Report

22 OCTOBER 2018

Glenbrook Station Upgrade

Flora and Fauna Assessment Report

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Approval for issue

Name	Signature	Date
Natalie Green	Natalie Green	22/10/2018

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Summary

Context

RPS Australia East Pty Ltd (RPS) was engaged by Transport for NSW (TfNSW) to prepare a flora and fauna assessment report for the Glenbrook Station Upgrade, hereafter referred to as the Proposal. The Proposal is part of a NSW Government commitment to facilitating and encouraging the use of public transport. In this circumstance the Proposal is focused on meeting key requirements for the Disability Standards for Accessible Public Transport (DSAPT) or the Commonwealth *Disability Discrimination Act* 1992 (DDA). This report assesses the impact of the Proposal on listed flora and fauna values identified within the Proposal area.

Methods

Threatened biodiversity listed under the NSW *Biodiversity Conservation Act* 2016 (BC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) relevant to the Proposal were identified to produce a preliminary 'likelihood of occurrence' analysis. Desktop and field investigations were performed in July 2018 including a revised likelihood of occurrence analysis following field validation. Plant Community Types (PCTs) present on site and relevant threatened biodiversity were identified. Impact assessments were performed in accordance with relevant legislation.

Key results – flora species

There were no observations of any threatened flora species listed under either the BC Act or the EPBC Act.

Key results – fauna species

There were no observations of any threatened fauna species listed under either the BC Act or the EPBC Act. Foraging habitat for the Grey-headed Flying Fox is associated with Grey Ironbark (*Eucalyptus paniculata*).

Key results – plant communities

The Proposal coincides with ecotonal vegetation transitioning between Deane's Gum – Mountain Grey Gum – Turpentine tall moist forest on shale, Sydney Basin Bioregion (PCT 792) and Turpentine – Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion (PCT 1281). Both these PCTs form part of the following State and Commonwealth listed threatened ecological communities (TECs):

- Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion (endangered under the BC Act)
- Sydney Turpentine-Ironbark Forest (critically endangered under the EPBC Act)

Impacts

It is estimated that the Proposal would result in the loss of 406 square metres of native vegetation comprising PCT 1281; which forms part of a State and Commonwealth listed TECs. Direct impacts would be limited to the removal of understorey vegetation and selected trees, with some of the tree specimens considered to provide foraging habitat for the Grey-headed Flying Fox.

Conclusion

The Proposal would result in the loss of native vegetation described as PCT 1281, which forms part of a State and Commonwealth listed threatened ecological community. The impacts would be limited to an area of 406 square metres and involves the trimming of branches, clearing of groundcover vegetation and selective tree removal. Further impact minimisation and mitigation is recommended and includes, among other matters, the management of high threat weeds.

1 Introduction

1.1 Overview

The NSW Government has devised a Transport Access Program initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure where it is needed most. The program aims to provide:

- stations that are accessible to people with a disability, limited mobility and parents with prams
- modern buildings and facilities for all modes that meet the needs of a growing population
- modern interchanges that support an integrated network and allow seamless transfers between all modes for all customers.

Glenbrook Station and interchange located in the Blue Mountains (see Figure 1) does not currently meet the key requirements of the Disability Standards for Accessible Public Transport (DSAPT) or the Commonwealth *Disability Discrimination Act* 1992 (DDA) (i.e. non-compliant ramp and stairs requiring upgrading).

1.2 The Proposal

The key features of the Glenbrook Station Upgrade (the 'Proposal') include the following:

- installation of a new lift on the platform to provide access to the existing footbridge (footbridge and stairs to be retained)
- provision of a new station entrance which would include demolition of the existing (non-compliant) ramp from the footbridge to Burfitt Parade to be replaced with new stairs and a new accessible path from the existing footbridge extending east to the raised pedestrian crossing
- landscaping around the station entrance
- internal reconfiguration of the station building to allow for a new Family Accessible Toilet, a new ambulant toilet, communications room and staff facilities
- installation of an external glass canopy at the entrance to the Family Accessible Toilet to provide weather protection
- new formalised kiss and ride on Burfitt Parade
- installation of a pad mount electrical transformer adjacent to the new stairs
- ancillary works including lighting, fencing, new bin storage, minor drainage works, seating adjustments, improvement to station communication systems (including CCTV cameras), hearing loops, installation of wayfinding signage and other signage to identify existing and new accessible features including installation of new tactile ground surface indicators (TGSIs).

1.3 Purpose of report

The purpose of this report is to assess the impacts of the Proposal on threatened biodiversity listed under the NSW *Biodiversity Conservation Act* 2016 (BC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) in addition to the general biodiversity values of the existing environment. These assessments have been prepared for threatened species and ecological communities impacted by the Proposal in accordance with:

- Section 7.8 of the BC Act involving the preparation of a Test of Significance under Section 7.3
- *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance* (DoE 2013, specifically for listings under Section 18 and 18A of the EPBC Act)

Assessments were used to determine if the Proposal is likely to have a significant impact on listed biodiversity values.

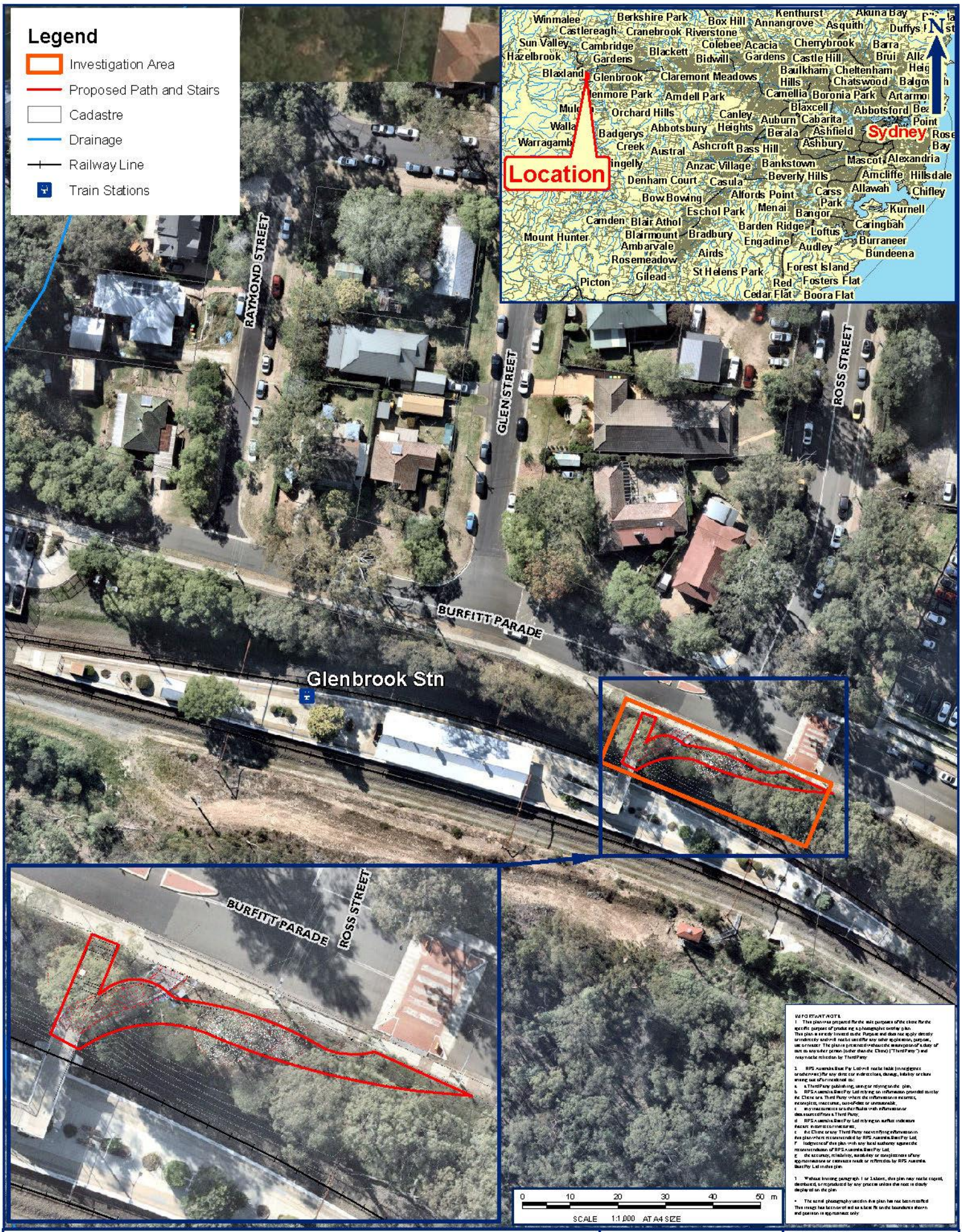

FIGURE 1: SITE LOCATION

LOCATION: GLENBROOK STATION	DATUM: GDA94
	PROJECTION: MGA Zone 56
JOB NO.: PR 141294	Data Sources: RPS, Client Land and Property 2015
PURPOSE: ECOLOGY	
Technician: Natalie.Wood Date: 2/08/2018	

CLIENT: NOT SPECIFIED

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Path: J:\JOBS\141K\141294 TAP3\10 - Drafting\Arcgis Map Documents\Eco\141294 Figure 1 Location A A4 20180801.mxd

NEW_A4_Portrait: 2018 Rev: 8 Produced: NW Reviewed: NW Date: 10/03/2018

1.4 Proposal area particulars

Proposal area:	Burfitt Parade, Glenbrook.
LGA:	Blue Mountains City Council
Current land use	The Proposal area is comprised of a station platform, footbridge, footpath and carpark
Hydrology	There are no natural water bodies or creek lines within the Proposal area
Vegetation	The Proposal area is characterised by a combination of landscaped vegetation and native bushland

1.5 Legislation and policy

1.5.1 NSW *Environmental Planning and Assessment Act* 1979

Section 1.7 of the EP&A Act requires the application of Part 7 of the BC Act (i.e. Biodiversity Assessment and Approvals under the Planning Act). Here, Part 7, Division 2 of the BC Act describes the biodiversity assessment requirements for Part 5 Activities (Section 7.8).

Transport for NSW (TfNSW) is both the proponent and determining authority and, under Section 110B(1)(a) of the EP&A Act, acts under Part 5 of the EP&A Act. Proponents acting under Part 5 of the EP&A Act need to consider Sections 7.2 (1)(a) and (c) of the BC Act, as indicated by Section 7.8 of the BC Act.

1.5.2 NSW *Biodiversity Conservation Act* 2016

The BC Act and supporting regulations establish a modern and integrated legislative framework for land management and conservation in NSW. The purpose of the BC Act, with reference to the assessment of development (Part 4 of the EP&A Act) or activities (Part 5 of the EP&A Act), is:

> *(k) to establish a framework to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity*
>
> *(l) to establish a scientific method for assessing the likely impacts on biodiversity values of proposed development and land use change, for calculating measures to offset those impacts and for assessing improvements in biodiversity values*
>
> *(m) to establish market-based conservation mechanisms through which the biodiversity impacts of development and land use change can be offset at landscape and site scales*

The assessment requirement for proponents acting under Part 5 of the EP&A is described in Section 7.3 of the BC Act (i.e. Assessment of Significance or Five-Part Test). This assessment is performed to determine if the Proposal is likely to significantly affect threatened species or ecological communities, or their habitats. If it is determined that a Proposal is likely to significantly affect threatened species or ecological communities, or their habitats, then one of the following two assessments are required:

- Species Impact Statement (SIS) under Part 7 Division 5 of the BC Act or
- Biodiversity Assessment Development Report (BDAR) under Section 7.13 of the BC Act (optional)

Participation in the latter assessment pathway is optional, at the discretion of the determining authority and is subject to the *Biodiversity Assessment Method Order* 2017; hereafter referred to as the Biodiversity Assessment Method (BAM). When opting in to the Biodiversity Offset Scheme (BOS) under Part 6 of the BC Act, a Proponent acting under Part 5 of the EP&A Act may consider Section 7.15 of the BC Act when determining the offsetting arrangements for residual impacts on threatened species, ecological communities or their habitats.

For this Proposal, TfNSW has elected to opt out of the BOS. The TfNSW pathway is explained further below.

1.5.3 NSW *Biosecurity Act* 2015

The NSW *Biosecurity Act* 2015 divides NSW into regions based on combined LGAs and priority weeds for a region. Some weeds are managed at a state level as they form part of a broader containment strategy. The legislation compliments listed Weeds of National Significance (WoNS).

The Act provides for the identification and classification of listed weeds to identify the duty required for management. The duty assigned to the weed informs land managers and owners of their role and responsibility in managing the weed within the Proposal area. Weeds identified as occurring within the Proposal area listed as a priority weed within the region, need to be managed according to the duty assigned to the species in NSW Weed wise.

1.5.4 State Environmental Planning Policy 44 – Koala Habitat Protection

State Environmental Planning Policy No.44 - Koala Habitat Protection (SEPP 44) aims to protect the Koala and its habitat by incorporating prescriptions for consent authorities to consider during the assessment of development applications. SEPP 44 contains prescriptions for the consideration of “potential koala habitat” and “core koala habitat” for developments within local government areas (LGAs) listed in Schedule 1 of the Policy. The Proposal area is located within the Blue Mountains LGA, which is listed under Schedule 1 as an LGA to which SEPP 44 applies; however, the Proposal is being assessed under Part 5 of the EP&A Act and as such is not part of a development application to be assessed by Blue Mountains City Council. Therefore SEPP 44 does not apply, however this assessment has had regard for the provisions of SEPP 44. .

1.5.5 Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999

The purpose of the EPBC Act is to ensure that actions likely to cause a significant impact on Matters on National Environmental Significance (MNES) undergo a process of assessment. Under the EPBC Act, an action includes a Proposal, undertaking, development or activity that may impact MNES. An action that ‘has, will have or is likely to have a significant impact on a MNES’ is deemed to be a ‘controlled action’ and may not be undertaken without prior approval from the Commonwealth Minister for the Department of the Environment and Energy (DoEE). MNES categories listed under the EPBC Act are:

- world heritage properties
- national heritage places
- wetlands of international importance (Ramsar wetlands)
- threatened species and ecological communities (Section 18 and 18A)
- migratory species
- commonwealth marine areas
- nuclear actions (including uranium mining)
- a water resource, in relation to coal seam gas development and large coal mining development.

The first step in considering MNES protected under the EPBC Act (e.g. Section 18 and 18A) is a self-assessment performed in accordance with the *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance* (DoE 2013). This is performed to determine if there is likelihood for an action to have a significant impact on MNES. Regulatory approval from the Commonwealth Minister for the Environment is required for actions that have, or are likely to have, a significant impact on MNES. The decision to refer an action must have due regard for directions specified under Section 68 of the Act.

1.6 Qualifications and licensing

1.6.1 Qualifications

This report was written by Joe May (M.EnvMgt, B.EnvSc) and reviewed by Mark Aitkens (BSc) of RPS. Academic qualifications and professional experience of RPS staff involved are documented in **Appendix A**.

1.6.2 Licensing

Research was conducted under the following licences:

- NSW National Parks and Wildlife Service Scientific Investigation Licence S100536 (Valid 31 December 2018)
- Animal Research Authority (Trim File No: 16/361) issued by NSW Department of Primary Industries (Valid 21 March 2019)
- Animal Care and Ethics Committee Certificate of Approval (Trim File No: 16/361) issued by NSW Department of Primary Industries (Valid 21 March 2019)
- Certificate of Accreditation of a Corporation as an Animal Research Establishment (Trim File No: V14/532 & Ref No: AW2001/014) issued by NSW Department of Primary Industries (DPI) (Valid to 22 May 2020).

2 Methodology

This assessment has been prepared in accordance with Assessments of Significance (Section 7.3 of the BC Act) as outlined in **Section 1.5.2**. The methods and tasks performed in preparing this assessment are outlined in the following sections.

2.1 Desktop assessment

2.1.1 Database

A review of relevant information was performed to gain an understanding of the biodiversity values that may occur. Information sources reviewed for a 10 kilometre radius of the Proposal, hereafter referred to as the 'locality', included:

- reviewing of threatened species profiles and notional output from the BAM Credit Calculator
- fauna and flora records contained in the Office of Environment and Heritage (OEH) Atlas of NSW Wildlife (OEH 2018a) (accessed July 2018)
- fauna and flora records contained in the Department of the Environment and Energy (DoEE) Protected Matters Search tool (DoEE 2018) (accessed July 2018).

2.1.2 Spatial datasets

The following spatial datasets were interrogated to describe key landscape parameters for the Proposal area:

- local vegetation mapping
- Mitchell Landscapes (NPWS 2003)
- IBRA Region and subregion mapping (IBRA7).

The latest aerial photography was inspected to review the currency / accuracy of these spatial datasets and to estimate adjacent patch size and condition.

2.1.3 Likelihood of occurrence

The list of threatened species, populations and ecological communities (threatened biodiversity) identified by database searches (i.e. **Section 2.1.1**) were subject to a likelihood of occurrence analysis using the key landscape parameters determined by **Section 2.1.2**. Five 'likelihood of occurrence' categories were attributed to threatened biodiversity. Habitat descriptions were generally taken from the online Threatened Species Profile Database (TSPD) (OEH 2018b).

A preliminary 'likelihood of occurrence' analysis was produced using the categories outlined in **Table 1**. Field validation of this preliminary analysis was performed during the site inspection and subsequently updated to identify species and ecological communities in need of further consideration.

Table 1 Likelihood of occurrence criteria

Likelihood Rating	Description
None	Suitable formation level vegetation habitat surrogates are absent from the Proposal area. Species incidence is not expected and, if present, would represent atypical habitat usage.
Low	Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction.
Moderate	Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat.
High	Habitat values generally consistent with description provided in the OEH TSPD. Habitat is located within known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001). If present, the species is likely to depend on the habitat it occurs within for important life cycle processes.
Known	Habitat values generally consistent with description provided in the OEH TSPD. Habitat is located within known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001). The species is likely to depend on the habitat it occurs within for important life cycle processes; however, the importance of this habitat would depend on additional factors (e.g. size and extent of local population).

2.2 Field investigations

An inspection of the Proposal was conducted on 17 July 2018, where an ecologist performed the following investigations:

- a flora inventory of the Proposal area, including the identification of threatened species and/or ecological communities
- incidental observations of fauna species and indirect evidence of fauna (such as scats, nests, burrows, location of hollow-bearing trees, tracks, scratches and diggings)
- identification of native and exotic plant species, including noxious weeds listed under the NSW *Biosecurity Act* 2015 for the Blue Mountains LGA
- taking photographs of any significant ecological values occurring within the Proposal area.

The methods involved in obtaining these results are provided in the following sections.

2.2.1 Flora

A flora inventory of the site was undertaken by undertaking Rapid Data Points (RDPs) in order to map the type and range of vegetation communities present.

General searches were undertaken for all threatened flora species known to occur within the locality and in the habitat types present within the Proposal area. These searches were performed in accordance with the 'parallel transect' method described in the NSW Guide to Surveying Threatened Plants (OEH 2016).

2.2.2 Fauna

Opportunistic sightings and secondary indications (scratches, scats, diggings, tracks etc.) of resident fauna were noted. Such indicators may include:

- distinctive scats left by mammals
- scratch marks made by various types of arboreal animals
- nests made by various guilds of birds
- feeding scars on Eucalyptus trees made by gliders
- whitewash, regurgitation pellets and prey remains from owls
- aural recognition of bird and frog calls
- skeletal material of vertebrate fauna
- searches for indirect evidence of fauna (such as scats, nests, burrows, hollows, tracks, and diggings).

2.2.3 Survey effort

Fauna observations were taken over one day in unison with flora surveys.

2.2.4 Data recording

A hand-held Trimble differential global positioning system (DGPS), accurate to less than one metre, was used to record the location of survey methodologies along with notable results including the location of threatened flora and/or fauna species.

2.3 Nomenclature

2.3.1 Plant taxonomy

Plant taxonomy used was consistent with the nomenclature of the Flora of NSW (Harden 1990-1993; 2002), except where more recent revisions have been published in recognised scientific journals and accepted by the National Herbarium of New South Wales (as per PlantNet website http://plantnet.rbgsyd.nsw.gov.au/).

2.3.2 Fauna taxonomy

Taxonomy and common names of fauna in this report were from the following sources.

- Mammals: Menkhorst and Knight (2010) and Churchill (2009)
- Birds: Simpson and Day (2010)
- Reptiles: Wilson and Swan (2010)
- Frogs: Tyler and Knight (2011).

2.4 Limitations

Limitations inherent in the investigation, as presented in this report, have been taken into account specifically in relation to threatened species surveys, assessments, results and conclusions. A precautionary approach has been adopted where scientific uncertainty exists; resulting in ‘assumed presence’ of known and expected threatened species, populations and ecological communities thus ensuring a holistic assessment.

2.4.1 Seasonality

Threatened flora species should be surveyed within their respective flowering periods to ensure accurate identification. Surveys have been undertaken outside the flowering period of some cryptic species and in these cases the precautionary principle has been applied and the potential presence of these species has been analysed based on the presence of suitable habitat.

The flowering and fruiting plant species that attract some nomadic or migratory threatened species, often fruit or flower in cycles spanning a number of years. Furthermore, these resources might only be accessed in some areas during years when resources more accessible to threatened species fail. As a consequence, threatened species may be absent from some areas where potential habitat exists for extended periods and this might be the case for nomadic and opportunistic species.

Where required, recommendations are provided in respect to these assumptions should information from an appropriately timed targeted survey provide important details and/ or clarity on the likely impact intensity of the Proposal.

2.4.2 Data availability and accuracy

The collated threatened flora and fauna species records provided by the Atlas of NSW Wildlife are known to vary in accuracy and reliability. Traditionally, this is due to the reliability of information provided to the NPWS for collation and/or the need to protect specific threatened species locations. For the purposes of this assessment, this information has been considered to have a maximum accuracy of ±one kilometre. Threatened flora and fauna records within the region were predominantly sourced from the online OEH BioNet and DoEE Protected Matters Search Tool. Limitations exist with regards to this data and its accuracy.

2.4.3 Fauna

The presence of fauna within a particular area is not static over time, may be seasonal or in response to the availability of a particular resource and interspecific interactions. Some fauna species that have been recorded in the local area occur on a seasonal or migratory basis and may be absent from the locality for much of the year. Fauna behaviours may have also affected the chance of detection; species that are easily disturbed or cryptic may not have been detected during surveys.

As such, habitat assessment and prediction of the occurrence of threatened fauna species has been applied where survey effort targeting particular threatened fauna species could not be undertaken. The precautionary principle was applied where marginal habitat was identified or predicted to occur or where species are migratory or nomadic and were therefore likely to utilise habitat components at some stage during their life cycle.

2.4.4 Flora

The cryptic nature of many flora species makes them very difficult to detect even when they are known to be present. There is a range of cryptic plant species that have a brief flowering period and hence a small window for detection. Due to seasonality and other factors some threatened species that are not detected cannot be regarded as absent from the Proposal area.

3 Results

3.1 Desktop assessment

3.1.1 Database searches

The results of database searches using OEH Atlas of NSW Wildlife (Accessed July 2018) and EPBC Protected Matters Search (Accessed July 2028) identified 21 threatened flora species, 35 threatened fauna species and 25 threatened ecological communities (TECs) as either previously recorded or potentially occurring within the locality. The EPBC Act Protected Matters Search and regional vegetation mapping identified a further eight TECs (DoEE 2018; OEH 2018a). This information was used to prepare a preliminary likelihood of occurrence analysis prior to the field investigation, which was subsequently updated following analysis of field data. The updated likelihood of occurrence analysis is provided in **Appendix B**. Results relevant to the Proposal are discussed in the following sections.

3.2 Flora

3.2.1 Species

The native species observed in the Proposal area are listed below:

- *Eucalyptus paniculata*
- *Eucalyptus deanei*
- *Acacia fimriata*
- *Acacia implexa*
- *Acacia parramattensis*
- *Dianella caerulea*
- *Hakea sericea*
- *Lomandra longifola*
- *Pittosporum undulatum*
- *Pteridium esculentum.*

Plates 1 and **2** provide a visual appreciation for the condition of the groundcover and midstorey layers.

Exotic species were also noted and include Mickey Mouse Plant (*Ochna serrulata*) and *Pavonia hastata*. Both species are commonly occurring in rail corridors. Some Weeds of National Significance, as listed in the NSW Department of Primary Industries (DPI) website, were identified on site. These include *Lantana camara* (Lantana), *Asparagus africanus* (Climbing asparagus) and Bridal Creeper (*Asparagus asparagoides*).

3.2.2 Vegetation cover

Analysis of floristic data indicates the Proposal is situated in an ecotone between the following two plant community types (PCTs):

- PCT 792: Deane's Gum – Mountain Grey Gum – Turpentine tall moist forest on shale, Sydney Basin Bioregion
- PCT 1281: Turpentine – Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion.

The distribution of native PCTs observed at the Glenbrook Station is shown in **Figure 2**.

IMPORTANT NOTE

1 This plan was prepared for the sole purposes of the client for the specific purpose of producing a photographic overlay plan. This plan is strictly limited to the Purpose and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter. The plan is presented without liability or warranty of any kind to any other person (other than the Client) ("Third Party") and may not be relied on by Third Party.

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f lodgement of the plan with any local authority against the recommendation of RPS Australia East Pty Ltd,

g the accuracy, reliability, suitability or completeness of any approximations or estimates made or referenced by RPS Australia East Pty Ltd in the plan.

3 Without limiting paragraph 1 or 2 above, the plan may not be copied, distributed, or reproduced by any process unless the note is clearly displayed on the plan.

4 The aerial photography used in the plan has not been rectified. The image has been overlaid and scaled to fit on the boundaries shown and positioned in approximate only.

FIGURE 2: VEGETATION

LOCATION: GLENBROOK STATION	DATUM: GDA94 PROJECTION: MGA Zone 56
JOB NO.: PR 141294 PURPOSE: ECOLOGY Technician: Natalie.Wood Date: 2/08/2018	Data Sources: RPS, Client Land and Property 2015

CLIENT: NOT SPECIFIED

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Path: J:\JOBS\141K\141294 TAP3\10 - Drafting\Arcgis Map Documents\Eco\141294 Figure 2 Vegetation A A4 20180801.mxd

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Plate 1 Proposal area (access path)

Plate 2 Proposal area (transformer)

3.2.3 Threatened Ecological Communities

TECs identified by the database searches are listed in **Table 2**.

Table 2 Threatened Ecological Communities

TEC Name	BC Act	EPBC Act
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Region Woodlands of the Sydney Basin Bioregion	E	E
Shale Sandstone Transition Forest of the Sydney Basin Bioregion		CE
Turpentine-Ironbark Forest of the Sydney Basin Bioregion		CE
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion		E
Blue Gum High Forest in the Sydney Basin Bioregion	E	CE
Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion	E	CE
Blue Mountains Swamps in the Sydney Basin Bioregion	V	E
Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion	V	E
Castlereagh Swamp Woodland Community	E	
Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion	E	CE
Cumberland Plain Woodland in the Sydney Basin Bioregion	E	CE
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	
Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion	V	CE
Moist Shale Woodland in the Sydney Basin Bioregion	E	CE
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions	E	E
Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion	E	E
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	
Shale Gravel Transition Forest in the Sydney Basin Bioregion	E	CE
Shale Sandstone Transition Forest in the Sydney Basin Bioregion	E	CE
Southern Sydney sheltered forest on transitional sandstone soils in the Sydney Basin Bioregion	E	
Sun Valley Cabbage Gum Forest in the Sydney Basin Bioregion	E	
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	
Western Sydney Dry Rainforest in the Sydney Basin Bioregion	E	CE
White Box Yellow Box Blakely's Red Gum Woodland	E	CE

E = Endangered CE = Critically Endangered

Analysis of floristic data indicates the Proposal is situated in an ecotone between PCT 792 and PCT 1281. Both these PCTs form part of the following State and Commonwealth listed TECs:

- Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion (listed as an endangered ecological community (EEC) under the BC Act)
- Sydney Turpentine-Ironbark Forest (listed as a critically endangered ecological community (CEEC) under the EPBC Act).

The extent of these TECs coincides with mapped occurrences of PCT 792 and PCT 1281 as shown in **Figure 2**.

3.3 Fauna Survey

A total of eight fauna species were identified during opportunistic surveys on-site. These include:

- Yellow-faced Honeyeater (*Lichenostomus chrysops*)
- White-throated Treecreeper (*Cormobates leucophaea*)
- Australian Magpie (*Cracticus tibicen*)
- Eastern Yellow Robin (*Eopsaltria australis*)
- Striated Pardalode (*Pardalotus striatus*)
- Noisy Miner (*Manorina melanocephala*)
- Rainbow Lorikeet (*Trichoglossus moluccanus*)
- Sulphur Crested Cockatoo (*Cacatua galerita*).

3.3.1 Fauna habitat

No important fauna habitat features such as hollow-bearing trees, fallen logs or termite mounds were observed in the Proposal area. However, seasonal nectar resources produced by mature Grey Ironbark (*Eucalyptus paniculata*) could be used for foraging purposes by the Grey-headed Flying Fox (*Pteropus poliocephalus*).

3.3.2 Koala habitat

No koala feed trees as listen on Schedule 2 of SEPP44 were identified within the area to be impacted by the Proposal. Therefore, the site does not constitute potential koala habitat. No further consideration of this matter is required.

4 Impact analysis

4.1 Avoidance

Where possible, the Proposal has been designed in a manner to avoid the clearing of mature trees with a diameter greater than 10 centimetres. This is particularly relevant for the new access path from the footbridge to the pedestrian crossing improving on earlier concept design options. Due to design parameters, it was not possible to avoid the clearing of groundcover vegetation.

4.2 Direct impacts

Direct impacts on native vegetation and associated flora and fauna habitat are detailed in the following sections.

4.2.1 Vegetation loss

An estimated 406 square metres of ground cover native vegetation and four trees described as forming part of PCT 1281 would be removed. In addition, 12 trees with an estimated 323 square metres of native overstorey vegetation will also be removed as they are having a major encroachment on the Proposal Allied Tree Consultancy 2018). A summary of the tree removal is provided in the **Table 3**.

Table 3 Proposed Tree Removal (Allied Tree Consultancy 2018)

Tree Number	Species	Height (metres)	Crown spread (square metres)	Reason for removal
2	*Eucalyptus deanei*	4	2	Major encroachment on Proposal area
3	*Eucalyptus deanei*	5	1	Major encroachment on Proposal area
5	*Eucalyptus deanei*	4	2	Major encroachment on Proposal area
6	*Eucalyptus deanei*	6	8	Directly in conflict with the Proposal
16	*Eucalyptus paniculata*	16	63	Major encroachment on Proposal area
17	*Eucalyptus paniculata*	16	42	Major encroachment on Proposal area
18	*Eucalyptus paniculata*	16	60	Major encroachment on Proposal area
19	*Eucalyptus paniculata*	17	81	Major encroachment on Proposal area
20	*Eucalyptus paniculata*	10	35	Major encroachment on Proposal area
26	*Eucalyptus deanei*	9	56	Directly in conflict with the Proposal
27	*Eucalyptus deanei*	4	2	Directly in conflict with the Proposal
31	*Eucalyptus deanei*	5	4	Major encroachment on Proposal area
33	*Eucalyptus deanei*	5	1	Major encroachment on Proposal area
37	*Eucalyptus deanei*	4	2	Major encroachment on Proposal area
38	*Eucalyptus deanei*	5	1	Directly in conflict with the Proposal
41	*Eucalyptus deanei*	8	30	Major encroachment on Proposal area

In addition to the tree removal specified by Allied Tree Consultancy (2018) and summarised in **Table 3**, Allied Tree Consultancy (2018) has also recommended the removal of 15 Wattles (*Acacia* sp.) for reasons of direct conflict or major encroachment with the Proposal.

After accounting for some canopy overlap over the Proposal area, the total vegetation loss for the Proposal is estimated to be 406 square metres.

4.2.2 Threatened flora

No threatened flora was detected within the area impacted by the Proposal.

4.2.3 Threatened Fauna

Foraging habitat for the Grey-headed Flying Fox (i.e. mature Grey Ironbark) occurs within the Proposal area. Five mature specimens of Grey Ironbark would be removed by the Proposal representing an impact on this species. Impacts on the habitat of this species is further discussed in **Section 5**, **Appendix C** and **Appendix D**.

4.2.4 Threatened Ecological Communities

The Proposal would impact on PCT 1281, which is part of the following TECs:

- Sydney Turpentine-Ironbark Forest (CEEC under the EPBC Act)
- Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion (EEC under the BC Act)

Impacts to TECs is further discussed in **Section 5**, **Appendix C** and **Appendix D**.

4.3 Habitat loss

The area impacted by the Proposal has limited habitat of value to native flora and fauna. Important habitat features such as hollow-bearing trees, fallen logs or termite mounds were not located in the impact area and would not be adversely impacted by the Proposal.

4.4 Indirect impacts

4.4.1 Overview

The ‘edge effect’ describes a collection of factors and processes that influence the presence and abundance of species at a boundary such as natural boundaries (e.g. ecotones) or a disturbance of some kind (e.g. cleared lands). Edges can occur naturally within ecosystems and include situations such as the common boundary between two ecological communities or the boundary between burnt and unburnt vegetation. Biodiversity often adapt to the effects of an edge, with some species being partially or wholly reliant on edge effects. Bali (2005) identifies the following main factors and processes that operate at a disturbed edge of an ecological community:

- microclimate (e.g. localised changes in temperature, wind, light, humidity)
- hydrology (i.e. localised changes in surface and subsurface water flows)
- altered fire frequency and intensity
- invasion by exotic plant and animal species
- alteration of soil conditions (e.g. increased sedimentation and nutrient availability)
- alteration of vegetation structure (e.g. tree death and increased shrub densities).

On average, edge effects have been estimated to occur up to 50 metres from the road edge (Bali 2005), although much greater distances have been recorded in some road studies (Forman et al. 2003). Edge effects are particularly pronounced in patches where a large edge to area ratio exists (i.e. small vegetation patches with a proportionally large perimeter). Such conditions often result in the simplification of biodiversity values in favour of generalists or edge specialist species. These impacts already exist in the smaller more isolated vegetation patches of the Proposal area. The Proposal is unlikely to have any substantial

incremental edge effects on these smaller isolated patches over and above existing conditions. Potential edge effects promoted by the proposal may include:

- establishment of weeds along boundaries between native vegetation and cleared lands and potential for weed incursions into adjacent native vegetation
- modification of habitat attributes, through increased light and noise levels, and changes to vegetation structure, soil nutrient levels and plant species diversity
- changes to fauna assemblages, including alteration of woodland and forest bird assemblages by edge specialists
- increased predation of vertebrate fauna by predator species that use forest edges for foraging
- increased nest predation of small insectivorous birds at forest edges.

In regards to the above potential edge effects it is considered that establishment of weeds and modification of habitat attributes (i.e. water runoff) are the most likely tangible impacts that may arise from the Proposal.

4.4.2 Exotic flora

Due to equipment use and soil disturbance, there is the potential for the introduction of weeds. Further, without the use of appropriate weed management protocols, the Proposal has the potential to facilitate the spread of weeds into adjoining native vegetation. Mitigation measures to be implemented during the construction and operational phases of the Proposal are recommended to manage and control the incidence and effect of noxious and environmental weeds on the receiving environment. There is potential for high threat weeds observed within and adjacent to the Proposal to benefit from construction works and, as such, the management of these species would be desirous in lowering any indirect impacts on the adjoining environment.

4.4.3 Runoff

The removal of vegetation, including both trees and grasses will increase the risk of sediment laden storm-water run-off. Operational activities also increase the risk of spills into the environment, specifically petroleum based materials (e.g. fuel and hydraulic oils).

Matters at greatest risk to terrestrial biodiversity that may be impacted by this factor are species and ecological communities with a facultative and / or obligate relationship with water. No such matters are identified within the Proposal area and as such the Proposal is unlikely to cause any deleterious effects. Post construction impacts are likely to have a similar profile to existing conditions, which does not appear to be having a deleterious impact on these matters.

4.5 Key Threatening Processes

Key Threatening Processes (KTPs) are listed under Schedule 4 of the BC Act and EPBC Act. There are no relevant KTPs that have the potential to affect biodiversity values within the Proposal area as a consequence of the Proposal. The proposed native vegetation removal is not of a scale to warrant significant impacts.

5 Impact assessment

5.1 Assumptions

This impact assessment has been prepared with reference to the Proposal description and impact analysis discussed in **Section 4**. As previously stated in **Section 4.1**, impacts to native vegetation (PCT 1281) would be limited to an area of 406 square metres and include the removal of 16 trees as shown in **Figure 2.** Edge effects are likely and cannot be avoided. Assessments are provided without the consideration of any benefit from mitigation.

5.2 BC Act 'Test of Significance' (Section 7.3 of the BC Act)

No threatened flora species or their habitat is likely to be disturbed by the Proposal and, as such, no Test of Significance is required for these matters. However, the Proposal will result in the removal of 406 square metres of a State listed TEC (i.e. Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion EEC) comprising potential foraging habitat for the Grey-headed Flying Fox

The BC Act test of significance was undertaken (**Appendix C**) to determine if the Proposal is likely to have any significant impact on Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion EEC and Grey-headed Flying Fox. That assessment concluded that the Proposal is not likely to substantially reduce the extent or composition of the ecological community or habitat for the Grey-headed Flying Fox. No important habitat features for a threatened species or ecological community would be adversely affected by the Proposal. The Proposal would not result in an impact on any declared area of outstanding biodiversity value. On this basis, it is considered that the Proposal is not likely to have a significant impact on the patch of Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion EEC or foraging habitat for the Grey-headed Flying Fox.

5.3 EPBC Act Significant Impact Guidelines

MNES likely to be impacted by the Proposal have been assessed in accordance with the *Matters of National Environmental Significance – Significant Impact Guidelines 1.1* (Department of the Environment 2013). The MNES relevant considerations are addressed below.

5.3.1 World heritage properties

The Proposal area is not within proximity to a World Heritage Area.

5.3.2 National heritage places

The Proposal area is not within proximity to a National Heritage Place.

5.3.3 Wetlands of international importance (declared Ramsar wetlands)

The Proposal area is not in a Ramsar listed wetland and there are no water bodies within the Proposal area, therefore the Proposal would not impact upon any Ramsar wetlands.

5.3.4 The Great Barrier Reef Marine Park

The Great Barrier Reef Marine Park does not occur within or adjacent to the Proposal area, therefore, the Proposal will not impact upon any areas of the Great Barrier Reef Marine Park.

5.3.5 Commonwealth marine area

The Proposal area is not a Commonwealth Marine Area and is not in close proximity to any such area. Therefore, the Proposal would not impact upon any Commonwealth Marine Area.

5.3.6 Listed threatened ecological communities

The Sydney Turpentine-Ironbark Forest CEEC was identified within the area impacted by the Proposal. An EPBC Act 'Assessment of Significance was undertaken (**Appendix D**) in order to determine if the Project is likely to have a significant impact of this TEC.

The Assessment of Significance concluded that the Proposal is not likely to substantially reduce the extent or fragment the ecological community. Habitat critical to the survival of the ecological community would not be adversely affected by Proposal. The Proposal would not result in a substantial change in species composition or the quality and integrity of an ecological community, nor would the Proposal interfere with the recovery of the ecological community. On this basis, it is considered that the Proposal is not likely to have a significant impact on the patch of Sydney Turpentine Ironbark Forest CEEC.

5.3.7 Nationally listed threatened and migratory species

Potential impacts on the Grey-headed Flying Fox were assessed in **Appendix D**. No significant impacts are expected to occur as a result of the Proposal.

5.4 Mitigation

Table 4 lists mitigation measures recommended for minimising direct and indirect impacts on flora and fauna as a consequence of the Proposal.

Table 4 Recommended Mitigation Measures

Impact	Mitigation Measure	Timing
Loss of native vegetation	Implement a Vegetation Management Plan with the main objective being the enhancement of the adjoining degraded patch of native vegetation as shown in **Figure 3**. This will be undertaken in order to avoid residual impacts and the need for additional offsetting. The total area of this patch is 3,275 square metres.	Pre and post construction
Invasive Flora	Remove all propagules of exotic flora from within the impact area and adjoining patch (within 10 metres) to prevent the spread or growth of exotic flora. Maintain weeds as part of landscaping maintenance.	Pre and post construction
Injury and mortality of fauna	If during the construction phase any fauna are injured, WIRES or a wildlife carer must be notified immediately to care for the injured individual.	During construction
Erosion and sediment impacts	A site-specific Erosion and Sediment Control Plan will be prepared and implemented for the Proposal. The Plan will identify detailed measures and controls to be applied to minimise erosion and sediment control risks including, but not necessarily limited to: runoff, diversion and drainage points; sediment basins and sumps; scour protection; stabilising disturbed areas as soon as possible, check dams, fencing and swales; and staged implementation arrangements. The Plan will also include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.	During construction
Minimise risk from spills	All fuels, chemicals and other hazardous materials will be stored in a roofed, fire-protected and impervious bunded area at least 50 metres from waterways, drainage lines, basins, flood-affected areas or slopes above 10%. Bunding design will comply with relevant Australian Standards, and should generally be in accordance with guidelines provided in the EPA Authorised Officers Manual.	During construction

5.5 Residual Impacts and the Need for Offsetting

The Proposal will remove area comprising 406 square metres of native vegetation (see **Figure 2**). According to Section 1.4 of the TfNSW Vegetation Offset Guide 9TP-SD-087/1.0, offsetting is to be used in circumstances where 'Residual Impacts' are identified, the Proposal is not likely to have a significant impact on threatened species, ecological communities or their habitats. 'Residual Impacts' are defined by native vegetation loss that cannot be avoided or mitigated. The process for determining the type and magnitude of an offset for 'Residual Impacts' is defined in the TfNSW Vegetation Offset Guide 9TP-SD-087/1.0.

Mitigation specified in **Section 5.4** includes a recommendation for the implementation of a Vegetation Management Plan for a degraded patch of native vegetation located adjacent to the impact area. This patch, as shown in **Figure 3**, totals an area of 3,142 square metres.

The Vegetation Management Plan would guide the bush regeneration measures required to enhance and improve the current biodiversity values of this patch. It is anticipated that this plan would combine weed management and supplementary plantings throughout most of this adjoining patch. Supplementary plantings will use native species that form part of *Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion* EEC.

The efficacy of this recommended mitigation was evaluated using the Vegetation Offset Calculator – 9TP-SD-067. Analysis was performed to determine if the recommended mitigation is equal to or greater than an equivalent Primary Offset. For the purposes of this analysis, the hypothetical 'Residual Impact' used in this comparison is the impact area (i.e. 406 square metres) with the area of the hypothetical mitigation being the area of the adjoining patch (i.e. 3,142 square metres).

The following outputs were generated from the Vegetation Offset Calculator – 9TP-SD-067:

- Primary Offset Ratio = 3.40
- Adjusted Offset Ratio = 2.80
- Total Area of Offset Required = 1,137 square metres

The total area of offset required is almost an order of magnitude less than the area of the 'adjoining patch' shown in **Figure 3**. On this basis, it is considered that the proposed mitigation is sufficiently scoped to demonstrate an 'improved or maintained' outcome. Therefore, it is considered the Proposal, inclusive of the recommendation mitigation specified in **Section 5.4**, can demonstrate no 'Residual Impact', thus no requirement for an offset.

IMPORTANT NOTE

1 This plan was prepared for the sole purposes of the client for the specific purpose of producing a photographic overlay plan. This plan is strictly limited to the Purpose and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter. The plan is presented without the assumption of a duty of care to any other person (other than the Client) ("Third Party") and may not be relied on by Third Party

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d RPS Australia East Pty Ltd relying on surface indications that are incorrect or inaccurate;
e the Client or any Third Party not verifying information in the plan where recommended by RPS Australia East Pty Ltd;
f Inclusion of the plan with any local authority against the recommendation of RPS Australia East Pty Ltd;
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4 The aerial photography used in the plan has not been rectified. The image has been orthoflat a distortion at the boundaries shown and position is approximate only

FIGURE 3: Adjoining degraded vegetation patch

LOCATION: GLENBROOK STATION	DATUM: GDA94 PROJECTION: MGA Zone 56
JOB NO.: **PR 141294** PURPOSE: ECOLOGY Technician: Natalie.Wood Date: 8/08/2018	Data Sources: RPS, Client Land and Property 2015

CLIENT: NOT SPECIFIED

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Path: J:\JOBS\141K\141294 TAP3\10 - Drafting\Arcgis Map Documents\Eco\141294 Figure 3 Rehab Area A A4 20180808.mxd

NEW_A4_Portrait: 2018 Rev: 8 Produced: NW Reviewed: NW Date: 10/03/2018

6 Conclusions

6.1 Key Biodiversity Values

The Proposal would result in the removal of 406 square metres of PCT 1281, which is part of a State and Commonwealth listed TEC as listed below:

- Sydney Turpentine-Ironbark Forest (CEEC under the EPBC Act)
- Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion (EEC under the BC Act)

Impact assessment has been undertaken for potential impacts on these TECs, as included in the Appendix C and D. Sixteen trees that form part of the aforementioned EECs are set to be cleared as part of the Proposal. The loss of some of these trees represents foraging habitat for the Grey-headed Flying Fox.

6.2 Impact Considerations

The impacts of the Proposal would be limited to the clearing of ground cover vegetation, trimming of branches and selective removal of trees. Whilst these constitute direct impacts, indirect impact also require consideration.

6.3 Impact Assessment

The following Impact assessments were performed for the State and Commonwealth listed threatened ecological community impacted by the Proposal as listed in **Appendix C** and **D**:

- Test of Significance under the BC Act (**Appendix C**)
- Assessment of Significant under the EPBC Act (**Appendix D**).

These assessments concluded that the Proposal is not likely to have a significant impact on the State and Commonwealth listed threatened ecological community.

The Proposal is not likely to substantially reduce the extent or composition of the ecological community. No important habitat features would be adversely affected by the Proposal. The Proposal would not result in an impact on any declared area of outstanding biodiversity value. On this basis, it is considered that the Proposal is not likely to have a significant impact on the patch of Blue Mountains shale cap forest in the Sydney Basin Bioregion EEC.

The Proposal would not result in a substantial change in species composition or the quality and integrity of an ecological community, nor would the Proposal interfere with the recovery of the ecological community. On this basis, it is considered that the Proposal is not likely to have a significant impact on the patch of Sydney Turpentine Ironbark Forest CEEC.

6.4 Key Mitigation

Mitigation for direct and indirect impacts have been addressed in **Table 4**. Key impact mitigation outcomes are listed below:

- implementation of a Vegetation Management Plan to enhance an adjoining degraded patch of native vegetation. Bush regeneration is to use native species characteristic of PCT 1281
- implementation of tree protection measures prior to the construction to protect retained trees
- a site-specific Erosion and Sediment Control Plan will be prepared and implemented for the Proposal
- all fuels, chemicals and other hazardous materials will be stored in a roofed, fire-protected and impervious bunded area at least 50 metres from waterways, drainage lines, basins, flood-affected areas or slopes above 10 per cent.

It is considered that the implementation of sensitive landscaping and use of weed management during construction would have a beneficial impact on residual vegetation cover.

6.5 Residual Impacts and Offsetting

It is considered that the recommended mitigation measures outlined in **Section 5.4** eliminates the incidence of 'Residual Impacts' to an extent that negates a requirement for offsets. Offsets have not been calculated on this basis.

7 References

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Appendix A

Staff CVs

RPS

Mark Aitkens

Principal Ecologist

Project role:	Principal Ecologist
Location:	Newcastle, NSW Australia
Qualifications:	Bachelor of Science (Environmental Biology), University of Technology Sydney (UTS)
Memberships:	Ecological Society of Australia (ESA)

How can Mark add value

Mark is Principal Ecologist with 22+ years' experience in the delivery of terrestrial and aquatic ecology services to the private and public sectors. As a consulting ecologist, he is experienced in all aspects of project delivery including design and implementation of seasonally based flora and fauna surveys, identification of terrestrial and aquatic species and ecological communities, impact assessments prepared under State and Commonwealth legislation, and design and implementation of monitoring programs.

Mark is accredited under the newly established Biodiversity Assessment Methodology (BAM) and has conducted a range of BAM assessments for Major Projects (State Significant Infrastructure and State Significant Developments). He has also conducted EPBC offset calculations under the EPBC Act Environmental Offsets Policy.

Relevant projects

Western Region Biodiversity Offset Strategy, Centennial Coal, 2018

Preparation of a biodiversity offset strategy for multiple approved coal mining operations in the NSW 'Western Coal Fields' near Lithgow. Involved a post hoc assessment of Project impacts and comparable offsets using the repealed Framework for Biodiversity Offsets (Major Projects) and Part 7A of the Threatened Species Conservation Act 1995. Demonstrated a suitable offset strategy for approved projects by gaining approval through the NSW Department of Planning and Environment and Office of Environment and Heritage.

Northern Coal Logistics Project, Centennial Coal, 2018

Preparation of a BioBanking compliant assessment for the Northern Coal Logistics Project including assessment of complimentary biodiversity offset sites for inclusion in the biodiversity offset strategy for the Project.

Finley Solar Farm EIS, ESCO, 2017

Mark was involved in RPS' preparation of an Environmental Impact Statement (EIS) for the Finley Solar Farm Project. The Finley Solar Farm would produce 170MW over 500 hectares of land. Numerous RPS service lines worked together to prepare the document. To date RPS have successfully liaised with the NSW Department of Planning and Environment, as well as the client, to progress the project smoothly in line with the desired outcomes

Limbri to Weabonga Road Reconstruction, Tamworth Regional Council, 2011

Performed biodiversity surveys and assessment for the reconstruction of the Limbri to Weabonga Road following flood damage from the adjacent Swamp Oak Creek. The endangered Booroolong Tree Frog (*Litoria booroolongensis*) was detected adjacent to the construction area. Impact minimisation involving the establishment of exclusion zones and frog hygiene (Chytrid control) was successfully used to avoid a significant impact on the species. Works were allowed to proceed in accordance with a 'Particular Manner' decision notice,

Springvale Coal, Centennial Coal, 2018

Preparation and implementation of Biodiversity Management Plans (BMP) and Swamp Monitoring Programs (SMP) as subplans of Longwall Extractions Plans for the Springvale Coal Extension Project. BMPs and SMPs are reviewed by the Independent Monitoring Panel and State/ Commonwealth regulators prior to the approval of secondary coal extraction. Works involved the synthesis of a growing knowledge base on best practice monitoring and management of endangered upland peat swamps listed on State and Commonwealth legislation.

Mandalong Coal, Centennial Coal, 2018

Preparation and implementation of a BMP as a subplan for Extractions Plans prepared for longwalls 25-31 of the Mandalong Coal Project. BMPs are reviewed by the relevant State regulator prior to the approval of secondary coal extraction.

Maitland to Minimbah Third Track Project, 2011-2012

Performed integral part of the approvals, post approvals and biodiversity offsetting components of a 30 km new rail track constructed adjacent an existing rail corridor in the Hunter Valley, NSW as part of the Hunter8 Alliance. Prepared and, implemented management plans for microbat exclusion from culverts, pre-clearance surveys and reporting, vegetation clearing audits, biodiversity offset site identification, evaluation and assessment

Albion Park, Tower Holdings, **2015-2016**

Prepared Biodiversity Management Plans for the protection of State and Commonwealth listed endangered and critically endangered plant species (*Zieria granulata* and *Cynanchum elegans*) and ecological communities (Illawarra and South Coast Lowland Forest and Woodland). Management prescriptions centred on weed and fire management, with the latter linked to asset protection zones for the adjoining approved residential subdivision

Mary's Mount Blue Metal Quarry, Gunnedah Quarry Products, 2013-2014

Project managed and prepared Preliminary Documentation for a 'controlled action' declared under the EPBC Act. Assessment involved the consideration of MNES impacted by the quarry including, but not restricted to Semi-evergreen Vine Thicket EEC and the Koala. Calculated and report biodiversity offset requirements in accordance with Commonwealth Offsets Policy and incorporated into a Biodiversity Offset Strategy.

Albion Park, Tower Holdings, 2016

Prepared Biodiversity Management Plans for the protection of State and Commonwealth listed endangered and critically endangered plant species (Zieria granulata and Cynanchum elegans) and ecological communities (Illawarra and South Coast Lowland Forest and Woodland). Management prescriptions centred on weed and fire management, with the latter linked to asset protection zones for the adjoining approved residential subdivision.

Midal Cabling Project, Midal Cabling Company, 2011-2012

The approved Midal aluminium cabling plant is a heavy industrial development involving hot aluminium metal haulage from the Tomago aluminium smelter to the manufacturing plant for the production of high-tension electrical cables. Mark's role in the approvals process involved the preparation of State and Commonwealth assessments centred on the threatened New Holland Mouse and Ramsar Wetlands. An EPBC Act controlled action was avoided as a consequence of the assessment prepared.

Pacific Highway Upgrade: Oxley Highway to Kempsey, RMS, 2012-2014

Assisted in the procurement of approvals under State and Commonwealth legislation including the performed of risk assessments, field surveys, reporting, project design and impact assessments. Performed monitoring surveys for the State listed Maundia triglochinoides and the State and Commonwealth listed Giant Barred Frog (Mixophyes iteratus) in accordance with a Before Impact Control After monitoring design. Analysed results and reported findings including an evaluation of Project impacts and performance of mitigation measures.

Springvale Coal (Newnes Plateau Shrub Swamp EEC) , 2015-current

Performed complex seasonal and annual monitoring programs for this State and Commonwealth listed threatened ecological community. Monitoring includes flora based repeated measures sampling within a BACI monitoring design and Soil Adjusted Normalised Vegetation Index (SANDVI) analysis of remotely sensed imagery (7cm resolution RGBI imagery) over four seasons.

Wyong Hospital Enabling Works, Health Infrastructure NSW, 2016

Mark prepared a Flora and Fauna Assessment for the Wyong Hospital Enabling Works to inform a Review of Environmental Factors (REF). The approach adopted for field surveys for the Flora and Fauna Assessment was in accordance with the BioBanking Methodology (OEH 2014), enabling the surveys and results of the assessment to be transferrable to any BioBanking Assessments that may be required if the project became considered a Major Project (i.e. State Significant Infrastructure (SSI) or a State Significant Development (SSD)).

Rosewood Estate Tamworth, 2014-2015

Project managed and prepared Preliminary Documentation for a 'controlled action' declared under the EPBC Act. Assessment involved a detailed consideration of White Box Yellow Box Blakely's Redgum Grassy Woodland and Derived Native Grasslands, a critically endangered ecological community

Joe May

Ecologist

Project role: Field Ecologist

Location: Newcastle, NSW, Australia

Qualifications: Accredited Biobanking Assessment Method Assessor
Master of Environmental Management
Bachelor of Environmental Science and Management

Memberships: Ecological Consultants Association of NSW
Environmental Institute of Australia and New Zealand
Royal Zoological Society of New South Wales
Birdlife Australia

How Joe can add value

Ecologist, RPS Group Australia East, 2014 to present. Working as an Ecologist for RPS Australia East Joe has experience in the preparation of the following report types:

- Environmental Impact Statements;
- Review of Environmental Factors;
- Biodiversity Monitoring Reports;
- Due Diligence Reporting;
- Thresholds Assessments;
- Vegetation Management Plans;
- Biodiversity Management Plans;
- Biodiversity Assessment Development Reports; and
- Biodiversity Stewardship Site Assessment Reports.

In preparing these report types, Joe has a demonstrated understanding of the relevant local, state and federal legislation and policies pertaining to each.

In addition to having skills in report writing and legislation, Joe is highly accomplished with the following field skills:

- Fauna identification; including birds, reptiles, amphibians and mammals; and
- Flora identification; including plants, vegetation community mapping and the identification of state and federally listed endangered ecological communities.

Relevant projects

Western Region Biodiversity Offsets Package, Centennial Coal, 2016/17

Conducted vegetation mapping, threatened flora and fauna searches and biometric plots for analysis of floristic composition.

NBN Thresholds Assessments, NBN, 2015 to present

Conducted a variety of Biodiversity threshold assessments for the installation and upgrade of NBN infrastructure throughout NSW.

Northern Beaches Hospital Connectivity Network Enhancements Project (SMEC), NSW Government, 2015

Flora and fauna assessment.

Annual Fauna Monitoring, Glencore Coal, 2014 to present

Ongoing seasonal and annual fauna monitoring for Bulga open-cut and Bulga underground operations.

Springvale Coal, Centennial Coal, 2014 to present

Variety of work including EIS, due diligence, threatened flora, fauna and ecological community monitoring and biodiversity management planning.

Airly Mine Annual Flora and Fauna Monitoring, Centennial Coal, 2014 to present

Project management of annual flora and fauna monitoring at Airly coal mine.

Appendix B

Likelihood of Occurrence

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat	Records (OEH 2018)	Likelihood of Occurrence
Litoria aurea (Green and Golden Bell Frog)	E	V	Inhabits a very wide range of water bodies including marshes, dams and streams, particularly those containing emergent vegetation such as bullrushes or spikerushes. It also inhabits numerous types of man-made water bodies including quarries and sand extraction sites. Optimum habitat includes water-bodies that are un-shaded, free of predatory fish such as Plague Minnow, have a grassy area nearby and diurnal sheltering sites available.	0	None. Suitable formation level vegetation habitat surrogates are absent from the Proposal area. Species incidence is not expected and, if present, would represent atypical habitat usage.
Litoria littlejohni (Littlejohn's Tree Frog)	V	V	Occurs in wet and dry sclerophyll forests and heathland associated with sandstone outcrops between 280 and 1000 m on the eastern slopes of the Great Dividing Range from the Central Coast down into Victoria. Individuals have been collected from a wide range of water bodies that includes semi-permanent dams, permanent ponds, temporary pools and permanent streams, with calling occurring from fringing vegetation or on the banks. Individuals have been observed sheltering under rocks on high exposed ridges during summer and within deep leaf litter adjacent to the breeding site. Calling occurs in all months of the year, often in association with heavy rains. The tadpoles are distinctive, being large and very dark in colouration.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species recently observed in the locality (NSW BioNet records).
Heleioporus australiacus (Giant Burrowing Frog)	V	V	The Giant Burrowing Frog has been recorded breeding in a range of water bodies associated with more sandy environments of the coast and adjacent ranges from the Sydney Basin south the eastern Victoria. It breeds in hanging swamps, perennial non-flooding creeks and occasionally permanent pools, but permanent water must be present to allow its large tadpoles time to reach metamorphosis.	1	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Mixophyes balbus (Stuttering Frog)	E	V	Associated with streams in dry sclerophyll and wet sclerophyll forests and rainforests of more upland areas of the Great Dividing Range of NSW and down into Victoria. Breeding occurs along forest streams with permanent water where eggs are deposited within nests excavated in riffle zones by the females and the tadpoles swim free into the stream when large enough to do so. Outside of breeding, individuals range widely across the forest floor and can be found hundreds of metres from water	0	None. Suitable formation level vegetation habitat surrogates are absent from the Proposal area. Species incidence is not expected and, if present, would represent atypical habitat usage.
Pseudophryne australis (Red-crowned Toadlet)	V	-	Occurs on wetter ridge tops and upper slopes of sandstone formations on which the predominant vegetation is dry open forests and heaths. This species typically breeds within small ephemeral creeks that feed into larger semi-perennial streams. After rain these creeks are characterised by a series of shallow pools lined by dense grasses, ferns and low shrubs and usually contain leaf litter for shelter. Eggs are terrestrial and laid under litter, vegetation or rocks where the tadpoles inside will reach a relatively late stage of development before waiting for flooding waters before hatching will occur.	5	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Hoplocephalus bungaroides (Broad-headed Snake)	E	V	Occurs almost exclusively in association with communities occurring on Triassic sandstone within the Sydney Basin. Typically found among exposed sandstone outcrops with vegetation types ranging from woodland to heath. Within these habitats they spend most of the year sheltering in and under rock crevices and exfoliating rock. However, some individuals will migrate to tree hollows to find shelter during hotter parts of summer.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat	Records (OEH 2018)	Likelihood of Occurrence
Varanus rosenbergi (Rosenberg's Goanna)	V	-	This species is a Hawkesbury-Narrabeen sandstone outcrop specialist. Occurs in coastal heaths, humid woodlands and both wet and dry sclerophyll forests.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Haliaeetus leucogaster (White-bellied Sea-Eagle)	V	M	Inhabits coastal and near coastal areas, building large stick nests, and feeding mostly on marine and estuarine fish and aquatic fauna.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Hieraaetus morphnoides (Little Eagle)	V	-	Most abundant in lightly timbered areas with open areas nearby. Often recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. May nest in farmland, woodland and forest in tall trees.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species recently observed in the locality (NSW BioNet records).
Lophoictinia isura (Square-tailed Kite)	V	-	Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by Eucalyptus longifolia, Corymbia maculata, E. elata or E. smithii. Individuals appear to occupy large hunting ranges of more than 100km2. They require large living trees for breeding, particularly near water with surrounding woodland -forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree fork or on large horizontal limbs.	2	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Botaurus poiciloptilus (Australasian Bittern)	E	E	The Australasian Bitterns is widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes and spikerushes.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species recently observed in the locality (NSW BioNet records).

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat	Records (OEH 2018)	Likelihood of Occurrence
Artamus cyanopterus cyanopterus (Dusky Woodswallow)	V	-	The Dusky Woodswallow is widespread in eastern, southern and southwestern Australia. In New South Wales it is widespread from coast to inland, including the western slopes of the Great Dividing Range and farther west. It is sparsely scattered in, or largely absent from, much of the Upper Western region. The Dusky Woodswallow is often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests. At sites where Dusky Woodswallows are recorded the understorey is typically open with sparse eucalypt saplings, acacias and other shrubs, including heath. The ground cover may consist of grasses, sedges or open ground, often with coarse woody debris (Higgins and Peter 2002). Birds are also often observed in farm land, usually at the edges of forest or woodland or in roadside remnants or wind breaks with dead timber.	2	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Callocephalon fimbriatum (Gang-gang Cockatoo)	V	-	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine snow gum woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species recently observed in the locality (NSW BioNet records).
Calyptorhynchus lathami (Glossy Black-Cockatoo)	V	-	Inhabits forest with low nutrients, characteristically with key Allocasuarina spp. Tends to prefer drier forest types with a middle stratum of Allocasuarina below Eucalyptus or Angophora. Often confined to remnant patches in hills and gullies. Breed in hollows stumps or limbs, either living or dead. Endangered population in the Riverina.	11	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Anthochaera phrygia (Regent Honeyeater)	CE	E,M	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. The distribution of the species has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Grantiella picta (Painted Honeyeater)	V	-	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits boree, brigalow and box-gum woodlands and box-ironbark forests.	0	Moderate. Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat. Not recently observed in the locality (NSW BioNet records).

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat	Records (OEH 2018)	Likelihood of Occurrence
Melithreptus gularis (Black-chinned Honeyeater (eastern subspecies))	V	-	Eucalypt woodlands within an approximate annual rainfall range of 400-700mm	0	Moderate. Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat. Species recently observed in the locality (NSW BioNet records).
Daphoenositta chrysoptera (Varied Sittella)	V	-	Inhabits wide variety of dry eucalypt forests and woodlands, usually with either shrubby under storey or grassy ground cover or both, in all climatic zones of Australia. Usually in areas with rough-barked trees, such as stringybarks or ironbarks, but also in paperbarks or mature Eucalypts with hollows.	1	Moderate. Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat. Not recently observed in the locality (NSW BioNet records).
Pyrrholaemus sagittatus (Speckled Warbler)	V	-	The Speckled Warbler lives in a wide range of eucalypt 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.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Melanodryas cucullata cucullata (Hooded Robin (south-eastern form))	V	-	Occupy a wide range of eucalypt woodlands, Acacia shrublands and open forests.	0	Moderate. Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat. Not recently observed in the locality (NSW BioNet records).
Petroica boodang (Scarlet Robin)	V	-	The Scarlet Robin is found from SE Queensland to SE South Australia and also in Tasmania and SW Western Australia. In NSW, it occurs from the coast to the inland slopes. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs.	0	Moderate. Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat. Not recently observed in the locality (NSW BioNet records).
Petroica phoenicea (Flame Robin)	V	-	Flame Robins are found in a broad coastal band from southern Queensland to just west of the South Australian border. The species is also found in Tasmania. The preferred habitat in summer includes eucalyptus forests and woodland, whilst in winter prefers open woodlands and farmlands. It is considered migratory. The Flame Robin breeds from about August to January.	0	Moderate. Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat. Not recently observed in the locality (NSW BioNet records).

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat	Records (OEH 2018)	Likelihood of Occurrence
Glossopsitta pusilla (Little Lorikeet)	V	-	Distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range in NSW, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Mostly occur in dry, open eucalypt forests and woodlands. They feed primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts. Most breeding records come from the western slopes.	0	Moderate. Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat. Not recently observed in the locality (NSW BioNet records).
Lathamus discolor (Swift Parrot)	E	CE	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects . The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW . This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.	0	Moderate. Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat. Not recently observed in the locality (NSW BioNet records).
Neophema pulchella (Turquoise Parrot)	V	-	The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Nests in tree hollows, logs or posts, from August to December. It lays four or five white, rounded eggs on a nest of decayed wood dust.	0	Moderate. Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat. Not recently observed in the locality (NSW BioNet records).
Rostratula australis (Australian Painted Snipe)	E	E, M	In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin. 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.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Calidris ferruginea (Curlew Sandpiper)	E	-	The Curlew Sandpiper is distributed around most of the coastline of Australia. It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. 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 the inland	0	None. Suitable formation level vegetation habitat surrogates are absent from the Proposal area. Species incidence is not expected and, if present, would represent atypical habitat usage.
Numenius madagascariensis (Eastern Curlew)	-	CE	The Eastern curlew spends its breeding season in northeastern Asia, including Siberia to Kamchatka, and Mongolia. Its breeding habitat is composed of marshy and swampy wetlands and lakeshores. Most individuals winter in coastal Australia, with a few heading to South Korea, Thailand, Philippines and New Zealand, where they stay at estuaries, beaches, and salt marshes. It uses its long, decurved bill to probe for invertebrates in the mud. It may feed in solitary but it generally congregates in large flocks to migrate or roost. Its call is a sharp, clear whistle, cuuue-reee, often repeated.	0	None. Suitable formation level vegetation habitat surrogates are absent from the Proposal area. Species incidence is not expected and, if present, would represent atypical habitat usage.

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat	Records (OEH 2018)	Likelihood of Occurrence
Ninox connivens (Barking Owl)	V	-	Generally found in open forests, woodlands, swamp woodlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species recently observed in the locality (NSW BioNet records).
Ninox strenua (Powerful Owl)	V	-	Occupies wet and dry eucalypt forests and rainforests. Can occupy both un-logged and lightly logged forests as well as undisturbed forests where it usually roosts on the limbs of dense trees in gully areas. It is most commonly recorded within red turpentine in tall open forests and black she-oak within open forests. Large mature trees with hollows at least 0.5 m deep are required for nesting. Tree hollows are particularly important for the Powerful Owl because a large proportion of the diet is made up of hollow-dependent arboreal marsupials. Nest trees for this species are usually emergent with a diameter at breast height of at least 100 cm.	13	Moderate. Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat. Not recently observed in the locality (NSW BioNet records).
Tyto novaehollandiae (Masked Owl)	V	-	Inhabits a diverse range of wooded habitat that provide tall or dense mature trees with hollows suitable for nesting and roosting. Mostly recorded in open forest and woodlands adjacent to cleared lands. Nest in hollows, in trunks and in near vertical spouts or large trees, usually living but sometimes dead. Nest hollows are usually located within dense forests or woodlands. Masked owls prey upon hollow-dependent arboreal marsupials, but terrestrial mammals make up the largest proportion of the diet.	0	Moderate. Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat. Species recently observed in the locality (NSW BioNet records).
Tyto tenebricosa (Sooty Owl)	V	-	Often found in tall old-growth forests, including temperate and subtropical rainforests. In NSW mostly found on escarpments with a mean altitude less than 500 metres. Nests and roosts in hollows of tall emergent trees, mainly eucalypts often located in gullies. Nests have been located in trees 125 to 161 centimetres in diameter.	1	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Macquaria australasica (Macquarie Perch)	E (FM Act)	E	Macquarie perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries	0	None. Suitable formation level vegetation habitat surrogates are absent from the Proposal area. Species incidence is not expected and, if present, would represent atypical habitat usage.
Prototroctes maraena (Australian Grayling)	-	V	Historically, this species occurred in coastal streams from the Grose River Valley, southwards through NSW, Vic. and Tas. It also occasionally occurred high upstream in the Snowy R. A single juvenile specimen was collected from Lake Macquarie in 1974 . This species spends only part of its lifecycle in freshwater. The Tambo River population inhabits a clear, gravel-bottomed stream with alternating pools and riffles, and granite outcrops. It has also been associated with clear, gravel-bottomed habitats in the Mitchell & Wonnangatta Rivers but was present in a muddy-bottomed, heavily silted habitat in the Tarwin R.	0	None. Suitable formation level vegetation habitat surrogates are absent from the Proposal area. Species incidence is not expected and, if present, would represent atypical habitat usage.

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat	Records (OEH 2018)	Likelihood of Occurrence
Hygrocybe anomala var. ianthinomarginata	V	-	Occurs in gallery warm temperate forests dominated by lilly pilly, grey myrtle, cheese tree and sweet pittosporum. Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Hygrocybe aurantipes (Hygrocybe aurantipes)	V	-	Occurs in gallery warm temperate forests dominated by lilly pilly, grey myrtle, cheese tree and sweet pittosporum. Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Hygrocybe reesiae (Hygrocybe reesiae)	V	-	Occurs in gallery warm temperate forests dominated by lilly pilly, grey myrtle, cheese tree and sweet pittosporum. Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species recently observed in the locality (NSW BioNet records).
Meridolum corneovirens (Cumberland Plain Land Snail)	E	-	Primarily inhabits Cumberland Plain woodland (an EEC). This community is a grassy, open woodland with occasional dense patches of shrubs. Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish.	5	None. Suitable formation level vegetation habitat surrogates are absent from the Proposal area. Species incidence is not expected and, if present, would represent atypical habitat usage.
Pommerhelix duralensis (Dural Land Snail)	-	E	Endemic to NSW and confined to northwest fringes of the Cumberland Plain. Distribution extends as far north as St. Albans; southwest to Mulgoa, and southeast to Parramatta. Occurs in low densities in Hawkesbury Sandstone Vegetation and Shale/Sandstone Transition Forest. Found under rocks, logs, bark and in leaf litter. Has a strong preference for shale-influenced transitional landscapes and has not been confirmed outside such habitats.	1	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Petalura gigantea (Giant Dragonfly)	E	-	The Giant Dragonfly is found along the east coast of NSW from the Victorian border to northern NSW. It is not found west of the Great Dividing Range. There are known occurrences in the Blue Mountains and Southern Highlands, in the Clarence River catchment, and on a few coastal swamps from north of Coffs Harbour to Nadgee in the south. Live in permanent swamps and bogs with some free water and open vegetation. Adults emerge from late October and are short-lived, surviving for one summer after emergence.	0	None. Suitable formation level vegetation habitat surrogates are absent from the Proposal area. Species incidence is not expected and, if present, would represent atypical habitat usage.

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat	Records (OEH 2018)	Likelihood of Occurrence
Cercartetus nanus (Eastern Pygmy-possum)	V	-	Inhabits rainforest through to sclerophyll forest and tree heath. Banksias and myrtaceous shrubs and trees are a favoured food source. Will often nest in tree hollows, but can also construct its own nest . Because of its small size it is able to utilise a range of hollow sizes including very small hollows. Individuals will use a number of different hollows and an individual has been recorded using up to 9 nest sites within a 0.5ha area over a 5 month period .	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Dasyurus maculatus maculatus (Spotted-tailed Quoll)	V	E	Spotted-tailed Quoll are found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland. Only in Tasmania is it still considered common. 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.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Phascogale tapoatafa (Brush-tailed Phascogale)	V	-	The Brush-tailed Phascogale has a patchy distribution around the coast of Australia. In NSW it is mainly found east of the Great Dividing Range although there are occassional records west ot the divide. Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Saccolaimus flaviventris (Yellow-bellied Sheathtail-bat)	V	-	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.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Petrogale penicillata (Brush-tailed Rock-wallaby)	E	V	Found in rocky areas in a wide variety of habitats including rainforest gullies, wet and dry sclerophyll forest, open woodland and rocky outcrops in semi-arid country. Commonly sites have a northerly aspect with numerous ledges, caves and crevices.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species recently observed in the locality (NSW BioNet records).
Mormopterus norfolkensis (Eastern Freetail-bat)	V	-	Most records are from dry eucalypt forests and woodlands to the east of the Great Dividing Range. Appears to roost in trees, but little is known of this species' habits.	1	Moderate. Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat. Not recently observed in the locality (NSW BioNet records).

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat	Records (OEH 2018)	Likelihood of Occurrence
Pseudomys novaehollandiae (New Holland Mouse)	-	V	The New Holland Mouse currently has a disjunct, fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Across the species' range the New Holland Mouse is known to inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes.	0	None. Suitable formation level vegetation habitat surrogates are absent from the Proposal area. Species incidence is not expected and, if present, would represent atypical habitat usage.
Petaurus australis (Yellow-bellied Glider)	V	-	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. Found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria.	0	Moderate. Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat. Not recently observed in the locality (NSW BioNet records).
Petaurus norfolcensis (Squirrel Glider)	V	-	Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range . Requires abundant hollow bearing trees and a mix of eucalypts, banksias and acacias . There is only limited information available on den tree use by Squirrel gliders, but it has been observed using both living and dead trees as well as hollow stumps. Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked. Endangered population in the Wagga Wagga LGA.	0	Moderate. Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat. Species recently observed in the locality (NSW BioNet records).
Phascolarctos cinereus (Koala)	V	V	Inhabits eucalypt forests and woodlands. The suitability of these forests for habitation depends on the size and species of trees present, soil nutrients, climate and rainfall .	1	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Petauroides volans (Greater Glider)	-	V	The Greater Glider occurs in eucalypt forests and woodlands. Utilise tree hollows	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species recently observed in the locality (NSW BioNet records).
Pteropus poliocephalus (Grey-headed Flying-fox)	V	V	This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Bats commute daily to foraging areas, usually within 15 km of the day roost although some individuals may travel up to 70 km.	2	Moderate. Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat. Not recently observed in the locality (NSW BioNet records).
Chalinolobus dwyeri (Large-eared Pied Bat)	V	V	Located in a variety of drier habitats, including the dry sclerophyll forests and woodlands to the east and west of the Great Dividing Range. Can also be found on the edges of rainforests and in wet sclerophyll forests. This species roosts in caves and mines in groups of between 3 and 37 individuals.	0	Moderate. Typical habitat types, important habitat features and/ or known habitat surrogates (e.g. PCTs) are present within the Proposal area. Habitat is located within known 'extent of occurrence'; however, is outside its known area of occurrence (i.e. standard grid size of 2x2km (IUCN 2001). Incidence may be supplementary to proximal incidence in higher value habitat or associated with modified or degraded habitat. Not recently observed in the locality (NSW BioNet records).

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Falsistrellus tasmaniensis (Eastern False Pipistrelle)	V	-	Inhabit sclerophyll forests, preferring wet habitats where trees are more than 20 m high. Two observations have been made of roosts in stem holes of living eucalypts. There is debate about whether or not this species moves to lower altitudes during winter, or whether they remain sedentary but enter torpor . This species also appears to be highly mobile and records showing movements of up to 12 km between roosting and foraging sites .	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).
Miniopterus australis (Little Bentwing-bat)	V	-	Coastal north-eastern NSW and eastern Queensland. Little Bent-wing Bat is an insectivorous bat that roost in caves, in old mines, in tunnels, under bridges, or in similar structures. They breed in large aggregations in a small number of known caves and may travel 100s km from feeding home ranges to breeding sites. Little Bent-wing Bat has a preference for moist eucalypt forest, rainforest or dense coastal banksia scrub where it forages below the canopy for insects.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species recently observed in the locality (NSW BioNet records).
Miniopterus schreibersii oceanensis (Eastern Bentwing-bat)	V	-	Eastern Bent-wing Bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young.	3	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species recently observed in the locality (NSW BioNet records).
Myotis macropus (Southern Myotis)	V	-	The Large-footed Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. 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.	2	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species recently observed in the locality (NSW BioNet records).
Scoteanax rueppellii (Greater Broad-nosed Bat)	V	-	Prefer moist gullies in mature coastal forests and rainforests, between the Great Dividing Range and the coast. They are only found at low altitudes below 500 m. In dense environments they utilise natural and human-made opening in the forest for flight paths. Creeks and small rivers are favoured foraging habitat. This species roosts in hollow tree trunks and branches.	2	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).
Cynanchum elegans (White-flowered Wax Plant)	E	E	Recorded from rainforest gullies scrub and scree slopes from the Gloucester district to the Wollongong area and inland to Mt Dangar.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species recently observed in the locality (NSW BioNet records).

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Hibbertia puberula (Hibbertia puberula)	E	-	Occurs on sandy soil often associated with sandstone. Flowering time is October to November.	1	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).
Acacia bynoeana (Bynoe's Wattle)	E	V	Grows mainly in heath and dry sclerophyll forest in sandy soils. Mainly south of Dora Creek-Morisset area to Berrima and the Illawarra region, west to the Blue Mountains, also recorded from near Kurri Kurri in the Hunter Valley and from Morton National Park.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).
Acacia pubescens	V	V	Concentrated around the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravely soils, often with ironstone. Grows 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.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).
Dillwynia tenuifolia	V	-	The core distribution is the Cumberland Plain from Windsor to Penrith east to Deans Park. Other populations in western Sydney are recorded from Voyager Point and Kemps Creek in the Liverpool LGA, Luddenham in the Penrith LGA and South Maroota in the Baulkham Hills Shire. Disjunct localities include: the Bulga Mountains at Yengo in the north, Kurrajong Heights and Woodford in the Lower Blue Mountains. 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.	1	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species recently observed in the locality (NSW BioNet records).
Pultenaea villifera (Pultenaea villifera Sieber ex DC. population in the Blue Mountains local government area)	E	-	Grows in dry sclerophyll forest and woodlands on sandy soil and appears to favour sheltered spots.	2	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).

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Pelargonium sp. Striatellum (Omeo's Stork's-bill)	-	E	Flowering occurs from October to March. Occurs in habitat usually located just above the high water level of irregularly inundated or ephemeral lakes. During dry periods, the species is known to colonise exposed lake beds. The species is known to form clonal colonies by rhizomatous propagation.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).
Haloragis exalata subsp. *exalata* (Square Raspwort)	V	V	Occurs in 4 widely scattered localities in eastern NSW. It is disjunctly distributed in the central coast, south coast and north-western slopes botanical subdivisions of NSW. The species appears to require protected and shaded damp situations in riparian habitats.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).
Eucalyptus aggregata (Black Gum)	V	-	Found in the NSW Central and Southern Tablelands, with small isolated populations in Victoria and the ACT. Has a moderately narrow distribution, occurring mainly in the wetter, cooler and higher parts of the tablelands in the lowest parts of the landscape, on alluvial soils, on cold, poorly-drained flats and hollows adjacent to creeks and small rivers. Also occurs as isolated paddock trees in modified native or exotic pastures.	0	None. Suitable formation level vegetation habitat surrogates are absent from the Proposal area. Species incidence is not expected and, if present, would represent atypical habitat usage.
Eucalyptus benthamii (Camden White Gum)	V	V	Occurs on the alluvial flats of the Nepean River and its tributaries. There are two major subpopulations: in the Kedumba Valley of the Blue Mountains National Park and at Bents Basin State Recreation Area. Several trees are scattered along the Nepean River around Camden and Cobbitty. At least five trees occur on the Nattai River in Nattai National Park. Requires a combination of deep alluvial sands and a flooding regime that permits seedling establishment. Occurs in open forest.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).
Melaleuca deanei (Deane's Paperbark)	V	V	Grows in wet heath on sandstone in coastal districts from Berowra to Nowra.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).
Syzygium paniculatum (Magenta Lilly Pilly)	E	V	Found only in NSW, in a narrow, linear coastal strip from Bulahdelah to Conjola State forest. On the south coast the species occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral rainforest. On the central coast it occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat	Records (OEH 2018)	Likelihood of Occurrence
Cryptostylis hunteriana (Leafless Tongue-orchid)	V	V	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (Eucalyptus sclerophylla), Silvertop Ash (E. sieberi), Red Bloodwood (Corymbia gummifera) and Black Sheoak (Allocasuarina littoralis); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (C. subulata) and the Tartan Tongue Orchid (C. erecta).	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).
Genoplesium baueri (Bauer's Midge Orchid)	E	E	Grows in dry sclerophyll forest and moss gardens over sandstone. Flowers February to March. Has been recorded between Ulladulla and Port Stephens. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded in Berowra Valley Regional Park, Royal National Park and Lane Cove National Park and may also occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).
Pterostylis saxicola (Sydney Plains Greenhood)	E	E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. 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 Pterostylis saxicola occurs are sclerophyll forest or woodland on shale-sandstone transition soils or shale soils.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).
Thelymitra kangaloonica (Kangaloon Sun Orchid)	CE	CE	Thelymitra sp. Kangaloon is only known to occur on the southern tablelands of NSW in the Moss Vale - Kangaloon - Fitzroy Falls area at 550-700 m above sea level. It is known to occur at three swamps that are above the Kangaloon Aquifer. It is found in swamps in sedgelands over grey silty grey loam soils.	0	None. Suitable formation level vegetation habitat surrogates are absent from the Proposal area. Species incidence is not expected and, if present, would represent atypical habitat usage.
Grevillea juniperina subsp. *juniperina*	V	-	Endemic to Western Sydney, centred on an area bounded by Blacktown, Erskine Park, Londonderry and Windsor with outlier populations at Kemps Creek and Pitt Town. Recorded from Cumberland Plain woodland, Castlereagh Ironbark woodland, Castlereagh Scribbly Gum woodland and Shale-Gravel Transition forest. Grows on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium (often with shale influence), typically containing lateritic gravels.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).
Grevillea parviflora subsp. *parviflora* (Small-flowered Grevillea)	V	V	Grows in sandy or light clay soils usually over thin shales. Occurs in a range of vegetation types from heath and shrubby woodland to open forest. Found over a range of altitudes from flat, low-lying areas to upper slopes and ridge crests. Often occurs in open, slightly disturbed sites such as along tracks.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat	Records (OEH 2018)	Likelihood of Occurrence
Persoonia hirsuta (Hairy Geebung)	E	E	Distributed from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. A large area of occurrence, but occurs in small populations, increasing the species's fragmentation in the landscape. Found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. Usually present as isolated individuals or very small populations. Probably killed by fire (as other Persoonia spp. are) but will regenerate from seed.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).
Persoonia nutans (Nodding Geebung)	E	E	Confined to aeolian and alluvial sediments and occurs 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. Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).
Pomaderris brunnea (Brown Pomaderris)	V	V	The species is expected to live for 10 - 20 years, while the minimum time to produce seed is estimated to be 4 - 6 years. Found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area. It also occurs at Walcha on the New England Tableland and in far eastern Gippsland in Victoria.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).
Thesium australe (Austral Toadflax)	V	V	Grows in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland or grassy woodland. Grows on kangaroo grass tussocks but has also been recorded within the exotic coolatai grass.	0	None. Suitable formation level vegetation habitat surrogates are absent from the Proposal area. Species incidence is not expected and, if present, would represent atypical habitat usage.
Pimelea spicata (Spiked Rice-flower)	E	E	Once widespread on the Cumberland Plain, the Spiked Rice-flower occurs in two disjunct areas; the Cumberland Plain (Narellan, Marayong, Prospect Reservoir areas) and the Illawarra (Landsdowne to Shellharbour to northern Kiama). In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils. On the inland Cumberland Plain sites it is associated with grey box and Ironbark. In the coastal Illawarra it occurs commonly in Coast Banksia open woodland with a better developed shrub and grass understorey.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Species not recently observed in the locality (NSW BioNet records).
Tetratheca glandulosa (Tetratheca glandulosa)	V	V	Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge. Topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey-sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops. Vegetation structure varies from heaths and scrub to woodlands-open woodlands, and open forest.	0	Low. Typical habitat types are absent from the Proposal area; however, formation level vegetation habitat surrogates are present. Irrespective of proximity to the species known 'extent of occurrence' and 'area of occurrence' (i.e. standard grid size of 2x2km (IUCN 2001), the presence of this species would likely be incidental or random and generally inconsistent with natural occurrences. The species is unlikely to depend on available habitat for important life cycle processes such as reproduction. Not recently observed in the locality (NSW BioNet records).

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat	Records (OEH 2018)	Likelihood of Occurrence
Maccullochella peelii peelii (Murray Cod)	-	V	The Murray Cod is found in a wide range of warm water habitats, from clear, rocky streams to slow-flowing turbid rivers and billabongs. Generally, they are found in waters up to 5 m deep and in sheltered areas with cover from rocks, timber or overhanging banks. The species is highly dependent on wood debris for habitat, using it to shelter from fast-flowing water.	0	None. Suitable formation level vegetation habitat surrogates are absent from the Proposal area. Species incidence is not expected and, if present, would represent atypical habitat usage.

Appendix C

Test of Significance

Grey-headed Flying Fox	
(a)	**In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**
Habitat critical to the survival of the Grey-headed Flying fox includes camp sites for communal diurnal roosts and proximal foraging habitat during lactating periods. The loss of an estimated 281 square metres of foraging habitat would be removed by the Proposal (i.e. canopy of mature Grey Ironbark). While potentially utilised by the Grey-headed Flying Fox, it is considered that this loss of foraging habitat is minor and not likely to have an adverse effect on the life cycle of the species such that a viable local population of this species is likely to be placed at risk of extinction.	
(b)	**In the case of an endangered ecological community or critically endangered community, whether the proposed development or activity:**
i)	Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or
Not an EEC or CEEC	
ii)	Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction
Not an EEC or CEEC	
(c)	**In relation to the habitat of a threatened species or ecological community**
i)	The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity; and
The Proposal would result in the clearance and/or disturbance of approximately 281 square metres of potential foraging habitat for the Grey-headed Flying Fox (i.e. five individuals of *Eucalyptus paniculata*). Due to the size and nature of the impact, it is not likely to have an adverse effect on the extent of the habitat for this species such that its local occurrence is likely to be placed at risk of extinction.	
ii)	Whether an area of habitat is likely to be fragmented or isolated from other areas of habitat as a result of the proposed development or activity; and
The Grey-headed Flying Fox is a highly mobile species capable of utilising resources across large areas without barriers. The clearing of habitat within the Proposal area will not generate or contribute to a barrier that would otherwise increase fragmentation or isolate habitat.	
iii)	The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.
The habitat to be removed is considered to be of moderate value to the Grey-headed Flying Fox. However, the contribution of this habitat area is not considered important to the long term survival of the species in the locality.	
(d)	**Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).**
No areas of outstanding biodiversity value would be impacted by the Proposal.	
(e)	**Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.**
The Proposal will result in clearing to approximately 281 square metres of foraging habitat and as such will contribute to the key threatening process: 'Clearing of Native Vegetation'.	
CONCLUSION	
The Proposal is not likely to substantially reduce the extent of foraging habitat for the Grey-headed Flying Fox; nor will it increase the fragmentation/ isolation of habitat or adversely impact lifecycle processes for this species. The Proposal would not result in an impact on any declared area of outstanding biodiversity value. It is considered that the Proposal is not likely to have a significant impact on the Grey-headed Flying Fox.	

Blue Mountains shale cap forest in the Sydney Basin Bioregion EEC	
(a)	**In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**
Blue Mountains shale cap forest in the Sydney Basin Bioregion is not a threatened species.	
(b)	**In the case of an endangered ecological community or critically endangered community, whether the proposed development or activity:**
i)	Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or
The Proposal would result in the clearance and/or disturbance of approximately 406 square metres of ground cover from this community. Mature tree removal will be limited to five individuals of *Eucalyptus paniculata*. Due to the size and nature of the impact, it is not likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	
ii)	Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction
Modifications to the community would be limited to groundcover, tree branch trimming, saplings and five mature individuals of *Eucalyptus paniculata*. Retained native vegetation within the adjoining patch will be enhanced. This is not likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	
(c)	**In relation to the habitat of a threatened species or ecological community**
i)	The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity; and
No important fauna habitat features such as hollow-bearing trees, fallen logs or termite mounds were observed in the area impacted by the Proposal.	
ii)	Whether an area of habitat is likely to be fragmented or isolated from other areas of habitat as a result of the proposed development or activity; and
Habitat for threatened species is present within the Proposal area in the form of flowering eucalypt canopy. This habitat would be removed as a result of the Proposal. However, no fragmentation or isolation of habitat is expected as a result of the Proposal.	
iii)	The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.
The habitat to be removed is considered to be of low value to threatened species. This is due to the lack of key habitat features such as hollow bearing trees, termite mounds, or fallen logs.	
(d)	**Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).**
No areas of outstanding biodiversity value would be impacted by the Proposal.	
(e)	**Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.**
The Proposal will result in clearing to approximately 406 square metres of native vegetation and as such will contribute to the key threatening process: 'Clearing of Native Vegetation'.	
CONCLUSION	
The Proposal is not likely to substantially reduce the extent or composition of the ecological community. No important habitat features would be adversely affected by the Proposal. The Proposal would not result in an impact on any declared area of outstanding biodiversity value. On this basis, it is considered that the Proposal is not likely to have a significant impact on the patch of Blue Mountains shale cap forest in the Sydney Basin Bioregion EEC.	

Appendix D

EPBC Act Assessment of Significance

Pteropus poliocephalus (Grey-headed Flying Fox)
Lead to a long-term decrease in the size of an important population of a species
The Proposal will result in a reduction in an estimated 281 square metres of foraging habitat of moderate importance for the Grey-headed Flying Fox. The Proposal will not adversely impact habitat that is likely to be relied on by the Grey-headed Flying Fox to an extent that would influence the size of an important population. It is considered that the Proposal is not likely to lead to a long-term decrease in the size of an important population of a species.
Reduce the area of occupancy of the species
The Proposal will result in a negligible reduction of potential foraging habitat for the species.
Fragment an existing population into two or more populations
The Proposal will not result in the fragmentation of any populations due to the small scale of the impact and the high mobility of the species.
Adversely affect habitat critical to the survival of an important population
The Proposal will have no impact on habitat important to the species (i.e. camps). If the species is present the area to be impacted would likely only be used for opportunistic foraging and mobility purposes. The Proposal is unlikely to affect habitat critical to the survival of the species.
Disrupt the breeding cycle of a population
The clearing of an estimated 281 square metres of foraging habitat will not impact upon the breeding cycle of the Grey-headed Flying Fox.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The clearing of estimated 281 square metres of foraging habitat will remove and ultimately modify a small portion of the available habitat for the species. Given the small area to be impacted and the nature of the impact the Proposal is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat
Mobilisation of fertilisers, herbicides or other chemicals or pollutants into the potential foraging habitat is not expected as a result of the Proposal. Mitigation measures are to be enacted to prevent the spread of WoNS as a result of the Proposal. The Proposal is not expected to result in additional invasive species that are harmful to the Grey-headed Flying Fox.
Introduce disease that may cause the species to decline
Clearing estimated 281 square metres of foraging habitat for this species is considered a small portion of moderate importance and is unlikely to introduce disease that may cause the species to decline.
Interfere with the recovery of the species
Clearing estimated 281 square metres of foraging habitat for this species is considered a small portion of moderate importance habitat and is unlikely to interfere with the recovery of the species.
CONCLUSION
The Proposal is not likely to substantially reduce the extent or fragment any populations of the Grey-headed Flying Fox. Habitat critical to the survival of the species would not be adversely affected by Proposal. The Proposal will not interfere with the recovery of the species in the area. On this basis, it is considered that the Proposal is not likely to have a significant impact on the Grey-headed Flying Fox.

Sydney Turpentine Ironbark Forest CEEC
Reduce the extent of an ecological community
The Proposal would result in a reduction in 406 square metres of understory for this ecological community.
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines
The Proposal would result in a localised separation of the groundcover stratum of this ecological community (i.e. installation of a path), but not to an extent that would fragment or increase the fragmentation of an ecological community. No additional separation of the tree canopy is predicted as the Proposal design avoids the need to remove mature trees.
Adversely affect habitat critical to the survival of an ecological community
The habitat to be removed is limited to 406 square metres of understory and overstorey vegetation comprising five mature *Eucalyptus paniculata* specimens and 10 *Eucalyptus deanei* saplings. The habitat to be disturbed is not considered critical to the survival of the ecological community.
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns
The Proposal would have no impact on groundwater. A footpath is set to be installed across a gradual slope as part of the Proposal, but this is not expected to substantially alter any surface water drainage patterns.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting.
The clearing of 406 square metres of groundcover vegetation is considered a small portion of the overall community and is unlikely to cause any decline or loss of functionality for any important species.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
Assisting invasive species, that are harmful to the listed ecological community, to become established, or
Clearing of native understory and overstorey vegetation and construction of a thoroughfare through the ecological community may contribute to the invasion of weeds via 'edge effects'. Weed management is recommended as mitigation to Proposal and post weed-management works will be required to limit the incursion of invasive weeds.
causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community
Mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community area not expected as a result of the Proposal.
Interfere with the recovery of an ecological community
Clearing 406 square metres of groundcover for this community is considered a small portion of the overall community and is unlikely to interfere with the recovery of the ecological community.
CONCLUSION
The Proposal is not likely to substantially reduce the extent or fragment the ecological community. Habitat critical to the survival of the ecological community would not be adversely affected by Proposal. The Proposal would not result in a substantial change in species composition or the quality and integrity of an ecological community, nor would the Proposal interfere with the recovery of the ecological community. On this basis, it is considered that the Proposal is not likely to have a significant impact on the patch of Sydney Turpentine Ironbark Forest CEEC.