APPENDIX 6
ADDENDUM BIODIVERSITY REPORT

Blue Springs Road Upgrade - Biodiversity Development Assessment Report

UPC/AC Renewables Australia

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Template 2.8.1

Executive Summary

Eco Logical Australia Pty Ltd (ELA) was commissioned by UPC\AC Renewables Australia (UPC) to prepare a Biodiversity Development Assessment Report (BDAR) under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Biodiversity Assessment Method (BAM) for the upgrade of Blue Springs Road near Stubbo, NSW – the Blue Springs Road Upgrade. UPC propose the Blue Springs Road Upgrade in association with the proposed Stubbo Solar Farm project in response to a submission from Mid-Western Regional Council.

This report has been prepared to meet the requirements of the Biodiversity Assessment Method (BAM) established under Section 6.7 of the BC Act. The accredited BAM assessor who prepared the assessment is Tom Schmidt (BAAS19034).

This BDAR has been applied by assessing a maximum development site footprint within which all direct impacts (both construction and operation) will occur. The proposed development involves widening approximately 5.5 km of existing road, with the impact footprint averaging 2-3 m on either side of the existing road.

UPC has designed the development site by taking steps to avoid, minimise and mitigate impacts to biodiversity values. The investigation area was initially surveyed in March 2021, and the proposed road design was refined to avoid and minimise impacts to areas of highest biodiversity value.

The proposed road upgrade (development site) covers 7 ha and includes the existing road and predominantly native roadside vegetation. The native vegetation is generally characterised by remnant canopy with a partly intact shrub and groundcover layer. Although common roadside exotic species are present within the immediate roadside area, most vegetation zones consist largely of native species, with minor areas highly modified by both historical and ongoing roadside disturbance activities.

Four Plant Community Types (PCTs) were recorded in the development site totalling 3.7 ha including:

- PCT 81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion (0.9 ha)
- PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (0.03 ha)
- PCT 281 - Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion (2.07 ha)
- PCT 1177 Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion (0.7 ha)

Two Threatened Ecological Communities (TECs) were recorded within the development site. Areas of PCT 81 conform to the *'Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions'* and '*Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia*' Endangered Ecological Community (EEC) listings under the BC Act and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Areas of PCT 266 and PCT 281 conform to the *'White Box - Yellow*

Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland' Critically Endangered Ecological Community (CEEC) listed under the BC Act and EPBC Act.

Flora and fauna habitats across the development site range in condition and attributes with the immediate roadside edges consisting of low quality habitat grading towards higher quality habitats in remnant roadside woodland. Assessment and survey of potential threatened species habitats recorded five threatened fauna species within or adjacent to the development site; Grey-crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*), Little Lorikeet (*Glossopsitta pusilla*), Dusky Woodswallow (*Artamus cyanopterus*), Diamond Firetail (*Stagonopleura guttata*) and Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*). All species are listed as Vulnerable under the BC Act. A number of threatened flora and fauna species have been assumed present within the development site as part of this assessment in accordance with the BAM. However, further targeted threatened species surveys are proposed during the appropriate survey season prior to development.

An assessment of the likely impacts of the project on aquatic ecology, including aquatic and riparian biodiversity and key fish habitats was undertaken.

An assessment of the impacts of the project on matters of national environmental significance (MNES) within the development site was undertaken to determine whether referral of the project to the Commonwealth Minister for the Environment is required. Assessments of significance were completed for two TECs and two threatened species. The assessment concluded that no significant impact to MNES is likely to result from the proposed development.

Impacts requiring offsets are:

- PCT 81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion. Mod-good (0.9 ha): requiring 40 credits.
- PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion. Mod-good (0.03 ha): requiring 1 credit.
- PCT 281 - Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion. Mod-good (2 ha): requiring 87 credits.
- PCT 281 - Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion. Low (0.07 ha): requiring 2 credits.
- PCT 1177 - Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion. Mod-good (0.7 ha): requiring 19 credits.
- *Acacia ausfeldii* (Ausfeld's Wattle) 3.7 ha; requiring 152 credits.
- *Diuris tricolor* (Pine Donkey Orchid) 3.7 ha; requiring 114 credits.
- *Grevillea wilkinsonii* (Tumut Grevillea) 3.7 ha; requiring 229 credits.
- Small Purple-pea (*Swainsona recta*) 3.7 ha; requiring 152 credits.
- Silky Swainson-pea (*Swainsona sericea*) 3.7 ha; requiring 152 credits.
- Major Mitchell's Cockatoo (*Lophochroa leadbeateri*) 3.7 ha; requiring 152 credits.
- Gang-gang Cockatoo (*Callocephalon fimbriatum*) 3.7 ha; requiring 152 credits.
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*) 3.7 ha; requiring 152 credits.
- Sloane's Froglet (*Crinia sloanei*) 3.7 ha; requiring 114 credits.

- Brush-tailed Phascogale (*Phascogale tapoatafa*) 3.7 ha; requiring 152 credits.
- Powerful Owl (*Ninox strenua*) 3.7 ha; requiring 152 credits.
- Barking Owl (*Ninox connivens*) (Breeding) 3.7 ha; requiring 152 credits.
- Superb Parrot (*Polytelis swainsonii*) 3.7 ha; requiring 152 credits.
- Masked Owl (*Tyto novaehollandiae*)) 3.7 ha; requiring 152 credits.

This BDAR has been prepared in accordance with the BAM. The development site has been designed to avoid and minimise impacts and is predominately located in disturbed roadside. The residual impact of the proposed development requires 149 ecosystem credits and 2,129 species credits.

A summary of the combined residual impacts of the Stubbo Solar Farm and Blue Springs Road Upgrade is 236 ecosystem credits and 2,195 species credits.

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Abbreviations

Abbreviation	Description
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Credit Calculator
BC Act	NSW Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
BSSAR	Biodiversity Stewardship Site Assessment Report
CEEC	Critically Endangered Ecological Community
DNG	Derived Native Grassland
DoEE	Commonwealth Department of Environment and Energy
DPE	NSW Department of Planning and Environment
EEC	Endangered Ecological Community
ELA	Eco Logical Australia Pty Ltd
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
FM Act	NSW Fisheries Management Act 1994
GDE	Groundwater Dependent Ecosystems
GIS	Geographic Information System
GPS	Global Positioning System
HBT	Hollow-bearing Tree
IBRA	Interim Biogeographic Regionalisation for Australia
LGA	Local Government Area
LLS	Local Land Service
NSW	New South Wales
NOW	NSW Office of Water
OEH	NSW Office of Environment and Heritage

Abbreviation	Description
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SSF	Stubbo Solar Farm
SSI	State Significant Infrastructure
TEC	Threatened Ecological Community
UPC\AC	UPC\AC Renewables Australia
VIS	Vegetation Information System
WM Act	NSW Water Management Act 2000

1. Introduction

1.1. Purpose of this report

Eco Logical Australia Pty Ltd (ELA) was commissioned by UPC\AC Renewables Australia (UPC\AC) to prepare a Biodiversity Development Assessment Report (BDAR) under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Biodiversity Assessment Method (BAM 2020) to assess the proposed Blue Springs Road upgrades as part of the Stubbo Solar Farm (SSF) State Significant Development (SSD-10452). An Environmental Impact Statement (EIS) for the SSF has been prepared and exhibited, and this road upgrade BDAR will form part of an Amendment Report to the EIS.

This BDAR assesses the impacts of the Blue Spring Road Upgrade and also provides a summary of the overall biodiversity impacts of the project (Stubbo Solar Farm and Blue Springs Road Upgrade).

This BDAR has been prepared by Tom Schmidt, who is an Accredited Person (BAAS19034) under the BC Act. The contents of this BDAR complies with the minimum requirements outlined in the BAM (2020).

This BDAR has been applied by assessing a maximum potential development site footprint within which all direct impacts (both construction and operation) will occur.

Species credit calculations assume presence of several species across all areas (worst case scenario). Further surveys at the relevant season will allow this assessment to be refined. UPC\AC may request the Secretary to refine the offset requirements prior to construction commencement following additional targeted survey.

Ecosystem credit calculations are based on the current design as included in the amendment report (worst case scenario). UPC\AC may request the Secretary to refine the offset requirements based on the final detailed design (road upgrades and Solar Farm) prior to construction commencement.

1.2. Project description

The proposed project is located approximately 10 km north east of Gulgong in the Mid-Western Regional Council Local Government Area (LGA), within the NSW South Western Slopes Bioregion (**Figure 1**).

The Blue Springs Road Upgrade is designed for increasing the safety and load capacity of the existing road to cater for trucks during the installation period of the proposed SSF. Mid-Western Regional Council have requested UPC\AC upgrade the 5.5 km length of road to be 7 m wide bitumen plus a 1 m gravel shoulder on each side in accordance with the AusRoads Standards. The existing road averages approximately 6 m in width and is tarred and in good condition. UPC\AC propose to include an upgrade of Blue Springs Road (from the Cope Rd intersection to 100 m north of the TransGrid easement access point of the proposed SSF) as part of the overall SSF project.

1.2.1. Study area and development site

The study area consists of the Blue Springs Road reserve extending for approximately 5.5 km from the intersection with Cope Road in the south, to approximately 100 m north of the north east access point of the proposed Stubbo Solar Farm. The land is predominately zoned RU1 – Primary Production (under Mid-Western Regional LEP 2012), with the southern quarter zoned R5 – Large Lot Residential. The study

area is characterised by remnant road reserve woodlands, with some disturbed roadside areas and Cope State Forest which is present in central portion of the study area.

The development site covers 7 ha and includes the existing road and adjacent roadside areas required for the road upgrade including all direct impact areas (Figure 2). The development site is characterised by the edges of moderate-good condition native roadside vegetation with remnant trees (Plate 1), low condition native roadside vegetation with an absent overstory (Plate 2) and areas of highly modified non-native vegetation with no remnant trees (Plate 3). Following consultation with Mid-Western Regional Council, the proposed design has been developed to avoid and minimize impacts to biodiversity and places the majority of the development site within the existing formed road and previously disturbed roadside edge and table drain, with incursion outside the existing road surface generally less than 3 m.

Plate 1: General view of the development site showing areas of moderate-good condition native roadside vegetation.

Plate 2: General view of the development site showing areas of low condition native roadside vegetation.

Plate 3: General view of the development site showing areas of cleared/highly disturbed non-native vegetation.

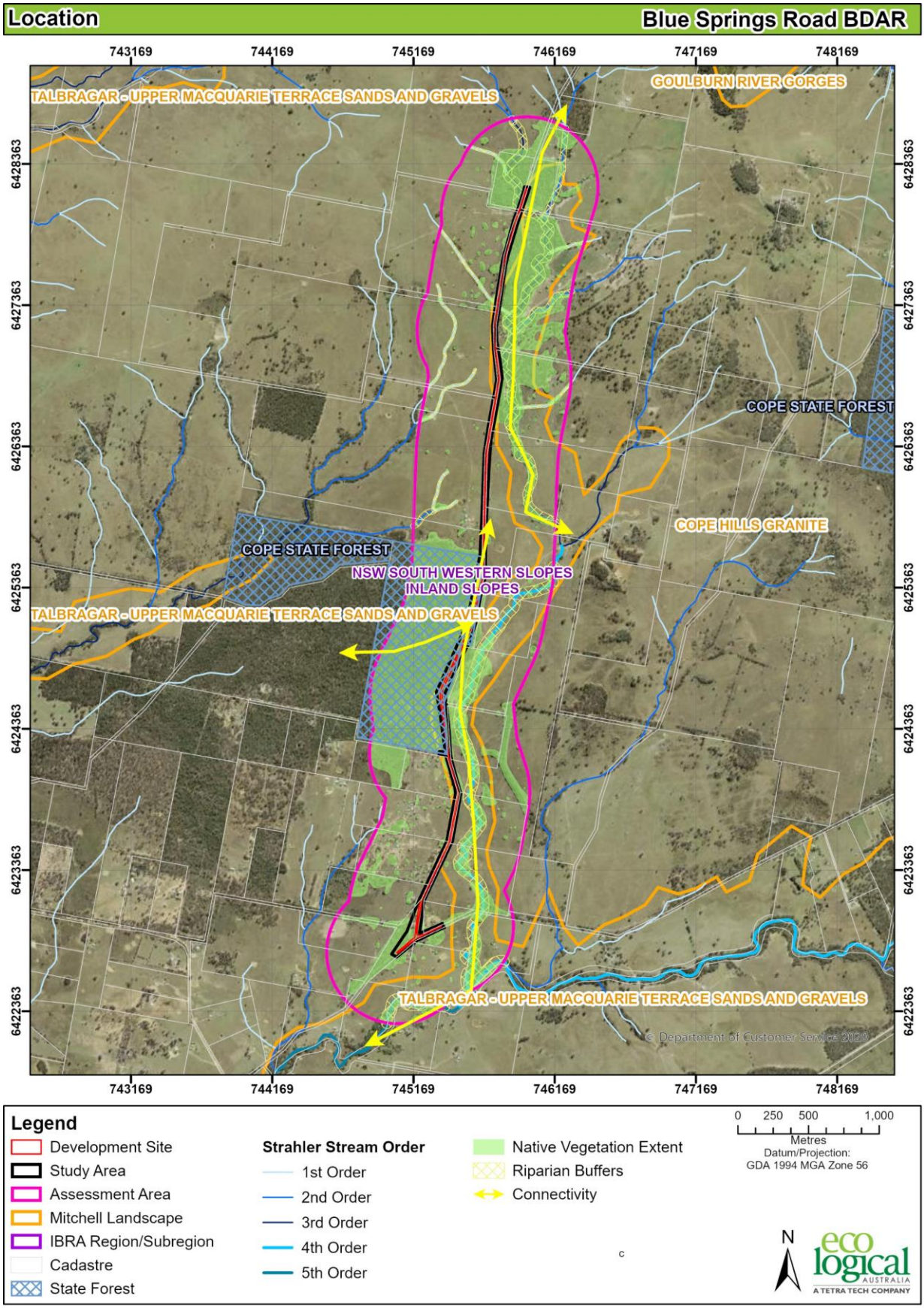

Figure 1: Location Map

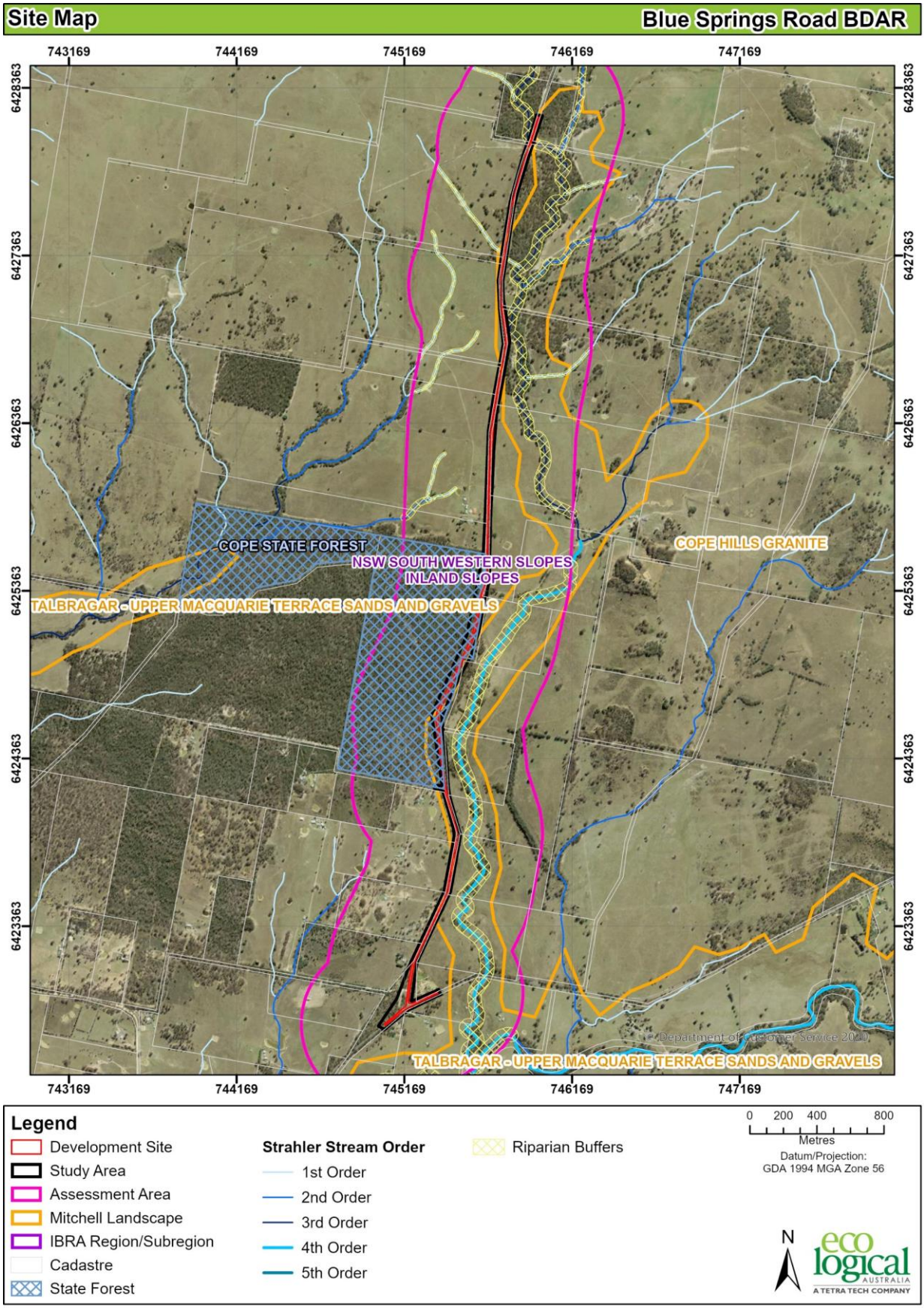

Figure 2: Site Map

1.3. Landscape Assessment

The development site occurs within gently undulating lower slopes and flats associated with Cope Creek, a second order watercourse that drains southward adjacent to the Blue Springs Road, with elevation ranging from approximately 450 m in the south to 520 m in the north. The landscape assessment utilised the following inputs, as presented on Figure 1.

Table 1 Development site landscape features

Landscape feature	Result
IBRA Region	NSW South Western Slopes
IBRA Subregion	Inland Slopes
NSW Landscape	Cope Hills Granite Talbragar - Upper Macquarie Terrace Sands and Gravels
Native Vegetation Extent	246 ha native vegetation in 659 ha assessment area = 38%
Percent native vegetation within the landscape (500 m buffer)	38%
Rivers and Streams	Unnamed third order drainage line mapped through northern extent, and unnamed and unmapped drainage line in close proximity of the southern extent.
Wetlands	None present
Connectivity features	Native vegetation
Areas of geological significance and soil hazards	No areas of geological significance such as karsts, caves, crevices or cliffs. All soil landscapes are considered to have a high to very high erosion hazard. Within the development site gully erosion is present in some roadside drainage lines.
Outstanding Areas of Biodiversity Value (AOBV)	None present

1.3.1. Connectivity features

Woodland and forest vegetation within the development site generally have moderate to high habitat connectivity. Ranging from narrow degraded roadside areas adjoined by grazing and residential lands (Plate 3), to higher condition areas adjoining larger intact reserves (Plate 1). The development site in general represents a linear area of vegetation dissecting several significant areas of woodland and an important habitat corridor within the area (Figure 2), with the potential to facilitate movement of threatened species across their local range.

1.4. Site context

The linear based method has been applied to this development. Due to the connectivity of the roadside vegetation, patch size for each patch was conservatively assessed as 101 ha (i.e. the maximum) for all patches.

1.5. Native vegetation

1.5.1. Survey effort

Preliminary vegetation survey was undertaken by ELA ecologists David Allworth on 12 March 2021, which involved the collection of Rapid Data Points (RDPs) to identify Plant Community Types (PCTs) and delineation of PCT boundaries, vegetation zones and refine vegetation mapping. This information was

used to refine the development site to avoid and minimise impacts to biodiversity values within the development site.

Vegetation integrity surveys were undertaken within the development site by ELA ecologists Tom Schmidt and Shawn Ryan on 29 and 30 March 2021 (Figure 3). A total of 10 full-floristic vegetation plots were undertaken in accordance with the BAM to identify PCTs and Threatened Ecological Communities (TECs) (Table 8). The survey event collected plot data to assess vegetation integrity within the roadside easement area or adjacent areas commensurate to the vegetation within the roadside easement. Areas of moderate-good condition (total of 3.63 ha) and low condition (total of 0.07 ha) native vegetation are present within the final development footprint.

Areas of roadside woodland vegetation remaining as a thin strip between the road and paddocks were considered to be in moderate condition, with areas that adjoin other woodland areas beyond the narrow road reserve representing good condition. Areas of moderate condition were generally <5 m wide and unsuitable to complete a plot. As such, plots were completed within good condition areas and those results assigned to the merged moderate-good condition zone for the relevant PCT. This is considered a conservative approach as it assigns a higher vegetation integrity condition score to the moderate condition parts of the zone.

Due to the linear and narrow nature of the development site generally extending less than 5 m from the existing road edge, plots were undertaken including the development site where possible, but also including the in the broader study area adjacent to the road. As such, the plots generally surveyed higher quality vegetation further from the existing road. The scores from all plots were utilised in calculating the vegetation integrity scores used in the assessment and are representative of the broader patch condition. The majority of the proposed impacts will occur within the existing disturbed shoulder, therefore this is considered to be a conservative approach. All areas of canopy over the road were also mapped as part of vegetation zones.

All field data collected at the full-floristic and vegetation integrity plots is included in Appendix B.

1.5.2. Plant Community Types present

A total of four PCTs and six vegetation zones were identified on the development site (Figure 4 - Figure 6). Of these, three PCTS represent listed TECs under the BC Act and EPBC Act (Table 8, Figure 7). Vegetation zone profiles and descriptions are provided in Table 2- Table 6. These tables also include justification for the selection of PCTs occurring on the development site based on a quantitative analysis of full-floristic plot data.

Table 2: PCT 81 (Mod-good) - Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion

PCT 81 Mod-good			
Vegetation formation/class/structure	Floodplain Transition Forest / Grassy Woodlands / Woodland		
Conservation status	BC Act: EEC EPBC Act: EEC		
	This zone is characterised by remnant canopy with a partly intact shrub and groundcover layer. Although common roadside exotic species are present within the immediate roadside area, this zone consists largely of native species. This zone within the development site has generally suffered some level of indirect roadside disturbance but canopy regeneration is present. This zone occurs within the development site as narrow strips of road reserve vegetation and as intact patches of adjoining woodland areas, such as Cope State Forest.		
Characteristic canopy trees	*Eucalyptus microcarpa* (Western Grey Box)*, E. albens* (White Box)*, E. melliodora* (Yellow Box) and *Callitris glaucophylla* (White Cypress Pine).		
Characteristic mid-storey	*Acacia decora* (Western Silver Wattle), *Cassinia sifton* (Sifton bush) and *Melichrus urceolatus* (Urn Heath)		
Characteristic groundcovers	*Themeda triandra* (Kangaroo Grass), *Aristida* ssp.*, Eremophila debilis* (Amulla), *Austrostipa* spp. and *Calotis cuneifolia* (Purple Burr-Daisy).		
Mean native richness	39		
Exotic species / HTW cover	0.8-4.3 % within plots. Higher in immediate roadside edge.		
Condition	Moderate-good		
Variation and disturbance	This zone is characterised by remnant canopy with a partly intact understorey that is dominated by native species and moderate occurrence of exotic species. This zone also includes isolated trees and groups of trees within disturbed roadside areas and adjoining intact forested areas.		
% cleared in NSW	78		
No. sites sampled	2 Plots (Plots 4 and 8)		
Fauna habitats	Hollow bearing trees, flowering eucalypts. Fallen logs are present in some patches.		
Composition	Structure	Function	Vegetation Integrity Score
93.6	84.6	89	89
PCT selection justification	The vegetation in the study area is a grassy woodland in the Inland Slopes subregion dominated by *Eucalyptus microcarpa*. Characteristic species from all strata were present including *Acacia decora* in the mid-storey and eight characteristic ground cover species.		

Table 3: PCT 266 (Mod-good) - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

PCT 266 Mod-good			
Vegetation formation/class/structure	Western Slopes Grassy Woodlands / Grassy Woodlands / Woodland		
Conservation status	BC Act: CEEC EPBC Act: CEEC where condition thresholds are met.		
	This community occurs only within the central area of the development site. This zone is characterised by remnant canopy with a partly intact understorey. The groundcover layer has generally suffered from some level of indirect roadside disturbance, but canopy regeneration is present. This zone, within the development site, occurs as road reserve vegetation and as intact patches of adjoining woodland areas.		
Characteristic canopy trees	*Eucalyptus albens* (White Box), *Brachychiton populneus* subsp. *populneus* (Kurrajong) and *Callitris glaucophylla* (White Cypress Pine).		
Characteristic mid-storey	*Acacia decora* and *Acacia falciformis* (Hickory wattle)		
Characteristic groundcovers	*Themeda triandra* (Kangaroo Grass), *Aristida* ssp., *Austrostipa* spp. and *Calotis lappulacea* (Yellow Burr-Daisy).		
Mean native richness	50		
Exotic species / HTW cover	0.5%		
Condition	Moderate-good		
Variation and disturbance	This zone is characterised by remnant canopy with a moderately degraded understorey that contains a mixture of native and exotic species. This zone includes isolated trees and small groups of trees within disturbed roadside areas and intact patches of adjoining forested areas.		
% cleared in NSW	94		
No. sites sampled	One plot (Plot 2)		
Fauna habitats	Hollow bearing trees, flowering eucalypts. Fallen logs are present in some patches.		
Composition	Structure	Function	Vegetation Integrity Score
98.7	100	88.3	95.5
PCT selection justification	The vegetation in the study area is a tall grassy woodland in the Inland Slopes subregion dominated by *Eucalyptus albens* with *Brachychiton populneus* subsp. *populneus*. Characteristic species from all strata were present including *Acacia decora* in the mid-storey and eight characteristic ground cover species.		

Table 4: PCT 281 (Mod-good) - Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion

PCT 281 Mod-good			
Vegetation formation/class/structure	Western Slopes Grassy Woodlands / Grassy Woodlands / Woodland		
Conservation status	BC Act: CEEC. EPBC Act: CEEC where condition thresholds are met		
	This zone is characterised by remnant canopy with a partly intact shrub and groundcover layer, although exotic species are also abundant. This zone, within the development site, has generally suffered from some level of historic clearing or associated roadside disturbance but is regenerating. This community occurs within the development site as narrow strips of road reserve vegetation.		
Characteristic canopy trees	*Angophora floribunda* (Rough-barked Apple), *Eucalyptus blakelyi* (Blakely's Red Gum), *E. melliodora* (Yellow Box)		
Characteristic mid-storey	*Acacia implexa*, *Cassinia sifton*, *Acacia decora*.		
Characteristic groundcovers	*Aristida ramosa*, *Austrostipa* spp., *Arundinella nepalensis*, *Calotis lappulacea*, *Cheilanthes* ssp., *Wahlenbergia* spp.		
Mean native richness	32		
Exotic species / HTW cover	0-0.3 within plots. Higher on immediate roadside.		
Condition	Moderate-good		
Variation and disturbance	This zone is characterised by remnant canopy with a degraded understorey that contains a mixture of exotic and native species. This zone includes isolated trees and small groups of trees within disturbed roadside areas.		
% cleared in NSW	67		
No. sites sampled	3 sites (Plots 5, 9 and 10)		
Fauna habitats	Hollow bearing trees, flowering eucalypts. Fallen logs are present in some patches within the development footprint and the broader study area.		
Composition	Structure	Function	Vegetation Integrity Score
97.6	94.9	71.4	87.1
PCT selection justification	The vegetation in the study area is a grassy woodland in the Inland Slopes subregion dominated by *Eucalyptus blakelyi, Eucalyptus melliodora and Angophora floribunda*. Characteristic species from all strata were present including 12 characteristic ground cover species.		

Table 5: PCT 281 (Low) - Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion

PCT 281 Low			
Vegetation formation/class/structure	Western Slopes Grassy Woodlands / Grassy Woodlands / Woodland		
Conservation status	BC Act: CEEC. EPBC Act: CEEC		
	This zone is characterised by an absent or sparse canopy with a partly intact shrub and groundcover layer, although exotic species are also abundant. This zone, within the development site, has generally suffered from higher levels of clearing or roadside disturbance but is regenerating. This zone occurs within the development site as narrow strips of road reserve vegetation and connected patches of derived native grasslands.		
Characteristic canopy trees	Absent in derived native grassland areas. *Angophora floribunda* (Rough-barked Apple), *Eucalyptus blakelyi* (Blakely's Red Gum), *E. melliodora* (Yellow Box) in adjacent intact and regenerating areas.		
Characteristic mid-storey	*Acacia spectabilis* (Mudgee Wattle), *Cassinia sifton* (Sifton bush) and *Acacia decora*.		
Characteristic groundcovers	*Aristida* ssp., *Themeda triandra* (Kangaroo Grass), *Setaria* ssp., *Cheilanthes* ssp., *Acaena novae-zelandiae* (Bidgee-widgee).		
Mean native richness	20		
Exotic species / HTW cover	0.1-9.1%		
Condition	Low		
Variation and disturbance	This zone is characterised by derived native grassland containing a mixture of exotic and native species. Occasional regenerating trees are present.		
% cleared in NSW	67		
No. sites sampled	2 Plots (Plots 6 and 7)		
Fauna habitats	Hollow bearing trees, flowering eucalypts. Fallen logs are present in some patches within the development footprint and the broader study area.		
Composition	Structure	Function	Vegetation Integrity Score
83.6	59.7	29.2	52.7
PCT selection justification	Based on location and similar groundcovers to adjacent more intact areas of this PCT.		

Table 6: PCT 1177 (Mod-good) - Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion

PCT 1177 Mod-good			
Vegetation formation/class/structure	Southern Tableland Dry Sclerophyll Forests/ Dry Sclerophyll Forests (Shrubby sub-formation)/ Grassy Woodlands / Woodland		
Conservation status	BC Act: Not Listed EPBC Act: Not Listed		
	This zone is characterised by remnant canopy with a naturally sparse shrub and groundcover layer. Although common roadside exotic species are present within the immediate roadside area, this zone consists largely of native species. This community occurs within the development site as narrow isolated strips of road reserve vegetation and also as part of larger patches connected to adjoining intact forested areas.		
Characteristic canopy trees	*Eucalyptus dawsonii* (Slaty Gum), *E. macrorhyncha* (Red Stringybark) and *E. melliodora* (Yellow Box)		
Characteristic mid-storey	*Cassinia sifton* (Sifton bush), *Acacia decora* and *Melichrus urceolatus* (Urn Heath)		
Characteristic groundcovers	*Aristida ramosa*, *Austrostipa* spp., *Cheilanthes* ssp., *Lomandra filiformis*, *Wahlenbergia* spp.		
Mean native richness	32		
Exotic species / HTW cover	0-0.1 in plots. Higher is immediate roadside area.		
Condition	Moderate-good		
Variation and disturbance	This zone is characterised by remnant canopy with a naturally sparse shrub layer and a degraded understorey relative to the proximity to the roadside. The understorey is predominately native with a moderate occurrence of exotic species. This zone includes isolated trees and groups of trees within disturbed road reserve vegetation and intact adjoining forested areas.		
% cleared in NSW	65		
No. sites sampled	2 sites (Plots 1 and 3)		
Fauna habitats	Hollow bearing trees, flowering eucalypts. Fallen logs are present in some patches within the development footprint and the broader study area.		
Composition	Structure	Function	Vegetation Integrity Score
97.8	35.6	71.5	62.9
PCT selection justification	The vegetation in the study area is a grassy woodland in the Inland Slopes subregion dominated by *Eucalyptus dawsonii* and occasional *Eucalyptus macrorhyncha*. Characteristic species from all strata were present including *Hibbertia obtusifolia* and *Melichrus urceolatus* in the mid-storey and *Hydrocotle laxiflora* in the groundcover.		

Table 7: Cleared/ non-native vegetation

Cleared/ non-native vegetation			
Vegetation formation/class/structure	Not applicable		
Conservation status	Not listed		
	Areas of cleared/ non-native vegetation within the development site no longer conform to any PCT. These areas have been cleared of canopy and mid-storey. The groundcover has been modified through roadside related impacts and further influenced by adjoining pastural and grazing lands. These areas are dominated by exotic grassy species and native canopy regeneration is absent. Scattered native grasses and forbs are occasionally present.		
Characteristic canopy trees	Not present.		
Characteristic mid-storey	Not present.		
Characteristic groundcovers	Exotics: *Paspalum dilatatum* (Paspalum), *Eragrostis curvula* (Weeping Lovegrass), *Setaria parviflora*, *Lepidium spp.* (Peppergrasses), *Verbena* ssp., *Conyza* ssp., *Hypericum perforatum* (St John's Wort) and *Bidens subalternans* (Greater Beggar's Ticks).		
Exotic species / HTW cover	As listed above		
Condition	Very low – not representative of a native plant community type		
Variation and disturbance	Includes cleared/ highly disturbed roadside areas and exotic grasslands.		
% cleared in NSW	n/a		
No. sites sampled	n/a		
Fauna habitats	Limited habitat opportunities.		
Similar PCTs	n/a		
Composition	Structure	Function	Vegetation Integrity Score
n/a	n/a	n/a	n/a

1.5.3. Threatened Ecological Communities

Two TECs were recorded in the development site. All areas of PCT 81 conform to the *Inland Grey Box Woodland* EEC listings under the BC Act and EPBC Act. All areas of PCT 266 and PCT 281 conform to the *'White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland'* CEEC listings under the BC Act and EPBC Act (Table 8). Disturbed roadside remnants are still considered to form part of the community including remnants where the vegetation, either understorey, overstorey or both, would, under appropriate management, respond to assisted natural regeneration, such as where the natural soil and associated seed bank are still at least partially intact (NSW Scientific Committee 2011).

Table 8: PCTs, vegetation zones, TECs and BAM requirements

Veg Zone	PCT ID	PCT Name	BC Act listing	TEC name	EPBC Act Listing	TEC name	Percent cleared (since pre-European)	Condition (onsite)	Area (ha) (within development site)	Plots required	Plots surveyed
1	81	Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	EEC	*Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions*	EEC	*Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia*	78	Moderate-good	0.9	2	2
2	266	White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	CEEC	*White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions*	CEEC	*White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*	94	Moderate-good	0.03	2	2
3	281	Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	CEEC	*White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions*	CEEC	*White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*	67	Low	0.07	1	1

Veg Zone	PCT ID	PCT Name	BC Act listing	TEC name	EPBC Act Listing	TEC name	Percent cleared (since pre-European)	Condition (onsite)	Area (ha) (within development site)	Plots required	Plots surveyed
4	281	Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	CEEC	*White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions*	CEEC	*White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*	67	Moderate-good	2	2	3
5	1177	Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion	Not listed	n/a	Not Listed	n/a	65	Moderate-good	0.7	2	2
6	n/a	Cleared/non-native vegetation	n/a	n/a	n/a	n/a	n/a	n/a	0.1	n/a	n/a
Total										**9**	**10**

1.5.4. Vegetation integrity assessment

A vegetation integrity assessment using the BAM Credit Calculator (BAMC) was undertaken and the results are outlined in Table 9.

Table 9: Vegetation integrity

Veg Zone	PCT ID	Condition	Area (ha)	Composition Condition Score	Structure Condition Score	Function Condition Score	Current vegetation integrity score
1	81	Mod-good	0.9	93.6	84.6	89	89
2	266	Mod-good	0.03	98.7	100	88.3	95.5
3	281	Mod-good	2	97.6	94.9	71.4	87.1
4	281	Low	0.07	83.6	59.7	29.2	52.6
5	1177	Mod-good	0.7	97.8	35.6	71.5	62.9

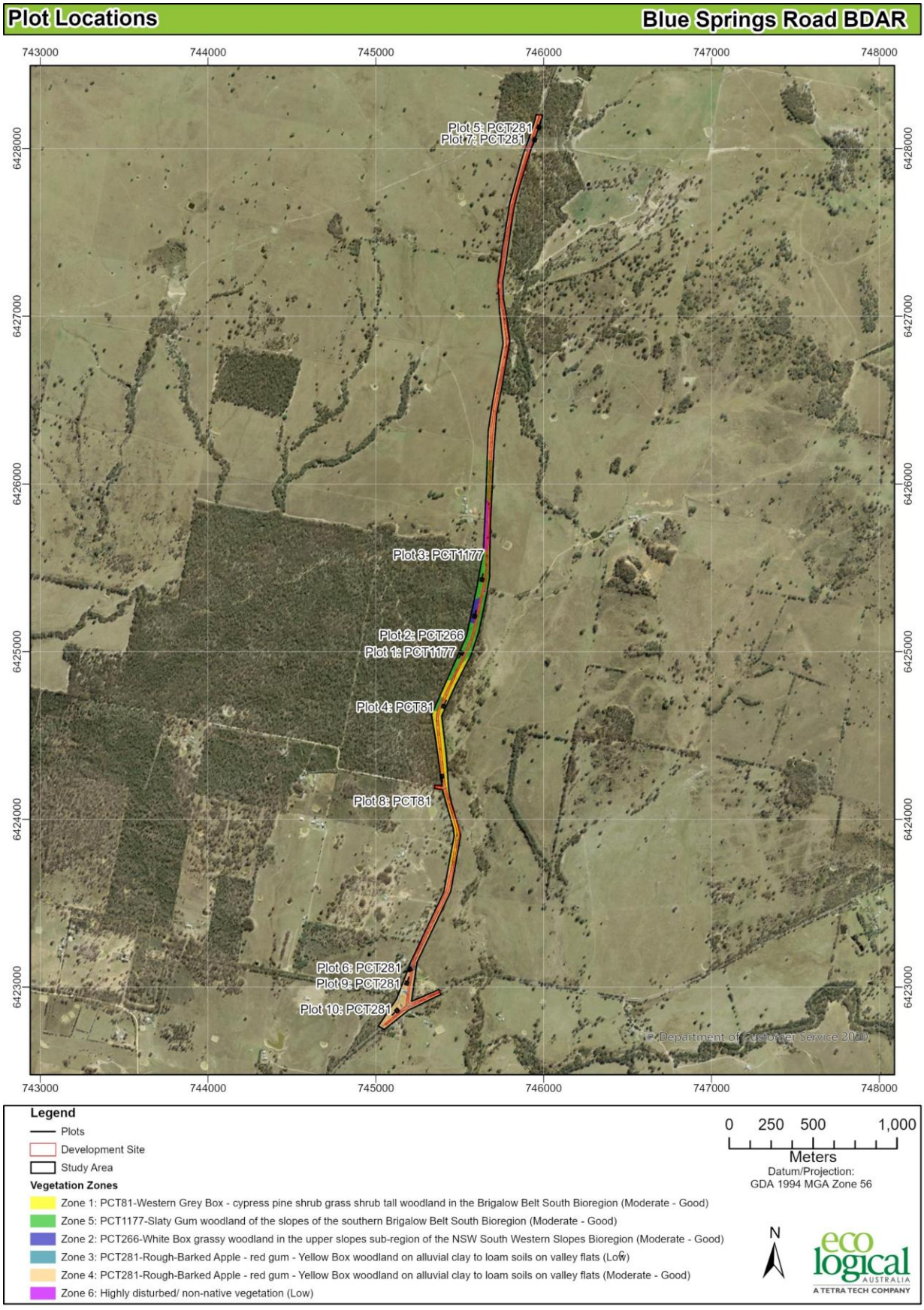

Figure 3: Survey Effort

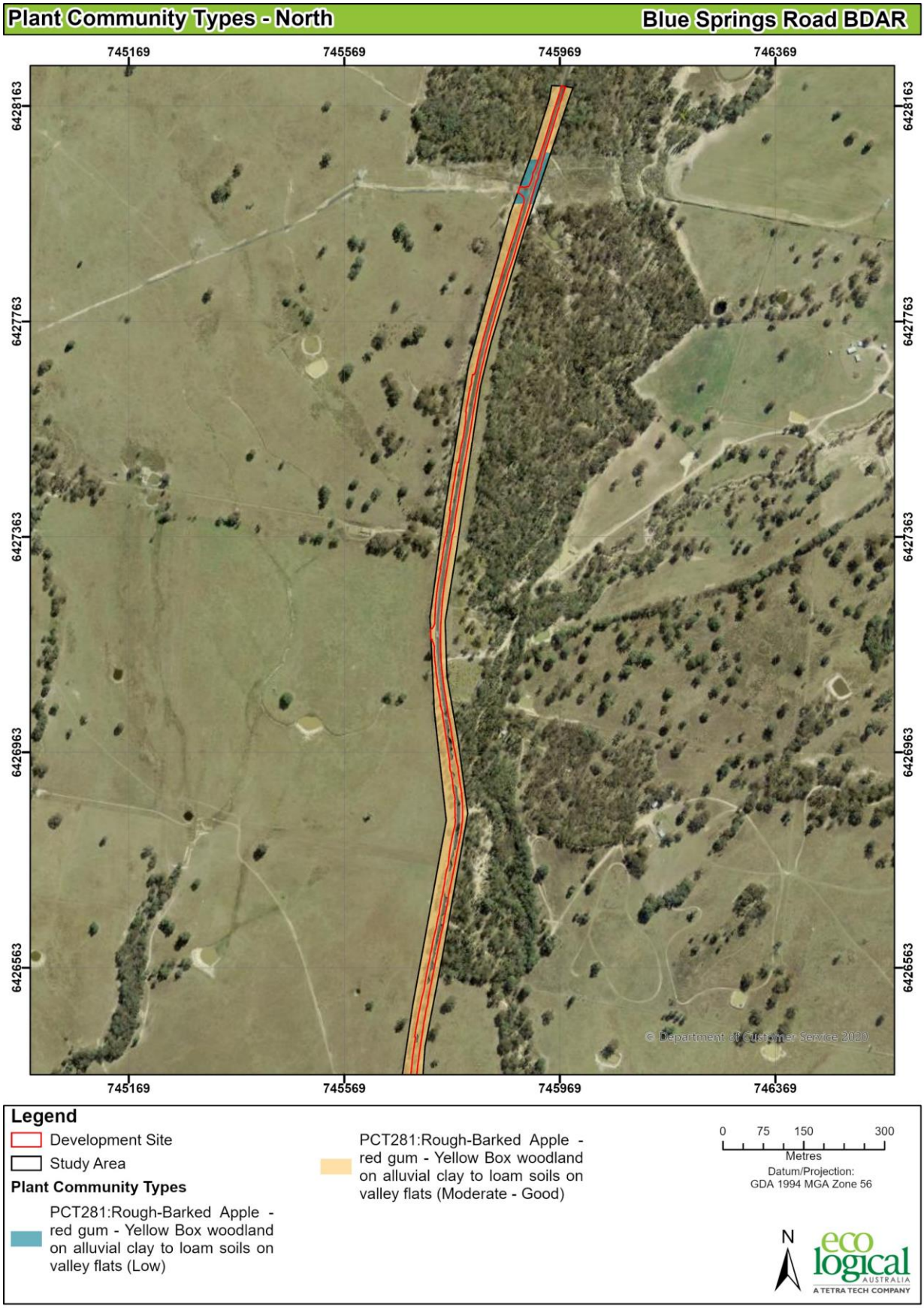

Figure 4: Plant Community Types (North)

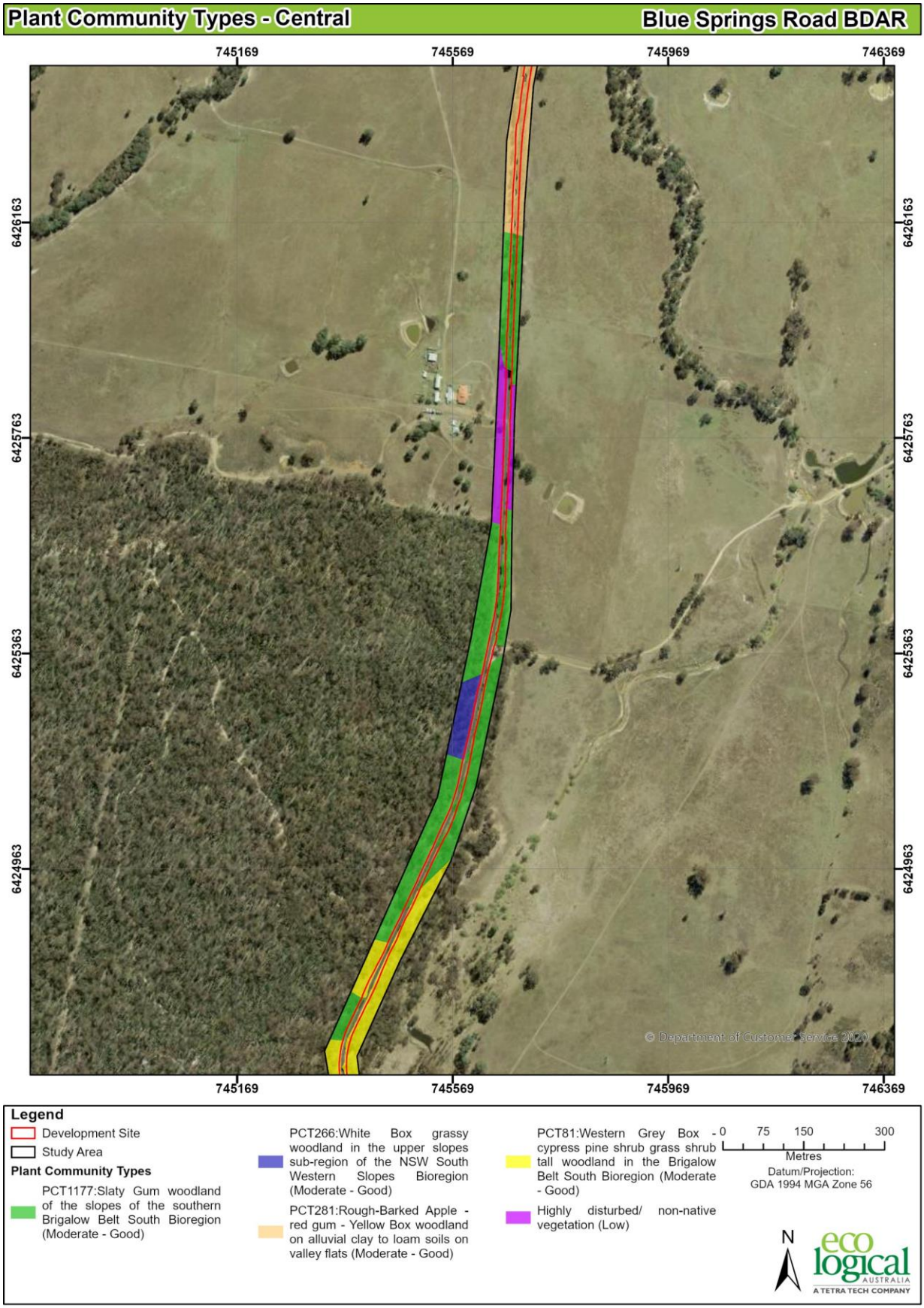

Figure 5: Plant Community Types (Central)

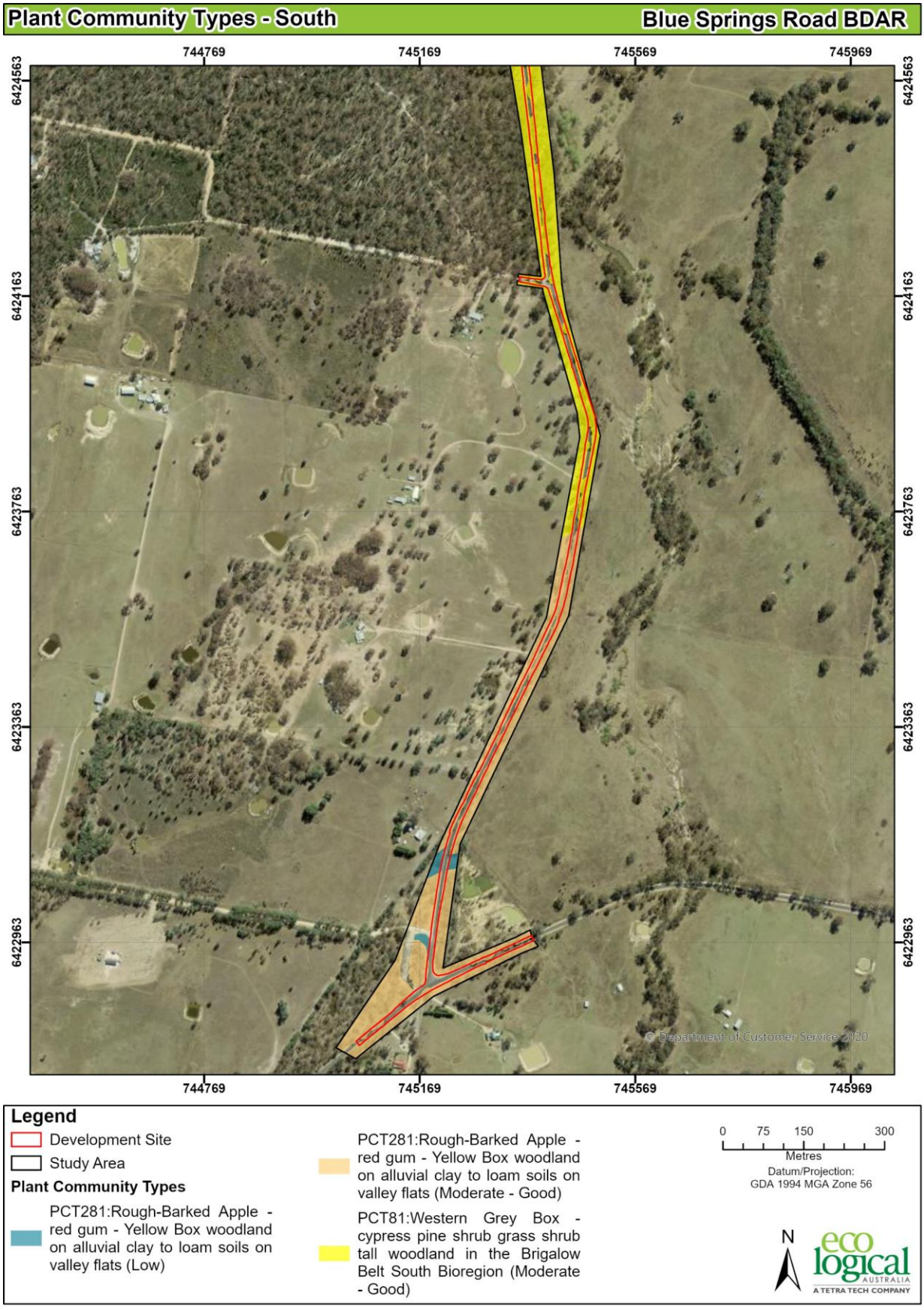

Figure 6: Plant Community Types (South)

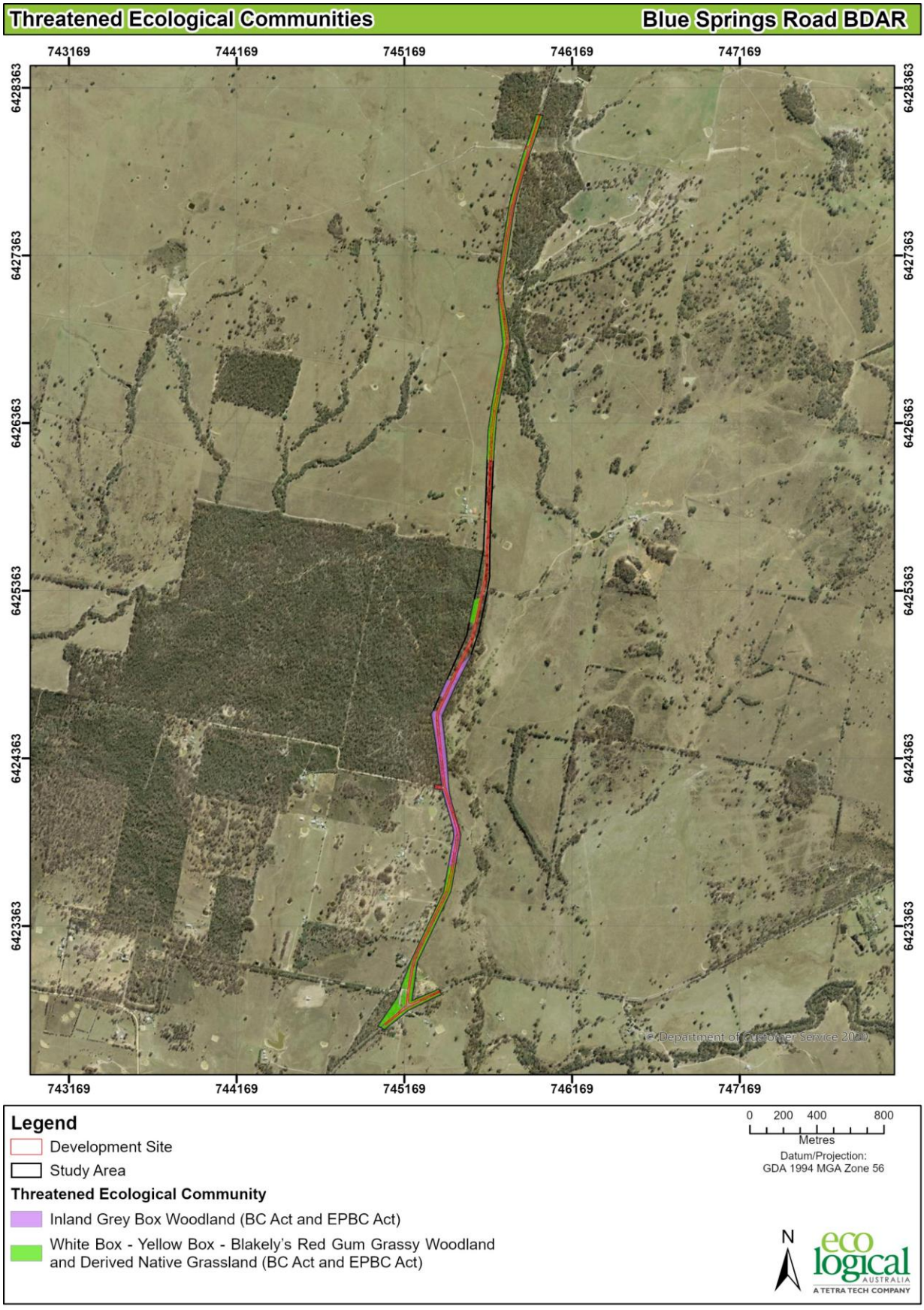

Figure 7: Threatened Ecological Communities

1.6. Threatened species

1.6.1. Fauna habitats

Fauna habitats were assessed concurrent with vegetation surveys. Fauna habitats within the development site include grassy woodland and forest in varying condition, cleared/highly disturbed non-native roadside vegetation, and ephemeral drainages.

1.6.1.1. Woodlands and Forests

Woodland and forest areas vary from low to moderate-good condition within the development site and contain seasonal flower resources, trees with hollows and fallen timber. In general, woodland and forest of the roadside area has a sparse mid-storey, and the groundcover is moderately degraded with some tussock grasses and other significant habitat features (Plate 4). Scattered throughout are numerous hollow-bearing trees containing small-medium (<5-10 cm) hollows. Common woodland birds such as Eastern Rosella (*Platycercus eximius*) and Red-winged Parrot (*Aprosmictus erythropterus*) were observed using hollows. Several large hollows (>20 cm) were observed within higher condition woodland. These areas have more shrubs and a higher diversity of native groundcover species and are limited to wider road reserve areas that adjoin intact continuous habitat (Plate 5).

In general, the development site represents a linear area of vegetation dissecting several significant areas of woodland and forest in an otherwise highly cleared landscape. As such, the vegetation within the road reserve provides an important habitat corridor within the local area (Figure 2).

1.6.1.2. Ephemeral drainage lines

Two unnamed ephemeral drainage lines are present, one a third order (across the northern extent) and one a second order (in close proximity to southern extent). These areas present moderate habitat for amphibian and bird species. Habitat quality is moderate owing to low to zero flow, moderate occurrence of emergent and surrounding vegetation cover (Plate 6).

1.6.1.3. Key Fish Habitat

The development site intersects mapped Key Fish Habitat at three locations (Figure 8). On the ground, only the most northern location of mapped Key Fish Habitat has a drainage line intersecting the development site. In the other locations the drainage line is not within the development site.

The northern crossing is an ephemeral drainage line with an existing concrete culvert under the road, presenting low quality habitat for aquatic species.

1.6.1.4. Threatened aquatic species

The development site does not contain any areas of mapped distribution of threatened aquatic species. The indicative distribution of the Purple Spotted Gudgeon (*Mogurnda adspersa*), listed as endangered under the NSW *Fisheries Management Act 1994* (FM Act), is mapped near the development site (Figure 8).

Purple Spotted Gudgeon is a benthic species that can be found in a variety of habitat types such as rivers, creeks and billabongs with slow-moving or still waters or in streams with low turbidity. Cover in the form of aquatic vegetation, overhanging vegetation from river banks, leaf litter, rocks or snags are important for the species. No suitable habitat for Purple Spotted Gudgeon is present within the development site.

1.6.1.5. Cleared/highly disturbed non-native vegetation

Cleared and highly disturbed non-native vegetation (Plate 7) dominate several areas of the development site and present limited habitat opportunities, primarily providing foraging habitat for common farmland birds such as Magpie Lark (*Grallina cyanoleuca*), Australian Magpie (C*racticus tibicen*) and Nankeen Kestrel (*Falco cenchroides*).

Plate 4: Typical moderate condition woodland habitat with mature scattered trees, an absent mid-storey and degraded groundcover.

Plate 5: Typical high condition woodland habitat, adjoining more intact and continuous habitat.

Plate 6: Ephemeral drainage line/pond within close proximity of the development site.

Plate 7: Typical cleared non-native roadside habitat

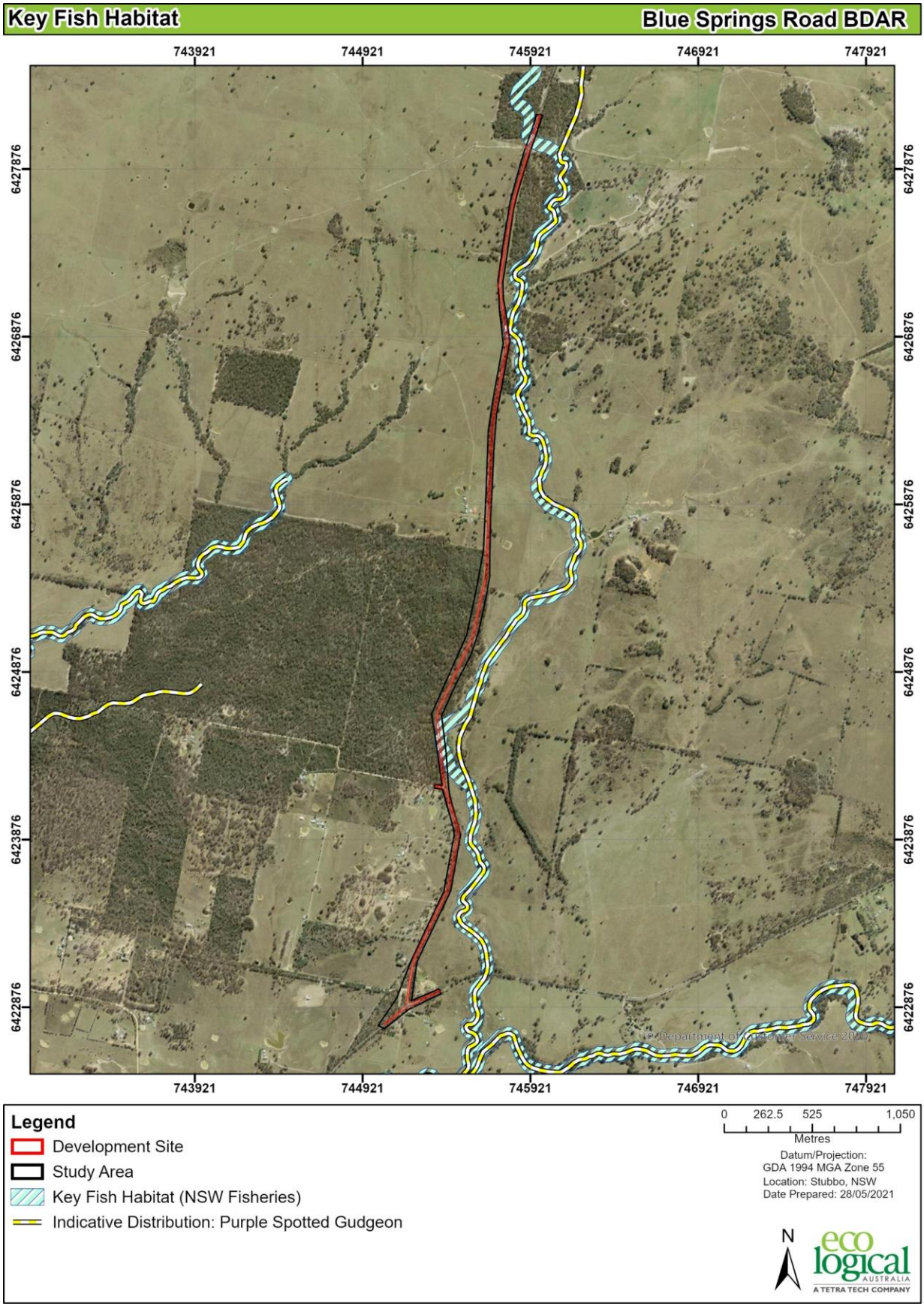

Figure 8: Key Fish Habitat

1.6.2. Threatened flora habitat

Areas of native woodland and forest areas within the development site contain potential habitat for threatened flora species despite some history of direct and indirect disturbance from road construction and maintenance. Cleared / non-native vegetation areas within the development site are considered too degraded for threatened flora species due the historical clearing and disturbance, and the current condition of high cover of exotic species.

1.6.3. Predicted threatened species

Ecosystem credit species predicted to occur at the development site, their associated habitat constraints, geographic limitations and sensitivity to gain class are included in Table 10. Ecosystem credit species were identified through operation of the BAM Credit Calculator in accordance with the BAM (2020).

Two species were excluded from the assessment:

- Glossy Black-cockatoo (*Calyptorhynchus lathami*) was excluded from the assessment due the habitat constraint – no *Allocasuarina* or *Casuarina* species present.
- Rosenberg's Goanna (*Varanus rosenbergi*) was excluded due to geographic constraint. The site is not south east of a line between Tarcutta and Galong.

Table 10: Predicted ecosystem credit species

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC listing status
Anthochaera phrygia	Regent Honeyeater	(Foraging habitat only)	n/a	High	Critically Endangered	Critically Endangered
Artamus cyanopterus cyanopterus	Dusky Woodswallow	n/a	n/a	Moderate	Vulnerable	Not listed
Callocephalon fimbriatum	Gang-gang Cockatoo	(Foraging habitat only)	n/a	Moderate	Vulnerable	Not listed
Chthonicola sagittata	Speckled Warbler	n/a	n/a	High	Vulnerable	Not listed
Chalinolobus picatus	Little Pied Bat	n/a	n/a	High	Vulnerable	Not listed
Circus assimilis	Spotted Harrier	n/a	n/a	Moderate	Vulnerable	Not listed
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	n/a	n/a	High	Vulnerable	Not listed
Daphoenositta chrysoptera	Varied Sittella	n/a	n/a	Moderate	Vulnerable	Not listed
Dasyurus maculatus	Spotted-tailed Quoll	n/a	n/a	High	Vulnerable	Endangered
Falco subniger	Black Falcon	n/a	n/a	Moderate	Vulnerable	Not listed
Falsistrellus tasmaniensis	Eastern False Pipistrelle	n/a	n/a	High	Vulnerable	Not listed

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC listing status
Grantiella picta	Painted Honeyeater	Mistletoes (>5/ha)	n/a	Moderate	Vulnerable	Vulnerable
Glossopsitta pusilla	Little Lorikeet	n/a	n/a	High	Vulnerable	Not listed
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	n/a	n/a	High	Vulnerable	Not listed
Hieraaetus morphnoides	Little Eagle	(Foraging habitat only)	n/a	Moderate	Vulnerable	Not listed
Haliaeetus leucogaster	White-bellied Sea-Eagle	(Foraging habitat only)	n/a	High	Vulnerable	Not listed
Lathamus discolor	Swift Parrot	(Foraging habitat only)	n/a	Moderate	Endangered	Critically Endangered
Lophochroa leadbeateri	Major Mitchell's Cockatoo	(Foraging habitat only)	n/a	Moderate	Vulnerable	Not listed
Lophoictinia isura	Square-tailed Kite	(Foraging habitat only)	n/a	Moderate	Vulnerable	Not listed
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	n/a	n/a	Moderate	Vulnerable	Not listed
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	n/a	n/a	Moderate	Vulnerable	Not listed
Miniopterus orianae oceanensis	Large Bent-winged Bat	(Foraging habitat only)	n/a	High	Vulnerable	Not listed
Neophema pulchella	Turquoise Parrot	n/a	n/a	High	Vulnerable	Not listed
Ninox connivens	Barking Owl	(Foraging habitat only)	n/a	High	Vulnerable	Not listed
Ninox strenua	Powerful Owl	(Foraging habitat only)	n/a	High	Vulnerable	Not listed
Nyctophilus corbeni	Corben's Long-eared Bat	n/a	n/a	High	Vulnerable	Vulnerable
Petaurus australis	Yellow-bellied Glider	Hollows >25cm	n/a	High	Vulnerable	Not listed
Petroica boodang	Scarlet Robin	n/a	n/a	Moderate	Vulnerable	Not listed
Petroica phoenicea	Flame Robin	n/a	n/a	Moderate	Vulnerable	Not listed
Phascolarctos cinereus	Koala	(Foraging habitat only)	n/a	High	Vulnerable	Vulnerable
Polytelis swainsonii	Superb Parrot	(Foraging habitat only)	n/a	Moderate	Vulnerable	Vulnerable
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	n/a	n/a	Moderate	Vulnerable	Not listed

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC listing status
Pteropus poliocephalus	Grey-headed Flying-fox	(Foraging habitat only)	n/a	High	Vulnerable	Vulnerable
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	n/a	n/a	High	Vulnerable	Not listed
Stagonopleura guttata	Diamond Firetail	n/a	n/a	Moderate	Vulnerable	Not listed
Tyto novaehollandiae	Masked Owl	(Foraging habitat only)	n/a	High	Vulnerable	Not listed

1.6.4. Candidate species

Candidate species were identified through operation of the BAM Credit Calculator in accordance with the BAM (2020).

Based on an assessment of habitat constraints, geographic limitations, and site degradation, species have been excluded from further assessment are identified in Table 11.

All other candidate species were considered for further assessment as identified in Table 12.

Table 11: Candidate species excluded from assessment

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act	EPBC Act	Distribution	Habitat	Ecology	Further assessment?
Fauna										
Anthochaera phrygia	Regent Honeyeater	As per mapped areas	n/a	High	Critically Endangered	Critically Endangered	Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions.	Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of *Casuarina cunninghamiana* (River Oak).	Two of three known key breeding areas are in NSW: the Capertee Valley and Bundarra-Barraba region. The species breeds between July and January and usually nests in horizontal branches or forks in tall mature eucalypts and Sheoaks. The Regent Honeyeater primarily feeds on nectar from box and ironbark eucalypts and occasionally from banksias and mistletoes.	No. Development site is not within mapped important area.
Aprasia parapulchella	Pink-tailed Legless Lizard	Rocky areas or within 50 m of rocky areas	n/a	High	Vulnerable	Vulnerable	In NSW, only known from the Central and Southern Tablelands, and the South Western Slopes.	Sloping, open woodland areas with predominantly native grassy ground layers, rocky outcrops or scattered, partially-buried rocks.	Commonly found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites. Feeds on the larvae and eggs of the ants with which it shares its burrows. It is thought that this species lays 2 eggs inside the ant nests during summer; the young first appear in March.	No. Habitat constraint – rocky areas and associated microhabitat not present.
Chalinolobus dwyeri	Large-eared Pied Bat	Cliffs Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels	n/a	Very High	Vulnerable	Vulnerable	Recorded from Rockhampton in Qld south to Ulladulla in NSW. Largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes.	Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	"Roosts in caves, rock overhangs and disused mine shafts and as such is usually associated with rock outcrops and cliff faces. It also possibly roosts in the hollows of trees. The species is thought to require roosting habitat that is adjacent to higher fertility sites which are used for foraging. This species probably forages for small, flying insects below the forest canopy.	No. Habitat constraint. No cliffs or tunnels or caves.
Haliaeetus leucogaster	White-bellied Sea-Eagle	Living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines	n/a	High	Vulnerable	Not listed	In New South Wales it is widespread along the east coast, and along all major inland rivers and waterways.	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea.	Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass.	No. Habitat constraint. No large waterbodies, river or creeks within 1 km. No nests present.

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act	EPBC Act	Distribution	Habitat	Ecology	Further assessment?
Hieraaetus morphnoides	Little Eagle	Nest trees	n/a	Moderate	Vulnerable	Not listed	Throughout the Australian mainland, with the exception of the most densely-forested parts of the Dividing Range escarpment.	Open eucalypt forest, woodland or open woodland, including sheoak or Acacia woodlands and riparian woodlands of interior NSW.	"Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	No. Habitat constraint. No nest trees present.
Lathamus discolor	Swift Parrot	As per mapped areas	n/a	Moderate	Endangered	Endangered	Migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes.	Box-ironbark forests and woodlands.	"Favoured feed trees include winter flowering species such as *Eucalyptus robusta* (Swamp Mahogany), *Corymbia maculata* (Spotted Gum), *C. gummifera* (Red Bloodwood), *E. sideroxylon* (Mugga Ironbark), and *E. albens* (White Box).	No. Not mapped important area under BAM.
Litoria booroolongensis	Booroolong Frog	n/a	n/a	High	Endangered	Endangered	Restricted to NSW and north-eastern Victoria, predominantly along the western-flowing streams of the Great Dividing Range. Several populations have recently been recorded in the Namoi catchment.	Permanent streams with some fringing vegetation cover such as ferns, sedges or grasses.	Breeding occurs in spring and early summer and tadpoles metamorphose in late summer to early autumn. Eggs are laid in submerged rock crevices and tadpoles grow in slow-flowing pools	No. Habitat too degraded. No permanent streams with fringing vegetation.
Lophoictinia isura	Square-tailed Kite	Nest trees	n/a	Moderate	Vulnerable	Not listed	In NSW, it is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast.	Timbered habitats including dry woodlands and open forests, particularly timbered watercourses.	"It is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage.	No. Habitat constraint. No nest trees within development site.
Petrogale penicillata	Brush-tailed Rock-wallaby	Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines	n/a	Very High	Endangered	Vulnerable	In NSW they occur from the Qld border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit.	Rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges.	"Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees.	No. Habitat constraint. No land within 1 km of rocky escarpments and cliffs.
Pteropus poliocephalus	Grey-headed Flying-fox	Other: Breeding camps	n/a	High	Vulnerable	Vulnerable	Along the eastern coast of Australia, from Bundaberg in Qld to Melbourne in Victoria.	Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Annual mating commences in January and a single young is born in October or November. Can travel up to 50 km from the camp to forage. Feed on the nectar and pollen of *Eucalyptus, Melaleuca* and *Banksia* species, and fruits of rainforest trees.	No. No breeding camps present. Nearest camp is at Mudgee, 35 km south of development site.

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act	EPBC Act	Distribution	Habitat	Ecology	Further assessment?
									and vines. Also forage in cultivated gardens and fruit crops.	
Miniopterus orianae oceanensis	Eastern Bentwing-bat	Caves: Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave;" observation type code "E nest-roost;" with numbers of individuals >500	n/a	High	Vulnerable	Not listed	In NSW it occurs on both sides of the Great Dividing Range, from the coast inland to Moree, Dubbo and Wagga Wagga.	Rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland.	It forages above and below the tree canopy on small insects, especially moths. The bats congregate at the same maternity roosts each year to give birth and rear young. In the southern part of the species' range this occurs during spring. Maternity roosts may be located in caves, abandoned mines, concrete bunkers and lava tubes. Over-wintering roosts used outside the breeding period include cooler caves, old mines, and stormwater channels, under bridges and occasionally buildings.	No. No caves, tunnels, mines or other structures potentially used for breeding are present.
Synemon plana	Golden Sun Moth	Wallaby grass (*Rytidosperma* spp.), Chilean needlegrass (*Nassella nessiana*) or Serrated Tussock (*Nassella trichotoma*))	Within a 15 km radius of Tumut	Moderate	Endangered	Critically Endangered	NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut.	Natural Temperate Grasslands and grassy Box-Gum Woodlands in which groundlayer is dominated by *Rytidosperma* spp. (wallaby grasses).	"Adults are short-lived (one to four days) and do not feed - having no functional mouthparts; the larvae are thought to feed exclusively on the roots of wallaby grasses.	No. Geographic limitation.
Flora										
Prasophyllum petilum	Tarengo Leek Orchid	n/a	East of Binalong, south and east of Boorowa.	High	Endangered	Endangered	Four sites in NSW: at Boorowa, Captains Flat, Ilford and Delegate. Also experimentally introduced at Bowning Cemetery NSW.	Natural Temperate Grassland, grassy woodland, and Box-Gum woodland.	Flowers in October at Boorowa and Ilford, and December at Captains Flat and Delegate. Flowers are followed by fleshy seed capsules in summer. Plants retreat into subterranean tubers after fruiting, so are not visible above-ground.	No. Geographic limitation.
Ammobium craspedioides	Yass Daisy	n/a	South of Cowra	High	Vulnerable	Vulnerable	Found from near Crookwell on the Southern Tablelands to near Wagga Wagga on the South Western Slopes.	Moist or dry forest communities, Box-Gum Woodland and secondary grassland.	Grows in association with a large range of eucalypts (*Eucalyptus blakelyi*, *E. bridgesiana*, *E. dives*, *E. goniocalyx*, *E. macrorhyncha*, *E. mannifera*, *E. melliodora*, *E. polyanthemos*, *E. rubida*).	No. Geographic limitation.

Table 12: Candidate species assessed and survey timing

Species	Common Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Flora													
Acacia ausfeldii	Ausfeld's Wattle								X	X	X		
Dichanthium setosum	Bluegrass	X	X	X	X	X						X	X
Diuris tricolor	Pine Donkey Orchid									X	X		
Euphrasia arguta	-	X	X	X								X	X
Grevillea wilkinsonii	Tumut Grevillea										X		
Leucochrysum albicans var. *tricolor*	Horay Sunray	X	X	X	X					X	X	X	X
Swainsona recta	Small Purple-pea									X	X	X	
Swainsona sericea	Silky Swainson-pea									X	X	X	
Fauna													
Burhinus grallarius	Bush Stone-curlew	X	X	X	X	X	X	X	X	X	X	X	X
Callocephalon fimbriatum	Gang-gang Cockatoo	X									X	X	X
Crinia sloanei	Sloane's Froglet							X	X				
Lophochroa leadbeateri	Major Mitchell's Cockatoo									X	X	X	X
Ninox connivens	Barking Owl					X	X	X	X	X	X	X	X
Ninox strenua	Powerful Owl					X	X	X	X				
Phascolarctos cinereus	Koala	X	X	X	X	X	X	X	X	X	X	X	X
Petaurus norfolcensis	Squirrel Glider	X	X	X	X	X	X	X	X	X	X	X	X
Phascogale tapoatafa	Brush-tailed Phascogale	X	X	X	X	X	X						X
Polytelis swainsonii	Superb Parrot									X	X	X	
Tyto novaehollandiae	Masked Owl					X	X	X	X				

Notes: X indicates appropriate survey season in BioNet. Green highlight indicates survey conducted. Additional targeted surveys are proposed prior to construction.

1.7. Targeted surveys

Targeted surveys for species credit species were undertaken at the development site on the dates outlined in Table 13. The location of targeted surveys are shown on Figure 9, with the results of the surveys shown as individual species polygons on Figure 11.

Further targeted surveys are proposed in the appropriate survey season prior to development.

1.7.1. Parallel transects

Parallel transects of less than 5 m spacing were undertaken on 29 and 30 March 2021 by experienced surveyors along the full length of roadside within the development site in accordance with DPIE (2021).

No threatened flora species were recorded.

1.7.2. Call playback

Call-playback for Bush Stone-curlew was undertaken at two locations on two separate nights in March 2021. A Bush stone curlew call sequence was broadcast 3-4 times followed by five minutes of quiet listening. Call playback was preceded and followed by spotlighting.

No Bush Stone-curlew were recorded.

1.7.3. Spotlighting

ELA completed spotlighting surveys from a slow-moving vehicle along Blue Springs Road on separate nights, 2 and 3 September 2020 and 29 and 30 March 2021. These surveys were aimed at Squirrel Glider (*Petaurus norfolcensis*), Brush-tailed Phascogale (*Phascogale tapoatafa*), Bush Stone-curlew (*Burhinus grallarius*) and Koala (*Phascolarctos cinereus*).

No threatened species were recorded.

1.7.4. Koala SAT survey

Two Koala Spot Assessment Technique (Phillips and Callaghan 2011) surveys were completed targeting areas that represent the highest quality and most connected habitat. These were in the central and southern area of the development site where road reserve vegetation provides the best local connectivity and habitat quality. For each SAT survey, a central tree was selected. A search of the ground within 1 m of the base of the centre tree and the nearest 29 trees (>10 cm DBH) was undertaken for Koala faecal pellets. Approximately 2 person minutes of search effort was undertaken at each tree.

No evidence of Koala was recorded.

1.7.5. Diurnal bird surveys

Bird surveys were undertaken using the 20 min/2 ha search method. All species heard and/or observed were recorded. Surveyors also recorded bird species incidentally throughout other surveys and while traversing the site.

Searches for large stick nests such as those used by the White-bellied Sea-Eagle (*Haliaeetus leucogaster*), Black Falcon (*Falco subniger*), Square-tailed Kite (*Lophoictinia isura*), Spotted Harrier (*Circus assimilis*) and Little Eagle (*Hieraaetus morphnoides*) were undertaken across the development site during vegetation surveys by ELA in September 2020, March and April 2021. One stick nest was recorded; however, the nest was not considered to be of suitable size for threatened raptor species.

Five threatened woodland bird species were recorded within or adjacent to the development site during diurnal bird surveys (Figure 10); Grey-crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*), Little Lorikeet (*Glossopsitta pusilla*), Dusky Woodswallow (*Artamus cyanopterus*), Diamond Firetail (*Stagonopleura guttata*) and Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*). All these species are listed as Vulnerable under the BC Act and are ecosystem credit species.

Red Sand Ecology recorded a Black Falcon (*Falco subniger*) on the south west of the SSF study area. Black Falcon is an ecosystem credit species.

Table 13: Targeted surveys

Date	Surveyors	Target species
02/09/2020	Tom Schmidt and Daniel McKenzie	Spotlighting for mammals and birds
03/09/2020	Tom Schmidt and Daniel McKenzie	Spotlighting for mammals and birds
29/03/2021	Tom Schmidt and Shawn Ryan	Flora, spotlighting for mammals and birds, diurnal birds, stick nest search
30/03/2021	Tom Schmidt and Shawn Ryan	Flora, spotlighting for mammals and birds, diurnal birds, Koala SAT
31/03/2021	Tom Schmidt and Shawn Ryan	Flora, diurnal birds

Weather conditions during the targeted surveys are outlined in Table 14.

Table 14: Weather conditions

Date	Rainfall (mm)	Minimum temperature ^{0}C	Maximum temperature ^{0}C
02/09/2020	0	4.0	23.8
03/09/2020	0	11.6	26.0
29/03/2021	0	8.2	25.1
30/03/2021	0	8.8	24.6
31/03/2021	0	10	23.6

Observations taken from BOM weather station Gulgong (Station 062013) approximately 12 km south west of the development site, and Dunedoo Post Office (Station 064009) approximately 30 km north of the development site when data not recorded at Gulgong.

Survey effort undertaken at the development is outlined in Table 15.

Table 15: Survey effort

Method	Habitat (ha)	Stratification units	Total effort	Target species
Area search	3.7 ha	1 – Woodlands	6 sites, 4 person hours	Birds
Call playback	3.7 ha	1 – Woodlands	3 nights	Birds and mammals
Parallel transects	3.7 ha	1 – Woodland 1 – Derived native grassland	18 person hours	Flora
Koala SAT	3.7 ha	1 – Woodlands	2 SATs, 2 person hours	Koala
Spotlighting	3.7 ha	1 – Woodlands	4 nights, 8 person hours	Mammals and nocturnal birds

Following completion of targeted surveys, the species credit species included in the assessment are outlined in Table 16.

Table 16: Species credit species included in the assessment

Species	Common Name	Species presence	Number of individuals / Habitat (ha)	Biodiversity Risk Weighting
Acacia ausfeldii	Ausfeld's Wattle	Yes (assumed present)	3.7 ha	2
Burhinus grallarius	Bush Stone-curlew	No (surveyed)	0	2
Callocephalon fimbriatum	Gang-gang Cockatoo	Yes (assumed present)	3.7 ha	2
Calyptorhynchus lathami	Glossy Black-cockatoo	Yes (assumed present)	3.7 ha	2
Crinia sloanei	Sloane's Froglet	Yes (assumed present)	3.7 ha	1.5
Dichanthium setosum	Bluegrass	No (surveyed)	0	2
Diuris tricolor	Pine Donkey Orchid	Yes (assumed present)	3.7 ha	1.5
Euphrasia arguta		No (surveyed)	0	3
Grevillea wilkinsonii	Tumut Grevillea	Yes (assumed present)	3.7 ha	3
Lophochroa leadbeateri	Major Mitchell's Cockatoo	Yes (assumed present)	3.7ha	2
Ninox connivens	Barking Owl	Yes (assumed present)	3.7 ha	2
Ninox strenua	Powerful Owl	Yes (assumed present)	3.7 ha	2
Petaurus norfolcensis	Squirrel Glider	No (surveyed)	0	2
Phascogale tapoatafa	Brush-tailed Phascogale	Yes (assumed present)	3.7 ha	2
Phascolarctos cinereus	Koala	No (surveyed)	0	2
Polytelis swainsonii	Superb Parrot	Yes (assumed present)	3.7 ha	2
Swainsona recta	Small Purple-pea	Yes (assumed present)	3.7 ha	2
Swainsona sericea	Silky Swainson-pea	Yes (assumed present)	3.7 ha	2
Tyto novaehollandiae	Masked Owl	Yes (assumed present)	3.7 ha	2

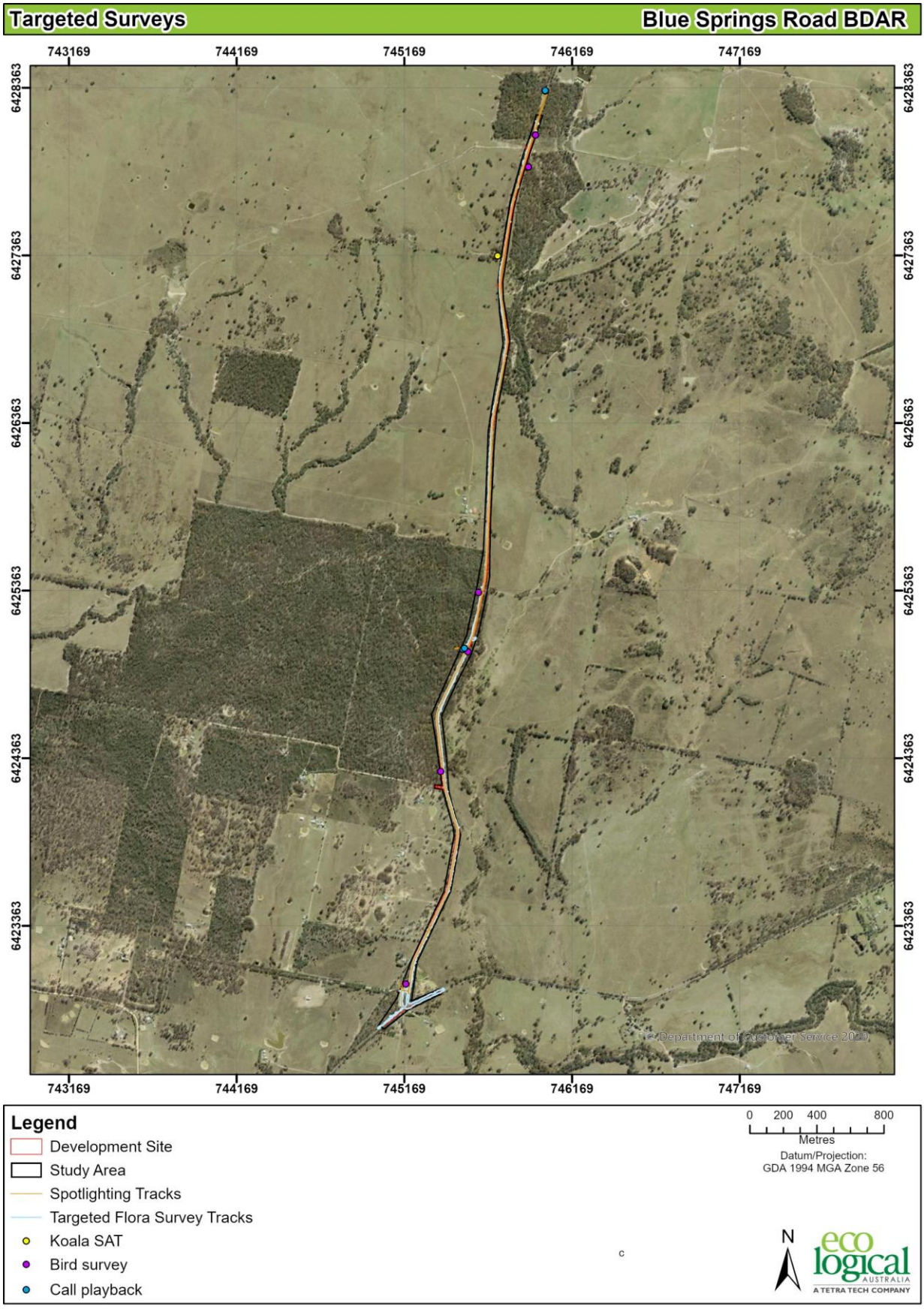

Figure 9: Targeted surveys

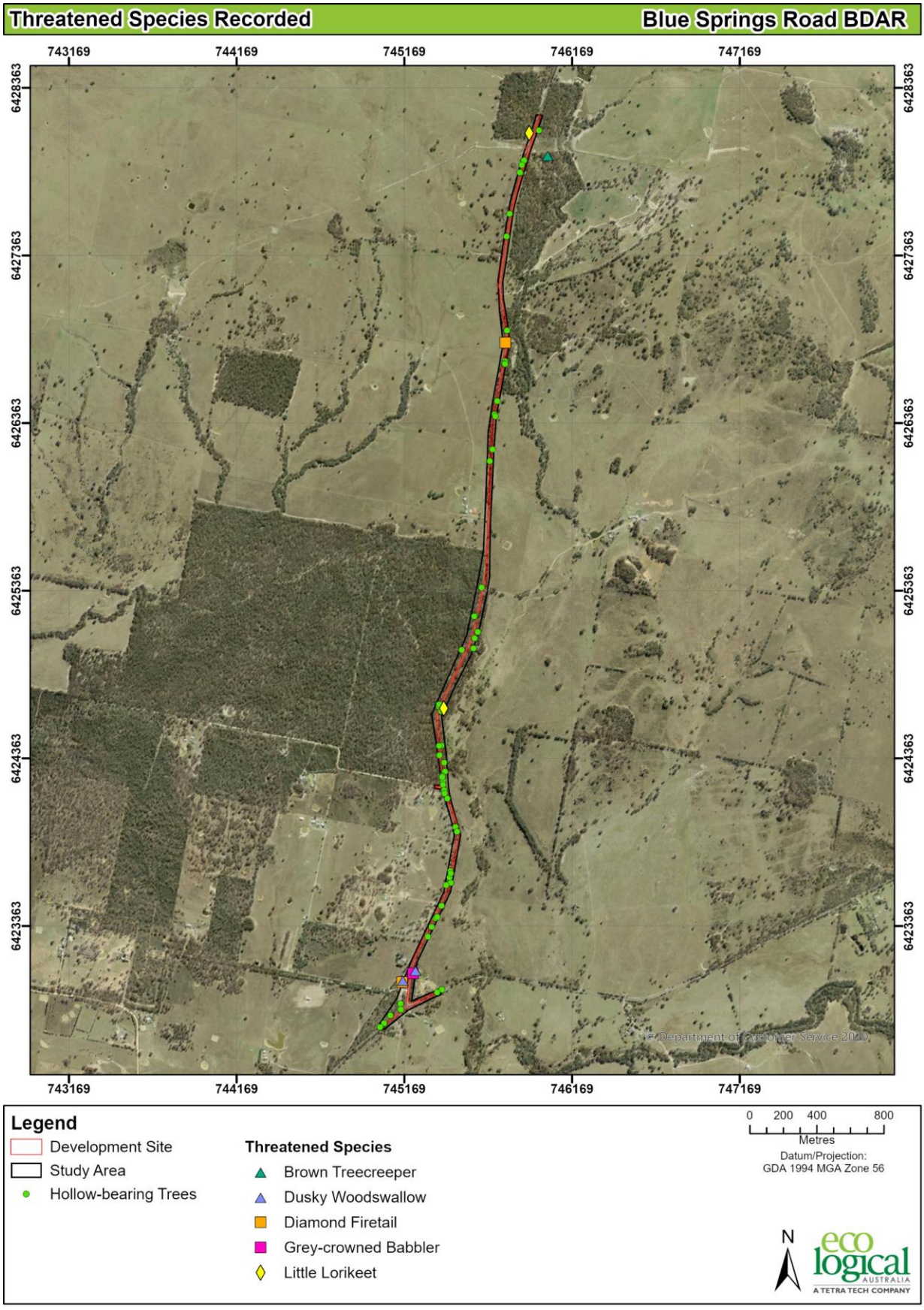

Figure 10: Threatened species recorded

Figure 11: Species polygon

2. Impact summary

2.1. Avoiding impacts

2.1.1. Locating a project to avoid and minimise impacts on vegetation and habitat

The development has been located in a way which avoids and minimises impacts as outlined in Table 17.

Table 17: Locating a project to avoid and minimise impacts on vegetation and habitat

Approach	How addressed	Justification
locating the project in areas where there are no biodiversity values	Areas of cleared land and reduced biodiversity values have been utilised within the development footprint.	The footprint of the road upgrade has been adjusted multiple times from the concept plan, with consultation with relevant stakeholders informing the final design to avoid areas of higher biodiversity values and EEC and CEEC. The road upgrade will utilise the existing road.
locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition	The final design avoids areas of higher quality vegetation and species habitat.	Alternative routes were investigated and clearing regimes have been modified to minimise impacts to biodiversity values. Vegetation and habitat values have been retained wherever possible, particularly within areas of high condition EEC and CEEC, areas of important connectivity and habitat features (such as HBT).
locating the project in areas that avoid habitat for species and vegetation in high threat categories (e.g. an EEC or CEEC), indicated by the biodiversity risk weighting for a species	The final design avoids areas of higher quality vegetation and species habitat.	Alternative routes were investigated and clearing regimes have been modified to minimise impact to biodiversity values. Where possible areas of remnant native vegetation identified as EEC or CEEC have been avoided.
locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained	Development footprint has been centred around the area of least biodiversity impact with the aim to conserve connectivity values surrounding the development site.	Woodland and forest vegetation within the development site is located within a fragmented landscape and generally represents a linear area of vegetation dissecting several significant areas of woodland, and as such having moderate to high habitat connectivity. Ranging from narrow degraded roadside areas adjoined by grazing and residential lands, to higher condition areas adjoining larger intact reserves. The design has sought to avoid and minimise impacts to areas of higher condition, HBT and large trees and more significant connectivity and also maintain connectivity by retaining as

Approach	How addressed	Justification
		much vegetation in the road reserve as possible to allow continued movement of species and genetic material between areas of nearby habitat.

2.1.2. Designing a project to avoid and minimise impacts on vegetation and habitat

The development has been designed in a way which avoids and minimises impacts as outlined in Table 18.

Table 18: Designing a project to avoid and minimise impacts on vegetation and habitat

Approach	How addressed	Justification
reducing the clearing footprint of the project	Alternative routes were investigated, and the removal of vegetation has been modified to minimise impacts to biodiversity values. In designing the development, the aim was to conserve the high condition vegetation, HBT and areas of higher habitat connectivity (such as isolated narrow areas of roadside vegetation) whilst centring development in the most cleared portion of the existing road shoulder.	The project has been designed to minimise vegetation and habitat clearing through strategic planning. This project has been modified to minimise areas of EEC and CEEC.
locating ancillary facilities in areas where there are no biodiversity values	The design has endeavoured to locate ancillary facilities (such as temporary offices and laydown areas) areas, within already cleared areas and avoid patches of native vegetation.	The placement of ancillary facilities (such as temporary offices and laydown areas) has been designed to minimise impacts to biodiversity values by locating them in already cleared areas.
locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a lower vegetation integrity score)	The design has endeavoured to locate ancillary facilities in existing cleared roadside areas.	The placement of ancillary facilities has been designed to minimise impacts to biodiversity values by locating them in areas of lower biodiversity value (existing cleared roadside areas) within the development site boundary.
locating ancillary facilities in areas that avoid habitat for species and vegetation in high threat status categories (e.g. an EEC or CEEC)	Placement of ancillary facilities has been able to avoid impacts to areas providing species habitat and EEC and CEEC vegetation.	The placement of ancillary facilities has been designed to work in and around areas of cleared land. No clearing of species habitat or CEEC will occur solely for ancillary facilities.
providing structures to enable species and genetic material to move across barriers or hostile gaps	The development site will not increase any hostile gaps or barriers.	Corridor movement will be retained for species around the periphery of the site.
making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of	Impacts to the vegetation will occur in small areas along the 5.5 km length of Blue Springs Road. Proponent to retain	The proponent will demarcate all areas outside the development site boundary to be retained.

Approach	How addressed	Justification
retained native vegetation habitat on the development site.	all remaining vegetation outside of the development site.	
Efforts to avoid and minimise impacts through design must be documented and justified	The proposed development site boundary has been refined from the concept design resulting in a development site that avoids and minimises impacts to areas of higher condition vegetation and habitat.	The design has avoided and minimised vegetation clearing through strategic placement. The original concept design included larger patches of vegetation and habitat, up to 10 m either side of the existing road.

2.1.3. Prescribed biodiversity impacts

The development site has the prescribed biodiversity impacts as outlined in Table 19.

Table 19: Prescribed biodiversity impacts

Prescribed biodiversity impact	Description in relation to the development site	Threatened species or ecological communities effected
impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	The road upgrade has been planned to avoid the removal of vegetation where possible. All existing corridors off-site allowing for the movement of species and genetic material will be retained.	Parrots, Cockatoo and Owls, Brush-tailed Phascogale.
impacts of development on movement of threatened species that maintains their lifecycle	The road upgrade has been planned to avoid the removal of vegetation where possible. All existing corridors off-site allowing for the movement of species and genetic material will be retained.	Parrots, Cockatoo and Owls, Brush-tailed Phascogale.
impacts of vehicle strikes on threatened species or on animals that are part of a TEC.	Whilst it is unlikely that Koalas use the area for breeding or foraging due to the lack of feed trees and indications of use, the roadside vegetation may be used as a corridor to facilitate movement. Koalas have been recorded crossing roads by vehicles in the greater vicinity of the development site (OEH 2015). The development site consists of the removal of a total of 3.7 ha of vegetation across the 5.5 km length of road. Only particular sections of the road will be widened. The development site contains moderate habitat connectivity and is located within a fragmented landscape. It is unlikely that vehicle strikes on threatened animals will increase.	*Inland Grey Box Woodland* *Box-Gum Woodland*

2.1.3.1. Locating a project to avoid and minimise prescribed biodiversity impacts

The development has been located in a way which avoids and minimises prescribed biodiversity impacts as outlined in Table 20.

Table 20: Locating a project to avoid and minimise prescribed biodiversity impacts

Approach	How addressed	Justification
locating the envelope of surface works to avoid direct impacts on the habitat features	The road upgrade has been planned to avoid and minimise the removal of vegetation where possible.	The development footprint has been planned and modified to avoid areas of high biodiversity values and reduce the impact.
locating the project to avoid severing or interfering with corridors connecting different areas of habitat, migratory flight paths to important habitat or preferred local movement pathways	The road upgrade has been planned to avoid and minimise the loss of vegetation and connectivity.	Alternative routes and access have been investigated. The road upgrade development site has been modified to minimise impacts to areas of higher biodiversity and habitat value. The overall footprint has been reduced.

2.1.3.2. Designing a project to avoid and minimise prescribed biodiversity impacts

The development has been designed in a way which avoids and minimises prescribed biodiversity impacts as outlined in Table 21.

Table 21: Designing a project to avoid and minimise prescribed biodiversity impacts

Approach	How addressed	Justification
design of project elements to minimise interactions with threatened and protected species and ecological communities, and the persistence of habitat features.	Strategic planning and modifications to the original design. Alternative routes and access were considered to minimize impacts to areas of higher biodiversity and habitat value.	Alternative routes and access have been investigated. The road upgrade development site has been modified to minimise impacts to areas of higher biodiversity and habitat value. The overall footprint has been reduced.

2.2. Assessment of Impacts

2.2.1. Direct impacts

The direct impacts of the development on:

- native vegetation are outlined in Table 22
- threatened ecological communities are outlined in Table 23
- threatened species and threatened species habitat is outlined in Table 24
- prescribed biodiversity impacts are outlined in 2.1.3

Direct impacts including the final project footprint (construction and operation) are shown on Figure 12.

Table 22: Direct impacts to native vegetation

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)
81	Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Floodplain Transition Forest	Grassy Woodland	0.9
266	White Box grassy woodland in the upper slopes sub-region of the	Western Slopes Grassy Woodlands	Grassy Woodlands	0.03

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)
	NSW South Western Slopes Bioregion			
281	Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Western Slopes Grassy Woodlands	Grassy Woodlands	2.07
1177	Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion	Southern Tableland Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	0.7

Table 23: Direct impacts on threatened ecological communities

PCT ID	BC Act			EPBC Act		
	Listing status	Name	Direct impact (ha)	Listing status	Name	Direct impact (ha)
81	EEC	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	0.9	EEC	*Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia*	0.9
266	CEEC	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	0.03	CEEC	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	0.03
281	CEEC	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	2.07	CEEC	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	2.07

Table 24: Direct impacts on threatened species and threatened species habitat

Species	Common Name	Direct impact number of individuals / habitat (ha)	NSW listing status	EPBC Listing status
Acacia ausfeldii	Ausfeld's Wattle	3.7 ha	Vulnerable	Not listed
Callocephalon fimbriatum	Gang-gang Cockatoo	3.7 ha	Vulnerable	Not listed
Calyptorhynchus lathami	Glossy Black-cockatoo	3.7 ha	Vulnerable	Not listed
Crinia sloanei	Sloane's Froglet	3.7 ha	Vulnerable	Not listed
Diuris tricolor	Pine Donkey Orchid	3.7 ha	Vulnerable	Not listed
Grevillea wilkinsonii	Tumut Grevillea	3.7 ha	Critically Endangered	Endangered
Lophochroa leadbeateri	Major Mitchell's Cockatoo	3.7ha	Vulnerable	Not listed
Ninox connivens	Barking Owl	3.7 ha	Vulnerable	Not listed
Ninox strenua	Powerful Owl	3.7 ha	Vulnerable	Not listed
Phascogale tapoatafa	Brush-tailed Phascogale	3.7 ha	Vulnerable	Not listed
Polytelis swainsonii	Superb Parrot	3.7 ha	Vulnerable	Vulnerable
Swainsona recta	Small Purple-pea	3.7 ha	Endangered	Endangered
Swainsona sericea	Silky Swainson-pea	3.7 ha	Vulnerable	Not listed
Tyto novaehollandiae	Masked Owl	3.7 ha	Vulnerable	Not listed

Note: Targeted surveys in the appropriate season are proposed prior to construction. It is considered likely that the majority of these species do not occur within the development site.

2.2.2. Change in vegetation integrity

The change in vegetation integrity as a result of the development is outlined in Table 25.

Table 25: Change in vegetation integrity

Veg Zone	PCT ID	Condition	Area (ha)	Current vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity
1	81	Mod-good	0.9	89	0	-89
2	266	Mod-good	0.03	95.5	0	-95.5
3	281	Mod-good	2	87.1	0	-87.1
4	281	Low	0.07	52.6	0	-52.6
5	1177	Mod-good	0.7	62.9	0	-62.9

2.2.3. Indirect impacts

The indirect impacts of the development are outlined in Table 26. Indirect impact zones are assumed to be within 10 m of the impact footprint are shown on Figure 13.

Table 26: Indirect impacts

Indirect impact	Project phase	Nature	Extent	Frequency	Duration	Timing
sedimentation and contaminated and/or nutrient rich run-off	Construction	Runoff during construction works	Sedimentation and runoff into nearby dams, creeks	During heavy rainfall or storm events	During rain events	Short-term impacts
noise, dust or light spill	Construction	Noise and dust created from machinery	Adjacent vegetation	Daily, during construction	Sporadic throughout construction and throughout operation period	Short-term impacts
inadvertent impacts on adjacent habitat or vegetation	Construction	Damage to adjacent habitat or vegetation	Adjacent vegetation	Daily, during construction and operational phases	Throughout project period	Potentially long-term impacts
transport of weeds and pathogens from the site to adjacent vegetation	Construction	Spread of weed seed and pathogens from incoming machinery and equipment	Potential for spread into nearby habitat	Daily, during construction and operational phases	Throughout project period	Potentially long-term impacts
vehicle strike	Construction / operation	Potential for native fauna to be struck by working machinery and moving vehicles	Within access roads and within Development Site	Daily, during construction and operational phases	Throughout project period	Potentially long-term impacts
trampling of threatened flora species	Construction / operation	Potential for species to be trampled by machinery	Within access roads and within Development Site	Daily, during construction and operational phases	Throughout project period	Potentially long-term impacts
rubbish dumping	Construction / operation	Illegal dumping by workers	Potential for rubbish to spread into areas outside Development Site	Any time	Throughout life of project	Potentially long-term impacts
wood collection	Construction / operation	Removal of wood in vegetation adjacent to Development Site	Throughout adjacent vegetation	Potential to occur at any time during construction or operational phases	Throughout life of project	Short-term impacts
bush rock removal and disturbance	Construction / operation	Removal of rocks in vegetation adjacent to Development Site	Potential for disturbance in adjacent vegetation and area	Potential to occur at any time during construction or operational phases	Throughout life of project	Short-term impacts

Indirect impact	Project phase	Nature	Extent	Frequency	Duration	Timing
increase in predatory species populations	Construction / operation	Potential for an increase in predatory species in the locality through disturbance to vegetation	Throughout adjacent vegetation	Likely to occur gradually after disturbance to habitat and vegetation takes place.	During construction phase of project	Short-term impacts
increase in pest animal populations	Construction / operation	Potential to increase if food scraps/rubbish is left on site. Potential to increase -/+ decrease due to disturbance to existing vegetation.	Throughout adjacent vegetation	Likely to occur gradually after disturbance to habitat and vegetation takes place	During construction phase of project	Short-term impacts
increased risk of fire	Construction / operation	Potential for fire to spark during construction and operation from any machinery or electrical works	Throughout adjacent vegetation	Potential to occur at any time throughout the operational or construction phases	During operating/ construction hours	During operational /construction hours
disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	Construction / operation	No specialist breeding or foraging habitat identified	N/A	N/A	N/A	N/A

The project is not likely to significantly impact groundwater during construction, operation or decommissioning due to the nature of the project requiring a limited amount of subsurface disturbance and the estimated depth to groundwater. No impacts to Groundwater Dependent Ecosystems (GDE), if present, are expected to occur as a result of the proposed development.

2.2.4. Prescribed biodiversity impacts

The development has the prescribed biodiversity impacts as outlined in Table 27.

Table 27: Direct impacts on prescribed biodiversity impacts

Prescribed biodiversity impact	Nature	Extent	Frequency	Duration	Timing
impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement	Partial removal of portion (narrowing) of roadside corridor vegetation.	Within development site	Daily and during construction and	Throughout project period	Potential long-term impacts

Prescribed biodiversity impact	Nature	Extent	Frequency	Duration	Timing
of those species across their range	Reduction in habitat for Brush-tailed Phascogale, Bush Stone-curlew, Squirrel Glider and Koala.		operational phases.		
impacts of vehicle strikes on threatened species or on animals that are part of a TEC.	Increased traffic movements have potential to increase impacts to fauna species. Potential for native fauna to be struck by working machinery during construction.	Within development site	Daily and during construction and operational phases.	Throughout project period	Potential long-term impacts

2.2.5. Mitigating and managing impacts

Measures proposed to mitigate and manage impacts at the development site before, during and after construction are outlined in Table 28.

Table 28: Measures proposed to mitigate and manage impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
timing works to avoid critical life cycle events such as breeding or nursing	Moderate	Minor	Active breeding or nesting identified during pre-clearance surveys will be avoided in August, September and October which is the breeding/nesting period for most fauna species.	Impacts to fauna during nesting/nursing avoided	Construction	Site manager
instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed wildlife handler during clearing events	Major	Minor	Pre-clearance surveys will be undertaken prior to tree clearing. A qualified ecologist/licenced wildlife handler will supervise tree removal in accordance with best practise methods.	Any fauna utilising habitat within the Development Site will be identified and managed to ensure clearing works minimise the likelihood of injuring resident fauna	Prior to construction	Site ecologist
relocate habitat features (fallen timber, hollow logs) from within the development site	Moderate	Minor	A procedure will be developed for the relocation of habitat features (e.g. fallen timber, hollow logs) to adjacent retained habitat.	Enhancement of retained habitats	Prior to construction	Site manager
clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chain-saw, rather than heavy machinery, is preferable in situations where partial clearing is proposed	Moderate	Minor	Clearing protocols will be developed that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance (e.g. removal of native vegetation by chainsaw instead of heavy machinery where only partial clearing is proposed). Fencing (or other barriers as required) and signage will be placed around those areas of vegetation to be maintained to prevent any accidental construction damage and provide a permanent barrier between the development footprint and retained areas.	Vegetation to be retained outside of the Development Site boundary will not be disturbed	Construction	Site manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
			The type of fencing during construction may be of a temporary nature and scale that is robust enough to withstand damage during this stage of work. Use of appropriate machinery for vegetation removal adjacent to retained areas.			
sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment	Minor	Negligible	Appropriate controls will be implemented to manage exposed soil surfaces and stockpiles to prevent sediment discharge into waterways. All works within proximity to the drainage lines will have adequate sediment and erosion controls (e.g. sediment barriers, sedimentation ponds). Revegetation will also commence as soon as is practicable to minimise risks of erosion. Suitable species will be used as ground cover species in any revegetation areas.	Erosion and sedimentation will be controlled	Construction and decommissioning	Site manager
daily/seasonal timing of construction and operational activities to reduce impacts of noise	Minor	Negligible	Construction works will only be undertaken during daylight hours.	Noise impacts associated with the development will be managed	Construction / operation /decommissioning	Site manager
light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill	Minor	Negligible	Construction works will only be undertaken during daylight hours and night lights will not be used. Lights associated with operation will be directional to avoid unnecessarily shining light into adjacent retained vegetation where possible.	Light impacts of construction will be avoided as all works will occur during daylight hours Light spill into adjacent vegetation is reduced	Construction / operation /decommissioning	Site manager
adaptive dust monitoring programs to control air quality	Minor	Negligible	Dust suppression measures will be implemented to limit dust on site. Revegetation will also be commenced as soon	Mitigate dust created during construction activities	Construction and decommissioning	Site manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
			as practicable to minimise areas likely to create dust. Suitable species will be used as ground cover species in any revegetation areas.			
hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	Minor	Negligible	All machinery will be cleaned prior to entering and exiting the study area to minimise the transport of weeds to vegetated areas to be retained. Weeds that are present within the study area that are listed under the *NSW Biosecurity Act 2015* will be managed.	Weed impacts managed	Construction	Site manager
staff training and site briefing to communicate environmental features to be protected and measures to be implemented	Minor	Negligible	All personnel working on the project will undertake an environmental induction as part of their site familiarisation. This will include: • site environmental procedures (vegetation management, sediment and erosion control, exclusion fencing and noxious weeds) • what to do in case of environmental emergency (e.g. chemical spills, fire, injured fauna) • key contacts in the case of an environmental emergency.	Staff trained and aware of environmental issues and responsibilities on site	Construction	Site manager
traffic management to reduce risk of vehicle strike	Minor	Negligible	A Traffic Management Plan will be developed which includes speed limits and controls to reduce risk of fauna strike. Any vehicle strike incidents will be recorded.	Reduced fauna strike	Construction / operation	Site manager
development control measures to regulate activity in vegetation and habitat adjacent to development including controls on pet ownership, rubbish disposal, wood collection,	Minor	Negligible	A strategy will be developed and implemented to protect vegetation and habitat adjacent to the project. This will outline the following:	Adjacent habitat protected	Construction	Site manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
fire management and disturbance to nests and other niche habitats			• rubbish disposal guidance • prohibition of wood collection • prohibition of lighting of fires • no-go-zones for native vegetation outside the development footprint • speed limits on the surrounding road network			

2.2.6. Serious and Irreversible Impacts (SAII)

The development has candidate Serious and Irreversible Impacts (SAII) for one TEC and one threatened flora species as outlined in Table 29 and shown on Figure 14 and Figure 15. Detailed consideration of whether impacts on the candidates are serious and irreversible is included in

Table 30, Table 31 and Table 32.

Table 29: Candidate Serious and Irreversible Impacts

Species / Community	Common Name	Principle	Direct impact individuals / area (ha)	Threshold
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland	n/a	Principle 1 and 2	2.07	No listed threshold
Grevillea wilkinsonii	Tumut Grevillea	Principle 3	3.6 ha	No listed threshold

Table 30: Determining whether impacts are serious and irreversible

Determining whether impacts are serious and irreversible	Assessment
Principle 1	
Does the proposal impact on a species, population or ecological community that is a candidate entity because it is in a rapid rate of decline?	Yes, the White Box Yellow Box Blakely's Red Gum Woodland is identified as potentially being SAII.
If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible? Note: where candidate entities have no listed threshold, any impact is considered likely to be serious and irreversible	There is no threshold for impacts that may trigger a serious and irreversible impact. Therefore, the determination of a serious and irreversible impact is to be assessed on a case-by-case basis.
Principle 2	
Does the proposal impact on a species that is a candidate entity because it has been identified as having a very small population size?	Yes
If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible? Note: where candidate entities have no listed threshold, any impact is considered likely to be serious and irreversible	No threshold is identified, and the community is widespread in several bioregions NSW. Further consideration of potential serious and irreversible impacts is outlined in Table 31 and Table 32.
Principle 3	
Does the proposal impact on the habitat of a species or an area of an ecological community that is a candidate entity because it has a very limited geographic distribution?	Yes. *Grevillea wilkinsonii* has a highly limited geographic distribution.
If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible? Note: where candidate entities have no listed threshold, any impact is considered likely to be serious and irreversible.	Given that no published thresholds are available any impact is considered likely to be a SAII. *G. wilkinsonii* is known from one main population and several smaller populations within the South Western Slopes approximately 20 km from each other. Surveys were outside the recommended survey period, and therefore this species has been assumed present. Although, no shrub species within *Grevillea* genus were detected within the study area. Removal of 3.6 ha of potential habitat may result in a loss of

Determining whether impacts are serious and irreversible	Assessment
	0.01% of the potential habitat within its predicted range. It is unlikely that this may lead to a long-term decrease in the size of any population. Given that only 3.6 ha of potential habitat for *G. wilkinsonii* will be removed it is unlikely that an SAII will occur.
Principle 4	
Does the proposal impact on a species, a component of species habitat or an ecological community that is a candidate entity because it is irreplaceable?	No
If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible? Note: where candidate entities have no listed threshold, any impact is considered likely to be serious and irreversible.	n/a

Table 31 Evaluation of an impact on a candidate species

Impact Assessment Provision	Assessment
The actions and measures taken to avoid direct and indirect impacts on the entities.	Surveys were outside the recommended survey period, and therefore this species has been assumed present. Removal of 3.6 ha of potential habitat may result in a loss of <0.01% of the potential habitat within its predicted range. Additionally, the development site footprint has been altered to reduce the impact on potential habitat and higher condition vegetation where possible.
the size of the local population directly and indirectly impacted by the development.	The proposed development will remove a small area of potential habitat for G*. wilkinsonii* however a larger area of potential habitat will remain undisturbed. Removal of 3.6 ha of potential habitat may result in a loss of <0.01% of the potential habitat within its predicted range.
the extent to which the impacts exceeds any thresholds	No published thresholds exist for G*. wilkinsonii*. Therefore, a threshold of 0 has been assumed and any loss of potential habitat is likely to have an impact. Therefore, the development site footprint has been altered to reduce the impact on potential habitat and higher condition vegetation where possible.
An estimation of change in habitat available to the local population as a result of the proposed development	No populations of G*. wilkinsonii* are known from within the study area or surrounding area. Removal of 3.6 ha of potential habitat may result in a loss of <0.01% of the potential habitat within its predicted range. Additionally, the development site footprint has been altered to reduce the impact on potential habitat and higher condition vegetation where possible.
the likely impact that the development will have on the habitat of the local population including the proposed loss, modification, destruction or isolation of the available habitat used by the local population	No populations of G*. wilkinsonii* are known from within the study area or surrounding area. Removal of 3.6 ha of potential habitat may result in a loss of <0.01% of the potential habitat within its predicted range. The proposed road widening will remove a small area of occupancy of available habitat although there are areas of

Impact Assessment Provision	Assessment
	undisturbed habitat for these species which remain outside the proposed development footprint. The proposed road widening is not expected to increase fragmentation of the existing population.
modification of habitat required for the maintenance of processes important to the species' life cycle (such as in the case of a plant – pollination, seed set, seed dispersal, germination), genetic diversity and long-term evolutionary development	Given that No populations of G. *wilkinsonii* are known from within the study area or surrounding area, and the removal of 3.6 ha of potential habitat may result in a loss of <0.01% of the potential habitat within its predicted range. It is considered unlikely that that genetic diversity and long-term evolutionary development will be impeded.
2. the likely impact on the ecology of the local population.	
for flora, address how the proposal is likely to affect the ecology and biology of any residual plant population that will remain post development including where information is available:	Due to the small scale of the proposed development site and the small area of potential habitat to be affected, the ecology and biology of any potential populations is unlikely to be impacted.
3. a description of the extent to which the local population will become fragmented or isolated as a result of the proposed development	The existing road currently intersects no known populations of G. *wilkinsonii*. Therefore, the proposed widening development site will not increase fragmentation of the existing populations.
4. the relationship of the local population to other population/populations of the species. This must include consideration of the interaction and importance of the local population to other population/populations for factors such as breeding, dispersal and genetic viability/diversity, and whether the local population is at the limit of the species' range	There is no likely genetic exchange with other populations. Given there is no previously known population within the development site or surrounding area, it is unlikely that any individuals viability and diversity will be impacted.
5. the extent to which the proposed development will lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population	Weeds and pests will be managed in accordance with a management plan to ensure the spread of weeds, pests and pathogens are prevented and incursions are adequately managed.
6. the measure/s proposed to contribute to the recovery of the species in the Interim Biogeographic Regionalisation for Australia (IBRA) subregion.	No measures are proposed.

Table 32: Evaluation of an impact on a TEC

Impact Assessment Provisions	Assessment
Actions and measures taken to avoid the direct and indirect impacts on the TEC	The development site has been modified (reduced in width) multiple times to avoid areas of the CEEC.
1. the area and condition of the TEC to be impacted directly and indirectly by the proposed development	2.03 ha removal of mod-good condition woodland present as an intact canopy layer with a partly intact shrub and groundcover layer. 0.07 ha removal of low condition woodland present as an absent canopy layer and sparse shrub and groundcover layer.
the extent to which the impact exceeds the thresholds for the TEC	No published threshold for this TEC is available so the threshold is considered to be 0. The removal of 2.1 ha has

Impact Assessment Provisions	Assessment
	exceeded the threshold. However, given the small areas to be impacted and their low condition on existing roadside a SAII is unlikely.
2. the extent and overall condition of the TEC within an area of 1500 metres, and then 5000 metres, surrounding the proposed development footprint. In the case of strategic biodiversity certification projects, the extent and overall condition of the TEC may be assessed across the IBRA sub region	In the absence of accurate and detailed mapping of the TEC in the region, an assessment of the extent of the TEC has been made using the vegetation formation layer from the Central Tablelands State Vegetation Type Map (OEH 2017). All areas of the formation 'Grassy Woodland' were plotted and the area calculated. Conservatively assuming that 50% of the area of Grassy Woodland is the TEC, the estimated extent of the TEC extent surrounding the proposed development footprint is: • 75 ha of Grassy Woodland within 1500m (this represents removal of an estimated 2.8 % of the community within 1500m) • 418 ha of Grassy Woodland within 5000 metres (this represents removal of an estimated 0.5 % of the community within 5000m) It is likely that the condition of the CEEC within the areas surrounding the development site varies. However, considering the characteristics of the surrounding lands are very similar to that of the Development Site, there is the potential that the occurrence of this EEC could be extensive in its derived form. Higher quality remnants are likely to be present in road reserves and along drainage lines. Higher quality and larger areas are present in State Forests within the vicinity.
3. an estimate of the extant area and overall condition of the TEC remaining before and after the impact of the proposed development has been taken into consideration	The extant area of the TEC is difficult to distinguish, as it occurs widely across NSW. It occurs in a variety of condition states and is fragmented over a wide distribution. Higher quality and larger areas of the community will be retained within the road reserve area, adjoining Cope State forest and also occur in the surrounding landscape. The extant area and overall condition of the community is not likely to be significantly changed as a result of the proposed development due to the small and narrow nature of areas to be impacted. it is considered that the development will have a negligible impact on the extant area and overall condition of the EEC on a broad scale. The area remaining within the IBRA subregion before (149,531 ha) and after development 149,530 ha) is 99.99%.
4. the development proposal's impact on:	
a. abiotic factors critical to the long-term survival of the TEC; for example, will the impact lead to a reduction of groundwater levels or substantial alteration of surface water patterns; will it alter natural disturbance regimes that the TEC depends upon, e.g. fire, flooding etc.?	The development will not impact abiotic factors critical to the long-term survival of the EEC.

Impact Assessment Provisions	Assessment
b. characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of under-storey species or harvesting of plants	The development will not impact characteristic and functionally important species outside of the proposed impact area.
c. the quality and integrity of an occurrence of the TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the TEC	The development is unlikely to result in the spread of invasive weed species into vegetation adjacent to the development site. However, this potential impact will be controlled during pre-construction works, throughout construction. The development will not have additional impacts to the quality and integrity of the occurrence of Box Gum Woodland outside of the proposed impact area.
5. direct or indirect fragmentation and isolation of an area of the TEC	The development will not cause direct or indirect fragmentation or isolation of any area of Box Gum Woodland. The development site does not provide a sole link between habitat or areas of vegetation.
6. the measures proposed to contribute to the recovery of the TEC in the IBRA subregion.	The development site will protect against the spread of weeds into adjoining similar vegetation and will not directly, or otherwise indirectly impact areas outside of the Development footprint.

2.3. Risk assessment

A risk assessment has been undertaken for any residual impacts likely to remain after the mitigation measures (Section 2.2) have been applied. Likelihood criteria, consequence criteria and the risk matrix are provided in Table 33, Table 34 and Table 35 respectively. The risk assessment is shown in Table 36.

Table 33: Likelihood criteria

Likelihood criteria	Description
Almost certain (Common)	Will occur, or is of a continuous nature, or the likelihood is unknown. There is likely to be an event at least once a year or greater (up to ten times per year). It often occurs in similar environments. The event is expected to occur in most circumstances.
Likely (Has occurred in recent history)	There is likely to be an event on average every one to five years. Likely to have been a similar incident occurring in similar environments. The event will probably occur in most circumstances.
Possible (Could happen, has occurred in the past, but not common)	The event could occur. There is likely to be an event on average every five to twenty years.
Unlikely (Not likely or uncommon)	The event could occur but is not expected. A rare occurrence (once per one hundred years).
Remote (Rare or practically impossible)	The event may occur only in exceptional circumstances. Very rare occurrence (once per one thousand years). Unlikely that it has occurred elsewhere; and, if it has occurred, it is regarded as unique.

Table 34: Consequence criteria

Consequence category	Description
Critical (Severe, widespread long-term effect)	Destruction of sensitive environmental features. Severe impact on ecosystem. Impacts are irreversible and/or widespread. Regulatory and high-level government intervention/action. Community outrage expected. Prosecution likely.
Major (Wider spread, moderate to long term effect)	Long-term impact of regional significance on sensitive environmental features (e.g. wetlands). Likely to result in regulatory intervention/action. Environmental harm either temporary or permanent, requiring immediate attention. Community outrage possible. Prosecution possible.
Moderate (Localised, short-term to moderate effect)	Short term impact on sensitive environmental features. Triggers regulatory investigation. Significant changes that may be rehabilitated with difficulty. Repeated public concern.
Minor (Localised short-term effect)	Impact on fauna, flora and/or habitat but no negative effects on ecosystem. Easily rehabilitated. Requires immediate regulator notification.
Negligible (Minimal impact or no lasting effect)	Negligible impact on fauna/flora, habitat, aquatic ecosystem or water resources. Impacts are local, temporary and reversible. Incident reporting according to routine protocols.

Table 35: Risk matrix

Consequence	Likelihood				
	Almost certain	Likely	Possible	Unlikely	Remote
Critical	Very High	Very High	High	High	Medium
Major	Very High	High	High	Medium	Medium
Moderate	High	Medium	Medium	Medium	Low
Minor	Medium	Medium	Low	Low	Very Low
Negligible	Medium	Low	Low	Very Low	Very Low

Table 36: Risk assessment

Potential impact	Project phase	Risk (pre-mitigation)	Risk (post mitigation)
Vegetation clearing	Construction / operation	Medium	Very Low
sedimentation and contaminated and/or nutrient rich run-off	Construction	Medium	Low
noise, dust or light spill	Construction	Low	Very Low
inadvertent impacts on adjacent habitat or vegetation	Construction	Low	Very Low
transport of weeds and pathogens from the site to adjacent vegetation	Construction	Medium	Very Low
vehicle strike	Construction / operation	Low	Very Low
trampling of threatened flora species	Construction / operation	Low	Very Low

Potential impact	Project phase	Risk (pre-mitigation)	Risk (post mitigation)
rubbish dumping	Construction / operation	Very Low	Very Low
wood collection	Construction / operation	Low	Very Low
bush rock removal and disturbance	Construction / operation	Medium	Low
increase in predatory species populations	Construction / operation	Low	Very Low
increase in pest animal populations	Construction / operation	Low	Very Low
increased risk of fire	Construction / operation	Low	Very Low
disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	Construction / operation	Low	Very Low
sedimentation and contaminated and/or nutrient rich run-off	Construction	Medium	Low

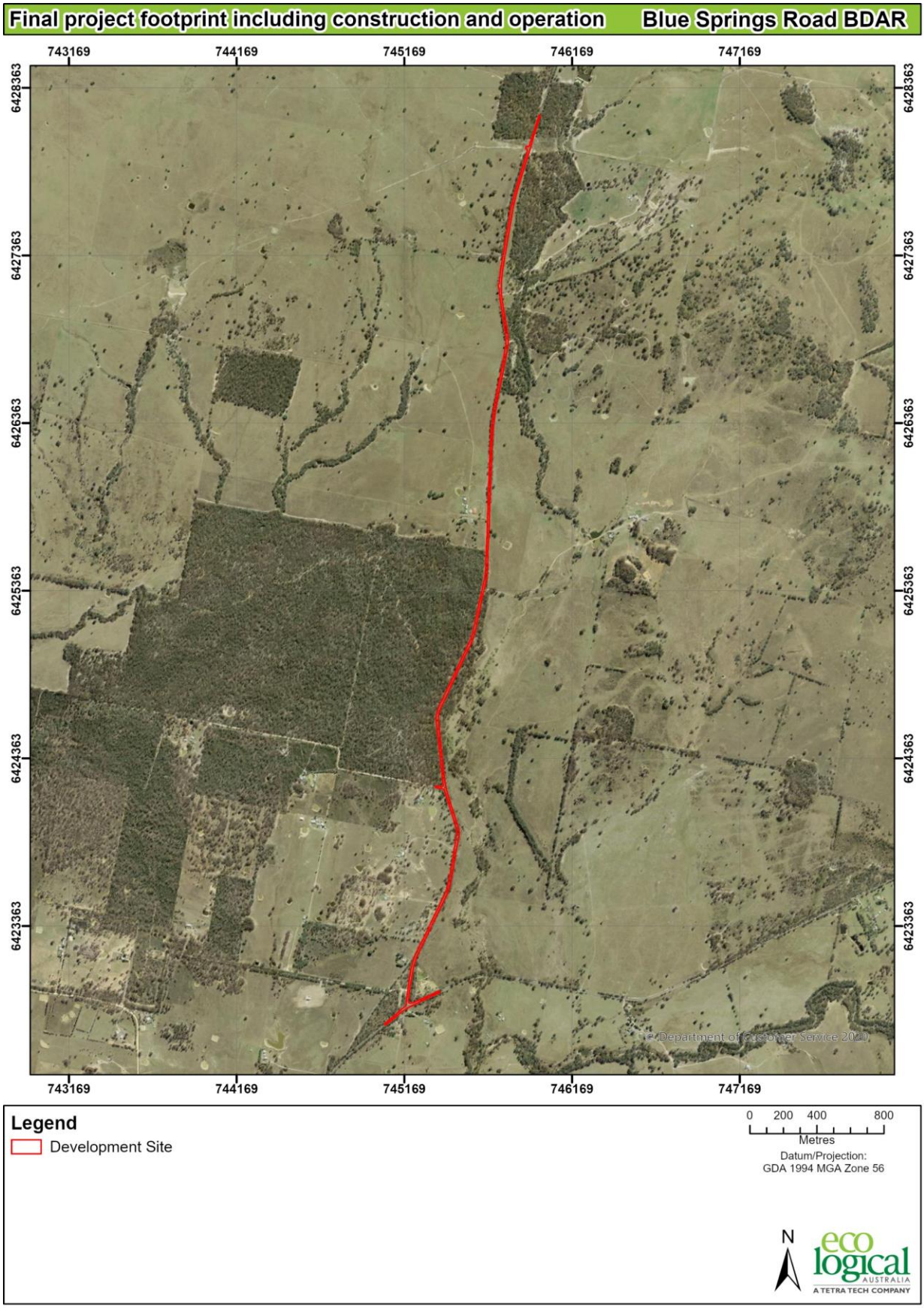

Figure 12: Final project footprint including construction and operation

Figure 13: Indirect impact zones

2.4. Impact summary

Following implementation of the BAM and the BAMC, the following impacts have been determined.

2.4.1. Serious and Irreversible Impacts (SAII)

As discussed in Section 2.2.6, as the thresholds for a SAII on Box Gum Woodland have not yet been published, impacts are potentially SAII (Table 37). Considering the degraded nature of Box Gum Woodland in the development site existing as roadside edge and the small area to be removed, it is unlikely that the development would have a SAII.

Table 37: Serious and Irreversible Impacts Summary

Species / Community	Principle	Direct impact individuals / area (ha)
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	Principle 1 and 2	Direct impacts will comprise up to 2.1 ha. Comprising: • 2.03 ha removal of mod-good condition woodland present as an intact canopy layer with a partly intact shrub and groundcover layer. • 0.07 ha removal of low condition woodland present as derived native grassland with a sparse shrub layer and without canopy.
Grevillea wilkinsonii	Principle 3	Potential direct to up to 3.6 ha of habitat.

2.4.2. Impacts requiring offsets

The impacts of the development requiring offset for native vegetation are outlined in Table 38 and shown on Figure 16. The impacts of the development requiring offset for threatened species and threatened species habitat are outlined in Table 39 and on Figure 16.

Table 38: Impacts to native vegetation that require offsets

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)
81	Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Floodplain Transition Forest	Grassy Woodland	0.9
266	White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	Western Slopes Grassy Woodlands	Grassy Woodlands	0.03
281	Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Western Slopes Grassy Woodlands	Grassy Woodlands	2.07
1177	Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion	Southern Tableland Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	0.7

Table 39: Impacts on threatened species and threatened species habitat that require offsets

Species	Common Name	Direct impact number of individuals / habitat (ha)	NSW listing status	EPBC Listing status
Acacia ausfeldii	Ausfeld's Wattle	3.7 ha	Vulnerable	Not listed
Callocephalon fimbriatum	Gang-gang Cockatoo	3.7 ha	Vulnerable	Not listed
Calyptorhynchus lathami	Glossy Black-cockatoo	3.7 ha	Vulnerable	Not listed
Crinia sloanei	Sloane's Froglet	3.7 ha	Vulnerable	Not listed
Diuris tricolor	Pine Donkey Orchid	3.7 ha	Vulnerable	Not listed
Grevillea wilkinsonii	Tumut Grevillea	3.7 ha	Critically Endangered	Endangered
Lophochroa leadbeateri	Major Mitchell's Cockatoo	3.7ha	Vulnerable	Not listed
Ninox connivens	Barking Owl	3.7 ha	Vulnerable	Not listed
Ninox strenua	Powerful Owl	3.7 ha	Vulnerable	Not listed
Phascogale tapoatafa	Brush-tailed Phascogale	3.7 ha	Vulnerable	Not listed
Polytelis swainsonii	Superb Parrot	3.7 ha	Vulnerable	Vulnerable
Swainsona recta	Small Purple-pea	3.7 ha	Endangered	Endangered
Swainsona sericea	Silky Swainson-pea	3.7 ha	Vulnerable	Not listed
Tyto novaehollandiae	Masked Owl	3.7 ha	Vulnerable	Not listed

2.4.3. Impacts not requiring offsets

There are no impacts to native vegetation that do not require offsets in accordance with BAM Section 10.3.2.2.

2.4.4. Areas not requiring assessment

There are no areas that do not require assessment.

2.4.5. Credit summary

The number of ecosystem credits required for the development are outlined in Table 40. The number of species credits required for the development are outlined in Table 41. A biodiversity credit report is included in Appendix C:

Table 40: Ecosystem credits required for the Blue Springs Road Upgrade

PCT ID	PCT Name	Vegetation Formation	Direct impact (ha)	Credits required
81	Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Grassy Woodland	0.9	40
266	White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	Grassy Woodlands	0.03	1

PCT ID	PCT Name	Vegetation Formation	Direct impact (ha)	Credits required
281	Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Grassy Woodlands	2.07	89
1177	Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion	Dry Sclerophyll Forests (Shrubby sub-formation)	0.7	19
			Total	**149**

Table 41: Species credit summary for the Blue Springs Road Upgrade

Species	Common Name	Direct impact (habitat (ha))	Credits required
Acacia ausfeldii	Ausfeld's Wattle	3.7 ha	152
Callocephalon fimbriatum	Gang-gang Cockatoo	3.7 ha	152
Calyptorhynchus lathami	Glossy Black-cockatoo	3.7 ha	152
Crinia sloanei	Sloane's Froglet	3.7 ha	114
Diuris tricolor	Pine Donkey Orchid	3.7 ha	114
Grevillea wilkinsonii	Tumut Grevillea	3.7 ha	229
Lophochroa leadbeateri	Major Mitchell's Cockatoo	3.7ha	152
Ninox connivens	Barking Owl	3.7 ha	152
Ninox strenua	Powerful Owl	3.7 ha	152
Phascogale tapoatafa	Brush-tailed Phascogale	3.7 ha	152
Polytelis swainsonii	Superb Parrot	3.7 ha	152
Swainsona recta	Small Purple-pea	3.7 ha	152
Swainsona sericea	Silky Swainson-pea	3.7 ha	152
Tyto novaehollandiae	Masked Owl	3.7 ha	152
		Total	**2,129**

2.4.6. Credit summary for Stubbo Solar Farm and Blue Spring Road Upgrade

An overall credit summary for the Stubbo Solar Farm and Blue Springs Road Upgrade is provided below. The number of ecosystem credits required for the development are outlined in Table 42. The number of species credits required for the development are outlined in Table 43.

Table 42: Ecosystem credits required for the Stubbo Solar Farm and Blue Springs Road Upgrade

PCT ID	PCT Name	Vegetation Formation	Solar Farm Direct impact (ha)	Solar Farm Credits required	Road Upgrade Direct impact (ha)	Road Upgrade Credits required	Total credits required
81	Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Grassy Woodland			0.9	40	40
266	White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	Grassy Woodlands			0.03	1	1
281	Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Grassy Woodlands	5.29	85	2.07	89	174
1177	Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion	Dry Sclerophyll Forests (Shrubby sub-formation)			0.7	19	19
1770	Narrow-leaved Ironbark - Red Stringybark - Black Pine woodlands on sandstone substrates of the Brigalow Belt South	Dry Sclerophyll Forests (Shrubby sub-formation)	0.24	2			2
Total			**5.53**	**87**	**3.6**	**149**	**236**

Table 43: Species credit summary for the Stubbo Solar Farm and Blue Springs Road Upgrade

Species	Common Name	Solar Farm Direct impact (habitat (ha))	Solar Farm Credits required	Road Upgrade Direct impact (habitat (ha))	Road Upgrade Credits required	Total credits required
Acacia ausfeldii	Ausfeld's Wattle			3.7 ha	152	152
Callocephalon fimbriatum	Gang-gang Cockatoo			3.7 ha	152	152
Calyptorhynchus lathami	Glossy Black-cockatoo			3.7 ha	152	152
Crinia sloanei	Sloane's Froglet			3.7 ha	114	114
Diuris tricolor	Pine Donkey Orchid			3.7 ha	114	114
Grevillea wilkinsonii	Tumut Grevillea			3.7 ha	229	229
Lophochroa leadbeateri	Major Mitchell's Cockatoo			3.7ha	152	152
Ninox connivens	Barking Owl	4.4ha	66	3.7 ha	152	218
Ninox strenua	Powerful Owl			3.7 ha	152	152
Phascogale tapoatafa	Brush-tailed Phascogale			3.7 ha	152	152
Polytelis swainsonii	Superb Parrot			3.7 ha	152	152
Swainsona recta	Small Purple-pea			3.7 ha	152	152
Swainsona sericea	Silky Swainson-pea			3.7 ha	152	152
Tyto novaehollandiae	Masked Owl			3.7 ha	152	152
Total			**66**		**2,129**	**2,195**

Figure 14: Candidate Serious and Irreversible Impacts (Box Gum Woodland)

Figure 15: Candidate Serious and Irreversible Impacts (*Grevillea wilkinsonii*)

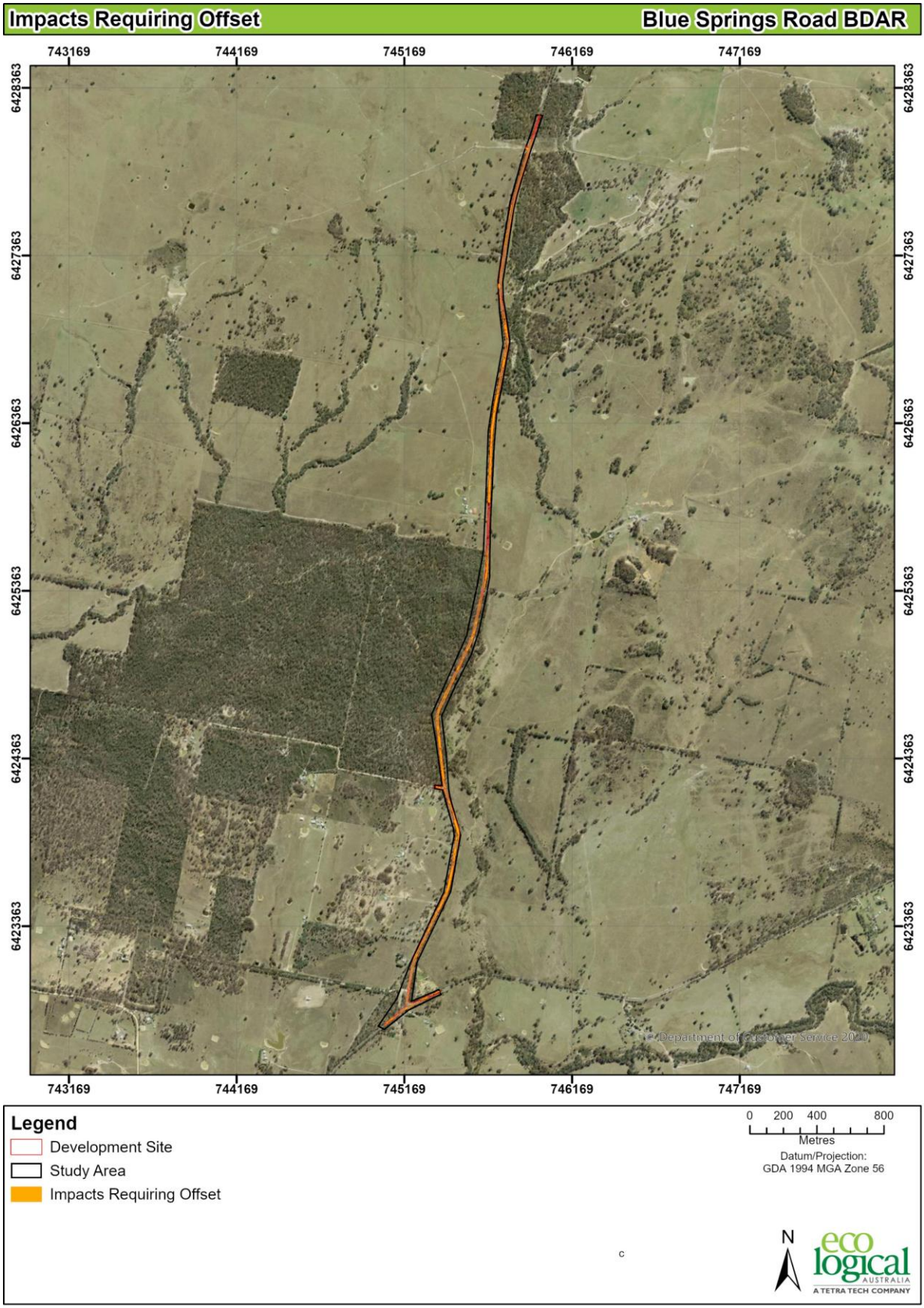

Figure 16: Impacts requiring offset

2.5. Consistency with legislation and policy

2.5.1. Environment Protection and Biodiversity Conservation Act (1999)

An assessment of the impacts of the proposed development on MNES was undertaken to determine whether there is the potential for any significant impacts and a referral to the Commonwealth Minister for the Environment is required.

A likelihood of occurrence table including assessment of MNES species known or predicted to occur in the locality based on a PMST search is included in Appendix D. Significant impact assessments have been completed for two ecological communities and two threatened species (Appendix E), with the results summarised in Table 44. Assessments concluded that no significant impacts are likely to occur, however the proponent may still elect to prepare a Referral under the EPBC Act for project certainty.

Table 44: Assessment of potential impacts to MNES under the EPBC Act

MNES	Occurrence	Significance assessment outcome
Threatened ecological communities	Two TEC are present within the development site. • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered • Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia	Significant impact unlikely.
Threatened species	No threatened species listed as MNES were recorded. Three species were considered to have potential to occur: • Regent Honeyeater • Swift Parrot	Significant impact unlikely.
Migratory species	No migratory species were considered likely to be impacted by the proposed road upgrade.	Significant impact unlikely.
Wetlands of International Importance	No Wetlands of National Importance are present within or in proximity to the development site.	Significant impact unlikely.

3. Conclusion and next steps

Based on preliminary biodiversity assessment, UPC\AC has developed a concept design for the proposed Blue Springs Road Upgrade. This design has considered initial impacts on biodiversity, including areas of native vegetation and presence of hollow-bearing trees. In consultation with Mid Western Regional Council and other relevant stakeholders, the proposed design provides a safer access to the Stubbo Solar Farm and aims to avoid and minimise impacts to biodiversity.

This BDAR has assessed the potential impacts of the proposed Blue Springs Road Upgrade in accordance with the BAM. The proposed design will be refined prior to construction in order to further mitigate biodiversity impacts. The proponent will also prepare a detailed Biodiversity Management Plan to further mitigate potential impacts during construction.

Species credit calculations assume presence of several species across all areas (worst case scenario). Further surveys at the relevant season are proposed and will allow this assessment to be refined. UPC\AC may request the Secretary to refine the offset requirements prior to construction commencement following additional targeted survey.

Ecosystem credit calculations are based on the current design as included in the amendment report (worst case scenario). UPC\AC may request the Secretary to refine the offset requirements based on the final detailed design (road upgrades and Solar Farm) prior to construction commencement.

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Appendix A: Definitions

Terminology	Definition
Biodiversity credit report	The report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site.
BioNet Atlas	The BioNet Atlas (formerly known as the NSW Wildlife Atlas) is the OEH database of flora and fauna records. The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails) and some fish
Broad condition state:	Areas of the same PCT that are in relatively homogenous condition. Broad condition is used for stratifying areas of the same PCT into a vegetation zone for the purpose of determining the vegetation integrity score.
Connectivity	The measure of the degree to which an area(s) of native vegetation is linked with other areas of vegetation.
Credit Calculator	The computer program that provides decision support to assessors and proponents by applying the BAM, and which calculates the number and class of biodiversity credits required to offset the impacts of a development or created at a biodiversity stewardship site.
Development	Has the same meaning as development at section 4 of the EP&A Act, or an activity in Part 5 of the EP&A Act. It also includes development as defined in section 115T of the EP&A Act.
Development footprint	The area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials.
Development site	An area of land that is subject to a proposed development that is under the EP&A Act.
Ecosystem credits	A measurement of the value of EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur with a PCT. Ecosystem credits measure the loss in biodiversity values at a development site and the gain in biodiversity values at a biodiversity stewardship site.
High threat exotic plant cover	Plant cover composed of vascular plants not native to Australia that if not controlled will invade and outcompete native plant species.
Hollow bearing tree	A living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the minimum entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1 m above the ground. Trees must be examined from all angles.
Important wetland	A wetland that is listed in the Directory of Important Wetlands of Australia (DIWA) and SEPP 14 Coastal Wetlands
Linear shaped development	Development that is generally narrow in width and extends across the landscape for a distance greater than 3.5 kilometres in length
Local population	The population that occurs in the study area. In cases where multiple populations occur in the study area or a population occupies part of the study area, impacts on each subpopulation must be assessed separately.
Local wetland	Any wetland that is not identified as an important wetland (refer to definition of Important wetland).
NSW (Mitchell) landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.
Operational Manual	The Operational Manual published from time to time by OEH, which is a guide to assist assessors when using the BAM

Terminology	Definition
Patch size	An area of intact native vegetation that: a) occurs on the development site or biodiversity stewardship site, and b) includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the development site or stewardship site.
Proponent	A person who intends to apply for consent to carry out development or for approval for an activity.
Regeneration	The proportion of over-storey species characteristic of the PCT that are naturally regenerating and have a diameter at breast height <5 cm within a vegetation zone.
Remaining impact	An impact on biodiversity values after all reasonable measures have been taken to avoid and minimise the impacts of development. Under the BAM, an offset requirement is calculated for the remaining impacts on biodiversity values.
Retirement of credits	The purchase and retirement of biodiversity credits from an already-established biobank site or a biodiversity stewardship site secured by a biodiversity stewardship agreement.
Riparian buffer	Riparian buffers applied to water bodies in accordance with the BAM
Sensitive biodiversity values land map	Development within an area identified on the map requires assessment using the BAM.
Site attributes	The matters assessed to determine vegetation integrity. They include: native plant species richness, native over-storey cover, native mid-storey cover, native ground cover (grasses), native ground cover (shrubs), native ground cover (other), exotic plant cover (as a percentage of total ground and mid-storey cover), number of trees with hollows, proportion of over-storey species occurring as regeneration, and total length of fallen logs.
Site-based development	a development other than a linear shaped development, or a multiple fragmentation impact development
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Subject land	Is land to which the BAM is applied in Stage 1 to assess the biodiversity values of the land. It includes land that may be a development site, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement.
Threatened Biodiversity Data Collection	Part of the BioNet database, published by OEH and accessible from the BioNet website.
Threatened species	Critically Endangered, Endangered or Vulnerable threatened species as defined by Schedule 1 of the BC Act, or any additional threatened species listed under Part 13 of the EPBC Act as Critically Endangered, Endangered or Vulnerable.
Vegetation Benchmarks Database	A database of benchmarks for vegetation classes and some PCTs. The Vegetation Benchmarks Database is published by OEH and is part of the BioNet Vegetation Classification.
Vegetation zone	A relatively homogenous area of native vegetation on a development site, land to be biodiversity certified or a biodiversity stewardship site that is the same PCT and broad condition state.
Woody native vegetation	Native vegetation that contains an over-storey and/or mid-storey that predominantly consists of trees and/or shrubs

Terminology	Definition
Biodiversity credit report	The report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site.
BioNet Atlas	The BioNet Atlas (formerly known as the NSW Wildlife Atlas) is the OEH database of flora and fauna records. The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails) and some fish
Broad condition state:	Areas of the same PCT that are in relatively homogenous condition. Broad condition is used for stratifying areas of the same PCT into a vegetation zone for the purpose of determining the vegetation integrity score.
Connectivity	The measure of the degree to which an area(s) of native vegetation is linked with other areas of vegetation.
Credit Calculator	The computer program that provides decision support to assessors and proponents by applying the BAM, and which calculates the number and class of biodiversity credits required to offset the impacts of a development or created at a biodiversity stewardship site.
Development	Has the same meaning as development at section 4 of the EP&A Act, or an activity in Part 5 of the EP&A Act. It also includes development as defined in section 115T of the EP&A Act.
Development footprint	The area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials.
Development site	An area of land that is subject to a proposed development that is under the EP&A Act.
Ecosystem credits	A measurement of the value of EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur with a PCT. Ecosystem credits measure the loss in biodiversity values at a development site and the gain in biodiversity values at a biodiversity stewardship site.
High threat exotic plant cover	Plant cover composed of vascular plants not native to Australia that if not controlled will invade and outcompete native plant species.
Hollow bearing tree	A living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the minimum entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1 m above the ground. Trees must be examined from all angles.
Important wetland	A wetland that is listed in the Directory of Important Wetlands of Australia (DIWA) and SEPP 14 Coastal Wetlands
Linear shaped development	Development that is generally narrow in width and extends across the landscape for a distance greater than 3.5 kilometres in length
Local population	The population that occurs in the study area. In cases where multiple populations occur in the study area or a population occupies part of the study area, impacts on each subpopulation must be assessed separately.
Local wetland	Any wetland that is not identified as an important wetland (refer to definition of Important wetland).
Mitchell landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.
Multiple fragmentation impact development	Developments such as wind farms and coal seam gas extraction that require multiple extraction points (wells) or turbines and a network of associated development including roads, tracks, gathering systems/flow lines, transmission lines

Terminology	Definition
Operational Manual	The Operational Manual published from time to time by OEH, which is a guide to assist assessors when using the BAM
Patch size	An area of intact native vegetation that: a) occurs on the development site or biodiversity stewardship site, and b) includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the development site or stewardship site.
Proponent	A person who intends to apply for consent to carry out development or for approval for an activity.
Reference sites	The relatively unmodified sites that are assessed to obtain local benchmark information when benchmarks in the Vegetation Benchmarks Database are too broad or otherwise incorrect for the PCT and/or local situation. Benchmarks can also be obtained from published sources.
Regeneration	The proportion of over-storey species characteristic of the PCT that are naturally regenerating and have a diameter at breast height <5 cm within a vegetation zone.
Remaining impact	An impact on biodiversity values after all reasonable measures have been taken to avoid and minimise the impacts of development. Under the BAM, an offset requirement is calculated for the remaining impacts on biodiversity values.
Retirement of credits	The purchase and retirement of biodiversity credits from an already-established biobank site or a biodiversity stewardship site secured by a biodiversity stewardship agreement.
Riparian buffer	Riparian buffers applied to water bodies in accordance with the BAM
Sensitive biodiversity values land map	Development within an area identified on the map requires assessment using the BAM.
Site attributes	The matters assessed to determine vegetation integrity. They include: native plant species richness, native over-storey cover, native mid-storey cover, native ground cover (grasses), native ground cover (shrubs), native ground cover (other), exotic plant cover (as a percentage of total ground and mid-storey cover), number of trees with hollows, proportion of over-storey species occurring as regeneration, and total length of fallen logs.
Site-based development	a development other than a linear shaped development, or a multiple fragmentation impact development
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Subject land	Is land to which the BAM is applied in Stage 1 to assess the biodiversity values of the land. It includes land that may be a development site, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement.
Threatened Biodiversity Data Collection	Part of the BioNet database, published by OEH and accessible from the BioNet website.
Threatened species	Critically Endangered, Endangered or Vulnerable threatened species as defined by Schedule 1 of the BC Act, or any additional threatened species listed under Part 13 of the EPBC Act as Critically Endangered, Endangered or Vulnerable.
Vegetation Benchmarks Database	A database of benchmarks for vegetation classes and some PCTs. The Vegetation Benchmarks Database is published by OEH and is part of the BioNet Vegetation Classification.
Vegetation zone	A relatively homogenous area of native vegetation on a development site, land to be biodiversity certified or a biodiversity stewardship site that is the same PCT and broad condition state.

Terminology	Definition
Wetland	An area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle. Wetlands may exhibit wet and dry phases and may be wet permanently, cyclically or intermittently with fresh, brackish or saline water
Woody native vegetation	Native vegetation that contains an over-storey and/or mid-storey that predominantly consists of trees and/or shrubs

Appendix B: Vegetation plot data

Table 45: Plot locations

Plot	PCT	Condition	Zone	Easting	Northing	Bearing
Plot 10	281	281_mod_good	55	745135	6422869	220
Plot 1	1177	1177_mod_good	55	745518	6425002	205
Plot 2	266	266_good	55	745583	6425198	10
Plot 3	1177	1177_mod_good	55	745630	6425413	8
Plot 4	81	81_good	55	745399	6424662	20
Plot 5	281	281_mod_good	55	745969	6428114	10
Plot 6	281	281_low	55	745205	6423107	0
Plot 7	281	281_low	55	745950	6428058	190
Plot 8	81	81_good	55	745389	6424266	175
Plot 9	281	281_mod_good	55	745183	6423012	9

Table 46: Plot Composition Data

Plot	PCT	Condition	Tree	Shrub	Grass	Forb	Fern	Other
Plot 10	281	281_mod_good	2	2	10	12	1	2
Plot 1	1177	1177_mod_good	3	5	7	4	1	0
Plot 2	266	266_good	3	3	14	26	1	3
Plot 3	1177	1177_mod_good	4	10	14	13	1	2
Plot 4	81	81_good	1	4	13	21	1	0
Plot 5	281	281_mod_good	4	3	15	17	1	3
Plot 6	281	281_low	2	5	5	7	1	0
Plot 7	281	281_low	1	0	14	7	1	0
Plot 8	81	81_good	2	3	18	12	1	3
Plot 9	281	281_mod_good	2	5	10	13	1	4

Table 47: Plot structure data

Plot	PCT	Condition	Tree	Shrub	Grass	Forb	Fern	Other
Plot 10	281	281_mod_good	10.5	0.7	16.5	11.3	0.2	0.2
Plot 1	1177	1177_mod_good	32.1	0.6	0.7	0.5	0.1	0.0
Plot 2	266	266_good	21.0	3.2	42.7	28.0	0.1	0.3
Plot 3	1177	1177_mod_good	17.6	1.9	17.6	2.9	0.1	0.2
Plot 4	81	81_good	25.0	0.7	7.4	3.6	0.1	0.0
Plot 5	281	281_mod_good	8.6	8.2	41.3	19.9	0.1	0.3
Plot 6	281	281_low	0.9	1.5	52.2	0.7	0.2	0.0
Plot 7	281	281_low	0.1	0.0	27.2	3.6	0.3	0.0
Plot 8	81	81_good	15.1	3.2	30.6	10.2	0.3	0.6
Plot 9	281	281_mod_good	17.0	1.5	42.4	2.2	0.1	0.9

Table 48: Plot function data

Plot	PCT	Large trees	Hollow-bearing trees	Litter Cover	Fallen Logs (m)	Tree (5 - 10 cm)	Tree (10 - 20 cm)	Tree (20 - 30 cm)	Tree (30 - 50 cm)	Tree (50 - 80 cm)	Regen (dbh <5cm)	High threat exotic
Plot 10	281	0	1	67	38	1	1	1	1	0	1	0.3
Plot 1	1177	1	0	80	15	1	1	1	1	1	1	0.0
Plot 2	266	3	3	96	20	1	1	1	1	1	1	0.5
Plot 3	1177	1	1	94.2	98	1	1	1	1	1	1	0.1
Plot 4	81	1	1	95.6	14	0	1	1	1	1	0	0.8
Plot 5	281	2	1	77.6	58	1	1	1	1	1	1	0.0
Plot 6	281	0	0	18	11	1	0	0	0	0	1	0.1
Plot 7	281	0	0	50	11	0	0	0	0	0	1	9.1
Plot 8	81	6	6	93	44	1	1	1	0	1	1	4.3
Plot 9	281	0	0	79.6	1	1	1	1	1	0	1	0.3

Note: Flora Species Plot Data attached in MS Excel to BAM Calculator

Appendix C: Biodiversity credit report

BAM Credit Summary Report

Proposal Details

Assessment Id
00025789/BAAS19034/21/00025790

Proposal Name
Blue_Springs_Road

BAM data last updated *
31/05/2021

Assessor Name
Tom Schmidt

Report Created
01/06/2021

BAM Data version *
40

Assessor Number
BAAS19034

BAM Case Status
Finalised

Date Finalised
01/06/2021

Assessment Revision
0

Assessment Type
Major Projects

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

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	BC Act Listing status	EPBC Act listing status	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion											
1	281_BSR_281_mod_good	White Box Yellow Box Blakely's Red Gum Woodland	87.1	87.1	2	Endangered Ecological Community	Critically Endangered	High Sensitivity to Potential Gain	2.00	TRUE	87

5	281_BSR_281_low	White Box Yellow Box Blakely's Red Gum Woodland	52.6	52.6	0.07	Endangered Ecological Community	Critically Endangered	High Sensitivity to Potential Gain	2.00	TRUE	2
										Subtotal	**89**
Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion											
2	1177_BSR_1177_mod_good	Not a TEC	62.9	62.9	0.7			High Sensitivity to Potential Gain	1.75		19
										Subtotal	**19**
Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion											
4	81_BSR_81_good	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	89	89.0	0.9	Endangered Ecological Community	Endangered	High Sensitivity to Potential Gain	2.00		40
										Subtotal	**40**
White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion											
3	266_BSR_266_good	White Box Yellow Box Blakely's Red Gum Woodland	95.5	95.5	0.03	Endangered Ecological Community	Critically Endangered	High Sensitivity to Potential Gain	2.00	TRUE	1
										Subtotal	**1**
										Total	**149**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Species credits
Acacia ausfeldii / Ausfeld's Wattle (Flora)								
281_BSR_281_mod_good	87.1	87.1	2	Vulnerable	Not Listed	2	False	87
1177_BSR_1177_mod_good	62.9	62.9	0.7	Vulnerable	Not Listed	2	False	22
266_BSR_266_good	95.5	95.5	0.03	Vulnerable	Not Listed	2	False	1
81_BSR_81_good	89.0	89.0	0.9	Vulnerable	Not Listed	2	False	40
281_BSR_281_low	52.6	52.6	0.07	Vulnerable	Not Listed	2	False	2
							Subtotal	**152**
Callocephalon fimbriatum / Gang-gang Cockatoo (Fauna)								
281_BSR_281_mod_good	87.1	87.1	2	Vulnerable	Not Listed	2	False	87
1177_BSR_1177_mod_good	62.9	62.9	0.7	Vulnerable	Not Listed	2	False	22
266_BSR_266_good	95.5	95.5	0.03	Vulnerable	Not Listed	2	False	1
81_BSR_81_good	89.0	89.0	0.9	Vulnerable	Not Listed	2	False	40
281_BSR_281_low	52.6	52.6	0.07	Vulnerable	Not Listed	2	False	2
							Subtotal	**152**
Calyptorhynchus lathami / Glossy Black-Cockatoo (Fauna)								
281_BSR_281_mod_good	87.1	87.1	2	Vulnerable	Not Listed	2	False	87

1177_BSR_1177_mod_good	62.9	62.9	0.7	Vulnerable	Not Listed	2	False	22
266_BSR_266_good	95.5	95.5	0.03	Vulnerable	Not Listed	2	False	1
81_BSR_81_good	89.0	89.0	0.9	Vulnerable	Not Listed	2	False	40
281_BSR_281_low	52.6	52.6	0.07	Vulnerable	Not Listed	2	False	2
							Subtotal	**152**
Crinia sloanei / Sloane's Froglet (Fauna)								
281_BSR_281_mod_good	87.1	87.1	2	Vulnerable	Endangered	1.5	False	65
1177_BSR_1177_mod_good	62.9	62.9	0.7	Vulnerable	Endangered	1.5	False	17
266_BSR_266_good	95.5	95.5	0.03	Vulnerable	Endangered	1.5	False	1
81_BSR_81_good	89.0	89.0	0.9	Vulnerable	Endangered	1.5	False	30
281_BSR_281_low	52.6	52.6	0.07	Vulnerable	Endangered	1.5	False	1
							Subtotal	**114**
Diuris tricolor / Pine Donkey Orchid (Flora)								
281_BSR_281_mod_good	87.1	87.1	2	Vulnerable	Not Listed	1.5	False	65
1177_BSR_1177_mod_good	62.9	62.9	0.7	Vulnerable	Not Listed	1.5	False	17
266_BSR_266_good	95.5	95.5	0.03	Vulnerable	Not Listed	1.5	False	1
81_BSR_81_good	89.0	89.0	0.9	Vulnerable	Not Listed	1.5	False	30
281_BSR_281_low	52.6	52.6	0.07	Vulnerable	Not Listed	1.5	False	1

							Subtotal	**114**
Grevillea wilkinsonii / Tumut Grevillea (Flora)								
281_BSR_281_mod_good	87.1	87.1	2	Critically Endangered	Endangered	3	True	131
1177_BSR_1177_mod_good	62.9	62.9	0.7	Critically Endangered	Endangered	3	True	33
266_BSR_266_good	95.5	95.5	0.03	Critically Endangered	Endangered	3	True	2
81_BSR_81_good	89.0	89.0	0.9	Critically Endangered	Endangered	3	True	60
281_BSR_281_low	52.6	52.6	0.07	Critically Endangered	Endangered	3	True	3
							Subtotal	**229**
Lophochroa leadbeateri / Major Mitchell's Cockatoo (Fauna)								
281_BSR_281_mod_good	87.1	87.1	2	Vulnerable	Not Listed	2	False	87
1177_BSR_1177_mod_good	62.9	62.9	0.7	Vulnerable	Not Listed	2	False	22
266_BSR_266_good	95.5	95.5	0.03	Vulnerable	Not Listed	2	False	1
81_BSR_81_good	89.0	89.0	0.9	Vulnerable	Not Listed	2	False	40
281_BSR_281_low	52.6	52.6	0.07	Vulnerable	Not Listed	2	False	2
							Subtotal	**152**
Ninox connivens / Barking Owl (Fauna)								
281_BSR_281_mod_good	87.1	87.1	2	Vulnerable	Not Listed	2	False	87

1177_BSR_1177_mod_good	62.9	62.9	0.7	Vulnerable	Not Listed	2	False	22
266_BSR_266_good	95.5	95.5	0.03	Vulnerable	Not Listed	2	False	1
81_BSR_81_good	89.0	89.0	0.9	Vulnerable	Not Listed	2	False	40
281_BSR_281_low	52.6	52.6	0.07	Vulnerable	Not Listed	2	False	2
							Subtotal	**152**
Ninox strenua / Powerful Owl (Fauna)								
281_BSR_281_mod_good	87.1	87.1	2	Vulnerable	Not Listed	2	False	87
1177_BSR_1177_mod_good	62.9	62.9	0.7	Vulnerable	Not Listed	2	False	22
266_BSR_266_good	95.5	95.5	0.03	Vulnerable	Not Listed	2	False	1
81_BSR_81_good	89.0	89.0	0.9	Vulnerable	Not Listed	2	False	40
281_BSR_281_low	52.6	52.6	0.07	Vulnerable	Not Listed	2	False	2
							Subtotal	**152**
Phascogale tapoatafa / Brush-tailed Phascogale (Fauna)								
281_BSR_281_mod_good	87.1	87.1	2	Vulnerable	Not Listed	2	False	87
1177_BSR_1177_mod_good	62.9	62.9	0.7	Vulnerable	Not Listed	2	False	22
266_BSR_266_good	95.5	95.5	0.03	Vulnerable	Not Listed	2	False	1
81_BSR_81_good	89.0	89.0	0.9	Vulnerable	Not Listed	2	False	40
281_BSR_281_low	52.6	52.6	0.07	Vulnerable	Not Listed	2	False	2

							Subtotal	**152**
Polytelis swainsonii / Superb Parrot (Fauna)								
281_BSR_281_mod_good	87.1	87.1	2	Vulnerable	Vulnerable	2	False	87
1177_BSR_1177_mod_good	62.9	62.9	0.7	Vulnerable	Vulnerable	2	False	22
266_BSR_266_good	95.5	95.5	0.03	Vulnerable	Vulnerable	2	False	1
81_BSR_81_good	89.0	89.0	0.9	Vulnerable	Vulnerable	2	False	40
281_BSR_281_low	52.6	52.6	0.07	Vulnerable	Vulnerable	2	False	2
							Subtotal	**152**
Swainsona recta / Small Purple-pea (Flora)								
281_BSR_281_mod_good	87.1	87.1	2	Endangered	Endangered	2	False	87
1177_BSR_1177_mod_good	62.9	62.9	0.7	Endangered	Endangered	2	False	22
266_BSR_266_good	95.5	95.5	0.03	Endangered	Endangered	2	False	1
81_BSR_81_good	89.0	89.0	0.9	Endangered	Endangered	2	False	40
281_BSR_281_low	52.6	52.6	0.07	Endangered	Endangered	2	False	2
							Subtotal	**152**
Swainsona sericea / Silky Swainson-pea (Flora)								
281_BSR_281_mod_good	87.1	87.1	2	Vulnerable	Not Listed	2	False	87
1177_BSR_1177_mod_good	62.9	62.9	0.7	Vulnerable	Not Listed	2	False	22

266_BSR_266_good	95.5	95.5	0.03	Vulnerable	Not Listed	2	False	1
81_BSR_81_good	89.0	89.0	0.9	Vulnerable	Not Listed	2	False	40
281_BSR_281_low	52.6	52.6	0.07	Vulnerable	Not Listed	2	False	2
							Subtotal	**152**
Tyto novaehollandiae / Masked Owl (Fauna)								
281_BSR_281_mod_good	87.1	87.1	2	Vulnerable	Not Listed	2	False	87
1177_BSR_1177_mod_good	62.9	62.9	0.7	Vulnerable	Not Listed	2	False	22
266_BSR_266_good	95.5	95.5	0.03	Vulnerable	Not Listed	2	False	1
81_BSR_81_good	89.0	89.0	0.9	Vulnerable	Not Listed	2	False	40
281_BSR_281_low	52.6	52.6	0.07	Vulnerable	Not Listed	2	False	2
							Subtotal	**152**

Appendix D: EPBC Act MNES likelihood table

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Likelihood	Justification
Central Hunter Valley eucalypt forest and woodland		E	CE	Permian-derived soils, typically medium in fertility, often of medium clay content, although some are sandy.	The ecological community is an open forest or woodland, typically dominated by one or more of the following four eucalypt species: *Eucalyptus crebra* (Narrow-leaved Ironbark), *Corymbia maculata* (Spotted Gum), *E. dawsonii* (Slaty Gum) and *E. moluccana* (Grey Box).	Not present within development footprint.	Landscape characteristics and species composition of native vegetation within the develop site are not consistent with this TEC.
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia		E	E	Central New South Wales through northern and central Victoria into South Australia. In NSW, found in the southern subregions of the Brigalow Belt South bioregion, the eastern subregions of the Darling Riverine Plain bioregion, the NSW South Western Slopes bioregion and the eastern subregions of the Cobar Peneplain bioregion.	Flat to undulating plains, low slopes and rises and, to a lesser extent, drainage depressions and flats. May extend to more elevated hillslopes on the fringes of its range. Often occurs on productive soils derived from alluvial or colluvial materials.	Present.	PCT 81 in the study area corresponds to this community.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland		CE	CE	Occurs in an arc along the western slopes and tablelands of the Great Dividing Range from Southern Queensland through NSW to central Victoria. In NSW, it occurs in the Brigalow Belt South, Nandewar, New England Tableland, Sydney Basin, NSW North Coast, South Eastern Highlands, South East Corner, NSW South Western Slopes and Riverina Bioregions.	Areas where rainfall is between 400 and 1200 mm per annum, on moderate to highly fertile soils at altitudes of 170 m to 1200 m.	Present	PCT 266 and PCT 281 in the study area corresponds to this community
Commersonia procumbens		V	V	Endemic to NSW, found in the Dubbo-Mendooran-Gilgandra region, the Pilliga and Nymagee areas, the Upper Hunter region, and in Goonoo SCA.	Sandy sites, disturbed habitats such as roadsides, quarry edges and gravel stockpiles. Often found in *Eucalyptus dealbata- E. sideroxylon* woodland,	Unlikely	Species not recorded in targeted surveys.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Likelihood	Justification
					Melaleuca uncinata scrub, and *mallee* with *Calytrix tetragona* understorey.		
Cryptostylis hunteriana	Leafless Tongue Orchid	V	V	In NSW, recorded mainly on coastal and near coastal ranges north from Victoria to near Forster, with two isolated occurrences inland north-west of Grafton.	Coastal heathlands, margins of coastal swamps and sedgelands, coastal forest, dry woodland, and lowland forest.	Unlikely	No suitable habitat.
Dichanthium setosum	Bluegrass	V	V	In NSW, found on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes.	Cleared woodland, grassy roadside remnants and highly disturbed pasture, on heavy basaltic black soils and red-brown loams with clay subsoil.	Unlikely	Not recorded in targeted survey.
Euphrasia arguta		E	CE	In NSW, recently recorded only from Nundle area of the north western slopes and tablelands, from near the Hastings River and from the Barrington Tops.	Eucalypt forest with a mixed grass and shrub understorey, disturbed areas, along roadsides.	Unlikely	Not recorded in targeted survey.
Homoranthus darwinioides		V	V	Central tablelands and western slopes of NSW, occurring from Putty to the Dubbo district. Found west of Muswellbrook between Merriwa and Bylong, and north of Muswellbrook to Goonoo SF.	Woodland with shrubby understorey, usually in gravely sandy soils.	Unlikely	Not recorded in targeted survey.
Leucochrysum albicans var. *tricolor*	Hoary Sunray	P	E	In NSW it occurs on the Southern Tablelands and adjacent areas in an area roughly bounded by Albury, Bega and Goulburn.	Grassland, woodland and forest, generally on relatively heavy soils.	Unlikely	Not recorded in targeted survey.
Prasophyllum petilum	Tarengo Leek Orchid	E	E	Four sites in NSW: at Boorowa, Captains Flat, Ilford and Delegate. Also	Natural Temperate Grassland, grassy woodland, and Box-Gum woodland.	Unlikely	No suitable habitat.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Likelihood	Justification
				experimentally introduced at Bowning Cemetery NSW.			
Swainsona recta	Small Purple-pea	E	E	Queanbeyan and Wellington-Mudgee areas. Historically also recorded at Carcoar, Culcairn and Wagga Wagga.	Grassland, open woodland and open forests dominated by *Eucalyptus blakelyi* (Blakely's Red Gum), *E. melliodora* (Yellow Box), *E. rubida* (Candlebark Gum) and *E. goniocalyx* (Long-leaf Box).	Unlikely	Nearest records 30km to the south.
Thesium australe	Austral Toadflax	V	V	In eastern NSW it is found in very small populations scattered along the coast, and from the Northern to Southern Tablelands.	Grassland on coastal headlands or grassland and grassy woodland away from the coast.	Unlikely	No records in locality.
Tylophora linearis		V	E	In NSW, found in the Barraba, Mendooran, Temora and West Wyalong districts in the northern and central western slopes. Records include Crow Mountain near Barraba, Goonoo, Pilliga West, Cumbil, and Eura State Forests, Coolbaggie Nature Reserve, Goobang National Park, and Beni Conservation Area	Dry scrub, open forest, dry woodlands of *Eucalyptus fibrosa, Eucalyptus sideroxylon, Eucalyptus albens, Callitris endlicheri, Callitris glaucophylla and Allocasuarina luehmannii.*	Unlikely	No suitable habitat.
Anthochaera phrygia	Regent Honeyeater	CE	CE	Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions.	Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of *Casuarina cunninghamiana (*River Oak).	Potential	Wide-ranging species.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Likelihood	Justification
Aprasia parapulchella	Pink-tailed Legless Lizard	V	V	In NSW, only known from the Central and Southern Tablelands, and the South Western Slopes.	Sloping, open woodland areas with predominantly native grassy groundlayers, rocky outcrops or scattered, partially-buried rocks.	Unlikely	No suitable habitat.
Apus pacificus	Fork-tailed Swift		M	Recorded in all regions of NSW.	Riparian woodland., swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.	Potential. Unlikely to be impacted. Species predominately aerial.	Wide-ranging species.
Botaurus poiciloptilus	Australasian Bittern	E	E	Found over most of NSW except for the far north-west.	Permanent freshwater wetlands with tall, dense vegetation, particularly *Typha* spp. (bullrushes) and *Eleocharis* spp. (spikerushes).	Unlikely	No suitable habitat.
Calidris ferruginea	Curlew Sandpiper	E	CE, M	Occurs along the entire coast of NSW, and sometimes in freshwater wetlands in the Murray-Darling Basin.	Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	Unlikely	No suitable habitat.
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Recorded from Rockhampton in Qld south to Ulladulla in NSW. Largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes.	Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	Unlikely	No suitable habitat.
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld.	Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	Unlikely	No suitable habitat.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Likelihood	Justification
Delma impar	Striped Legless Lizard	V	V	In NSW, occurs in the Southern Tablelands, the South West Slopes and possibly on the Riverina.	Natural Temperate Grassland, secondary and modified grassland, open Box-Gum Woodland.	Unlikely	No suitable habitat.
Grantiella picta	Painted Honeyeater	V	V	Widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas.	Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	Unlikely.	Species not recorded during surveys.
Hirundapus caudacutus	White-throated Needletail		V, M	All coastal regions of NSW, inland to the western slopes and inland plains of the Great Divide.	Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	Potential. Unlikely to be impacted. Species predominately aerial.	Wide-ranging species.
Lathamus discolor	Swift Parrot	E	CE	Migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes.	Box-ironbark forests and woodlands.	Potential	Wide-ranging species.
Leipoa ocellata	Malleefowl	E	V	Arid and semi-arid zones. In NSW, populations occur in the south west mallee centred on Mallee Cliffs NP and extending east to near Balranald; in the Scotia mallee west of the Darling River; and in the Goonoo forest near Dubbo. Recorded less recently in the Pilliga forests, around Cobar and Goulburn River NP.	Predominantly mallee communities. Less frequently found in other eucalypt woodlands, such as Inland Grey Box, Ironbark or Bimble Box Woodlands, or other woodlands dominated by Mulga or native Cypress Pine species.	Unlikely	No suitable habitat.
Litoria booroolongensis	Booroolong Frog	E	E	Restricted to NSW and north-eastern Victoria, predominantly along the western-flowing streams of the Great Dividing Range. Several populations	Permanent streams with some fringing vegetation cover such as ferns, sedges or grasses.	Unlikely	No suitable habitat.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Likelihood	Justification
				have recently been recorded in the Namoi catchment.			
Motacilla flava	Yellow Wagtail		M	Regular summer migrant to mostly coastal Australia. In NSW recorded Sydney to Newcastle, the Hawkesbury and inland in the Bogan LGA.	Swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, lawns.	Unlikely	No suitable habitat.
Myiagra cyanoleuca	Satin Flycatcher		M	In NSW, widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains.	Eucalypt-dominated forests, especially near wetlands, watercourses, and heavily-vegetated gullies.	Unlikely	No suitable habitat.
Numenius madagascariensis	Eastern Curlew		CE, M	Summer migrant to Australia. Primarily coastal distribution in NSW, with some scattered inland records.	Estuaries, bays, harbours, inlets and coastal lagoons, intertidal mudflats or sandflats, ocean beaches, coral reefs, rock platforms, saltmarsh, mangroves, freshwater/brackish lakes, saltworks and sewage farms.	Unlikely	No suitable habitat.
Nyctophilus corbeni	Corben's Long-eared Bat	V	V	Distribution coincides approximately with the Murray Darling Basin; the Pilliga Scrub region is the distinct stronghold for this species.	Mallee, *Allocasuarina luehmannii* (bulloke) and box eucalypt- dominated communities, especially box/ironbark/cypress-pine vegetation.	Unlikely	No suitable habitat.
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	In NSW they occur from the Qld border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit.	Rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges.	Unlikely	No suitable habitat.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Likelihood	Justification
Phascolarctos cinereus	Koala	V	V	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. There are sparse and possibly disjunct populations in the Bega District, and at several sites on the southern tablelands.	Eucalypt woodlands and forests.	Unlikely	Species not recorded in targeted surveys of potential habitat.
Polytelis swainsonii	Superb Parrot	V	V	In NSW, occurs on inland slopes of the Great Divide and on adjacent plains, especially along the major river-systems.	Box-gum woodland, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	Unlikely	Species not recorded in targeted surveys of potential habitat.
Pseudomys novaehollandiae	New Holland Mouse		V	Fragmented distribution across eastern NSW.	Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes.	Unlikely	No suitable habitat.
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Along the eastern coast of Australia, from Bundaberg in Qld to Melbourne in Victoria.	Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	Unlikely	No suitable habitat.
Rhipidura rufifrons	Rufous Fantail		M	Coastal and near coastal districts of northern and eastern Australia, including on and east of the Great Divide in NSW.	Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	Unlikely	No suitable habitat.
Rostratula australis	Australian Painted Snipe	E	E	In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys.	Swamps, dams and nearby marshy areas.	Unlikely	No suitable habitat.

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Likelihood	Justification
Maccullochella peelii	Murray Cod		V	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 system in NSW).	Clear rocky streams to slow flowing, turbid rivers and billabongs. Frequently found in the main river channel and larger tributaries; also in floodplain channels when they contain water.	Unlikely	No suitable habitat.
Macquaria australasica	Macquarie Perch	E	E	Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments.	River and lake habitats, especially the upper reaches of rivers and their tributaries.	Unlikely	No suitable habitat.

Appendix E: Assessments of Significance for MNES

The EPBC Act administrative guidelines on significance set out 'Significant Impact Criteria' (DotE 2013) that are to be used to assist in determining whether a proposed action is likely to have a significant impact on matters of national environmental significance. Matters listed under the EPBC Act as being of national environmental significance 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.
- A water resource, in relation to coal seam gas development and large coal mining development.

Specific 'Significant Impact Criteria' are provided for each matter of national environmental significance except for threatened species and ecological communities in which case separate criteria are provided for species listed as endangered and vulnerable under the EPBC Act.

The following section assesses impacts on MNES against the relevant significant impact criteria. The MNES assessed are:

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland – CEEC
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia - EEC
- Regent Honeyeater – Critically Endangered
- Swift Parrot – Critically Endangered

Table 49: Significant impact assessment for TECs

Criterion	Question	Response – Box Gum woodland (CEEC)	Response – Inland Grey Box Woodland (EEC)
An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:			
1)	reduce the extent of an ecological community	Marginally. Up to 2.07 ha of the community will be impacted, however this area consists of narrow strips of predominantly disturbed roadside vegetation over several kilometres. Adjoining areas will be retained. The Stubbo Solar Farm will also impact 0.17 ha of the community.	Marginally. Up to 0.9 ha of the community will be impacted, however this area consists of narrow strips of predominantly disturbed roadside vegetation over several kilometres. Adjoining areas will be retained.
2)	fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	Negligible. The areas likely to be impacted are very narrow strips of existing roadside edge.	Negligible. The areas likely to be impacted are very narrow strips of existing roadside edge.
3)	adversely affect habitat critical to the survival of an ecological community	No. The habitat to be impacted is not considered critical to the survival of the ecological community due to the majority of impacts focussing on a narrow strip of existing roadside with the adjacent higher quality area of the community to be retained.	No. The habitat to be impacted is not considered critical to the survival of the ecological community due to the majority of impacts focussing on a narrow strip of existing roadside with the adjacent higher quality area of the community to be retained.
4)	modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	No. The proposed road upgrade is unlikely to modify or destroy abiotic factors necessary for the ecological community's survival.	No. The proposed road upgrade is unlikely to modify or destroy abiotic factors necessary for the ecological community's survival.
5)	cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	No. The proposed road upgrade is unlikely to cause substantial change in the species composition for an occurrence of the community. The areas to be impacted are existing roadside with previous disturbance. Mitigation measure such as erosion and sediment control, hygiene protocols and weed control will be in place to protect adjacent retained vegetation.	No. The proposed road upgrade is unlikely to cause substantial change in the species composition for an occurrence of the community. The areas to be impacted are existing roadside with previous disturbance. Mitigation measure such as erosion and sediment control, hygiene protocols and weed control will be in place to protect adjacent retained vegetation.

Criterion	Question	Response – Box Gum woodland (CEEC)	Response – Inland Grey Box Woodland (EEC)
6) i	cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: assisting invasive species, that are harmful to the listed ecological community, to become established, or	No. The roadside already contains exotic species, and their extent is unlikely to increase, such that a substantial reduction in the quality or integrity of an occurrence of an ecological community will occur. Mitigation measures will include weed hygiene and control protocols.	No. The roadside already contains exotic species, and their extent is unlikely to increase, such that a substantial reduction in the quality or integrity of an occurrence of an ecological community will occur. Mitigation measures will include weed hygiene and control protocols.
6) ii	cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or	No. The road upgrade is unlikely to result in a substantial reduction in the quality or integrity of an occurrence of an ecological community. Mitigation measures will include chemical management and pollutant control protocols.	No. The road upgrade is unlikely to result in a substantial reduction in the quality or integrity of an occurrence of an ecological community. Mitigation measures will include chemical management and pollutant control protocols.
7)	interfere with the recovery of an ecological community.	Negligible. The road upgrade has been designed to minimise impacts as much as possible and will retain the majority of the road reserve vegetation in the study area which is likely to persist into the long term. Additionally, offsets will be provided for all impacts to native vegetation.	Negligible. The road upgrade has been designed to minimise impacts as much as possible and will retain the majority of the road reserve vegetation in the study area which is likely to persist into the long term. Additionally, offsets will be provided for all impacts to native vegetation.
Conclusion	Is there likely to be a significant impact?	**No.** Considering the narrow strip of vegetation to be impacted, existing disturbance of the immediate roadside area where the majority of impacts will occur, and much larger areas to be retained in the road reserve and surrounding areas, impacts resulting from the proposed road upgrade are unlikely to constitute a significant impact to this MNES.	**No.** Considering the narrow strip of vegetation to be impacted, existing disturbance of the immediate roadside area where the majority of impacts will occur, and much larger areas to be retained in the road reserve and surrounding areas, impacts resulting from the proposed road upgrade are unlikely to constitute a significant impact to this MNES.

Table 50: Species profiles – Swift Parrot and Regent Honeyeater

Overview	Swift Parrot	Regent Honeyeater
EPBC Act status	Critically Endangered	Critically Endangered
BC Act status	Endangered	Critically Endangered
Threat abatement plan	Yes (Feral Cats)	Yes (Feral Cats)
Recovery plan	Yes	Yes
Habitat and ecology	Migratory species that only breeds in Tasmania and migrates to the south-eastern mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes where it feeds in Box-ironbark forests and woodlands.	Nomadic species that uses eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of *Casuarina cunninghamiana* (River Oak).
Extent of local occurrence	Potential to use trees within the development site for foraging on occasion. The development site does not contain potential breeding habitat.	Potential to use trees within the development site for foraging on occasion. The development site does not contain potential breeding habitat.
Impacts	2.53 ha of potential foraging habitat will be removed for the road upgrade. 5.53 ha of potential foraging habitat will be removed for the solar farm.	2.53 ha of potential foraging habitat will be removed for the road upgrade. 5.53 ha of potential foraging habitat will be removed for the solar farm.

Table 51: Significant impact assessment – Swift Parrot and Regent Honeyeater

Criterion	Question	Swift Parrot	Regent Honeyeater
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:			
1)	Lead to a long-term decrease in the size of a population	The removal of 8.06 ha of potential seasonal foraging habitat is unlikely to lead to a long-term decrease in the size of the population of Swift Parrot.	The removal of 8.06 ha of potential seasonal foraging habitat is unlikely to lead to a long-term decrease in the size of the population of Regent Honeyeater.
2)	Reduce the area of occupancy of the species	The removal of 8.06 ha of potential seasonal foraging habitat is unlikely to reduce the area of occupancy for Swift Parrot. Adjacent habitat within the study area will be retained.	The removal of 8.06 ha of potential seasonal foraging habitat is unlikely to reduce the area of occupancy for Regent Honeyeater. Adjacent habitat within the study area will be retained.
3)	Fragment an existing population into two or more populations	Fragmentation of the population will not result from the proposed activity.	Fragmentation of the population will not result from the proposed activity.

Criterion	Question	Swift Parrot	Regent Honeyeater
4)	Adversely affect habitat critical to the survival of a species	The study area does not contain habitat listed as critical to the survival of Swift Parrot.	The study area does not contain habitat listed as critical to the survival of Regent Honeyeater.
5)	Disrupt the breeding cycle of a population	No	No
6) i	Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The removal of 8.06 ha of potential seasonal foraging habitat is unlikely to result in the species decline.	The removal of 8.06 ha of potential seasonal foraging habitat is unlikely to result in the species decline.
6) ii	Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Invasive species are unlikely to become established above that already in existence.	Invasive species are unlikely to become established above that already in existence.
7)	Introduce disease that may cause the species to decline	Disease is unlikely to be introduced.	Disease is unlikely to be introduced.
8)	Interfere with the recovery of the species	The removal of 8.06 ha of potential seasonal foraging habitat is unlikely to interfere with the species recovery.	The removal of 8.06 ha of potential seasonal foraging habitat is unlikely to interfere with the species recovery.
Conclusion	**Is there likely to be a significant impact?**	**No**. The proposed activity is unlikely to have a significant impact on Swift Parrot as the impacts are restricted to a small area of low quality potential seasonal foraging habitat and much larger areas of higher quality habitat will remain in the locality.	**No**. The proposed activity is unlikely to have a significant impact on Regent Honeyeater as the impacts are restricted to a small area of low quality potential seasonal foraging habitat and much larger areas of higher quality habitat will remain in the locality.

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