeatedly. The home ranges of both sexes appear to be non-overlapping suggesting exclusivity of non-breeding habitat. Home ranges are approximately 0.04 ha in size.	Low. Minimal habitat occurs.
Southern Bell Frog	<i>Litoria raniformis</i>	E	V	PMST	Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat. Breeding occurs during the warmer months and is triggered by flooding or a significant rise in water levels. The species has been known to breed anytime from early spring through to late summer/early autumn (Sept to April) following a rise in water levels. During the breeding season animals are found floating amongst aquatic vegetation (especially cumbungi or Common Reeds) within or at the edge of slow-moving streams, marshes, lagoons, lakes, farm dams and rice crops.	Very low. Habitat does not occur on subject land.

V – Vulnerable, E – Endangered, CE – Critically endangered, EP – Endangered population, Mi = Migratory

APPENDIX F: BAMC REPORT

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00026784/BAAS20012/21/00026785	Eastern Creek REP Throughout Increase	24/11/2021
Assessor Name	Report Created	BAM Data version *
Elvira Jane Lanham	06/12/2021	50
Assessor Number	BAM Case Status	Date Finalised
BAAS20012	Open	To be finalised
Assessment Revision	Assessment Type	
0	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)	BC Act Listing status	EPBC Act listing status	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAI	Ecosystem credits

BAM Credit Summary Report

Cumberland shale plains woodland											
1	849_planted	Cumberland Plain Woodland in the Sydney Basin Bioregion	32.1	32.1	0.28	Critically Endangered Ecological Community	Critically Endangered	High Sensitivity to Potential Gain	2.50	TRUE	6
										Subtotal	6
										Total	6

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAI	Species credits
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APPENDIX G: BCF PAYMENT CALCULATOR



Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00026784/BAAS20012/21/00026785		0	06/12/2021
Assessor Name	Assessor Number	Proposal Name	BAM Case Status
Elvira Jane Lanham	BAAS20012	Eastern Creek REP Throughout Increase	Open
Assessment Type	Date Finalised		
Major Projects	To be finalised		

PCT list

Price calculated	PCT common name	Credits
Yes	849 - Cumberland shale plains woodland	6

Species list

Price calculated	Species	Credits
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Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Assessment Id	Proposal Name
00026784/BAAS20012/21/00026785	Eastern Creek REP Throughout Increase



Biodiversity payment summary report

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Cumberland	849 - Cumberland shale plains woodland	Yes	Cumberland Plain Woodland in the Sydney Basin Bioregion	18.83%	\$ 1,097.37	1.6350	\$ 33,697.42	6	\$202,184.53
Subtotal (excl. GST)									\$202,184.53
GST									\$20,218.45
Total ecosystem credits (incl. GST)									\$222,402.98

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
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No species available

Grand total							\$222,402.98
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