Burra Road upgrade, Burra – Terrestrial Biodiversity Report

Queanbeyan-Palerang Regional Council

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Abbreviations

Abbreviation	Description
ADD	Aboriginal Due Diligence
AHIMS	Aboriginal Heritage Information Management System
BC Act	NSW *Biodiversity Conservation Act 2016*
CEMP	Construction Environmental Management Plan
CEEC	Critically Endangered Ecological Community
CoP	Code of Practice
DNG	Derived Native Grassland
DoEE	Department of the Environment and Energy
DPI	Department of Primary Industries
EEC	Endangered Ecological Community
ELA	Eco Logical Australia
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
KFH	Key Fish Habitat
kph	Kilometres per hour
LEP	Local Environment Plan
NES	National Environmental Significance
NPW Act	*National Parks & Wildlife Act 1974*
OEH	Office of Environment and Heritage
OH&S	Occupational Health and Safety
PCT	Plant Community Type
REF	Review of Environmental Factors
RMS	NSW Roads and Maritime Services
SEPP	State Environmental Planning Policy
TEC	Threatened Ecological Community

1. Introduction

Eco Logical Australia Pty Ltd (ELA) was engaged by Queanbeyan-Palerang Regional Council to prepare a terrestrial biodiversity report for the proposed road upgrade works on Burra Road from Little Burra Road to London Bridge Road, Burra. This report forms part of a Review of Environmental Factors which would be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This terrestrial biodiversity report describes potential impacts of the proposed road upgrade on native vegetation, threatened species, populations and communities listed under the *Biodiversity Conservation Act 2016* (BC Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The impact assessment in this report is based on information gathered from data searches and field investigations. The report sets out the legislative context, methods used, impacts to the environment and recommendations to minimise these impacts.

1.1 Project description

The proponent is proposing to upgrade the 1.7 km of Burra Road, between Little Burra Road and London Bridge Road, Burra, largely within the existing alignment but with the possibility of realignment, as outlined in the project brief.

The project will involve the survey and upgrade of the existing alignment, with the possibility of realignment to meet road design standards, clearing and grubbing of the construction footprint, earthworks, drainage works, pavement building and bituminous sealing. Specifically, the project will involve:

- clearing and grubbing of the new construction footprint
- earthworks to shape batters and road formation
- construction of drainage requirements such as culverts to protect the road from flooding events
- construction of the road pavement
- sealing of the road surface for waterproofing
- installing road furniture for safety requirements.

This terrestrial biodiversity report has been submitted as part of a Review of Environmental Factors to Queanbeyan-Palerang Regional Council.

Note: The proposal forms part of a larger project of works, including upgrading the section of Burra Road south east of Old Cooma Road. These form part of separate proposals and have been subject to separate environmental assessments.

1.2 Subject site and study area

The subject site refers to the area directly affected by the proposal. It includes the footprint of the development and any ancillary works, facilities, accesses or hazard reduction zones that support the construction or operation of the development or activity (

Figure 1).

The study area refers to the subject site and any additional areas which are likely to be affected by the proposal, either directly or indirectly.

1.3 Site description

The study area is located within the Queanbeyan-Palerang Local Government Area (LGA) and is zoned as E4 – Environmental Living. The study area is located 5 km north of Burra and is approximately 820 m above sea level at its most elevated point.

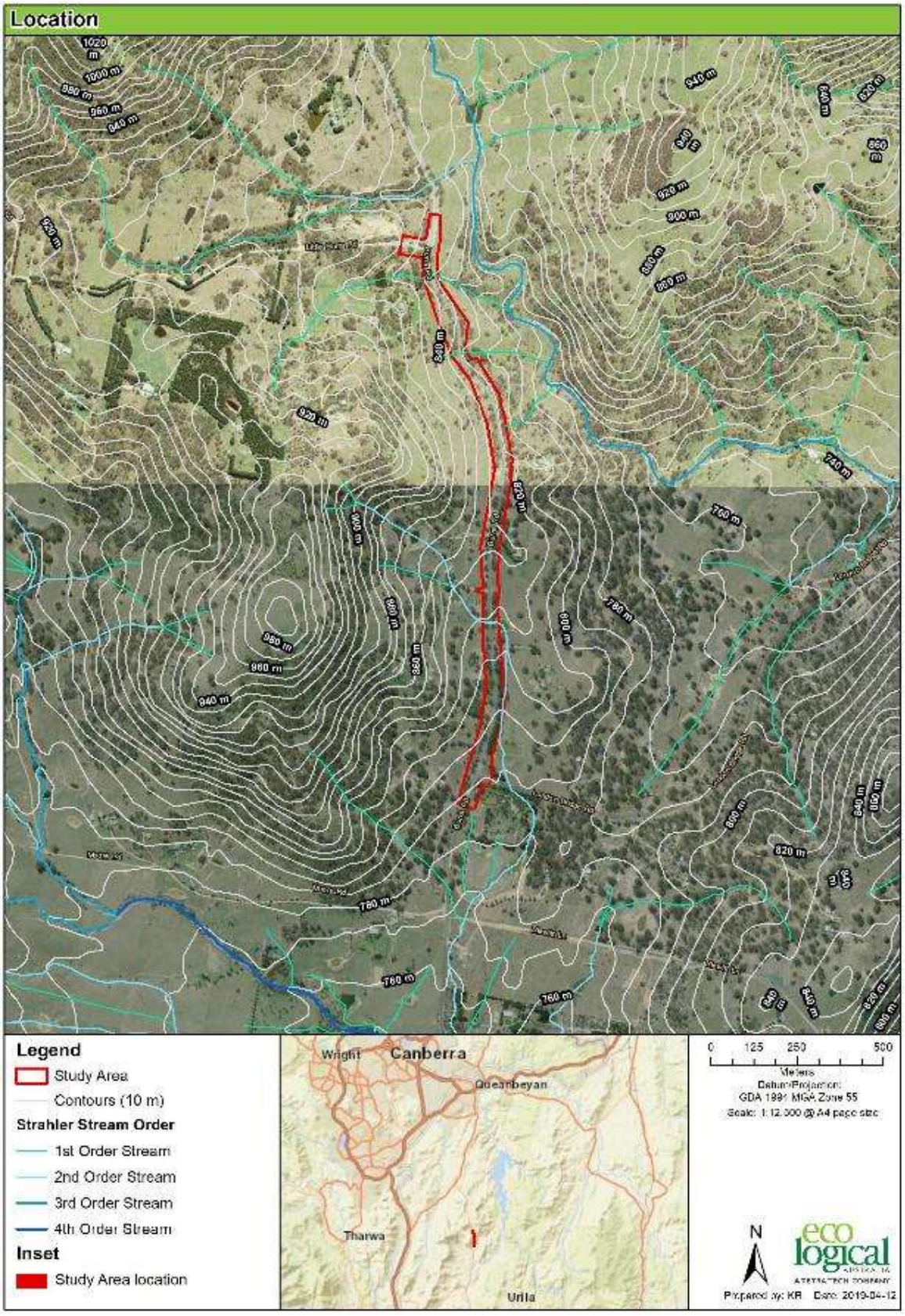

Figure 1: Location of subject site

2. Legislative context

Table 1: Legislative context

Name	Relevance to the project
Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Matters of National Environmental Significance (MNES) have been identified within the Project area. This report includes an assessment of any impacts to threatened species, populations or ecological communities, or their habitats, in accordance with the EPBC Act.
State	
Environmental Planning and Assessment Act 1979 (EP&A Act)	The Nerriga Road upgrade works are defined under the NSW State Environmental Planning Policy (SEPP) (Infrastructure) 2007 as development for a road or road infrastructure facilities; the project may be carried out by or on behalf of a public authority, without consent, on any land. As such, Council is considered the determining authority and the proponent under Part 5 of the EP&A Act and has a duty to consider the environmental impact under Section 111 of the Act. This report includes an assessment of any impacts to threatened species, populations or ecological communities, or their habitats in accordance with Section 5A of the EP&A Act.
Biodiversity Conservation Act 2016 (BC Act)	Assessments of significance for the impact to threatened species and endangered ecological communities in accordance with s7.3 of the Act have been undertaken for the proposed works.
Biosecurity Act 2015 (BS Act)	The BS Act provides a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers. A list of priority weeds identified within the study area is included in this report.
Water Management Act 2000 (WM Act)	The project does not involve works on waterfront land. A Controlled Activity Approval under s91 of the WM Act is not required.
Planning Instruments	
Vegetation SEPP (non-rural areas 2017)	The Vegetation SEPP applies to development that does not require consent. As this project requires consent under the Palerang LEP, the Vegetation SEPP is not relevant.
SEPP Coastal Management 2018	SEPP Coastal Management 2018 consolidated SEPP 14 Coastal Wetlands, SEPP 26 Littoral Rainforests and SEPP 71 Coastal Protection. The proposed development is not located on land subject to SEPP Coastal Management 2018.
SEPP 44 – Koala Habitat Protection	The policy applies only to the Queanbeyan-Palerang Regional Council area. SEPP 44 applies only to land undergoing development application and therefore does not apply to the proposed works as it is being assessed under Part 5 of the EP&A Act.

3. Methods

3.1 Literature and data review

The following databases were reviewed prior to conducting the field surveys:

- Atlas of NSW Wildlife Search (OEH, 2019a) covering an area from latitude -35.43 to -35.58 and longitude 149.15 to 149.30
- EPBC Act Protected Matters Search Tool (DoEEa, 2019a), using a radius of 15 km around the coordinates -35.50558, 149.23302
- NSW Threatened Species Profiles (OEH 2019b)
- The Australasian Virtual Herbarium database (AVH 2019).

Aerial photography of the study area and surrounds was also used to investigate the extent of native vegetation cover and landscape features.

The list of threatened species and ecological communities returned by the database searches was supplemented or amended based on local ecological knowledge of the area, including known species occurrences. A list of species (defined as 'yes', 'likely' or 'potential') was then used to inform the need for any targeted surveys (**Appendix B**).

3.2 Field survey

The initial field survey was conducted on 28 February and 5 March 2019 by ELA Ecologists David Allworth and Clare Duck.

This involved traversing the full extent of the subject site to assess:

- vegetation (including assessment of floristic structure and composition, and of vegetation communities against key listing criteria for relevant Threatened Ecological Communities (TECs))
- aquatic ecology (including Key Fish Habitat)
- the presence of, or potential habitat for, threatened flora and fauna (including hollow-bearing trees)
- opportunistic fauna sightings
- Koala habitat.

Vegetation community descriptions were based on multiple rapid survey assessments conducted within each vegetation community. Rapid assessments involved describing the vegetation structure (dominant species and cover within each vegetation stratum), as well as topographic position, soils and any other relevant abiotic factors. Two detailed floristic surveys were also undertaken using the Biodiversity Assessment Method (BAM) as per the BC Act. Following the initial field survey, the vegetation communities were assigned a Plant Community Type (PCT).

The following data recorded was recorded, both upslope and downslope, of all drainage lines and areas identified as Key Fish Habitat: the type and condition of vegetation present within the drainage Line (including dominant canopy, midstorey and ground cover species and the presence/absence of priority

weeds); the shape of the drainage line and substrate type; bank height/slope and the presence of erosion; channel width; presence of fish; the size of pools; and culvert size.

3.2.1 Threatened flora and fauna habitat assessment

Assessments of the suitability of the available habitat for threatened flora and fauna species included locating any features of importance to threatened biodiversity and recording its location using a handheld GPS unit. Elements of specific interest included hollow-bearing trees, rock outcrops, stick nests, stands of winter-flowering trees and riparian areas. Based on the ELA ecologists' knowledge and understanding of potential threatened species and their associated habitat, as well as the results of database searches, targeted threatened species flora surveys were undertaken in areas of suitable habitat (**Table 2**).

Targeted flora surveys were undertaken by Clare Duck and Andrew Mitchell on 2 April 2019. Due to the narrow linear configuration of the subject site, the majority of the area was surveyed by parallel traverses. Targeted threatened flora surveys involved transects of suitable habitat and followed the NSW Guide to Surveying Threatened Plants (OEH 2016) (**Table 2**).

Table 2: Threatened flora species searched for in targeted survey

Scientific name	Common name	BC Act Status	EPBC Act Status	Survey period	Within survey period?
Dillwynia glaucula	Matted Bush-pea	E	-	Sept-Dec	No
Leucochrysum albicans var. *tricolor*	Hoary Sunray	-	E	Sept - April	Yes
Pomaderris cotoneaster	Cotoneaster Pomaderris	E	E	October - Nov	No
Pultenaea pedunculata	Michelago Parrot-pea	E	-	Sept - Nov	No

3.2.2 Survey limitations

Suitable habitat was limited to areas of potential habitat within the subject site; areas devoid of native vegetation (e.g. grazed paddocks) were excluded from targeted flora surveys.

Targeted field survey was undertaken outside the recommended survey period for three of the threatened flora species that were considered potential occurrences: *Pultenaea pedunculata* (Michelago Parrot-pea), *Pomaderris cotoneaster* (Cotoneaster Pomaderris) and *Dillwynia glaucula* (Matted Bush-pea) (OEH 2019).

Pultenaea pedunculata is a shrub that forms carpets >1 m wide, and *Dillwynia glaucula* and *Pomaderris cotoneaster* are shrubs that grow up to 2.5 m and 4 m tall, respectively. Although the targeted field survey was undertaken outside of the known flowering period for these two species, they are both conspicuous species and should still have been able to be located, if present. On that basis, it is considered unlikely that they occur within the subject site.

4. Existing environment

4.1 Literature and data review

4.1.1 Topography, geology and soils

The topography of the study area is characterised by undulating to rolling low hills and alluvial fans on Silurian volcanics, with most of the study area located at elevations of 650 – 900 m.

The study area is situated in the Canberra Lowlands, which falls within the South Eastern Highlands Bioregion. The soil and underlying geomorphology of the study area is characterised by the 'Burra' soil landscape profile (Jenkins 2000). Its geomorphology is comprised of the Colinton volcanics group and the Cappanana Formation, and includes various tuffs with minor siltstone, shale, sandstone, and limestone (Jenkins 2000:44). This soil landscape is classified as a transferral landscape, which has resulted from the accumulation of eroded parent materials washed downslope. Localised landscape limitations include strongly acidic soils with low available water-holding capacity, sheet erosion, and run-on (Jenkins 2000:44).

4.1.2 Disturbance

Much of the vegetation in the wider landscape has been cleared and exotic vegetation species associated with agricultural and pastoral cultivation have been introduced. Where remnant vegetation is extant, it is characterised by woodland species (Jenkins 2000:44).

4.1.3 Threatened ecological communities

Three threatened ecological communities (TECs) were identified as having the potential to occur within the study area and surrounds:

- White Box – Yellow Box – Blakely's Red Gum Derived Woodland and Derived Native Grassland
- Natural Temperate Grassland of the South Eastern Highlands
- Alpine Sphagnum Bogs and Associated Fens.

Following the field survey (see below), no TECs were found to occur.

4.1.4 Threatened flora species

The desktop review identified a total of 15 threatened flora species listed under the BC or EPBC Acts that have the potential to occur within a 15 km radius of the study area. Based on local ecological knowledge of the area and the AVH (2019) database, one additional threatened species was identified as potentially occurring.

An assessment of the likelihood of occurrence of threatened flora species within the study area is available in **Appendix B**.

4.1.5 Threatened fauna species

The desktop review identified a total of 49 threatened, migratory or marine fauna species listed under the BC and/or EPBC Acts that have the potential to occur within a 15 km radius of the study area. Based on local ecological knowledge of the area and the AVH (2019) database, six additional threatened

species were identified as potentially occurring. An assessment of the likelihood of occurrence of threatened fauna species within the impact assessment area is available in **Appendix B**.

4.2 Field survey

4.2.1 Vegetation validation

Field survey identified one Plant Community Type (PCT), which covered 6.67 ha of the study area:

- PCT 999 Ribbon Gum - Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion.

0.62 ha of the site consisted of *Pinus* sp. (Pines), *Salix* sp. (Willows) or *Rubus fruticosus* sp. agg. (Blackberry). This area has been mapped as 'Planted / Exotic'. An additional 0.74 ha was comprised of treeless vegetation with exotic groundcover species.

Three declared priority weed species within the South East Local Land Services Region, *Rubus fruticosus* sp. agg. (Blackberry), *Hypericum perforatum* (St. John's Wort) and *Cytisus proliferous* (Scotch Broom), as well as several other exotic species, were identified within the subject site.

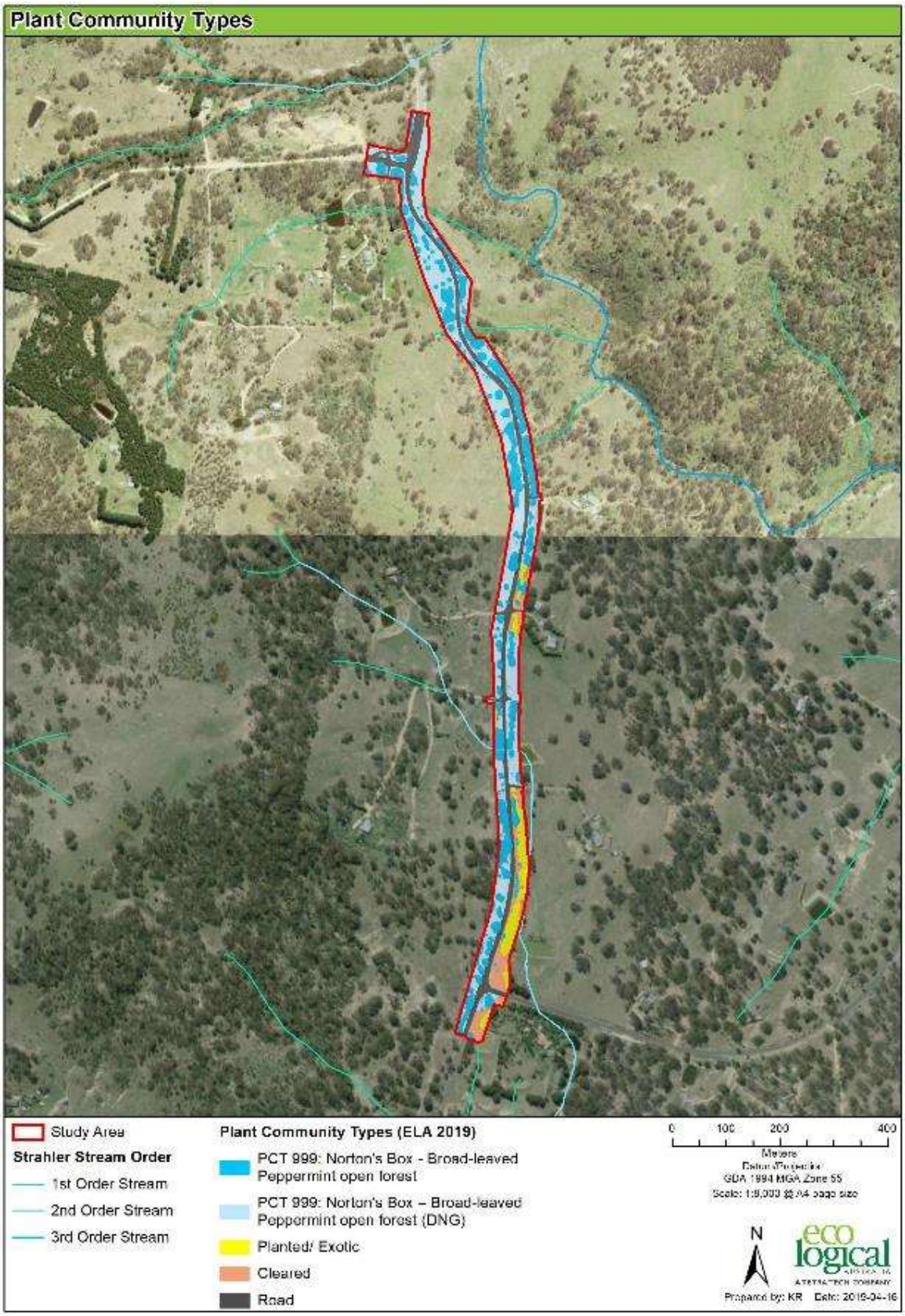

Figure 2: Vegetation communities within the subject site

PCT 999: Ribbon Gum - Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion

The canopy of Norton's Box - Broad-leaved Peppermint open forest typically consists of *Eucalyptus nortonii* (Norton's Box), *Eucalyptus dives* (Narrow-leaved Peppermint) and *Callitris endlicheri* (Black Cypress Pine).

The midstorey may contain *Acacia echinula* (Hedgehog Wattle), *Acacia falciformis* (Broad-leaved Hickory), *Calytrix tetragona* (Common Fringe-myrtle), *Cassinia longifolia* and *Olearia tenuifolia* (Thin-leaf Daisy-bush). Typical groundcover species include *Austrostipa scabra* subsp. *falcata*, *Desmodium varians* (Slender Tick-trefoil), *Dianella revoluta* var. *revoluta* (Blueberry Lily), *Dichelachne micrantha* (Shorthair Plumegrass), *Anthosachne scabra* (Wheatgrass), *Geranium solanderi* var. *solanderi* (Native Geranium), *Rytidosperma pallidum* (Silvertop Wallaby Grass), *Poa sieberiana* var. *sieberiana*, *Stypandra glauca* (Nodding Blue Lilly) and *Themeda triandra* (Kangaroo grass).

The Norton's Box - Broad-leaved Peppermint open forest identified in the field had a canopy dominated by *Eucalyptus nortonii*, *E. mannifera* (Brittle Gum), *E. bridgesiana* (Apple Box) and *E. melliodora* (Candlebark). Midstorey species included *Acacia* spp. and *Cassinia longifolia*. The groundcover included species such as *Themeda triandra*, *Desmodium varians*, *Anthosachne scabra*, *Dichelachne micrantha*, *Geranium solanderi* var. *solanderi* and *Rytidosperma* spp.

Photo: PCT 999

4.2.2 Threatened flora and fauna habitat assessment

Key fauna habitat components within the study area included fallen timber and other large woody debris, hollow-bearing trees, native tree and shrub canopy, and ephemeral creeklines. The study area crosses three first order streams and one second order stream. Several wombat burrows were also recorded. The native vegetation in the subject site is likely to provide foraging habitat for forest birds, megachiropteran and microchiropteran bats, frogs and reptiles.

Field survey identified 37 hollow-bearing trees in the subject site. These provide potential denning, roosting and nesting habitat for a range of small to large birds, arboreal frogs and reptiles, arboreal mammals and microchiropteran bat species. These hollow-bearing trees contain hollows ranging from small hollows (<5 cm) that may be used by smaller birds and mammals (including microchiropteran bats), through to medium to large hollows (>10cm) which are potentially suitable for threatened species such as the large forest owls that require large hollows. Some hollow-roosting threatened microchiropteran bats and birds are known from the locality, including *Myotis macropus* (Southern Myotis), which was previously recorded north of the study area by (NGH 2016). The hollow-bearing trees within the subject site have the potential to support roosts (including maternity roosts) and nesting sites.

Gang-gang Cockatoos (*Callocephalon fimbriatum*) and Glossy Black-Cockatoos (*Calyptorhynchus lathami*) are both listed as endangered under the BC Act. A flock of Gang-gang cockatoos was observed within the subject site. Gang-gang Cockatoo breeding habitat is defined as *Eucalyptus* spp. with hollows greater than 9 cm diameter (OEH 2019c). Twenty-five trees satisfied these requirements. However, seven of these trees contained hollows less than 5 m from the ground. It is considered unlikely that Gang-gang Cockatoos would utilise these hollows for breeding habitat. Therefore, 18 trees within the subject site are considered potential Gang-gang Cockatoo breeding habitat (**Figure 3**). The survey area contained 14 trees with hollows greater than 15 cm diameter more than 5 m above ground, which indicates that they are potential Glossy Black-Cockatoo breeding habitat (OEH 2019c) (**Figure 4**).

The secondary Koala feed trees *E. Bridgesiana*, *E. mannifera*, *E. nortonii* and *E. melliodora* (OEH 2019c) were recorded within the subject site. The study area therefore constitutes potential Koala habitat (**Section** Error! Reference source not found.).

No threatened flora species were recorded in the study area.

Photo: A hollow-bearing *Eucalyptus rubida* within the subject site

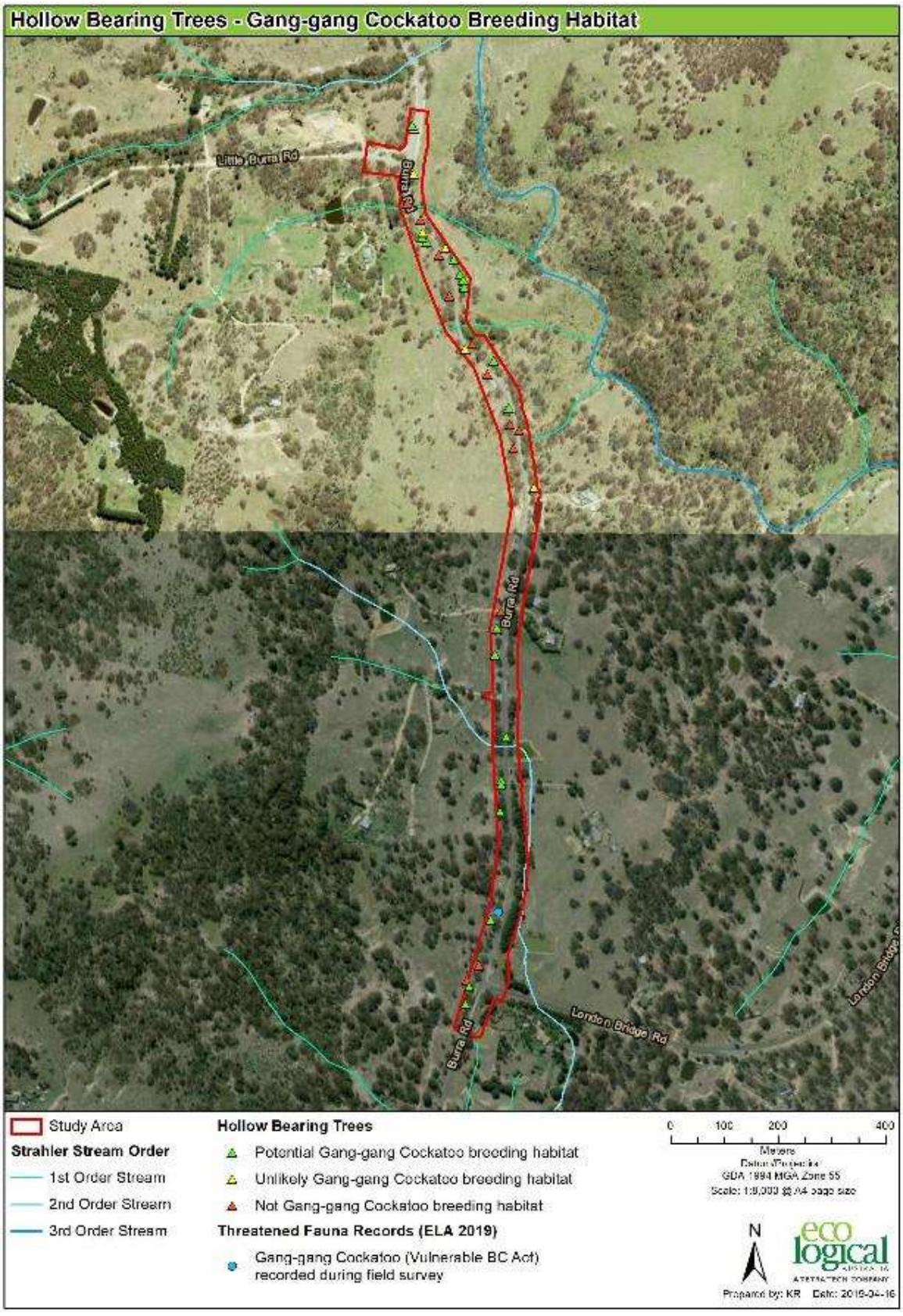

Figure 3: Potential Gang-gang Cockatoo breeding habitat and location of Gang-gang Cockatoo flock recorded during survey

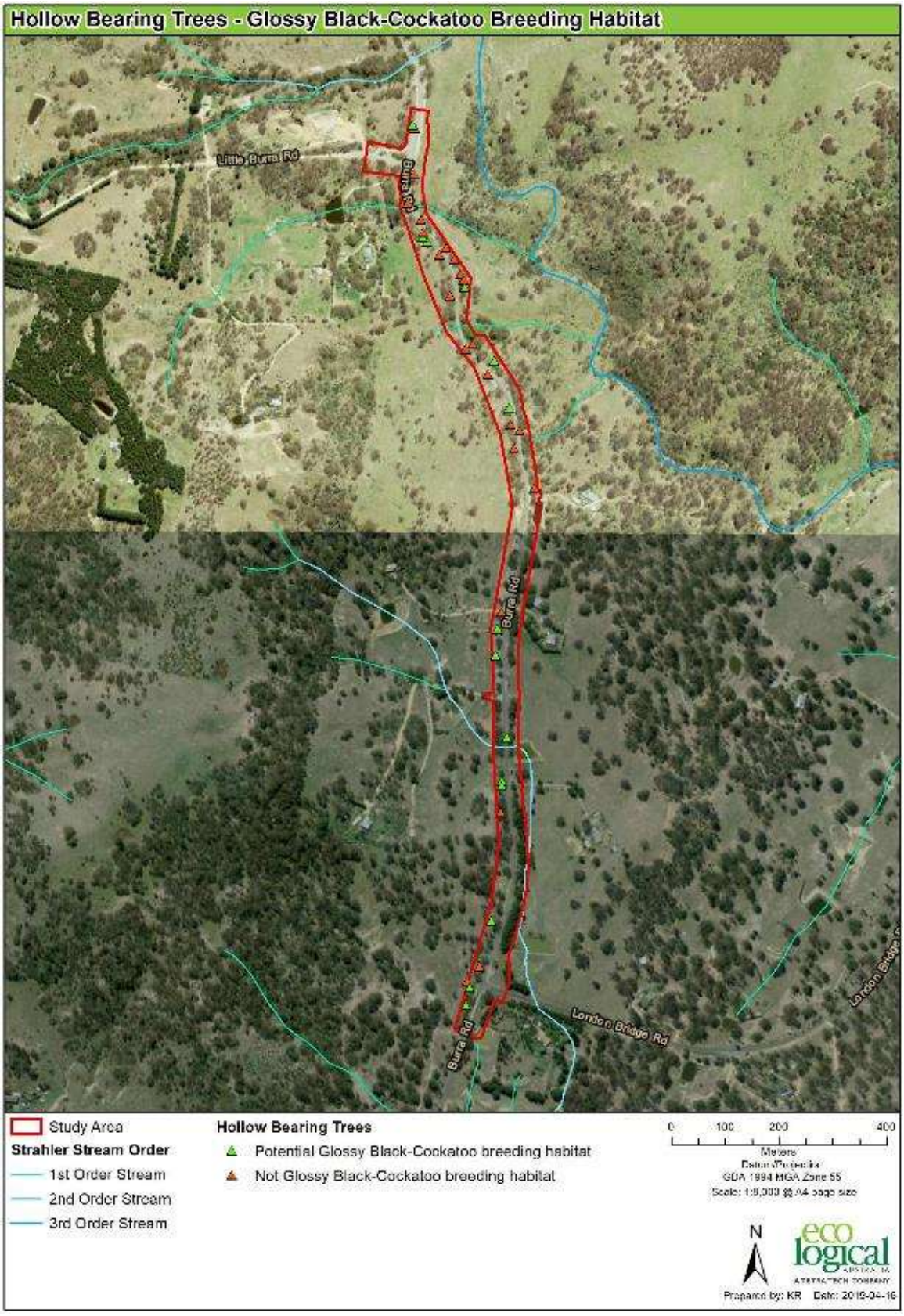

Figure 4: Potential Glossy Black-Cockatoo breeding habitat

4.2.2.1 EPBC Act Koala habitat assessment

The Study Area contains Koala habitat as defined by the Commonwealth Department of the Environment (2014). An assessment of the Koala habitat is therefore required. The assessment is in three stages:

1. Qualification as Critical Koala Habitat assessment.
2. Impacts on Critical Koala Habitat.
3. Assessment of other threats.

The habitat on site has been assessed using the Koala habitat assessment tool from the EPBC Act Referral Guidelines (DotE 2014) to determine if the site contains habitat critical to the survival of the Koala. To qualify as critical habitat, it must score 5 or more. The results of this assessment for the study area are presented in Error! Reference source not found. below. As vegetation within the study area does not meet the definition of critical Koala habitat in accordance with the EPBC Act Referral Guidelines, there is no requirement for an impact assessment under the EPBC Act for this species.

Table 3: Koala habitat assessment tool

Attribute	Score	Reason
Koala occurrence	0	No Koala records within 2 km of the subject site within the last 10 years.
Vegetation structure and composition	2	Forest with emerging trees with four known koala food tree species.
Habitat connectivity	2	Site is part of a contiguous landscape >1000 ha.
Key existing threats	0	0 for Koala occurrence; significant vehicle threat present.
Recovery value	0	• Other, larger patches of native vegetation to the north and west are more likely to be important for the recovery of the koala • No Koala records within 15 km of the survey area • 'Refuges' (areas with reliable soil moisture and fertility) not present within study area and unlikely in contiguous vegetation
Total	4	**Site does not qualify as critical habitat**

5. Impact Assessment

5.1 Direct impacts

Direct impacts are those that directly affect the habitat of species and ecological communities and of individuals using the study area.

5.1.1 Flora and Vegetation communities

The proposed upgrade works will result in a direct impact to 6.67 ha of native vegetation within the subject site.

Direct Impacts to native vegetation will include direct loss (clearing) of native vegetation associated with the widening of the road and batters. A summary of the area of each vegetation community to be directly affected by the proposed works is presented in **Table 4** below.

Table 4: Vegetation communities within the subject site

PCT #	PCT Name	Associated BC Act Community	Associated EPBC Act Community	Area (ha) within subject site
999	Ribbon Gum - Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion – Intact Canopy	None	None	3.20
999	Ribbon Gum - Norton's Box - Broad-leaved Peppermint open forest on footslopes, central and southern South Eastern Highlands Bioregion – DNG	None	None	3.47

5.1.2 Fauna

A search of the BioNet database and the EPBC Act Protected Matters Search Tool identified a total of 49 threatened, migratory or marine fauna species listed under the BC and/or EPBC Acts that have the potential to occur within a 15 km radius of the study area. Based on local ecological knowledge of the area and the AVH (2019) database, six additional threatened species were identified as potentially occurring.

The proposed works will impact 37 hollow-bearing trees. These trees may provide roosting, denning or nesting habitat for a range of hollow-dependent fauna species such as microbat species. Eighteen of the hollow-bearing trees are considered potential Gang-gang Cockatoo breeding habitat, and fourteen are considered potential Glossy Black-Cockatoo habitat.

Given the narrow nature of the study area and the proposed habitat modifications, the proposal is unlikely to disrupt connectivity between fauna habitats. In addition, >1000 ha of remnant open forest and woodland vegetation is contained in the vegetation contiguous with the study area.

An Assessment of Significance under the NSW BC Act was undertaken for 12 threatened species (11 birds and one microbat) (**Appendix C**). This concluded that, if the mitigation measures in **Section 6** are followed, the proposal is unlikely to have significant impacts on any threatened fauna species under the BC Act and, therefore, neither an SIS nor a BDAR is required.

An impact assessment under the EPBC Act was undertaken for six migratory fauna species (**Appendix D**) and concluded that the proposal was unlikely to have a significant impact on these species. Therefore, a referral to the Commonwealth DoEE is not required.

5.2 Indirect Impacts

Indirect impacts occur when project-related activities affect species or ecological communities in a manner other than direct loss within the subject site.

Potential indirect impacts as a result of this proposal include dust settlement, invasion by exotic species in disturbed areas, and pollution by contaminated runoff. The proposal has the potential to result in increased wildlife deaths through vehicle collision resulting from increased road traffic once the upgrade is complete. A detailed assessment of the potential indirect impacts associated with this was beyond the scope of this report. Measures designed to mitigate indirect impacts have been outlined in **Section 6.1** and **6.2**.

6. Recommendations

6.1 Mitigation: Threatened flora and vegetation communities

The following mitigation measures are designed to limit the impact of the proposal on flora and vegetation communities:

- Avoid further clearing and modification of all native vegetation.
- The limits of the corridor of works (disturbance footprint) should be clearly marked (for example, using temporary fencing or bunting) to ensure site disturbance occurs only within the designated works areas and is not unnecessarily extended.
- Material stockpile and equipment storage areas should be restricted to existing disturbed areas.
- Vegetation clearing should be undertaken in a manner to avoid damage to adjacent vegetation.
- Fallen logs and felled tree trunks should be retained on site and used in rehabilitation works on or off site. The remaining portions of felled trees (e.g. upper branches and leaves) should be mulched/chipped and used in erosion mitigation and/or revegetation works.
- Vehicle movements should be confined to the disturbance footprint.
- Machinery coming from outside the works area should be thoroughly washed down prior to entering the site to reduce the risk of introducing weed species and pathogens.
- Priority weed species should be targeted in accordance with the NSW DPI WeedWise recommended control measures (DPI 2019).
- Any revegetation of disturbed areas should utilise a seed mix consisting of local provenance species that are typical of the vegetation in the study area.
- Council should develop an induction plan should be developed to inform workers of appropriate safeguards to limit impacts on vegetation to be retained and to limit impacts on vegetation beyond the disturbance footprint.

6.2 Mitigation: Threatened fauna

The following mitigation measures are designed to limit the impact on fauna resulting from the proposal:

- Undertake pre-clearing assessment immediately prior to felling of any hollow-bearing trees to identify any resident fauna. Should fauna roosts/nests be identified during this survey, a qualified ecologist should be consulted to determine the appropriate course of action prior to any disturbance.
- Felling of any hollow-bearing trees should be supervised by a qualified ecologist or fauna handler.
- Hollow-bearing trees should be removed in a way that minimises the risk of harm to fauna (e.g. by clearing surrounding, non-hollow-bearing trees at least one day prior to removing hollow-bearing trees; and by bumping the tree several times to initiate evacuation of any fauna prior to felling). Hollows should be inspected for fauna after felling.
- Retain, where possible, all felled hollow-bearing trees or hollow limbs on site or within adjacent vegetation to provide fauna habitat.

- Any occupied nests located or any fauna which are inadvertently injured should be reported to WIRES or a similar organisation and relocated from the works area by a suitably qualified fauna handler.

Gang-gang Cockatoo and Glossy Black-Cockatoos

Gang-gang Cockatoos breed from October to January and Glossy Black-Cockatoos breed from March to August (OEH 2019c). February is therefore the only month of the year when removing hollow-bearing trees that are suitable for nesting does not risk the possibility that Gang-gangs or Glossy Blacks are using the hollows at that time for breeding. The following mitigation measures are recommended so that a significant impact, as per the BC Act (**Appendix C**), can be avoided. These measures should be undertaken in conjunction with the more general fauna mitigation measures listed above:

- Targeted pre-dusk hollow-bearing tree watching surveys (1.5 person hours per tree) will be undertaken for the relevant cockatoo species, based on the time of year.
- If there is no breeding pair present, the tree can be removed during the breeding season of the species surveyed for.
- If there is a breeding pair, the tree will be retained with a 20 m buffer around it until it can be checked for a breeding pair of the other species.
- Any trees that are being used by both species should be retained in perpetuity with a 20 m buffer.

It is considered likely that the removal of potential or known breeding trees during their respective breeding seasons will result in a significant impact on the Gang-gang Cockatoo or Glossy Black-Cockatoo, as per the BC Act, and would therefore require an SIS or a BDAR (**Appendix C**).

7. Conclusion:

This report has identified and assessed the potential impacts of the proposal to upgrade approximately 1.7 km of Burra Road, between Little Burra Road and London Bridge Road, Burra.

After consideration of the field investigation outcomes and analyses undertaken for this report, the identified impacts of the proposal are unlikely to have significant adverse impacts on any threatened flora or fauna species, provided that the mitigation measures outlined in **Section 6** are adopted.

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Appendix A Species List

Flora species recorded within the study area

Species Name	Common Name	Exotic (*)	Priority Weed for the South East
Acacia dealbata	Silver Wattle		
Acacia sp.			
Acaena novae-zelandiae	Bidgee-widgee		
Anthosachne scabra	Wheatgrass		
Aristida ramosa	Purple Wiregrass		
Austrostipa bigeniculata			
Austrostipa scabra	Speargrass		
Billardieri scandens	Hairy Apple Berry		
Bothriochloa macra	Red Grass		
Bursaria spinosa	Blackthorn		
Cassinia longifolia			
Cassinia sp.			
Centaurium tenuiflorum		*	
Chamaecytisus palmensis	Tagasaste	*	
Cheilanthes distans	Bristly Cloak Fern		
Cheilanthes sp.			
Chloris truncata	Windmill Grass		
Chrysocephalum apiculatum	Common Everlasting		
Convolvulus erubescens	Blushing Bindweed		
Cynoglossum australe			
Cytisus proliferous	Scotch Broom	*	*
Desmodium varians	Slender Tick-trefoil		
Dichelachne micrantha	Shorthair Plumegrass		
Dodonaea viscosa subsp. angustifolia	Sticky Hop-bush		
Echinopogon ovatus	Forest Hedgehog Grass		
Einadia hastata			
Eragrostis sp.	Berry Saltbush		
Eucalyptus bridgesiana	Apple Box		
Eucalyptus mannifera	Brittle Gum		
Eucalyptus nortonii	Norton's Box		
Eucalyptus melliodora	Yellow Box		
Fabaceae sp.			
Geranium solanderi	Native Geranium		

Geranium sp.			
Gonocarpus sp.			
Hibbertia obtusifolia	Hoary guinea flower		
Hypericum perforatum	St. John's Wort	*	*
Hypochaeris radicata	Catsear	*	
Indigofera australis	Australian Indigo		
Kunzea ericoides	Burgan		
Lactuca serriola	Prickly Lettuce	*	
Lomandra glauca	Pale Mat-rush		
Microlaena stipoides			
Oxalis perennans			
Oxalis sp.			
Panicum effusum			
Phalaris aquatica	Phalaris	*	
Phyllanthus sp.			
Phyllanthus gunnii	Scrubby Spurge		
Phyllanthus hirtellus	Thyme Spurge		
Plantago lanceolata	Lamb's Tongue	*	
Poa sieberiana			
Pomaderris aspera	Hazel Pomaderris		
Rosa rubiginosa	Sweet Briar	*	
Rubus fruticosus sp. agg.		*	*
Rytidosperma richardsonii	Straw Wallaby-grass		
Rytidosperma sp.			
Senecio sp.			
Themeda triandra	Kangaroo Grass		
Vittadinia cuneata	Fuzzweed		
Vittadinia hispidula			
Wahlenbergia gracilis	Sprawling Bluebell		
Wahlenbergia sp.			
Pomaderris aspera	Silver Wattle		

Appendix B Likelihood table

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search. Five terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposal site, results of the site inspection and professional judgement. Some migratory, marine and aquatic species identified from the Commonwealth database search have been excluded from the assessment, due to lack of habitat. The terms for likelihood of occurrence are defined below:

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

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

The records column refers to the number of records occurring within 15 km of the subject site, as provided by the NSW Wildlife Atlas (BioNet) database search. Information provided in the habitat associations' column has primarily been extracted (and modified) from the Commonwealth Species Profile and Threats Database (DoEE 2018b), NSW Threatened Species Profiles (OEH 2018b) and BioNet (OEH 2019d).

- "CE" = critically endangered
- "E" = endangered
- "V" = Vulnerable
- "M" = Migratory

Scientific name	Common name	Habitat associations	Conservation status		Likelihood of occurrence
			BC Act	EPBC Act	
THREATENED FLORA					
Calotis glandulosa	Mauve Burr-daisy	Occurs in the Monaro and Kosciuszko regions, upper Shoalhaven catchment and near Oberon. Found in montane, subalpine and natural temperate grasslands.	V	V	Unlikely. No suitable habitat present.
Dillwynia glaucula	Michelago Parrot-pea	Recorded from four areas on the NSW Southern Tablelands: near Windellama, near Mongarlowe, north-east of Michelago and at Numeralla. It is found in exposed patches of clay or on rocky outcrops in eucalypt woodland often dominated by *Eucalyptus rossii* (Scribbly Gum), *E. pauciflora* (Snow Gum), *E. dives* (Broad-leafed Peppermint) and *E. macrorhyncha* (Red Stringybark).	E	-	Unlikely. One BioNet record within 15 km of the site. This conspicuous species was not observed within the subject site despite good survey coverage.
Dodonaea procumbens	Trailing Hop-bush	This species is found in dry areas of the Monaro, between Michelago and Dalgety; there is one population at Lake Bathurst. It occurs in Natural Temperate Grassland or fringing eucalypt woodland of *Eucalyptus pauciflora* (Snow Gum), on sandy-clay soils, usually on or near vertically-tilted shale outcrops.	V	V	Unlikely. No suitable habitat present. No BioNet records within 15 km of the site.
Eucalyptus aggregata	Black Gum	In NSW, this species is found in the Central and Southern Tablelands, in the South Eastern Highlands Bioregion and on the western fringe of the Sydney Basin Bioregion. It grows on alluvial soils, on cold, poorly-drained flats and hollows adjacent to creeks and small rivers and usually occurs in open woodland with a grassy groundlayer.	V	V	No. This conspicuous species was not observed during the field survey.
Lepidium hyssopifolium	Basalt Pepper-cress,	In NSW, this species occurs near Bathurst, Bungendore, and Crookwell and may also be extant near Armidale. It grows on alluvial soils, on cold, poorly-drained flats and hollows adjacent to creeks and small rivers and usually occurs in open woodland with a grassy groundlayer.	E	E	Unlikely. Targeted survey outside recommended survey period (November – February), but potential habitat (creeks/small rivers) very limited.

Scientific name	Common name	Habitat associations	Conservation status		Likelihood of occurrence
			BC Act	EPBC Act	
Leucochrysum albicans var. *tricolor*	Hoary Sunray, Grassland Paper-daisy	In NSW, the Hoary Sunray occurs on the Southern Tablelands and adjacent areas in an area roughly bounded by Albury, Bega and Goulburn. It is usually found in grassland, woodland and forest, generally on relatively heavy soils.	-	E	No. Eight BioNet records within 15 km of the site. Not observed during targeted field survey.
Pelargonium sp. *striatellum*	Omeo Stork's-bill	The Omeo Stork's-bill is known from only 3 locations in NSW: two on lake-beds on the basalt plains of the Monaro and one at Lake Bathurst. It grows on irregularly inundated or ephemeral lakes, in the transition zone between surrounding grasslands or pasture, and wetland or aquatic communities	E	E	Unlikely. No suitable habitat present. No BioNet records within 15 km of the site.
Pomaderris cotoneaster	Cotoneaster Pomaderris	*Cotoneaster Pomaderris* has a very disjunct distribution, being known from the Nungatta area, northern Kosciuszko National Park (near Tumut), the Tantawangalo area in South-East Forests National Park and adjoining freehold land, Badgery's Lookout near Tallong, Bungonia State Conservation Area, the Yerranderie area, Kanangra-Boyd National Park, the Canyonleigh area and Ettrema Gorge in Morton National Park. It has been recorded in a range of habitats in predominantly forested country. The habitats include forest with deep, friable soil, amongst rock beside a creek, on rocky forested slopes and in steep gullies between sandstone cliffs.	E	E	Unlikely. This conspicuous species was not observed during the field survey. No BioNet records within 15 km of the site.
Pomaderris pallida	Pale Pomaderris	In NSW, this species has been recorded from near Kydra Trig (north-west of Nimmitabel), Tinderry Nature Reserve, the Queanbeyan River (near Queanbeyan), the Shoalhaven River (between Bungonia and Warri), the Murrumbidgee River west of the ACT and the Byadbo area in Kosciuszko National Park. It grows in shrub communities surrounded by *Eucalyptus mannifera* (Brittle Gum) and *E. macrorhyncha* (Red Stringybark) or *Callitris* sp. woodland.	V	V	Unlikely. Suitable habitat limited. There are no BioNet records within 15 km of the site.
Prasophyllum petilum	Tarengo Leek Orchid	Natural populations are known from five sites in NSW: near Boorowa, Queanbeyan area, Ilford, Delegate and a newly recognised population approximately 10 km west of Muswellbrook. The species grows in open sites within Natural Temperate Grassland at the Boorowa and Delegate sites. It also grows in grassy woodland in association with *Poa labillardieri*, *Eucalyptus*	E	E	Unlikely. Suitable habitat limited. There are no BioNet records within 15 km of the site.

Scientific name	Common name	Habitat associations	Conservation status		Likelihood of occurrence
			BC Act	EPBC Act	
		aggregata and *Leptospermum* spp. near Queanbeyan and within the grassy groundlayer dominated by *Themeda triandra* (Kangaroo Grass) under Box-Gum Woodland at Ilford (and Hall, ACT).			
Pultenaea pedunculata	Matted Bush-pea	In NSW it is represented by just three disjunct populations: in the Cumberland Plains in Sydney, the coast between Tathra and Bermagui and the Windellama area south of Goulburn. It is found in woodland, sclerophyll forest, road batters and coastal cliffs.	E	-	Unlikely. This conspicuous species was not observed during the field survey.
Rutidosis leptorrhynchoides	Button Wrinklewort	In NSW, populations occur at Goulburn, the Canberra - Queanbeyan area and Michelago. It grows in Box-Gum Woodland, secondary derived grassland, or in Natural Temperate Grassland, and is usually found on shallow, stony red-brown clay loams.	E	E	Unlikely. No BioNet records within 15 km of the site. Suitable habitat (Box-Gum Woodland, secondary derived grassland or Natural Temperate Grassland) not present.
Swainsona recta	Small purple pea	*Swainsona recta* occurs throughout the Queanbeyan and Wellington-Mudgee areas. It is also known from the ACT and a single population of four plants near Chiltern in Victoria. Over 80% of the southern population grows on a railway easement. Its habitat includes grassland, woodland and open forest dominated Blakely's Red Gum (*Eucalyptus blakelyi*), Yellow Box (*E. melliodora*), Candlebark Gum (*E. rubida*) and Long-leaf Box (*E. goniocalyx*) (OEH 2018b).	E	E	Unlikely. Suitable habitat (Box-Gum Woodland) not present. Twenty-three BioNet records within 15 km of the site.
Swainsona sericea	Silky Swainson-pea	In NSW, this species has been recorded from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains. There is also an isolated record from the far north-west of NSW. It is found in Natural Temperate Grassland and *Eucalyptus pauciflora* (Snow Gum) Woodland on the Monaro, and Box-Gum Woodland in the Southern Tablelands and South West Slopes.	-	-	Unlikely. Box-Gum Woodland, Natural Temperate Grassland and Snow Gum Woodland not present Twenty-four BioNet records within 15 km of the site.

Scientific name	Common name	Habitat associations	Conservation status		Likelihood of occurrence
			BC Act	EPBC Act	
Thesium australe	Austral Toadflax, Toadflax	In eastern NSW, this species is found in very small populations scattered along the coast, and from the Northern to Southern Tablelands. It grows in grassland on coastal headlands or grassland and grassy woodland away from the coast.	V	V	Unlikely. Suitable habitat limited. No BioNet records within 15 km of the site.
Xerochrysum palustre	Swamp Everlasting	In NSW, this species is found in Kosciuszko National Park and the eastern escarpment south of Badja. It is found in or on the margins of swamps and bogs that are often dominated by heaths.	-	V	No. Suitable swamp habitat not present.
THREATENED FAUNA					
Actitis hypoleucos	Common Sandpiper	Summer migrant. In NSW, this species is widespread along coastline and also occurs in many areas inland. It can be found in coastal wetlands and some inland wetlands, especially muddy margins or rocky shores. It also occurs near estuaries and deltas, lakes, pools, billabongs, reservoirs, dams and claypans, mangroves.	-	M	No. Suitable wetland habitat not present.
Anthochaera phrygia	Regent Honeyeater	Inhabits temperate woodlands and open forests of the inland slopes of south-east Australia, particularly Box-Ironbark woodland, and riparian forests of *Casuarina cunninghamiana* (River Sheoak). These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. This species makes nomadic movements following winter flowering eucalypt species. Two of three known key breeding areas are in NSW: the Capertee Valley and the Bundarra-Barraba region. The other breeding area is in Chiltern, Victoria. They breed between July and January and usually nest in horizontal branches or forks in tall mature *Eucalyptus* spp. and *Casuarina*/*Allocasuarina* spp. (Sheoaks).	CE	CE	Unlikely. There are no NSW BioNet Atlas records within 15 km of the site. Suitable habitat not present.

Scientific name	Common name	Habitat associations	Conservation status		Likelihood of occurrence
			BC Act	EPBC Act	
Aprasia parapulchella	Pink-tailed Worm-lizard	This species inhabits sloping, open woodland areas with predominantly native grassy groundcover, particularly those dominated by Kangaroo Grass (*Themeda triandra*). This species is commonly found beneath small, partially-embedded rocks and appears to spend considerable time in burrows below these rocks.	V	V	Unlikely. Ten BioNet records within 15 km of the site. Suitable habitat (partially-embedded rocks) not present.
Apus pacificus	Fork-tailed Swift	This species has been recorded in all regions of NSW. It most commonly occupies riparian woodland, swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and coastal sand-dunes.	-	M	Potential. There are no BioNet records within 15 km of the site.
Ardea Ibis	Cattle Egret	Widespread and common across NSW. It can be found near grasslands, wooded lands and terrestrial wetlands.	-	M	Potential. Suitable habitat present. No records within 15 km of the site.
Artamus cyanopterus cyanopterus	Dusky Woodswallow	The species occurs throughout most of New South Wales, and primarily inhabits dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris (OEH 2018b).	V	-	Potential. Potential foraging habitat within and adjacent to the subject site. Three BioNet records >15 km from the site.
Bidyanus bidyanus	Silver Perch	Historically widespread throughout much of the Murray-Darling River System and introduced into the Lake Eyre Basin. The species inhabits freshwater rivers, lakes and reservoirs, particularly in areas of high water flow.	V	CE	Unlikely. There are no NSW BioNet Atlas records within 15 km of the site. Suitable habitat not present.
Botaurus poiciloptilus	Australasian Bittern	Found over most of NSW, this species' habitat consists of permanent freshwater wetlands, with tall, dense vegetation, particularly *Typha* spp. (Bulrushes) (OEH 2018b).	E	E	No. There is no suitable vegetated wetland habitat present. No BioNet records within 15 km of the site.

Scientific name	Common name	Habitat associations	Conservation status		Likelihood of occurrence
			BC Act	EPBC Act	
Calidris acuminata	Sharp-tailed Sandpiper	Summer migrant. Widespread in most regions of NSW, especially in coastal areas, but sparse in the south-central Western Plain and east Lower Western Regions. It is found near shallow fresh or brackish wetlands with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	-	M	No. There is no suitable habitat present.
Calidris ferruginea	Curlew Sandpiper	The Curlew Sandpiper occupies littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	E	CE	No. There is no suitable habitat present. No BioNet records within 15 km of the site.
Calidris melanotos	Pectoral Sandpiper	This species is a summer migrant to Australia and is widespread but scattered in NSW. It is found near Shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	-	M	No. There is no suitable habitat present. No BioNet records within 15 km of the site.
Callocephalon fimbriatum	Gang-gang Cockatoo	In spring and summer (during the breeding season), this species is generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter (non-breeding season), the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. The species requires *Eucalyptus* spp. trees with hollows greater than 9 cm diameter for breeding.	V	-	Yes. This species was recorded within the subject site. Potential foraging and breeding habitat present.
Calyptorhynchus lathami	Glossy Black-Cockatoo	In NSW, this species is widespread along coast and inland to the southern tablelands and central western plains, with a small population in the Riverina. It occupies open forest and woodlands of the coast and the Great Dividing Range. The species requires the presence of presence of *Allocasuarina* spp. or *Casuarina* spp. for foraging and living or dead tree with hollows greater than 15 cm diameter and greater than 5 m above ground for breeding.	V	-	Potential. One BioNet record >15 years old within 15 km of the site. Potential foraging and breeding habitat present.

Scientific name	Common name	Habitat associations	Conservation status		Likelihood of occurrence
			BC Act	EPBC Act	
Chalinolobus dwyeri	Large-eared Pied Bat, Large Pied Bat	This species has been recorded from Rockhampton in Qld south to Ulladulla in NSW. The largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes. It occupies wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	V	E	No. No sandstone escarpments nearby. No BioNet records within 15 km of the site.
Chthonicola sagittata	Speckled Warbler	This species occurs from south-eastern Qld, the eastern half of NSW and into Victoria, as far west as the Grampians, mostly on hills and tablelands of the Great Dividing Range and rarely on coast. It can be found in Eucalyptus-dominated communities with a grassy understorey and sparse shrub layer, often on rocky ridges or in gullies.	V	-	Potential. Suitable habitat present. Six BioNet records within 15 km of the site.
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	This species is found from eastern through central NSW, west to Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell. It inhabits Eucalypt woodlands and dry open forest.	V	-	Potential. Suitable habitat present. No BioNet records within 15 km of the site.
Daphoenositta chrysoptera	Varied Sittella	The distribution of this species in NSW is nearly continuous from the coast to the far west. It inhabits Eucalypt forests and woodlands, mallee and Acacia woodland.	V	-	Potential. Suitable habitat present. No BioNet records within 15 km of the site.
Dasyurus maculatus maculatus	Spotted-tailed Quoll (SE mainland population)	The Spotted-tailed Quoll has been 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. It uses hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. It is mostly nocturnal, and spends most of the time on the ground, although is also an excellent climber and will hunt in tree hollows and prey on roosting birds.	V	E	Unlikely. Subject site provides marginal habitat at best. One BioNet record approximately 40 years old within 15 km of the site.
Delma impar	Striped Legless Lizard	This species occurs throughout temperate lowland grasslands in the Australian Capital Territory (ACT), the south-western slopes and southern tablelands of New South Wales (NSW), central and southern Victoria, and the south-eastern corner of South Australia (SA). This species is found in habitat where grassland is dominated by perennial, tussock-forming grasses such as *Themeda triandra*	V	V	Unlikely. Habitat not suitable. No BioNet records within 15 km of the site.

Scientific name	Common name	Habitat associations	Conservation status		Likelihood of occurrence
			BC Act	EPBC Act	
		(Kangaroo Grass), *Austrostipa* spp., *Poa* spp. and occasionally *Rytidosperma* spp.			
Gallinago hardwickii	Latham's Snipe	Migrant to east coast of Australia, extending inland west of the Great Dividing Range in NSW. Found near freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually in freshwater swamps, flooded grasslands or heathlands.	-	M	No. There is no suitable habitat present. No BioNet records within 15 km of the site.
Grantiella picta	Painted Honeyeater	The Painted Honeyeater is a nomadic species that occurs predominantly on the inland slopes of the Great Dividing Range. It inhabits Boree/ Weeping Myall (*Acacia pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests. It is a specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias, preferring mistletoes of the genus *Amyema*. Nesting occurs from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping *Eucalyptus* spp., *Allocasuarina* and *Casuarina* spp. (Sheoaks), *Melaleuca* sp. (Paperbark) or Mistletoe branches.	V	V	Unlikely. No suitable habitat (abundant mistletoe) present at subject site. No BioNet records within 15 km of the site.
Haliaeetus leucogaster	White-bellied Sea-Eagle	This species is distributed along the coastline of mainland Australia and Tasmania, extending inland along some of the larger waterways, especially in eastern Australia. It can be found near freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas.	V	-	Unlikely except as vagrant/fly-over – no suitable habitat in subject site. One BioNet record (>20 years old) within 15 km of the site.
Heleioporus australiacus	Giant Burrowing Frog	The Giant Burrowing Frog is found in two distinct populations in south eastern NSW and Victoria: a northern population in the sandstone geology of the Sydney Basin as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Habitat includes heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Breeds in ephemeral streams with permanent or semi-permanent pools.	V	V	Unlikely. One BioNet record (>20 years old) within 15 km of the site.
Hieraaetus morphnoides	Little Eagle	This species is found throughout the Australian mainland, with the exception of the most densely-forested parts of the Dividing Range escarpment. It inhabits	V	-	Potential. Suitable habitat present. No

Scientific name	Common name	Habitat associations	Conservation status		Likelihood of occurrence
			BC Act	EPBC Act	
		open eucalypt forest, woodland or open woodland, including Sheoak or Acacia woodlands and riparian woodlands of interior NSW.			BioNet records within 15 km of the site.
Hirundapus caudacutus	White-throated Needletail	The White-throated Needletail is recorded in all coastal regions of Qld and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. They are recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but are less commonly recorded flying above woodland. The species also occurs over heathland, but less often over treeless areas such as grassland or swamps. When flying above farmland, Needletails are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks.	-	M	Potential (fly-over only).
Lathamus discolor	Swift Parrot	This species breeds in Tasmania during Spring and Summer and migrates to the Australian south-east mainland between March and October. On the mainland they occur where Eucalypts are flowering profusely, or where there are abundant lerp infestations. Favoured feed trees include winter flowering species such as *Eucalyptus robusta* (Swamp Mahogany), *Corymbia Maculata* (Spotted Gum), *C. gummifera* (Red Bloodwood), *E. sideroxylon* (Mugga Ironbark), and *E. albens* (White Box).	E	CE	Unlikely. No BioNet records within 15 km of the site. Preferred feed trees do not occur at the subject site.
Litoria aurea	Green and Golden Bell Frog	Since 1990, recorded from approximately 50 scattered sites within its former range in NSW, from the north coast near Brunswick Heads, south along the coast to Victoria. Records exist west to Bathurst, Tumut and the ACT region, but the only remaining extant inland population is an old gold mine at Captains Flat. All other records within 10 km of coastal waters where the effects of the chytrid fungus are ameliorated.	E	V	Unlikely. No suitable habitat present and not within 10 km of the coast. No BioNet records within 15 km of the site.
Litoria castanea	Yellow-spotted Tree Frog	A single known population occurs on the Southern Tablelands of NSW. Large permanent ponds or slow-flowing streams with plenty of emergent vegetation such as bulrushes.	E	E	Unlikely. Species considered extinct outside of single known population.

Scientific name	Common name	Habitat associations	Conservation status		Likelihood of occurrence
			BC Act	EPBC Act	
					No suitable vegetated wetland habitat present. No BioNet records within 15 km of the site.
Litoria raniformis	Growling Grass Frog	In NSW, only known to exist in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. A few recent unconfirmed records have also been made in the Murray Irrigation Area. It inhabits permanent or ephemeral *Eucalyptus largiflorens* (Black Box)/*Duma florulenta* (Lignum)/*Chenopodium nitrariaceum* (Nitre Goosefoot) swamps, *D. florulenta*/*Typha* spp. swamps and *Eucalyptus camaldulensis* (*River* Red Gum) swamps or billabongs along floodplains and river valleys. It is also found in irrigated rice crops.	E	V	Unlikely. Species occurs only west of divide. Local records probably mistaken *Litoria castanea*. No suitable habitat present. No BioNet records within 15 km of the site.
Maccullochella macquariensis	Trout Cod	The single naturally occurring population is restricted to a small (approximately 120 km) stretch of the Murray River from below Yarrawonga Weir to Strathmerton. The species occupies stream positions characterised by a high abundance of large woody debris (or 'snags') in water that is comparatively deep and close to riverbanks. However, midstream snags are also an important habitat component.	E	E	Unlikely. No suitable habitat present. No BioNet records within 15 km of the site.
Maccullochella peelii	Murray Cod	Found throughout most of the Murray Darling Basin with the exception of some localised extinctions. Some translocated populations exist outside the species' natural distribution in impoundments and waterways (Cataract Dam and the Nepean River). It inhabits clear rocky streams to slow flowing, turbid rivers and billabongs. Frequently found in the main river channel and larger tributaries; it is also found in floodplain channels when they contain water.	E	V	Unlikely. No suitable habitat present. No BioNet records within 15 km of the site.
Macquaria australasica	Macquarie Perch	The Macquarie Perch is found in the Murray-Darling Basin, particularly in the upstream reaches of the Lachlan, Murrumbidgee and Murray rivers, and in parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. It inhabits river and lake habitats, especially the upper reaches of rivers and their tributaries.	E	E	Unlikely. No suitable habitat present. No BioNet records within 15 km of the site.

Scientific name	Common name	Habitat associations	Conservation status		Likelihood of occurrence
			BC Act	EPBC Act	
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	This species is found throughout much of inland NSW, with the exception of the extreme north-west, where it is replaced by the subspecies *picata*. It inhabits open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas.	V	-	Potential. Potential foraging habitat within and adjacent to the site. Three BioNet records >15 years old within 15 km of the site.
Merops ornatus	Rainbow Bee-eater	This species is distributed across much of mainland Australia, including NSW. It inhabits open forests and woodlands, shrublands, farmland, areas of human habitation, inland and coastal sand dune systems, heathland, sedgeland, vine forest and vine thicket.	-	M	Potential (on migration). No BioNet records within 15 km of the site
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	In NSW it occurs on both sides of the Great Dividing Range, from the coast inland to Moree, Dubbo and Wagga Wagga. It inhabits rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland. In breeding season females and older males congregate in large well documented maternity roosts. Outside of breeding seasons smaller groups roost in caves, rock overhangs culverts and buildings.	V	-	Potential. No BioNet records within 15 km of the site.
Monarcha melanopsis	Black-faced Monarch	In NSW and the ACT, the species occurs around the eastern slopes and tablelands of the Great Divide, inland to Coutts Crossing, Armidale, Widden Valley, Wollemi National Park, Wombeyan Caves and Canberra. It is rarely recorded farther inland. It occurs mainly in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrubland, warm temperate rainforest, dry (monsoon) rainforest and (occasionally) cool temperate rainforest.	-	M	Unlikely. No suitable habitat present. No BioNet records within 15 km of the site.
Motacilla flava	Yellow Wagtail	This species is a regular summer migrant to mostly coastal Australia. In NSW, it has been recorded from Sydney to Newcastle, the Hawkesbury and inland in the Bogan LGA. It inhabits swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land and lawns.	-	M	Unlikely. No suitable habitat. No BioNet records within 15 km of the site.

Scientific name	Common name	Habitat associations	Conservation status		Likelihood of occurrence
			BC Act	EPBC Act	
Myiagra cyanoleuca	Satin Flycatcher	Satin Flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and, on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests.	-	M	Potential (on migration). No BioNet records within 15 km of the site.
Neophema pulchella	Turquoise Parrot	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. It lives on the edges of Eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	V	-	Unlikely, except as an occasional visitor. Suitable habitat limited. One BioNet record >30 years old within 15 km of the site.
Numenius madagascariensis	Eastern Curlew, Far Eastern curlew	In NSW, the Eastern Curlew has a primarily coastal distribution. It generally occupies coastal lakes, inlets, bays and estuarine habitats, and is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. They occur in both fresh and brackish waters and occasionally are recorded around floodwaters.	-	CE	Unlikely. No suitable habitat. No BioNet records within 15 km of the site.
Pandion haliaetus	Osprey	Common around the northern NSW coast, and uncommon to rare from coast further south. Some records from inland areas. It can be found near rocky shorelines, islands, reefs, mouths of large rivers, lagoons and lakes.	V	M	No. No suitable habitat. No BioNet records within 15 km of the site.
Petauroides volans	Greater Glider	The Greater Glider occurs in Eucalypt forests along the ranges and coastal plains of eastern Australia, feeding almost exclusively on the young leaves and flower buds of select Eucalypt species. It shelters in tree hollows, with a particular preference for large hollows in large, old trees. Individuals occupy relatively small home ranges (1-3 ha).	-	V	Unlikely. Habitat (large, old trees) limited. No BioNet records within 15 km of the site.
Petrogale penicillata	Brush-tailed Rock-wallaby	In NSW, the Brush-tailed Rock-wallaby occurs from the Qld border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. It inhabits rocky escarpments, outcrops and cliffs, with a preference for complex structures with fissures, caves and ledges.	E	V	Unlikely. Suitable rocky habitat not present. No BioNet records within 15 km of the site.

Scientific name	Common name	Habitat associations	Conservation status		Likelihood of occurrence
			BC Act	EPBC Act	
Petroica boodang	Scarlet Robin	In NSW, this species occurs from the coast to the inland slopes. It is often found in dry eucalypt forests and woodlands, and occasionally in mallee, wet forest, wetlands and tea-tree swamps.	V	-	Potential. Potential foraging habitat within and adjacent to the site. Eight BioNet records within 15 km of the site.
Petroica phoenicea	Flame Robin	In NSW, the Flame Robin breeds in upland areas, and in winter many birds move to the inland slopes and plains, or occasionally to coastal areas. It breeds in upland tall moist eucalypt forests and woodlands. In winter it uses dry forests, open woodlands, heathlands, pastures and native grasslands. It can occasionally be found in temperate rainforest, herbfields, heathlands, shrublands and sedgelands.	V	-	Potential. Potential foraging habitat within and adjacent to the site. Six BioNet records within 15 km of the site.
Phascolarctos cinereus	Koala	In NSW, it mainly occurs on the central and north coasts, with some populations in the west of the Great Dividing Range. There are sparse and possibly disjunct populations in the Bega District and at several sites on the southern tablelands. It inhabits eucalypt woodlands and forests.	V	V	Unlikely. No primary food trees present. No BioNet records within 15 km of the site. Habitat does not qualify as critical habitat under the EPBC Act referral guidelines.
Polytelis swainsonii	Superb Parrot	Found throughout eastern inland NSW in Box-gum woodland, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. It nests in small colonies, often with more than one nest in a single tree. They nest in the hollows of large trees (dead or alive), mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes, nest trees can be in open Box-Gum Woodland or isolated paddock trees. The species known to be used are *Eucalyptus blakelyi* (Blakely's Red Gum), *E. melliodora* (Yellow Box), *E. bridgesiana* (Apple Box) and *E. polyanthemos* (Red Box). It feeds in trees and understorey shrubs and on the ground, and their diet consists mainly of grass seeds and herbaceous plants.	V	V	Unlikely. Box-Gum woodland not present. No BioNet records within 15 km of the site.

Scientific name	Common name	Habitat associations	Conservation status		Likelihood of occurrence
			BC Act	EPBC Act	
Pseudomys fumeus	Smoky Mouse	In south-east NSW, the Smoky Mouse occurs at a small number of sites in Kosciuszko NP, Bondo SF and Ingbyra SF, and around Mt Poole, Nullica SF and South East Forests NP. It can be found in sclerophyll forest, heathland and open-forest, mainly on ridgetops but sometimes in ferny gullies.	E	E	Unlikely. No BioNet records within 15 km of the site.
Pteropus poliocephalus	Grey-headed Flying-fox	The Grey-headed Flying Fox inhabits subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps, as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20-50 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. They feed on the nectar and pollen of *Eucalyptus* spp., *Melaleuca* spp. and *Banksia* spp., and fruits of rainforest trees and vines.	V	V	Unlikely. No camps present. No important patches of feed trees present. No BioNet records within 15 km of the site.
Rhipidura rufifrons	Rufous Fantail	The Rufous Fantail inhabits the coastal and near coastal districts of northern and eastern Australia, including on and east of the Great Divide in NSW. It is often found in sclerophyll forests and subtropical and temperate rainforest. It sometimes inhabits drier sclerophyll forests and woodlands.	-	M	Potential (on migration only). No BioNet records within 15 km of the site.
Rostratula australis	Australian Painted Snipe	In NSW, records of the Painted Snipe are from the Murray-Darling Basin, including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp, and swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. It prefers the fringes of swamps, dams and nearby marshy areas, where there is a cover of grasses, Lignum, low scrub or open timber. It nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.	E	E	Unlikely. No suitable habitat present. No BioNet records within 15 km of the site.
Stagonopleura guttata	Diamond Firetail	The Diamond Firetail is distributed in NSW, and has mainly been recorded in the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina, and less commonly in coastal areas and further inland. It prefers gassy Eucalypt woodlands, open forest, mallee, Natural Temperate Grassland, secondary derived grassland, riparian areas, and lightly wooded farmland.	V	--	Potential. Potential foraging habitat within and adjacent to the site. Eight BioNet records within 15 km of the site.

Scientific name	Common name	Habitat associations	Conservation status		Likelihood of occurrence
			BC Act	EPBC Act	
Synemon plana	Golden Sun Moth	The Golden Sun Moth's NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut. The species' historical distribution extended from Bathurst (central NSW) through the NSW Southern Tablelands, central and western Victoria, to Bordertown in eastern South Australia. It occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which the groundlayer is dominated by *Austrodanthonia* spp.	E	CE	Unlikely. No suitable grassland habitat. No BioNet records within 15 km of the site.
Tympanocryptis pinguicolla	Grassland Earless Dragon	The only populations now known are in the ACT and adjacent NSW at Queanbeyan, and on the Monaro Basalt Plains between Cooma and south-west of Nimmitabel. Restricted to a small number of Natural Temperate Grassland sites dominated by wallaby grasses (*Nothodanthonia* spp.), spear grasses (*Austrostipa* spp.), Poa Tussock (*Poa sieberiana*), Red Grass (*Bothriochloa macra*), and occasionally Kangaroo Grass (*Themeda triandra*).	E	E	Unlikely. No suitable grassland habitat. No BioNet records within 15 km of the site.
Varanus rosenbergi	Rosenberg's Goanna	In NSW, this species is found on the Sydney Sandstone in Wollemi National Park, in the Goulburn and ACT regions, and near Cooma in the south. It has also recorded from the South West Slopes near Khancoban and Tooma River. It can be found in heath, open forest and woodland. The species is known from Morton National Park and the Queanbeyan area and is found in heath, open forest and woodland. It nests in terrestrial termite mounds.	V	-	Unlikely. No suitable breeding habitat (termite mounds). One BioNet record (approximately 20 years old) within 15 km of the site.
THREATENED ECOLOGICAL COMMUNITIES					
Natural Temperate Grassland of the South Eastern Highlands (EPBC Act)		Natural temperate grassland is dominated by moderately tall (25–50 cm) to tall (50–100 cm), dense to open tussock grasses in the genera *Austrodanthonia* spp., *Austrostipa* spp., *Bothriochloa* spp., *Poa* spp. and *Themeda* spp.. It occurs on Ridges, crests, hillsides, undulating plains, valleys and lower slopes, creeks, drainage lines and river flats. It generally corresponds with the Monaro, Murrumbateman, Bungonia and Crookwell subregions of the South Eastern Highlands bioregion.	-	CE	No

Scientific name	Common name	Habitat associations	Conservation status		Likelihood of occurrence
			BC Act	EPBC Act	
Alpine Sphagnum Bog and Associated Fens		The community can usually be defined by the presence or absence of *Sphagnum* spp., the most common of which is *Sphagnum cristatum*. However, there are some sites in the community that are dominated by shrubs or *Restionaceae* spp., where *Sphagnum* spp. are only a minor component, and others where Sphagnum has been depleted or lost due to disturbance. In these cases, the site may still be considered to be part of this ecological community if other key species are present. It is found in permanently wet areas, such as along streams, valley edges and valley floors. They are also situated on slopes where soils are waterlogged. In NSW, it occurs in the Australian Alps bioregion and the Bondo subregion of the South Eastern Highlands bioregion.	E	CE	No
White Box-Yellow Box-Blakely's Red Gum Woodland (BC Act)	Box-Gum Woodland	This TEC is characterised by the presence or prior occurrence of *Eucalyptus albens* (White Box), *E. melliodora* (Yellow Box) and/or *E. blakelyi* (Blakely's Red Gum). Trees may occur as pure stands, mixtures of the three species, or in mixtures with other trees, including wattles. The understorey in intact sites is characterised by native grasses and a high diversity of herbs; the most commonly encountered include *Themeda triandra* (Kangaroo Grass), *Poa sieberiana* (Snowgrass), *Rytidosperma* spp., *Austrostipa* spp., *Chrysocephalum apiculatum* (Common Everlasting), *Goodenia pinnatifida, Hypericum gramineum* (Small St. John's Wort), *Vittadinia muelleri* and *Wahlenbergia* spp. Shrubs are generally sparse or absent, though they may be locally common. Remnants generally occur on fertile lower parts of the landscape where resources such as water and nutrients are abundant.	E	-	No
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act)			-	CE	No

Appendix C Assessment of Significance for BC Act listed species

Threatened species impact assessment is an integral part of environmental impact assessment. The objective of Section 5A of the Environmental Planning and Assessment Act 1979 (EP&A Act) is to improve the standard of consideration afforded to threatened species, populations and ecological communities, and their habitats, through the planning and assessment process, and to ensure that the consideration is transparent.

Assessments of significance were undertaken for the following species and communities:

- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow)
- *Callocephalon fimbriatum* (Gang-gang Cockatoo)
- *Calyptorhynchus lathami* (Glossy Black-Cockatoo)
- *Chthonicola sagittata* (Speckled Warbler)
- *Climacteris picumnus victoriae* (Brown Treecreeper (eastern subspecies))
- *Daphoenositta chrysoptera* (Varied Sittella)
- *Hieraaetus morphnoides* (Little Eagle)
- *Melanodryas cucullata cucullata* (Hooded Robin (south-eastern form))
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-Bat)
- *Petroica boodang* (Scarlet Robin)
- *Petroica phoenicea* (Flame Robin)
- *Stagonopleura guttata* (Diamond Firetail)

***Callocephalon fimbriatum* (Gang-gang Cockatoo)**

The Gang-gang Cockatoo is distributed from southern Victoria through south and central-east NSW. In summer it occupies tall montane forests and woodlands, although it may also occur in sub-alpine *Eucalyptus pauciflora* (Snow Gum) woodland and occasionally temperate rainforests. In winter, the species occurs at lower altitudes in drier, more open eucalypt forests, particularly box-ironbark assemblages.

(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,

A key stage in the life cycle of this species is its breeding period, which usually occurs between October and January. The species requires hollows in large trees to breed and prefers to breed in tall mature sclerophyll forests with a dense understorey.

The action proposed will result in the removal of 37 hollow-bearing trees, 18 of which are considered suitable Gang-gang Cockatoo breeding habitat (hollows greater than 9 cm diameter and more than 5 m from the ground). This has the potential to disrupt this key life cycle stage.

The proposed development is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species will be placed at risk of extinction if breeding trees are removed.

(b) in the case of an endangered ecological community or critically endangered ecological 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

(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,

NA

(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

Approximately 6.67 ha of foraging habitat (all native vegetation within the subject site) and 18 potential breeding trees will be removed as a result of this proposed action.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

As the areas to be removed are located at the edges of patches of the open forest and woodland communities which are already located adjacent to the existing road alignment, the proposed action will not result in increased fragmentation of habitat for this species. This, combined with the highly

mobile characteristic of the Gang-gang Cockatoo, means that the foraging habitat to be impacted is unlikely to be important to the long-term survival of the species in the locality.

(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 and modified has been historically disturbed through clearing, ongoing road maintenance activities, and weed encroachment. This area is neither the tall mountain forest/wet sclerophyll forest, lowland box-gum nor the box-ironbark forest preferred by this species. In addition, similar or higher quality woodland habitat is widespread in the vicinity, including >1000 ha of contiguous suitable foraging habitat. The 6.67 ha of foraging habitat to be removed is therefore not considered important for the long-term survival of this species in the locality. However, any breeding trees within the study area are considered important to the long-term survival of the species.

(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),

The proposal is unlikely to have an adverse effect on any declared area of outstanding biodiversity value.

(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 is part of the key threatening processes “clearing of native vegetation”, “removal of dead wood and dead trees” and “loss of hollow-bearing trees”.

Conclusion

If the mitigation actions outlined in **Section 6.2** are followed, the proposal is unlikely to have a significant impact on the Gang-gang Cockatoo.

***Calyptorhynchus lathami* (Glossy Black-Cockatoo)**

The Glossy Black-Cockatoo is uncommon although widespread throughout suitable forest and woodland habitats from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW. It inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of *Casuarina* and *Allocasuarina* spp. (Sheoak) occur. It feeds almost exclusively on the seeds of several species of *Casuarina* and *Allocasuarina* spp. and requires hollows >9 cm diameter and >5 m from the ground for breeding.

(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,

A key stage in the life cycle of this species is its breeding period, which usually occurs between March and August. The species requires hollows >9 cm diameter and >5 m from the ground for breeding.

The action proposed will result in the removal of 37 hollow-bearing trees, 14 of which are considered suitable Glossy Black-Cockatoo breeding habitat. This has the potential to disrupt this key life cycle stage.

The proposed development is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species will be placed at risk of extinction if breeding trees are removed.

(b) in the case of an endangered ecological community or critically endangered ecological 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

(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,

NA

(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

Approximately 6.67 ha of foraging habitat (native vegetation within the subject site) and 14 potential breeding trees will be removed as a result of this proposed action.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

As the areas to be removed are located at the edges of patches of the open forest and woodland communities which are already located adjacent to the existing road alignment, the proposed action will not result in increased fragmentation of habitat for this species. This, combined with the highly

mobile characteristic of the Glossy-black Cockatoo, means that the foraging habitat that will be impacted is unlikely to be important to the long-term survival of the species in the locality.

(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 and modified has been historically disturbed through clearing, ongoing road maintenance activities, and weed encroachment; similar or higher quality woodland habitat is widespread in the vicinity, including >1000 ha of contiguous suitable foraging habitat. The area does not contain the *Allocasuarina* and *Casuarina* spp. preferred by this species. The 6.67 ha of foraging habitat to be removed is therefore not considered important for the long-term survival of this species in the locality. However, any potential breeding trees within the survey area are considered important to the long-term survival of the species.

(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),

The proposal is unlikely to have an adverse effect on any declared area of outstanding biodiversity value.

(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 is part of the key threatening processes “clearing of native vegetation”, “removal of dead wood and dead trees” and “loss of hollow-bearing trees”.

Conclusion

If the mitigation actions outlined in **Section 6.2** are followed, proposal is unlikely to have a significant impact on the Glossy Black-Cockatoo.

Threatened Woodland Birds - Dusky Woodswallow, Speckled Warbler, Varied Sittella, Hooded Robin, Scarlet Robin, Flame Robin and Diamond Firetail

These birds are assessed together because they have broadly similar habitat requirements (they live in woodland and forest, feed mostly on invertebrates, and do not require hollows for nesting) and the proposal is likely to impact on them in similar ways.

***Artamus cyanopterus cyanopterus* (Dusky Woodswallow)**

This species is widespread from the coast to inland NSW, including the western slopes of the Great Dividing Range. It prefers woodlands and dry open sclerophyll eucalypt forests, generally with a sparse shrub understorey and a ground cover consisting of grasses, sedges or open ground with woody debris. It also occurs in farm land or roadside remnants. It feeds primarily on invertebrates, and occasionally on nectar, fruit and seeds (OEH 2019b).

***Chthonicola sagittata* (Speckled Warbler)**

The Speckled Warbler inhabits 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. Large, relatively undisturbed remnants are required for the species to persist in an area. The Speckled Warbler builds a grass dome nest in a dense grass tussock or shrub (OEH 2019b).

The diet of the Speckled Warbler consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees. Speckled Warblers often join mixed species feeding flocks in winter, travelling in company with other species such as Yellow-rumped, Buff-rumped, Brown and Striated Thornbills (OEH 2019b).

***Daphoenositta chrysoptera* (Varied Sittella)**

The distribution of the Varied Sittella includes most of mainland Australia except deserts and open grasslands. It prefers eucalypt forests and woodlands with rough-barked species, or mature smooth-barked gums with dead branches, mallee and *Acacia* spp. woodland and feeds on arthropods from bark, dead branches, or small branches and twigs. It nests in a small cup built onto a branch or peeling bark crevice of a rough-barked tree (OEH 2019b).

***Melanodryas cucullata cucullata* (Hooded Robin – south-eastern form)**

This bird is associated with a wide range of eucalypt woodlands, shrubland and open forests. In temperate woodlands, the species favours open areas adjoining large woodland blocks, with areas of dead timber and sparse shrub cover. Hooded Robin home ranges are relatively large, averaging 18 ha for birds from the New England Tableland (OEH 2019b).

***Petroica phoenicea* (Flame Robin)**

The Flame Robin breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes, nesting mostly near edges or areas with an open understorey and grassy ground layer. It often occurs in recently burnt areas, and abundant fallen timber is an important component of its habitat. In winter

many birds move to the inland slopes and plains, or to drier more open habitats in the lowlands (OEH 2019b).

***Petroica boodang* (Scarlet Robin)**

The Scarlet Robin inhabits dry eucalypt forests and woodlands with an open grassy understorey and a few scattered shrubs. It breeds in summer in higher country; some birds migrate to lower altitudes in autumn. Abundant logs and fallen timber are important components of its habitat (OEH 2019b).

Stagonopleura guttata (Diamond Firetail)

The Diamond Firetail can be found in grassy eucalypt woodlands, including Box-Gum Woodlands. This species can also be found in open forest, mallee, riparian vegetation, and grasslands, and is often seen in flocks of between five to forty birds. The Diamond Firetail is a ground feeder, feeding on ripe and partly-ripe grass, herb seeds, green leaves, and on insects. It nests in dense shrubs or in tree canopy (OEH 2019b).

(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,

6.67 ha of vegetation within the subject land provides potential foraging habitat for these species (all native vegetation). The trees, shrubs and tussock grasses provide potential breeding habitat for the Dusky Woodswallow, Hooded Robin, Diamond Firetail, Speckled Warbler, Varied Sittella and Scarlet Robin. The Flame Robin does not breed in the drier inland areas that it commonly occupies during winter.

Similar or better quality (less disturbed) foraging and breeding habitat is available in the broader landscape, including >1000 ha of contiguous native vegetation. As such, the proposed activity is unlikely to affect the life cycle of these species such that a viable local population is likely to be placed at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological 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

(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,

NA

(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

An area of approximately 6.67 ha of open forest and woodland would be removed to facilitate road widening. This constitutes approximately 2.5% of the mapped extent of similar woodland and open forest habitat within 1 km of the study area (265 ha) and 0.08% within 10 km (8349 ha). The area to be removed is also contiguous with >1000 ha of open forest and woodland that would provide similar habitat for these species.

Given the large extent of similar habitats in the locality (immediately adjoining the study area), and the highly mobile nature of these species, the proposal is not considered likely to affect habitat important for the long-term survival of the species in the locality.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

As the areas of vegetation to be removed are located at the edges of patches of this community, which are already located adjacent to the existing road alignment, the proposed action will not result in increased fragmentation of habitat for this species.

(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 local populations of these species are likely to extend well beyond the study area; similar or higher quality woodland habitat is widespread in the vicinity. The habitat to be removed is therefore likely to be of low importance to the long-term survival of these 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),

The proposal is unlikely to have an adverse effect on any declared area of outstanding biodiversity value.

(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 is part of the key threatening processes “clearing of native vegetation” and “removal of dead wood and dead trees”. The limited extent of native vegetation clearance, relative to the native vegetation in the wider locality, means that in this context these key threatening processes are not considered to constitute a significant impact.

Conclusion

The proposal is unlikely to have a significant impact on the Dusky Woodswallow, Speckled Warbler, Varied Sittella, Hooded Robin, Scarlet Robin, Flame Robin or Diamond Firetail.

***Climacteris picumnus victoriae* (Brown Treecreeper)**

This species inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, open ground and fallen timber. It nests in hollows in standing dead or live trees and tree stumps. Fallen timber constitutes important foraging habitat for the Brown Treecreeper. The species is sedentary, although some birds may disperse locally after breeding. Populations consist of pairs or groups of three to six (OEH 2019b). No Brown Treecreepers were recorded during the field survey.

(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,

The availability of similar or higher quality foraging and breeding habitat in the broader landscape (including >1000 ha of contiguous potential habitat) means that the proposed activity is unlikely to result in a local population of any of these species being placed at risk of extinction.

As such, the proposed activity is unlikely to affect breeding, or the life cycle, of these species such that a viable local population is likely to be placed at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological 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

NA

(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,

NA

(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

Approximately 6.67 ha of open forest and woodland and 37 hollow-bearing trees would be removed to facilitate road widening. This constitutes approximately 2.5% of the mapped extent of similar woodland and open forest habitat within 1 km of the study area (265 ha) and 0.08% within 10 km (8349 ha).

Given the large extent of similar habitats in the locality (>1000 ha contiguous with the study area), and the highly mobile nature of the Brown Treecreeper, the proposal is not considered likely to affect habitat important for the long-term survival of the species in the locality.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

As the areas of vegetation to be removed are located at the edges of patches of this community that are already located adjacent to the existing road alignment, the proposed action will not result in increased fragmentation of habitat for this species. This, combined with the highly mobile characteristic of the Brown Treecreeper, means that this habitat is unlikely to be important to the long-term survival of the species in the locality.

(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,

Similar or higher quality vegetation exists in adjacent land. As such, the habitat to be removed is not considered important to the long-term survival of these 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),

The proposal is unlikely to have an adverse effect on any declared area of outstanding biodiversity value.

(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 is part of the key threatening processes “clearing of native vegetation”, “removal of dead wood and dead trees” and “loss of hollow-bearing trees”.

Conclusion

The proposal is unlikely to have a significant impact on the Brown Treecreeper.

***Hieraaetus morphnoides* (Little Eagle)**

The Little Eagle is found throughout mainland Australia, with the exception of the most densely forested parts of the Great Dividing Range and escarpment. It occupies open Eucalypt forest and woodland, nesting in tall living trees within a remnant patch where it builds a large stick nest in winter. No Little Eagles have been recorded in the study area; however, the species has large home ranges and is likely to occasionally hunt over the study area.

(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,

The proposal has the potential to affect foraging through the removal of 6.67 ha of potential habitat for the species (all native vegetation) but is unlikely to impact on breeding: there are no large raptor nests in the site. Given that similar or better quality (less disturbed) habitat is widespread in the vicinity, the proposal is unlikely to place the local population at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological 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

(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,

NA

(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

6.67 ha of woodland or open forest will be removed.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

Although the proposal will result in the widening of Burra Road, this species is easily capable of crossing such a gap, and the proposal will not result in any fragmentation or isolation of 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 proposal will impact on 6.67 ha of potential habitat for the species, comprising 2.5% of the potential habitat (all native woodland or open forest) within 1 km of the study area. The local population of the species would extend well beyond the study area: similar or better quality (less disturbed) woodland habitat is widespread in the vicinity. The habitat to be removed is therefore unlikely to be important for 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),

The proposal is unlikely to have an adverse effect on any declared area of outstanding biodiversity value.

(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 is part of the key threatening processes "clearing of native vegetation".

Conclusion

On consideration of the factors above, the proposal is unlikely to have a significant impact on the Little Eagle.

***Miniopterus schreibersii oceanensis* (Eastern Bentwing-Bat)**

The Eastern Bentwing-bat roosts primarily in culverts, caves, pipes and other similar structures, and breeds only in substantial caves; however, it has also been recorded roosting in tree hollows. It forages in open forest and woodland. The study area constitutes potential foraging and roosting (but not breeding) habitat for this species. It should be noted that targeted searches for microchiropteran bats have not been undertaken at this site.

(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,

The proposal will not affect any breeding habitat for this species. Up to 37 hollow-bearing trees and 6.67 ha of potential foraging and roosting habitat will be removed, which represents 2.5% of the mapped extent of similar woodland and open forest habitat within 1 km of the study area (265 ha) and 0.08% within 10 km (8349 ha).

However, the habitat within the study area is considered marginal and does not contain the preferred habitat for this species (caves). It also does not include and is not near a maternity roost. If present, it is likely that the local population would extend well beyond the study area. Therefore, the proposal would be unlikely to place a local population at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological 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

(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,

NA

(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

As noted above, approximately 6.67 ha of foraging or roosting habitat and 37 hollow-bearing trees will be removed for the proposed action. This represents 2.5% of the potential habitat for the species in the vicinity, although it does not represent primary habitat.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

As the areas of habitat to be removed are located at the edges of patches of this community, which are already located adjacent to the existing road alignment, and the Eastern Bentwing-Bat is highly mobile, the proposed action will not result in increased fragmentation of habitat for this species.

(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 located immediately adjacent to much larger patches of native vegetation, and the species are highly mobile and able to traverse both the road and these larger areas of habitat. As such, the proposed action is unlikely to further fragment this habitat or to result in the removal of important foraging habitat.

(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),

The proposal is unlikely to have an adverse effect on any declared area of outstanding biodiversity value.

(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 is part of the key threatening processes “clearing of native vegetation”, “removal of dead wood and dead trees” and “loss of hollow-bearing trees”.

Conclusion

The proposal is unlikely to have a significant impact on the Eastern Bentwing-bat. However, the mitigation measures outlined in **Section 6** have been recommended to further reduce the potential impacts of the proposal on the species.

Appendix D EPBC Act Assessment of Significance

EPBC Significant impact criteria and assessment

This section provides an assessment of the potential significance of impacts from the proposed activity on Matters of National Environmental Significance (MNES). The EPBC Act Administrative Guidelines on Significance set out 'Significant Impact Criteria' that are to be used to assist in determining whether a proposed action is likely to have a significant impact on MNES. A 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts. MNES listed under the EPBC Act include:

- listed threatened species and ecological communities
- listed migratory species
- Wetlands of International Importance
- The Commonwealth marine environment
- World Heritage properties
- National Heritage places
- nuclear actions
- Great Barrier Reef
- a water resource, in relation to coal seam gas development and large coal mining development.

An action will require federal approval if the action has, will have, or is likely to have a significant impact on a species or community listed in any of the following categories:

- extinct in the wild
- critically endangered
- endangered
- vulnerable

Impact assessments were undertaken for six Migratory species:

- *Apus pacificus* (Fork-tailed Swift) (Migratory)
- *Ardea ibis* (Cattle Egret) (Migratory)
- *Hirundapus caudacutus* (White-throated Needletail) (Migratory)
- *Merops ornatus* (Rainbow Bee-eater) (Migratory)
- *Myiagra cyanoleuca* (Satin Flycatcher) (Migratory)
- *Rhipidura rufifrons* (Rufous Fantail) (Migratory)

Matters to be addressed	Impact (Commonwealth legislation)
(a) any environmental impact on a World Heritage Property;	NA: the proposed action does not impact on a World Heritage Property.
(b) any environmental impact on Wetlands of International Importance;	NA: The proposed action will not affect any part of a Ramsar Wetland.
(c) any impact on Commonwealth Listed Endangered Species or Communities	NA: the proposed action will not impact any Commonwealth Listed Endangered Species or Communities
(d) any impact on Commonwealth Listed Vulnerable Species;	NA: the proposed action will not impact any Commonwealth Listed Vulnerable Species.
(e) any environmental impact on Commonwealth Listed Migratory Species;	The Study Area provides potential foraging habitat for six migratory species: *Apus pacificus* (Fork-tailed Swift), *Ardea ibis* (Cattle Egret), *Hirundapus caudacutus* (White-throated Needletail), *Merops ornatus* (Rainbow Bee-eater), *Myiagra cyanoleuca* (Satin Flycatcher) and *Rhipidura rufifrons* (Rufous Fantail). The vegetation present is unlikely to provide breeding habitat for any of these species. The significant impact criteria in terms of migratory species are discussed below: **(a) substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species** The proposed action will remove or modify 6.67 ha of potential foraging habitat for these species. Due to the highly mobile nature of these species, the removal of this vegetation is unlikely to increase fragmentation or isolation. **(b) result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or** The proposed action is unlikely to introduce any invasive species. **(c) seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.** The proposed action does not impact breeding habitat, and the foraging habitat that will be impacted would form only a small fraction of the range for these species. The proposed action would affect substantially less than an ecologically significant proportion of the populations of these species, so is unlikely to result in a significant impact. Conclusion: Referral not required.
(f) does any part of the Proposal involve a Nuclear Action;	NA: the proposal does not involve a Nuclear Action.
(g) any environmental impact on a Commonwealth Marine Area;	NA: the proposed action will not impact on a Commonwealth Marine Area.
(h) In addition, any direct or indirect impact on Commonwealth lands	NA: the proposed action will not directly or indirectly impact on Commonwealth land.