Attachment C – Biodiversity Development Assessment Report (February 2019)

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Crudine Ridge Wind Farm Modification 1 Biodiversity Development Assessment Report: Prepared for supplementary information request, February 2019.

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Template 2.8.1

Executive Summary

Eco Logical Australia (ELA) was engaged by CRWF Nominees Pty Ltd (the Proponent) to prepare a Biodiversity Development Assessment Report (BDAR) for a proposed upgrade to Aarons Pass Road to facilitate the movement of turbines associated infrastructure and access for the Crudine Ridge Wind Farm (CRWF). Aarons Pass Road consists of a linear strip of native vegetation adjoined by neighbouring properties that are used for sheep and cattle grazing and have a history of pasture improvement.

Aarons Pass Road was subject to previous ecological assessments by ELA in 2013 for the CRWF Project Approval (SSD-6697). The road design has since been improved in consultation with Mid-Western Regional Council (MWRC) to address detailed design changes and provide long term benefit to the surrounding community. The additional impact area subject to the current BDAR (herein referred to as the development site) includes the new proposed road design, temporary disturbance areas associated with civil works required for the road construction, and the blade swept path, which will require pruning of vegetation in areas to allow for the passage of the blade components of the wind turbines.

Field surveys identified approximately 6.47 ha of native vegetation to be cleared within the development site within the current road design, including 0.95 ha which meets the listing criteria for Endangered Ecological Communities (EEC) under the NSW *Biodiversity Conservation Act 1999* (BC Act) and/or Critically Endangered Ecological Communities (CEEC) under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), located toward the western end of the development site. The 6.47 ha of native vegetation clearing will comprise 4.97 ha of permanent clearing for the construction of the road, 1.06 ha of temporary disturbance for civil works, and 0.44 ha of disturbance for pruning in the blade swept path to allow for transportation of the WTG blades.

The CRWF Project Approval (SSD-6697) allows for clearing of 1.54 ha of native vegetation on Aarons Pass Road (including 0.28 ha of EEC). Improvements to the road design have resulted in inconsistencies in alignment with the existing approval; however, given the like-for-like vegetation communities present within the Aarons Pass Road reserve, this BDAR has been prepared upon consideration that the approved 1.54 ha of native vegetation approved for clearing along Aaron's Pass Road can be directly exchanged for the same area within the development site. An area of 0.12 ha has been cleared at the eastern end of the development site in association with the commencement of road construction, which occurs outside of the current road design. This area was not considered as part of this assessment, however, it was considered to have been cleared under the existing CRWF Project Approval (SSD-6697).

Therefore, the additional area of native vegetation clearing for the development site requiring approval is 5.05 ha.

This BDAR has been prepared using the 5.05 ha of disturbance and has considered total removal of the vegetation within all categories of disturbance proposed (permanent clearing, temporary disturbance and the blade swept path). The 5.05 ha assessed in the BDAR was assigned to two (2) Plant Community Types (PCTs):

1. PCT 277 - Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (0.67 ha)

2. PCT 290 - Red Stringybark – Red Box – Long-leaved Box – Inland Scribbly Gum tussock grass shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion (4.38 ha).

The entire area of PCT 277 (0.67 ha) meets the criteria for EEC listed under the BC Act, with smaller patches totaling 0.32 ha meeting the CEEC listing criteria under the EPBC Act:

- White Box Yellow Box Blakely's Red Gum Woodland (listed as EEC under the BC Act)
- White Box Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (listed as CEEC under the EPBC Act).

Nine threatened flora species were identified from the data audit as known, likely or having the potential to occur within the development site area, with two (2) of these identified and confirmed during the field survey. *Acacia meiantha*, listed as Endangered under both the BC Act and EPBC Act was identified, along with *Pomaderris cotoneaster* (Cotoneaster Pomaderris), which is also listed as Endangered under the BC Act and EPBC Act. *Acacia meiantha* occurs throughout a 1.5 km section of the development site area, whilst the Cotoneaster Pomaderris is confined to a single corner of the development site, covering approximately 70 m. These species have been considered within the CRWF Biodiversity Management Plan approved by Department of Planning and Environment on 15 December 2017. 59 individual *A. meiantha* have been identified for removal as part of the development site. A number of *P. cotoneaster* individuals are within the blade swept path of the road upgrade and will not be directly impacted by vegetation clearing. Only one individual *P. cotoneaster* will be impacted by the development.

Thirty-one threatened fauna species were identified from the data audit as known, likely or having the potential to occur within the development site area, with three of these identified and confirmed during the field survey. *Artamus cyanopterus cyanopterus* (Dusky Woodswallow), *Daphoenositta chrysoptera* (Varied Sittella) and *Petroica boodang* (Scarlet Robin) were identified, all are listed as Vulnerable under the BC Act and identified as ecosystem credit species within the BAMC. Threatened fauna habitat was assessed, comprising mainly 150 individual hollow-bearing trees to be removed for the development site. Targeted fauna surveys were undertaken in December 2019 for seven of the ten threatened species credit species (derived from BAMC; Bush stone curlew, Gang-gang Cockatoo, Eastern Pygmy Possum, Squirrel Glider, Brush tailed Phascogale, Barking Owl, and Koala). The targeted surveys were undertaken using spotlighting, call playback, baited camera traps, active searches and diurnal and nocturnal transects, with the results of the field survey not identifying any individuals of these species. However, scratches on tree trunks and a possible Koala scat was found indicating that Koalas are potentially utilising habitat within the development area. Three of the species credit species (Powerful Owl, Masked Owl and Glossy Black Cockatoo) have been assumed present as the survey period for the additional targeted surveys was outside the recommended survey period for these species (as indicated by the BAMC). Therefore, it is inferred that these three (3) species will be impacted by the proposed development.

Potential Koala habitat was assessed in accordance with the *State Environmental Planning Policy No. 44 – Koala Habitat Protection* (SEPP 44). The impact area was not determined to be either potential or core Koala habitat in accordance with SEPP 44, due to the identification of only three individual key feed trees of *Eucalyptus albens* (White Box). There are however, secondary feed trees on site, *E. melliodora, E. polyanthemos, E. blakelyi* and *E. bridgesiana* (OEH 2018). There are five historical records of Koalas along or near Aarons Pass Road (OEH 2018). Further assessment using the 'EPBC Act referral guidelines

for the vulnerable Koala' (Department of the Environment [DoE], 2014) was undertaken which concluded that significant impacts to Koala would not occur as a result of the proposed development. However, it is likely that Koalas use the habitat within the area.

The development site, Aarons Pass Road, is located within the Mid-Western Regional Council (MWRC) Local Government Area (LGA) and is located predominately along a road reserve. The surrounding properties adjoining the site are either zoned as Primary Production RU1, Large Lot Residential R5, Environmental Management E3 or Infrastructure SP2 water supply systems under the Mid-Western Council Local Environment Plan (LEP; 2012).

The proposed activity forms part of an application for modification to Development Consent SSD-6697 under State Significant Development (SSD) Part 4 of the NSW *Environment Planning and Assessment Act 1979* (EP&A Act).

This report has been prepared to meet the requirements of the Biodiversity Assessment Method 2016 (BAM) established under Section 6.7 of the BC Act.

For vegetation zone 1 – PCT 277 Intact, the BAM Credit Calculator (BAMC) generated a vegetation integrity score of 56.5. Nine ecosystem credits are required to offset the removal of 0.32 ha for vegetation zone 1. For vegetation zone 2 – PCT 277 Degraded, the BAMC generated a vegetation integrity score of 40.4. Seven ecosystem credits are required to offset the removal of 0.4 ha for vegetation zone 2. For vegetation zone 3 – PCT 290 Intact, the BAMC generated a vegetation integrity score of 69.3. 47 ecosystem credits are required to offset the removal of 1.6 ha of vegetation zone 3. For vegetation zone 4 – PCT 290 Degraded, the BAMC generated a vegetation integrity score of 61. 76 ecosystem credits are required to offset the removal of 2.8 ha for vegetation zone 4.

Additionally, a total of five (5) species credits are required to offset the impact on *Acacia meiantha* and zero (0) species credits are required to offset the impact on *Pomaderris cotoneaster.* Fauna surveys for seven of the ten threatened species credit species were conducted during 17th – 22nd December 2018 and 7th January 2019. Due to the presence of suitable habitat on site, three (3) threatened species of fauna were presumed to be present. 154 species credits are required to offset each of the Glossy Black-Cockatoo, Powerful Owl, and Masked Owl. Due to the presence of scratches, one possible scat and recent records Koalas were also assumed to be present across the entire development site requiring 156 species credits to offset for this species.

Serious and Irreversible Impacts (SAII) values have been considered as part of this assessment. These values include the '*White Box Yellow Box Blakely's Red Gum Woodland*' and the threatened flora species *Acacia meiantha* which is also listed as candidate SAII. Given that there were no known published thresholds for this species, a threshold of 0 is assumed and therefore it is possible that SAII could occur given the small and isolated population of this species. Modification to the road design has reduced impacts and these will be further mitigated by evaluating detailed design options to avoid individuals in the first instance. Where avoidance is not possible, the Proponent has committed to amending the Project Biodiversity Management Plan (BMP) to incorporate management strategies for the removal and pruning of *P. cotoneaster* and *A. meiantha* in consultation with the Secretary of DPE. Management measures may include translocating affected individuals salvaged from site and propagation via cuttings collected from site to mitigate the impacts of any clearance works on threatened flora. If these precautions are followed, it is unlikely that an SAII will occur.

Seven Matters of National Environmental Significance (MNES) were identified as potentially adversely affected by the proposed development. An assessment of the Commonwealth Significant Impact Criteria (Commonwealth of Australia 2013) was applied to one threatened community (White Box Yellow Box Blakely's Red Gum Grassy Woodland) and each of the six threatened species listed under the EPBC Act, including one mammal, *Phascolarctos cinereus* (Koala), four bird species, *Anthochaera phrygia* (Regent Honeyeater), *Grantiella picta* (Painted Honeyeater), *Lathamus discolor* (Swift Parrot) and two (2) endangered flora species, *Pomaderris cotoneaster* and *Acacia meiantha*. The assessment concluded that the project would not have a significant impact on the above-mentioned species.

All impacts to MNES and BC Act listed entities have been avoided as far as practicable and all impacts have been assessed in accordance with Commonwealth guidelines. Mitigation strategies have been put into place to manage potential impacts to MNES and BC Act listed entities. The development footprint has been modified, reduced and access routes have been altered to avoid impacts to Threatened Ecological Communities and habitat for listed species. Additionally, the removal of vegetation will be avoided where possible by vegetation trimming rather than removal wherever possible, in accordance with the Project's Biodiversity Management Plan.

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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
GIS	Geographic Information System
GPS	Global Positioning System
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
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SSI	State Significant Infrastructure
TEC	Threatened Ecological Community
VIS	Vegetation Information System
WM Act	NSW Water Management Act 2000

1. Stage 1: Biodiversity assessment

1.1 Introduction

This Biodiversity Development Assessment Report (BDAR) has been prepared by Dr. Cheryl O'Dwyer, who is an Accredited Person under the NSW *Biodiversity Conservation Act 2016* (BC Act) with support from Vivian Hamilton and Martin Stuart.

The contents of this BDAR complies with the minimum requirements outlined in Table 25 of the Biodiversity Assessment Methodology (BAM; OEH, 2017).

1.1.1 General description of the development site

Aarons Pass Road is located approximately 45 km south of Mudgee in Central West NSW. The development site subject to this BDAR included both sides of the approximately 20 km length of Aarons Pass Rd to be subject to the development site from the Castlereagh Highway to the CRWF northern site entrance. The development site varies with small sections only 1-2 m wide present whilst the majority of the width of the development site varied between 5-10 m.

The development site is wholly located within the Mid-Western Regional Council (MWRC) Local Government Area (LGA) and is largely within a road reserve. The surrounding area is zoned RU1 Primary Production with small sections zoned R5 Large Lot Residential, E5 Environmental Management or, SP2 Infrastructure under the Mid-Western Regional Local Environment Plan (LEP; MWRC, 2012).

The vegetation mapping produced within this BDAR is based on field observation and data collection, using ESRI Collector for ArcGIS on handheld tablets and handheld GPS.

There are inconsistencies in the aerial imagery when compared to both the current road design and the vegetation mapping produced within this BDAR. This is largely due to clearing undertaken by Council during previous road upgrades after the 2007 aerial photograph (SIX Maps) was captured. The current road design and vegetation mapping have been produced based on site surveyed data of the existing road and road reserve. Therefore, the current road design and vegetation mapping are considered to be an accurate representation.

Two (2) Plant Community Types (PCT) are present along the length of Aarons Pass Road and have been mapped as PCT 277 and PCT 290. PCT 277 conforms to the Endangered Ecological Community (EEC) '*White Box Yellow Box Blakely's Red Gum Woodland*', listed under the NSW BC Act. While PCT 277 also comprises part of the Critically Endangered Ecological Community (CEEC) '*White Box Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland*', listed under the EPBC Act.

Five threatened species were recorded along the roadside (two flora and three fauna) and potential habitat for 25 threatened fauna species has been assumed to be present based on suitable site characteristics. Fifteen (15) of these species require no further assessment as they are considered Ecosystem credit species. Targeted surveys for seven (7) species credit species were undertaken in December 2018 – January 2019. No signs were recorded, nor observations made for six of these species. Three species could not be surveyed as the timing of the surveys were outside of the survey period identified by the BAMC. Therefore, a total of four threatened fauna species (Koala, Glossy Black-

Cockatoo, Powerful Owl and Masked Owl) are presumed to be present based on the presence of habitat features and or signs, and species credits have been calculated for these species. The two threatened flora species, *Acacia meiantha* and *Pomaderris cotoneaster*, have also been considered. Species credits have been calculated for both *A. meiantha* and *P. cotoneaster*.

This report includes two base maps, the Site Map (Figure 1) and the Location Map (Figure 2). The Site Map is comprised of 59 individual tiles which show greater detail. These are included in Appendix D.

1.1.2 Development site footprint

The development site covers an area of 6.47 ha.

The CRWF Project Approval (SSD-6697) allowed for clearing of 1.54 ha of native vegetation on Aarons Pass Road (including 0.28 ha of EEC) at the time it was approved on 10 May 2016. Improvements to the road design since the approval of the Traffic Management Plan (TMP) and Biodiversity Management Plan (BMP) on 15 December 2017 have resulted in inconsistencies between the approved road design the proposed improvements to the road alignment; however, given the like-for-like vegetation communities present within the Aaron's Pass Road road reserve, this BDAR has been prepared upon consideration that the approved 1.54 ha of native vegetation approved for clearing along Aaron's Pass Road can be directly exchanged for the same area within the development site. An area of 0.12 ha has been cleared at the eastern end of the development site in association with the commencement of road construction, which occurs outside of the current road design. This area was not considered as part of this assessment, however, was considered to have been cleared under the existing CRWF Project Approval (SSD-6697).

Therefore, the additional area of native vegetation clearing for the development site the subject of this BDAR is 5.05 ha and defines the likely extent of impact, and includes:

1. The new proposed road design
2. A 0.5 m civil works buffer around the road design, for potential temporary disturbance areas associated with civil works required for the road construction.
3. The blade swept path, which will require pruning of vegetation in some areas to allow for the passage of the blade components of the wind turbines.

It should be noted that not all vegetation within the blade swept path will be disturbed as a result of the proposed road upgrade works. Rather, vegetation present within this path will be pruned where necessary to facilitate transportation of the wind turbine blades with the remainder of the vegetation in this zone retained.

1.1.3 Sources of information used

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

- Biodiversity Assessment Methodology Calculator
- BioNet Vegetation Classification (OEH, 2018)
- Bionet Atlas of NSW Wildlife (OEH 2018) covering an area from 10km buffer around coordinates North -32.83: West 149.64; East 149.81; South -32.93 (Datum GDA94)

- EPBC Protected Matters Search Tool (DotEE, 2018) using a 10km buffer around coordinates – 32.83 149.64,-32.93 149.81 (Datum GDA94)
- Aerial Mapping (SIXMaps)
- OEH Threatened Species Profile Data Collection (OEH, 2018b)
- Aarons Pass Road threatened flora species survey letter report (ELA, 2018)
- Addendum - Crudine Ridge Wind Farm Part 3A Ecological Assessment, Aarons Pass Rd, and north access point (ELA, 2013).

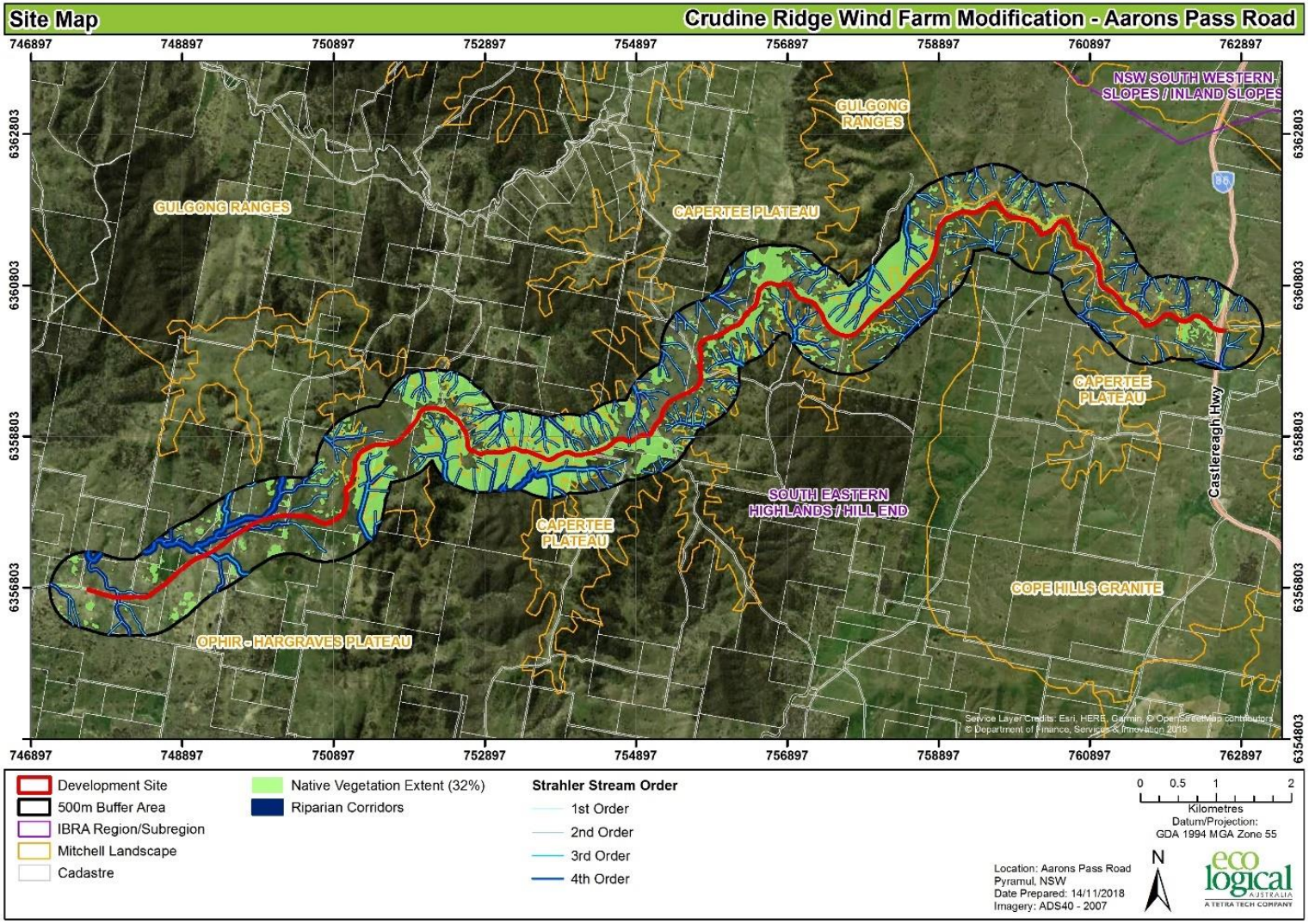

Figure 1: Site Map

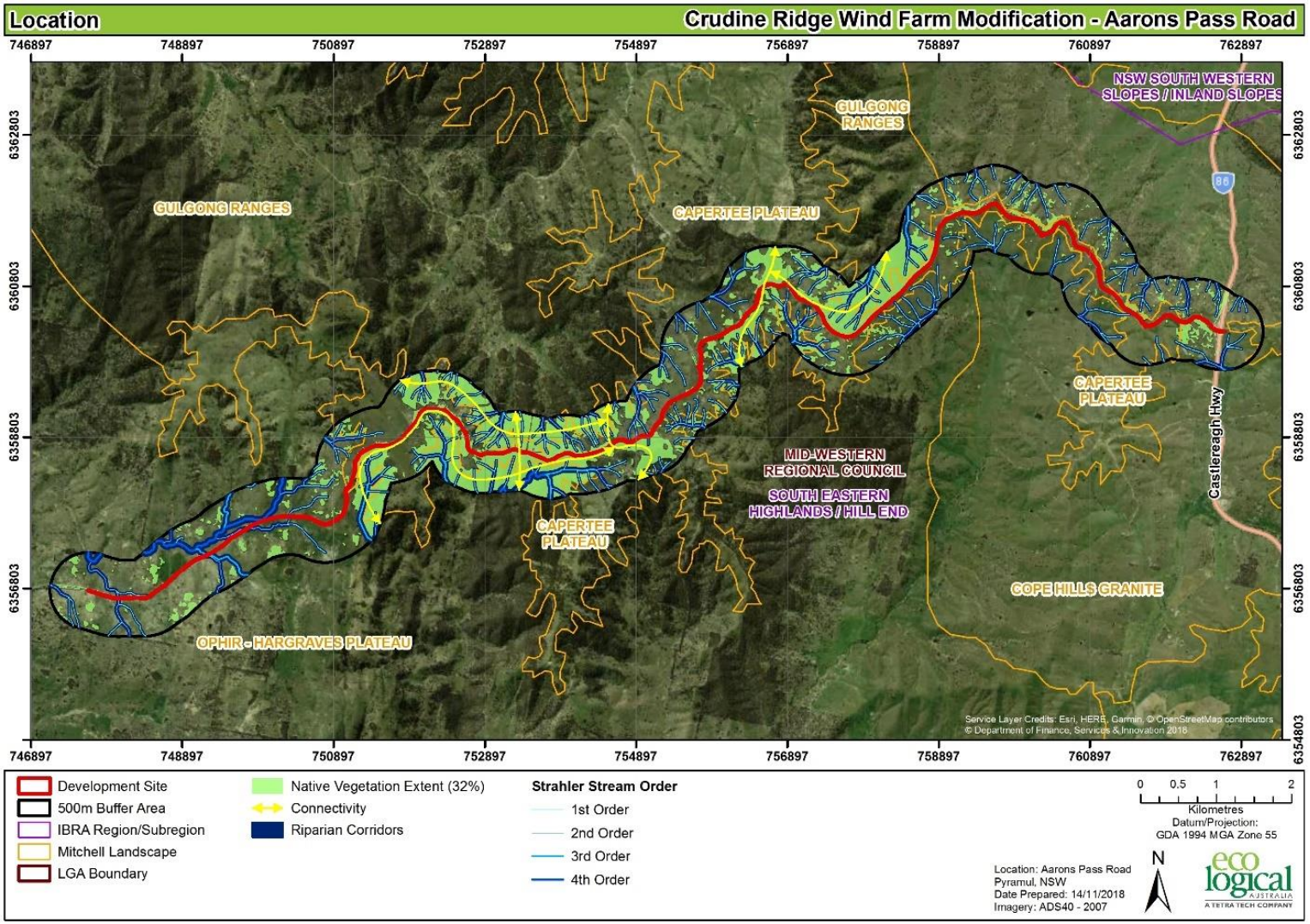

Figure 2: Location Map

1.2 Legislative context

Table 1: Legislative context

Name	Relevance to the project	Report Section
Commonwealth		
Environmental Protection and Biodiversity Conservation Act 1999	Matters of National Environmental Significance have been identified on or near the development site. This report assesses impacts to MNES and concludes that the development is not likely to have a significant impact on MNES.	2.5.1
State		
Environmental Planning and Assessment Act 1979	The proposed development requires consent under the Mid-Western Regional Local Environmental Plan (LEP) and is to be assessed under Part 4 of the EP&A Act.	N/A
Biodiversity Conservation Act 2016	The proposed development exceeds the BAM threshold and requires submission of a Biodiversity Development Assessment Report (i.e. this report).	All
Fisheries Management Act 1994	The development does not involve impacts to Key Fish Habitat, does not involve harm to marine vegetation, dredging, reclamation or obstruction of fish passage. A permit or consultation under the FM Act is not required.	N/A
Local land Services Amendment Act 2016	The LLS Act does not apply to development consent issued under Part 4 of the EP&A Act.	N/A
Water Management Act 2000	A Controlled Activity Approval under s91 of the WM Act is not required as the proposed development is state significant development.	N/A
Planning Instruments		
Vegetation SEPP	The Vegetation SEPP applies to development that does not require consent. As this project requires consent under the Mid-Western Regional LEP, the Vegetation SEPP is not relevant.	N/A
SEPP 14 – Coastal Wetlands	SEPP Coastal Management 2018 consolidated SEPP 14 Coastal Wetlands, SEPP 26 Littoral Rainforests and SEPP 71 Coastal Protection. The proposed development is not located on land subject to SEPP Coastal Management 2018.	N/A
SEPP 44 – Koala Habitat Protection	The proposed development site is located within the Mid-Western Regional Council Local Government Area which is listed as one of the Council's to which SEPP 44 applies. The proposed Works does not impact on core koala habitat as defined by SEPP 44.	2.5.2
Mid-Western Regional Local Environment Plan (LEP)	The development site is located in a Road reserve. Surrounding property is zoned RU 1 Primary Production, R5 Large Lot Residential, E3 Environmental Management and SP2 Infrastructure under the Mid-Western Regional Council LEP.	N/A
Mid-Western Regional Development Control Plan (DCP)	The Mid-Western Regional Council DCP has been reviewed for additional provisions that may relate to the Development Site. No additional provisions are required.	N/A

1.3 Landscape features

1.3.1 IBRA regions and subregions

The development site falls within the IBRA region and subregions as outlined in Table 2 and Table 3.

Table 2: IBRA regions

IBRA region	Area within development site (ha)
South Eastern Highlands Biogeographic Region	5.05 ha

Table 3: IBRA subregions

IBRA subregion	Area within development site (ha)
Hill End	5.05 ha

1.3.2 Native vegetation extent

The extent of native vegetation within the development site and buffer is outlined in Table 4.

Table 4: Native vegetation extent

Area within the development site (ha)	Area within the 500 m buffer (ha)
5.05 ha	676 ha

There are differences between the mapped vegetation extent and the aerial imagery. The road reserve is narrow, less than 10 m along most of the length and much of the vegetation visible on the aerial is canopy from overhanging vegetation that will not be impacted by the development site.

1.3.3 Rivers and streams

The Work area contains a number of minor streams along the route of the Aaron's Pass Road Upgrade. The majority of the length of Aaron's Pass Road is located on a ridgeline. Therefore, a number of unnamed minor tributaries commence on the slopes of this ridgeline.

Two first order streams are present along Aaron's Pass Road. One fourth order stream is present within the vicinity of Aaron's Pass Road, Cow Flat Creek.

1.3.4 Wetlands

The development site does not contain any wetlands.

1.3.5 Connectivity features

The development site does not contain any connectivity features.

1.3.6 Areas of geological significance and soil hazard features

The development site does not contain areas of geological significance and soil hazard features.

1.3.7 Site context

1.3.7.1 *Method applied*

The linear based method has been applied to this development.

1.3.7.2 *Percent native vegetation cover in the landscape*

The current percent native vegetation cover in the landscape was assessed in a Geographic Information System (GIS) using aerial imagery sourced from SIX Maps using increments of 5%. The results of this analysis are shown in Table 5.

Table 5: Percent native vegetation cover in the landscape

Area within the development site (ha)	Cover within the 500 m buffer (%)
5.05	32%

1.3.7.3 *Patch size*

Patch size was calculated using available vegetation mapping for all patches of intact native vegetation on and adjoining the development site (Table 6).

Table 6: Patch size

Patch	Patch size area (ha)
PCT 277	>100
PCT 290	>100

1.4 Native vegetation

1.4.1 Survey effort

Vegetation surveys were undertaken within the development site by David Allworth, Rebecca Croake, Tomas Kelly, Kate Maslen and Cheryl O'Dwyer on the 17th – 21st September and the 5th and 6th November 2018 (Figure 4).

A total of five full-floristic / vegetation integrity plots were surveyed to identify PCTs and Threatened Ecological Communities (TECs) on the development site (Table 7 and Table 8). All five plots were altered from the standard 20 x 50 m to a 5 x 200 m plot formation to best fit within the development site in accordance with the BAM. Full floristic surveys were taken within the nested 5 x 80 m (0.04 ha). Litter cover plots were located 1 m from the 200 m midline, on alternate sides and at 20, 60, 100, 140, and 180 m from the midline start.

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

Table 7: Full-floristic PCT identification plots

PCT ID	PCT Name	Number of plots surveyed
277	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (0.94 ha).	2
290	Red Stringybark – Red Box – Long-leaved Box – Inland Scribbly Gum tussock grass shrub low open forest on	3

PCT ID	PCT Name	Number of plots surveyed
	hills in the southern part of the NSW South Western Slopes Bioregion (5.51 ha).	

Table 8: Vegetation integrity plots

Veg Zone	PCT ID	PCT Name	Condition	Area (ha)	Plots required	Plots surveyed
1	277	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion.	Intact	0.32	1	1
2	277	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion.	Degraded	0.35	1	1
3	290	Red Stringybark – Red Box – Long-leaved Box – Inland Scribbly Gum tussock grass shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion.	Intact	1.55	1	1
4	290	Red Stringybark – Red Box – Long-leaved Box – Inland Scribbly Gum tussock grass shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion.	Degraded	2.83	2	2

1.4.2 Plant Community Types present

A total of two PCTs were identified on the development site (Table 9, Figure 3, Appendix D). Of these, one is listed as a TEC under the BC Act and EPBC Act (Table 10, Figure 5), namely *White Box Yellow Box Blakely's Red Gum Woodland* (listed as EEC under the BC Act) / *White Box Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (listed as CEEC under the EPBC Act). Justification for the selection of PCTs occurring on the development site is based on a quantitative analysis of full-floristic plot data and is provided in Table 11. Both PCT's have been stratified into two vegetation zones based on two condition classes (Intact and Degraded) present.

Table 9: Plant Community Types

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Area	Percent cleared
277	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion.	Western Slopes Grassy Woodlands	Grassy Woodlands	0.67 ha	94%
290	Red Stringybark – Red Box – Long-leaved Box – Inland Scribbly Gum tussock grass	Upper Riverina Dry Sclerophyll Forests	Dry Sclerophyll Forests	4.38 ha	67%

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Area	Percent cleared
	shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion.		(Shrub/grass sub formation)		

Table 10: Threatened Ecological Communities

PCT ID	BC Act			EPBC Act		
	Listing status	Name	Area (ha)	Listing status	Name	Area (ha)
277	EEC	*White Box Yellow Box Blakely's Red Gum Woodland*	0.67	CEEC	*White Box Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland*	0.32

Table 11: PCT selection justification

PCT ID	PCT Name	Selection criteria	Species relied upon for identification of vegetation type and relative abundance
277	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion.	IBRA region, landform, soils, vegetation formation and vegetation class	The dominant overstory was *Eucalyptus blakelyi* and *E. melliodora* with a ground layer of *Poa sieberiana* and *Themeda triandra*. *Acacia dealbata* was also present.
290	Red Stringybark – Red Box – Long-leaved Box – Inland Scribbly Gum tussock grass shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion.	IBRA region, landform, soils, vegetation formation and vegetation class	*Eucalyptus macrorhyncha*. was not present in the plots however, it was dominant along the roadside together with *E. globoidea, E. rossii* and *E. polyanthemos*. *Hibbertia obtusifolia, Dianella revoluta* and *Hardenbergia violacea* were present in the lower stratums.

1.4.3 PCT selection justification

Classification of vegetation zone 1 as PCT 277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion, was based on various attributes which were considered in combination to assign vegetation to the best fit PCT. Attributes included dominant species in each

stratum, community composition, soils and landscape position. Plot data collected in the field was input into the BioNet Vegetation Information System (VIS). The canopy comprised of *Eucalyptus blakelyi* (Blakely's Red Gum) and *E. melliodora* (Yellow Box) with the occasional *E. bridgesiana* (Apple Box). Within the ground stratum, several of the species characteristic of Box Gum Woodland were present: *Aristida ramosa* (Purple Wiregrass), *Austrostipa scabra* (Rough Speargrass), *Bothriochloa macra* (Red-leg Grass), *Rytidosperma setacea* (Smallflower Wallaby Grass) and *Themeda australis* (Kangaroo grass).

For the areas classified as PCT 290, a qualitative analysis of the plot data and nearby canopy species were used to aid in the analysis. *Eucalyptus macrorhyncha* (Red Stringybark) was not in two of the plots but was a dominant canopy species. *Eucalyptus rossii* (Inland Scribbly Gum) and *E. polyanthemos* (Red Box) were also dominant. Within the mid stratum very few of the species were present however within the ground stratum, species typical of PCT 290 were present: *Dianella revoluta* (Blue Flax Lily), *Hardenbergia violacea* (False Sarsaparilla), *Poa sieberiana* (Snowgrass), *Rytidosperma pallidum* (Red-anther Wallaby Grass) and *Stypandra glauca* (Nodding Blue Lily).

Whilst the PCT's have been classified into two vegetation zones, intact and degraded, it is considered that both vegetation zones within the development site have been highly modified, with the mid-storey and ground-layer species diverging from species originally present in these PCTs. It can also be that the disturbed vegetation communities no longer comprise certain characteristic species from certain structural layers present in the undisturbed form of these PCTs.

Another PCT considered for this site was PCT 326 *Long-leaved Box - Red Box grass-shrub open forest on hillslopes in the Mudgee Region, NSW central western slopes*. However, this PCT was ruled out due to the lack of characteristic canopy species, *Eucalyptus albens*, and *Eucalyptus cannonii* and due to variations within the middle and ground stratums. Both PCT 277 and 290 inhabit IBRA Bioregion of South Eastern Highlands and Hill End subregion.

1.4.4 Threatened Ecological Communities Justification

BioNet VIS lists PCT 277 as comprising the EEC, '*White Box Yellow Box Blakely's Red Gum Woodland*' (Box Gum Woodland) listed under the BC Act.

Justification of PCT 277 within the development site as Box Gum Woodland is based on the presence of diagnostic species in the upper *(E. blakelyi, E. melliodora and E. albens*) and lower stratum, vegetation structure and characteristic soil of the community. While the vegetation structure is degraded by weed incursion, past clearing and impacts of edge effects, PCT 277 still manifests as a form of Box Gum Woodland. As is typical of Box Gum Woodland, there was a poor representation of forbs. Seven characteristic species of Box Gum Woodland were identified within plot data, *Aristida ramosa* (Purple Wiregrass), *Austrostipa scabra* (Rough Speargrass), *Bothriochloa macra* (Red-leg Grass), *Geranium solanderi* (Native Geranium), *Lomandra filiformis* (Wattle Matt-rush), *Rytidosperma* spp. (Wallaby Grass) and *Themeda triandra* (Kangaroo grass).

1.4.5 Vegetation integrity assessment

A vegetation integrity assessment using the Credit Calculator (BAMC) was undertaken and the results are outlined in Table 12.

Table 12: Vegetation integrity

Veg Zone	PCT ID	Condition	Area (ha)	Composition Condition Score	Structure Condition Score	Function Condition Score	Current vegetation integrity score
1	277	Intact	0.32	89.2	20.2	100	56.5
2	277	Degraded	0.35	41.3	17.7	90.3	40.4
3	290	Intact	1.55	75.6	44.1	99.9	69.3
4	290	Degraded	2.83	67.3	33.7	100	61

1.4.6 Use of local data

Use of local data is not proposed.

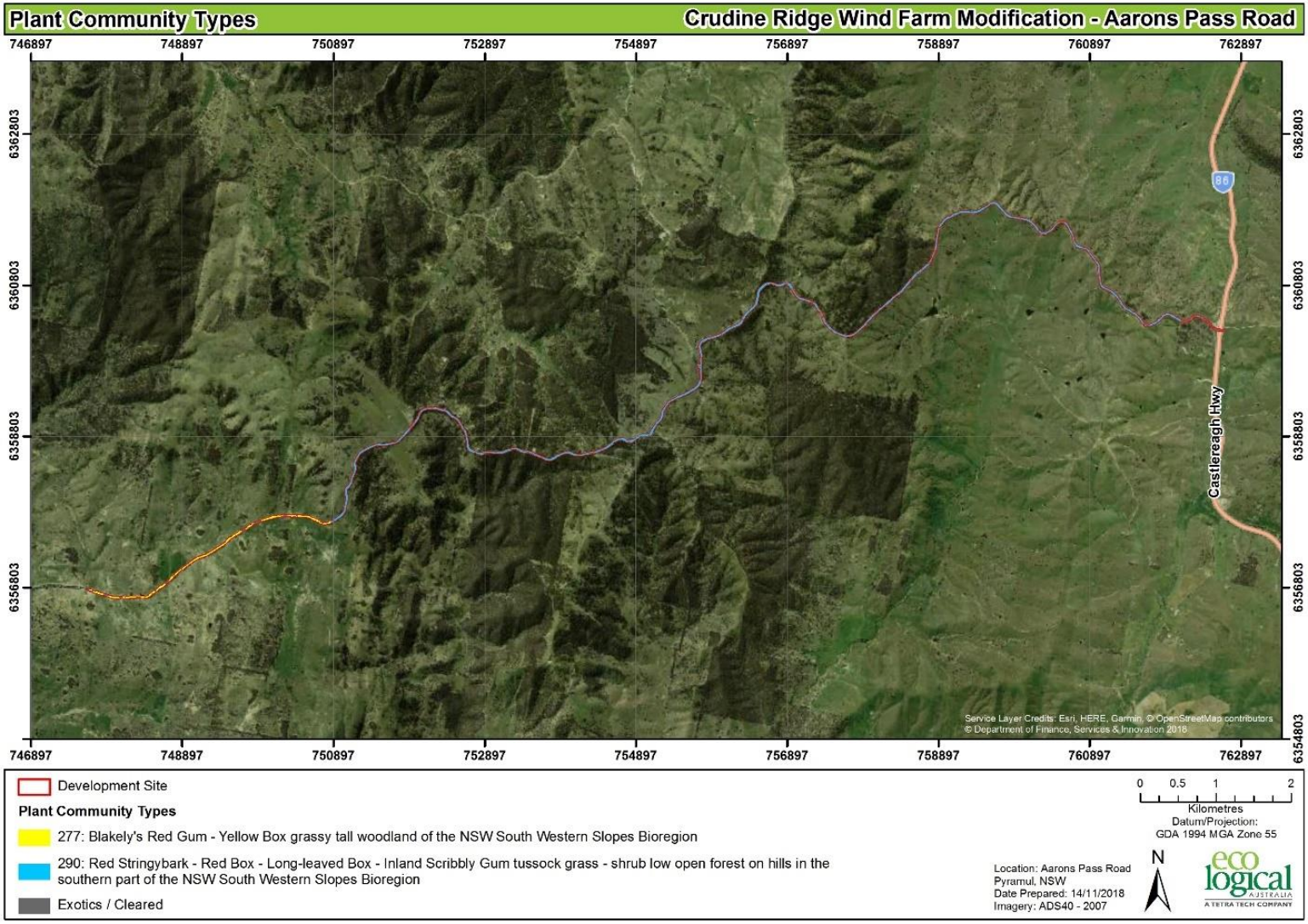

Figure 3: Plant Community Types and native vegetation extent

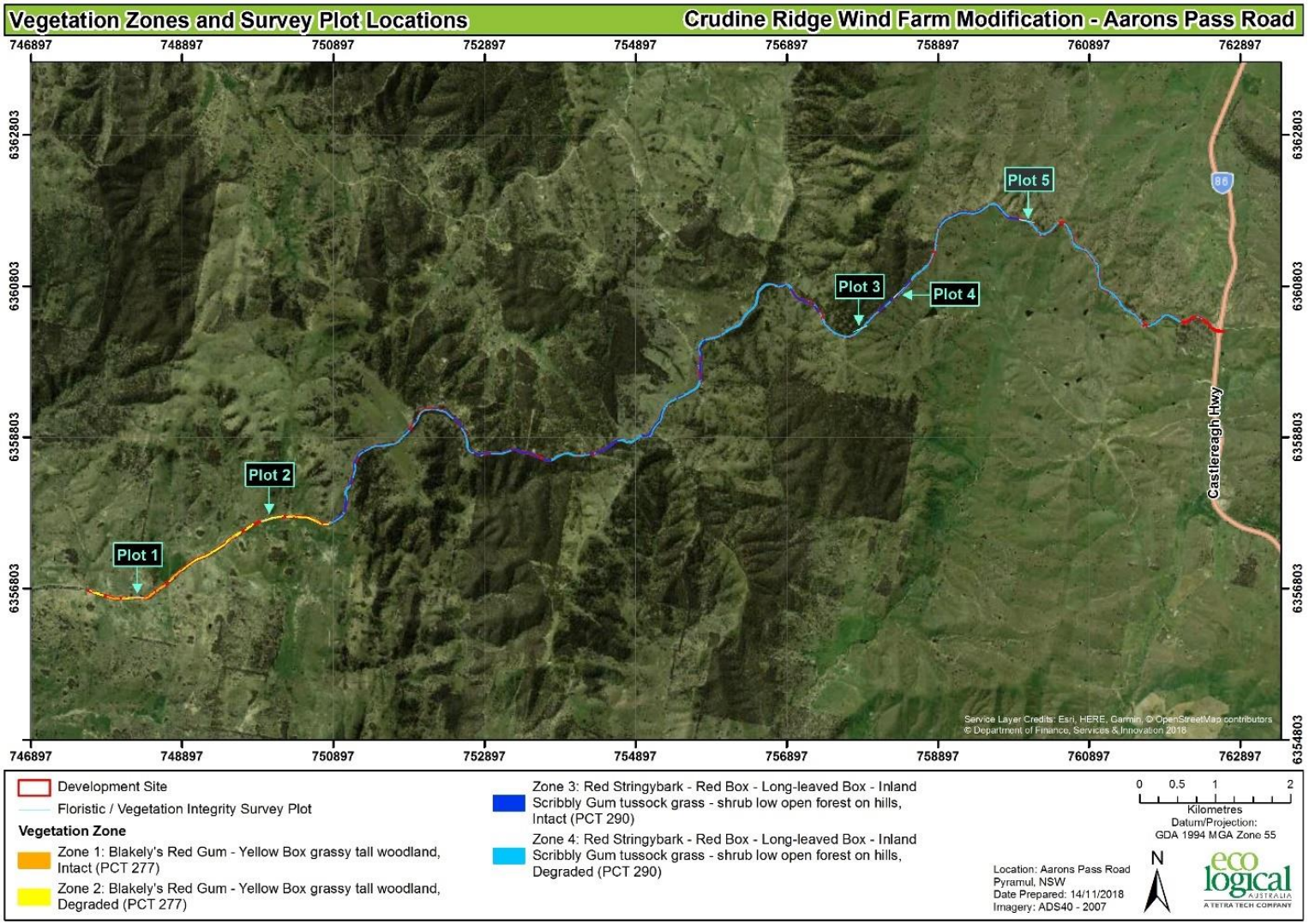

Figure 4: Plot locations

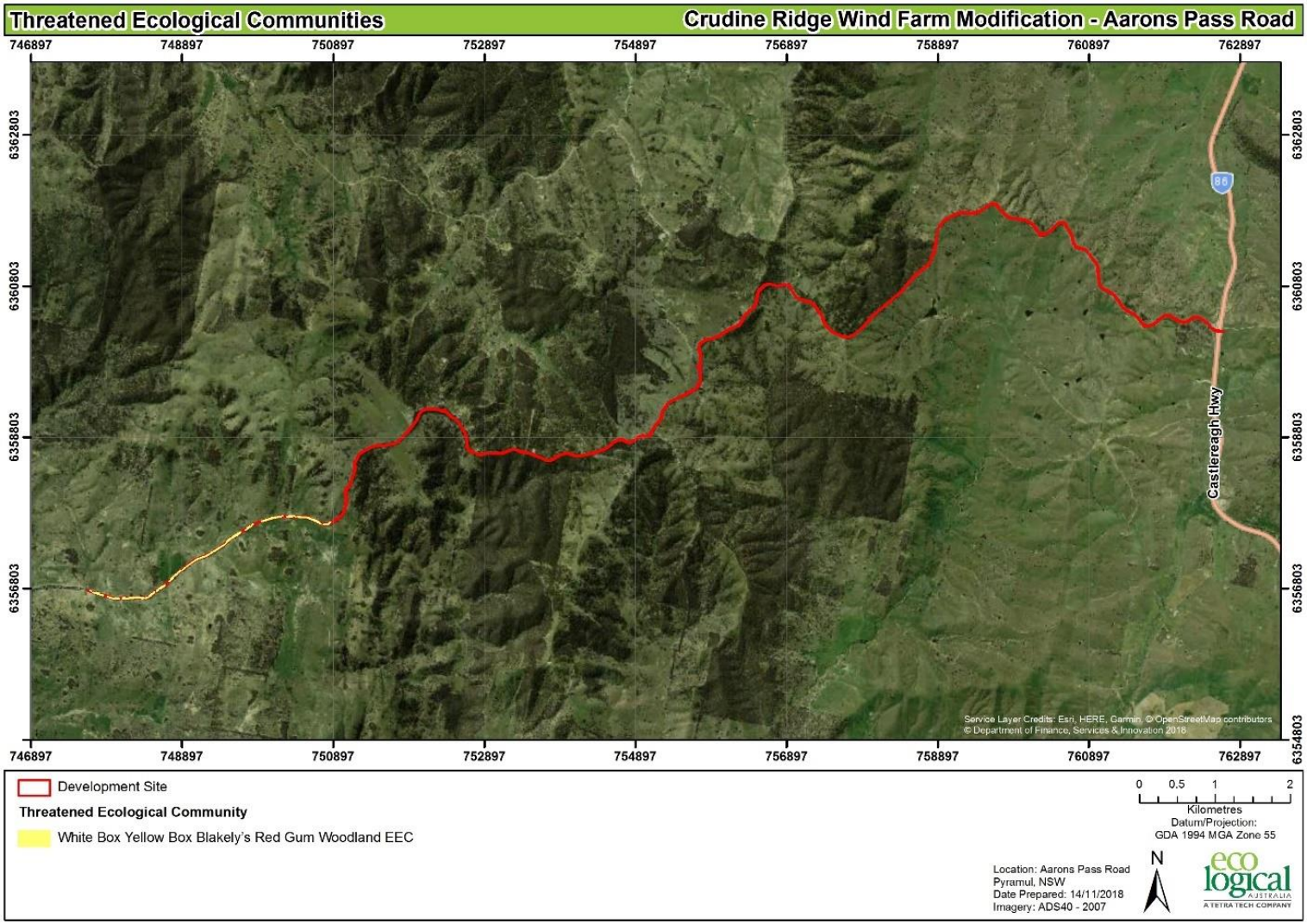

Figure 5: Threatened Ecological Communities

1.5 Threatened species

1.5.1 Ecosystem credit species

Ecosystem credit species predicted to occur within the development site, their associated habitat constraints, geographic limitations and sensitivity to gain class is included in Table 13. An assessment of those predicted ecosystem credit species identified have been undertaken to determine likelihood of those species to occur based on the absence of necessary habitat components or habitat constraints, in accordance with BAM sections 6.4.1.10 and 6.4.1.17. All species identified by the BAMC had the potential to occur within the development site.

Table 13: 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)			High	Critically Endangered	Critically Endangered
Callocephalon fimbriatum	Gang-gang Cockatoo (foraging)			Moderate	Vulnerable	Not Listed
Calyptorhynchus lathami	Glossy Black-Cockatoo			High	Vulnerable	Not Listed
Artamus cyanopterus cyanopterus	Dusky Woodswallow			Moderate	Vulnerable	Not Listed
Chthonicola sagittata	Speckled Warbler			High	Vulnerable	Not Listed
Circus assimilis	Spotted Harrier			Moderate	Vulnerable	Not Listed
Climacteris picumnus	Brown Treecreeper (eastern subspecies)			Moderate	Vulnerable	Not Listed
Daphoenositta chrysoptera	Varied Sittella			Moderate	Vulnerable	Not Listed
Dasyurus maculatus	Spotted-tailed Quoll			High	Vulnerable	Endangered
Falsistrellus tasmaniensis	Eastern False Pipistrelle			High	Vulnerable	Not Listed
Glossopsitta pusilla	Little Lorikeet			High	Vulnerable	Not Listed
Grantiella picta	Painted Honeyeater	Mistletoe present at density of greater than		Moderate	Vulnerable	Vulnerable

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status
		five mistletoes per hectare				
Haliaeetus leucogaster	White-bellied Sea-Eagle (foraging)			High	Vulnerable	Not Listed
Hieraaetus morphnoides	Little Eagle (foraging)			Moderate	Vulnerable	Not Listed
Lathamus discolour	Swift Parrot (foraging)			Moderate	Endangered	Critically Endangered
Lophoictinia isura	Square-tailed Kite (foraging)			Moderate	Vulnerable	Not Listed
Melanodryas cucullata	Hooded Robin (south-eastern form)			High	Vulnerable	Not Listed
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)			Moderate	Vulnerable	Not Listed
Miniopterus schreibersii	Eastern Bentwing-bat (foraging)			High	Vulnerable	Not Listed
Neophema pulchella	Turquoise Parrot			High	Vulnerable	Not Listed
Ninox connivens	Barking Owl (foraging)			High	Vulnerable	Not Listed
Ninox strenua	Powerful Owl (foraging)			High	Vulnerable	Not Listed
Petroica boodang	Scarlet Robin			Moderate	Vulnerable	Not Listed
Petroica phoenicea	Flame Robin			Moderate	Vulnerable	Not Listed
Phascolarctos cinereus	Koala (foraging)			High	Vulnerable	Vulnerable
Polytelis swainsonii	Superb Parrot (foraging)			Moderate	Vulnerable	Not Listed
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)			Moderate	Vulnerable	Not Listed
Saccolaimus flaviventris	Yellow-bellied Sheathtail bat			High	Vulnerable	Not Listed
Stagonopleura guttata	Diamond Firetail			Moderate	Vulnerable	Not Listed

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status
Tyto novaehollandiae	Masked Owl (foraging)			High	Vulnerable	Not Listed
Varanus rosenbergi	Rosenberg's Goanna			High	Vulnerable	Not Listed

1.6 Species credit species

Species credit species predicted to occur at the development site (i.e. candidate species), their associated habitat constraints, geographic limitations and sensitivity to gain class is included in Table 14. An assessment of those species credit species identified has been undertaken to determine likelihood of those species to occur based on the absence of necessary habitat components or habitat constraints, in accordance with BAM sections 6.4.1.10 and 6.4.1.17. For those species that have been excluded, the justification is also provided. Maps from OEH to determine breeding habitat for Swift Parrot and Regent Honeyeater were requested, with the response from OEH (pers. comm. Shannon Simpson, 28 November 2018) confirming that no important areas for either of these species are present within the development site.

Table 14: Candidate species credit species

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status
Acacia ausfeldii	Ausfeld's Wattle			High	Vulnerable	Endangered
Acacia meiantha				High	Endangered	Not Listed
Burhinus grallarius	Bush Stone-curlew			High	Endangered	Not Listed
Callocephalon fimbriatum	Gang-gang Cockatoo (breeding)			High	Vulnerable	Not Listed
Calyptorhynchus lathami	Glossy Black-Cockatoo			High	Vulnerable	Not Listed
Cercartetus nanus	Eastern Pygmy-possum			High	Vulnerable	Not Listed
Eucalyptus cannonii	Capertee Stringybark			High	Vulnerable	Not Listed
Eucalyptus pulverulenta	Silver-leafed Gum			High	Vulnerable	Vulnerable
Eucalyptus robertsonii subsp. Hemisphaerica	Robertson's Peppermint			N/A	Vulnerable	Vulnerable
Grevillea divaricata				High	Endangered	Not Listed

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status
Ninox connivens	Barking Owl (breeding)			High	Vulnerable	Not Listed
Ninox strenua	Powerful Owl (breeding)			High	Vulnerable	Not Listed
Petaurus norfolcensis	Squirrel Glider			High	Vulnerable	Not Listed
Phascogale tapoatafa	Brush-tailed Phascogale	Hollow bearing trees		High	Vulnerable	Not Listed
Phascolarctos cinereus	Koala (breeding)			High	Vulnerable	Vulnerable
Pomaderris cotoneaster	Cotoneaster Pomaderris			High	Endangered	Endangered
Swainsona recta	Small Purple-pea			High	Endangered	Endangered
Swainsona sericea	Silky Swainson-pea			High	Vulnerable	Not Listed
Tyto novaehollandiae	Masked Owl (breeding)			High	Vulnerable	Not Listed

1.6.1 Targeted surveys

Targeted surveys for flora and fauna species credit species were undertaken at the development site on the dates outlined in Table 15.

Flora surveys consisted of two ecologists, one on either side of the road, meandering along the 10 m wide vegetation over the 20 km covering an area of 20 ha.

Fauna surveys consisted of two ecologists undertaking diurnal bird surveys, call-playback, evening bird surveys, spotlighting and Koala Spot Assessment Techniques (SAT) over five days and five nights. The location of fauna surveys is shown in Figure 6. Results of the surveys are shown as individual species polygons on Figure 7 to Figure 12. Twenty baited cameras were also set up along Aarons Pass Road for a period of 24 days. Unfortunately, four cameras were removed from the site by unknown persons and were not recovered, meaning 384 trap nights were completed using this method.

Elliot traps were not used during the targeted survey, instead baited cameras were mounted on trees near suitable hollow-bearing trees. Recent research as shown that using baited cameras is just as effective in detecting small, medium and large arboreal species when compared to live trapping (Bondi *et al* 2010, Harley *et al* 2014; Cotsell and Vernes, 2016). Baited camera traps have been successful in capturing images of Squirrel gliders (Taylor and Goldingay 2012; Cotsell and Vernes 2016), Brush-tailed Phascogales (Cotsell and Vernes 2016) and smaller Pygmy Possums (Advertiser 2017). Baited camera traps can be left in the field for longer periods of time and there is no stress relating to the physical capture of animals which are often detained for several hours in the trap.

Table 15: Targeted surveys

Date	Surveyors	Target species
17th-21st September 2018	Tomas Kelly and Rebecca Croake	Flora
5th – 7th October 2018	David Allworth, Cheryl O'Dwyer and Kate Maslen	Flora
14th, 17th-20th December 2018	Tomas Kelly, Cassandra Holt, Elise Keane, Rebecca Croake, Justin Russel, Angelina Siegrist, Cheryl O'Dwyer	Fauna – Gang Gang Cockatoo, Bush Stone Curlew, Koala, Barking Owl, Eastern Pygmy Possum, Squirrel Glider, Brush Tailed Phascogale.
7th -8th January	Cassandra Holt, Elise Keane and Rebecca Croake	Fauna – Bush Stone Curlew, Koala, Eastern Pygmy Possum, Squirrel Glider, Brush Tailed Phascogale.

Weather conditions during the targeted surveys are outlined in Table 16. The summer preceding the spring survey recorded slightly warmer than average temperatures, but the months leading up to the survey period were colder than the historical mean. The region has been experiencing drought conditions during 2018. Fauna surveys were not conducted during rain or storm events.

Table 16:Weather conditions (Mudgee Airport, Bureau of Meteorology, 2018)

Date	Rainfall (mm)	Minimum temperature 0C	Maximum temperature 0C
17 September 2018	0	-0.3	17.7
18 September 2018	0	0	23.3
19 September 2018	0	3.4	21.4
20 September 2018	0	-1.0	17.8
21 September 2018	0	-1.1	20.0
5 November 2018	0	9.0	29.7
6th November 2018	0	17.2	32.5
14th December 2018	7.8	17.0	25.8
17th December 2018	0	17.5	32.7
18th December 2018	0	18.7	34.3
19th December 2018	0	20.3	33.3
20th December 2018	39.6	19.1	35.8
7th January 2019	0	18.8	30.4
8th January 2019	0	19.3	34.5

Survey effort undertaken at the development site is outlined in Table 17 and shown in Figure 13.

Table 17: Survey effort

Method	Habitat (ha)	Stratification units	Total effort	Target species
Habitat search (day)	20	SU<50ha	17-21 September – 100 person hours	Flora and opportunistic sightings of birds

Method	Habitat (ha)	Stratification units	Total effort	Target species
Random meander	20	SU<50ha	17-21 September – 100 person hours	Flora and opportunistic sightings of birds
Transect	0.5	SU<50ha	5-6 October – 5 transects 40 person hours 14th, 17th – 20th December. 20 person hours	Flora Bush Stone Curlew
Spot Assessment Technique	20	SU<50ha	14th, 17th-20th December – all Koala feed trees, 20 person hours	Koala
Spotlighting	20	SU<50ha	14th, 17th -20th December 2018, 7th-8th January 2019, 50 person hours	Bush Stone Curlew, Koala, Barking Owl, Eastern Pygmy Possum, Squirrel Glider, Brush Tailed Phascogale.
Baited Cameras	20 trees	SU<50ha	14th December – 7th January 2019. 11,520 hours	Eastern Pygmy Possum, Squirrel Glider, Brush Tailed Phascogale.
Nocturnal transect	0.5 ha	SU<50ha	14th, 17th – 20th December. 20 person hours	Bush Stone Curlew
Point survey	0.5 ha	SU<50ha	14th, 17th – 20th December. 40 person hours	Birds

Following completion of targeted surveys, the species credit species included in the assessment are outlined in Table 18.

Table 18: Species credit species included in the assessment

Species	Common Name	Species presence	Geographic limitations	Number of individuals / Habitat (ha)	Biodiversity Risk Weighting
FLORA					
Acacia ausfeldii	Ausfelds wattle	No (surveyed)			2
Acacia meiantha		Yes (surveyed)		59 individuals / 0.1 ha	3
Eucalyptus cannonii	Capertee Stringybark	No (surveyed)			2
Eucalyptus pulverulenta	Silver-leafed Gum	No (surveyed)			2

Species	Common Name	Species presence	Geographic limitations	Number of individuals / Habitat (ha)	Biodiversity Risk Weighting
Eucalyptus robertsonii subsp. Hemisphaerica	Robertson's Peppermint	No (surveyed)			1
Grevillea divaricate		No (surveyed)			3
Pomaderris cotoneaster	Cotoneaster Pomaderris	Yes (surveyed)		1 individual/ 0.01 ha	2
Swainsona recta	Small Purple-pea	No (surveyed)			2
Swainsona sericea	Silky Swainson-pea	No (surveyed)			2
FAUNA					
Burhinus grallarius	Bush Stone-curlew	No (surveyed)			2
Callocephalon fimbriatum	Gang-gang Cockatoo	No (surveyed)			2
Calyptorhynchus lathami	Glossy Black-Cockatoo	Yes (assumed present)		4.97 ha	2
Cercartetus nanus	Eastern Pygmy-possum	No (surveyed)			2
Ninox connivens	Barking Owl	No (surveyed)			2
Ninox strenua	Powerful Owl	Yes (assumed present)		4.97 ha	2
Petaurus norfolcensis	Squirrel Glider	No (surveyed)			2
Phascogale tapoatafa	Brush-tailed Phascogale	No (surveyed)			2
Phascolarctos cinereus	Koala	Yes (assumed present)		5.05 ha	2
Tyto novaehollandiae	Masked Owl	Yes (assumed present)		4.97 ha	2

Table 19: Justification for exclusion of candidate species credit species

Species	Common Name	NSW listing status	EPBC Listing status	Justification for exclusion of species
Anthochaera phrygia	Regent Honeyeater (Breeding)	Critically Endangered	Critically Endangered	This species is not known to breed in the development site (National Recovery Plan). There are only two known key breeding regions within NSW – the Capertee Valley and the Bundarra-Barraba region. Breeding areas consist of Box-Ironbark with River Sheoaks. Nests are usually located in Ironbarks, Sheoaks and Angophoras located on fertile soils that have high water content. Aarons Pass Road does not contain these plant

Species	Common Name	NSW listing status	EPBC Listing status	Justification for exclusion of species
				species nor are the soils fertile or moist. Regularly used areas within the Capertee Valley is the Mudgee-Munghorn Gap – Wollar region which is 50 km north of Aarons Pass Road. OEH has confirmed that the development site does not contain species credit habitat.
Aprasia parapulchella	Pink-tailed Legless Lizard	Vulnerable	Vulnerable	This species inhabits sites which are typically well-drained with rocky outcrops or scattered and partially buried rocks. Suitable rocky areas are not present within the development site.
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Vulnerable	This species requires areas with extensive caves and cliffs. The development site does not contain breeding habitat such as caves, overhangs or culverts within 2 km that are suitable for the species to utilise the site.
Haliaeetus leucogaster	White-bellied Sea-Eagle (breeding)	Vulnerable	Not Listed	This is a duel credit species, and only a species credit species when specific habitat constraints are present for breeding. This species requires rivers, swamps, lakes and freshwater billabong within 1 km for foraging with large mature trees nearby. Habitat was not deemed suitable for breeding for this species.
Hieraaetus morphnoides	Little Eagle (Breeding)	Vulnerable	Not Listed	This is a duel credit species, and only a species credit species when specific habitat constraints are present for breeding. The presence of this species was not identified, and it was determined that the habitat is substantially degraded such that this species is unlikely to utilise the development site. No nests were observed during the field survey.
Lathamus discolour	Swift Parrot (breeding)	Endangered	Critically Endangered	The presence of this species was not identified, and it was determined that the habitat is substantially degraded such that this species is unlikely to utilise the development site. Breeding is not known to occur within the area. This species is only known to breed in Tasmania during Spring. OEH has confirmed that the development site does not contain species credit habitat.

Species	Common Name	NSW listing status	EPBC Listing status	Justification for exclusion of species
Litoria booroolongensis	Booroolong Frog	Endangered	Endangered	There were no permanent streams within the development site. No suitable habitat was identified on site.
Lophoictinia isura	Square-tailed Kite (Breeding)	Vulnerable	Not Listed	This is a duel credit species, and only a species credit species when specific habitat constraints are present for breeding. The presence of this species was not identified, and it was determined that the habitat is substantially degraded such that this species is unlikely to utilise the development site. No nests were observed during field surveys as nests are usually located along or near watercourses.
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat (breeding)	Vulnerable	Not Listed	This is a duel credit species, and only a species credit species when specific habitat constraints are present for breeding. The development site does not contain breeding habitat such as caves, overhangs or culverts that are suitable for the species to breed within the development site.
Polytelis swainsonii	Superb Parrot	Vulnerable	Vulnerable	The Superb Parrot inhabits Box-Gum Woodlands on the South-Western Slopes their core breeding area is bounded by Cowra and Yass in the east and Grenfell, Cootamundra and Coolac in the west. This region is well south of the development site.
Zieria obcordata		Endangered	Endangered	The presence of this species was not identified, and it was determined that the habitat is substantially degraded such that this species is unlikely to utilise the development site.

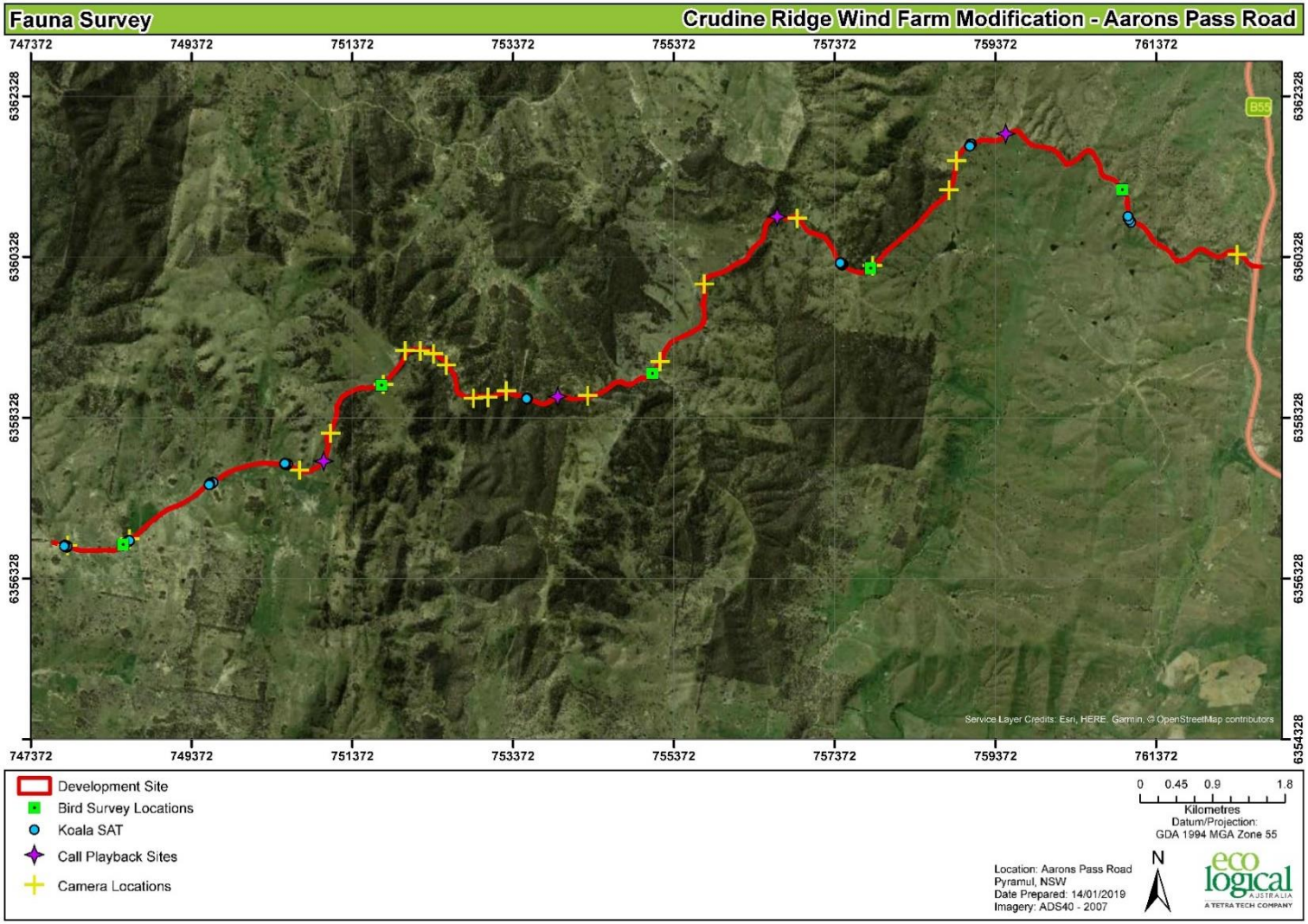

Figure 6: Location of fauna surveys

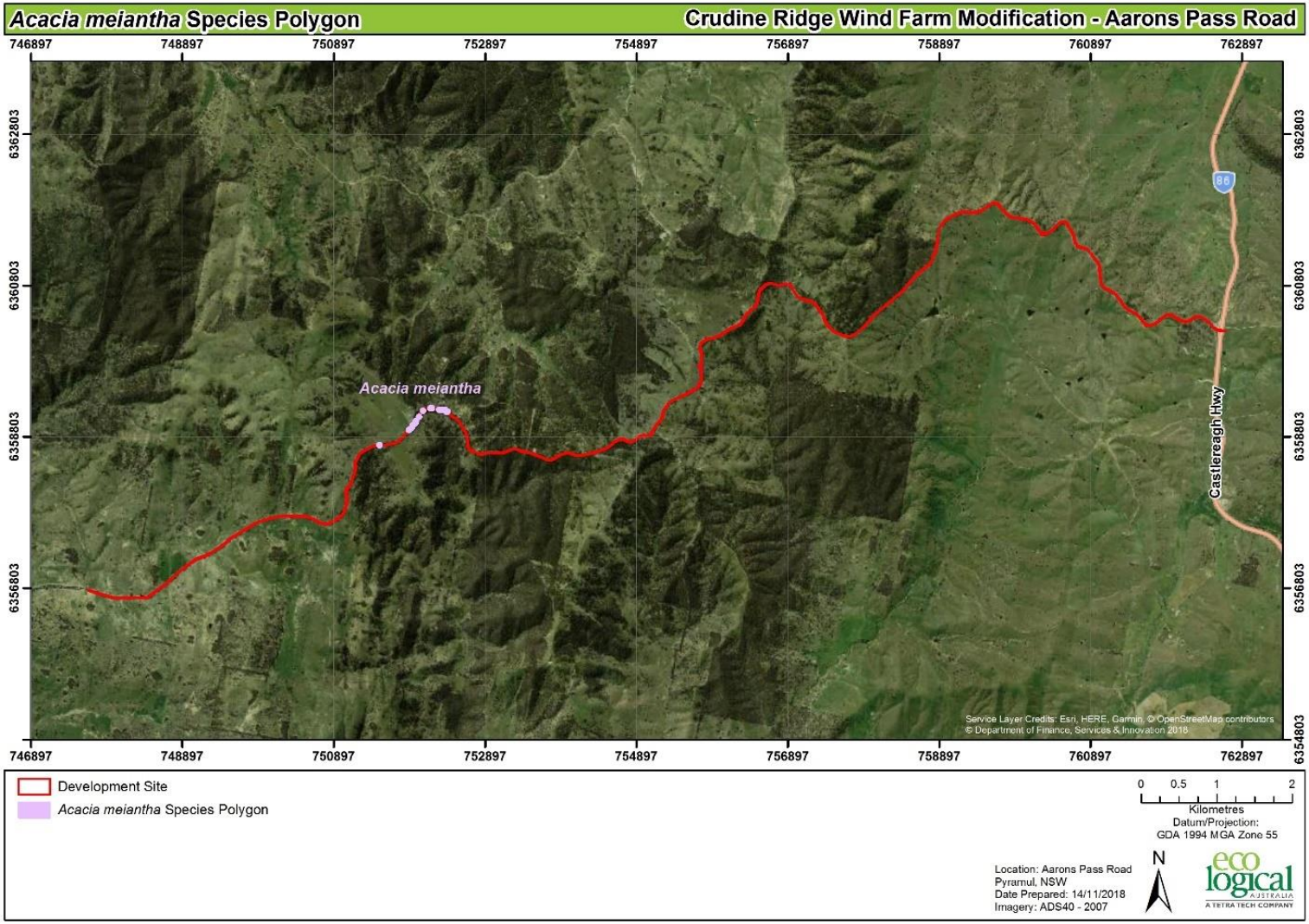

Figure 7: Species polygon for *Acacia meiantha*

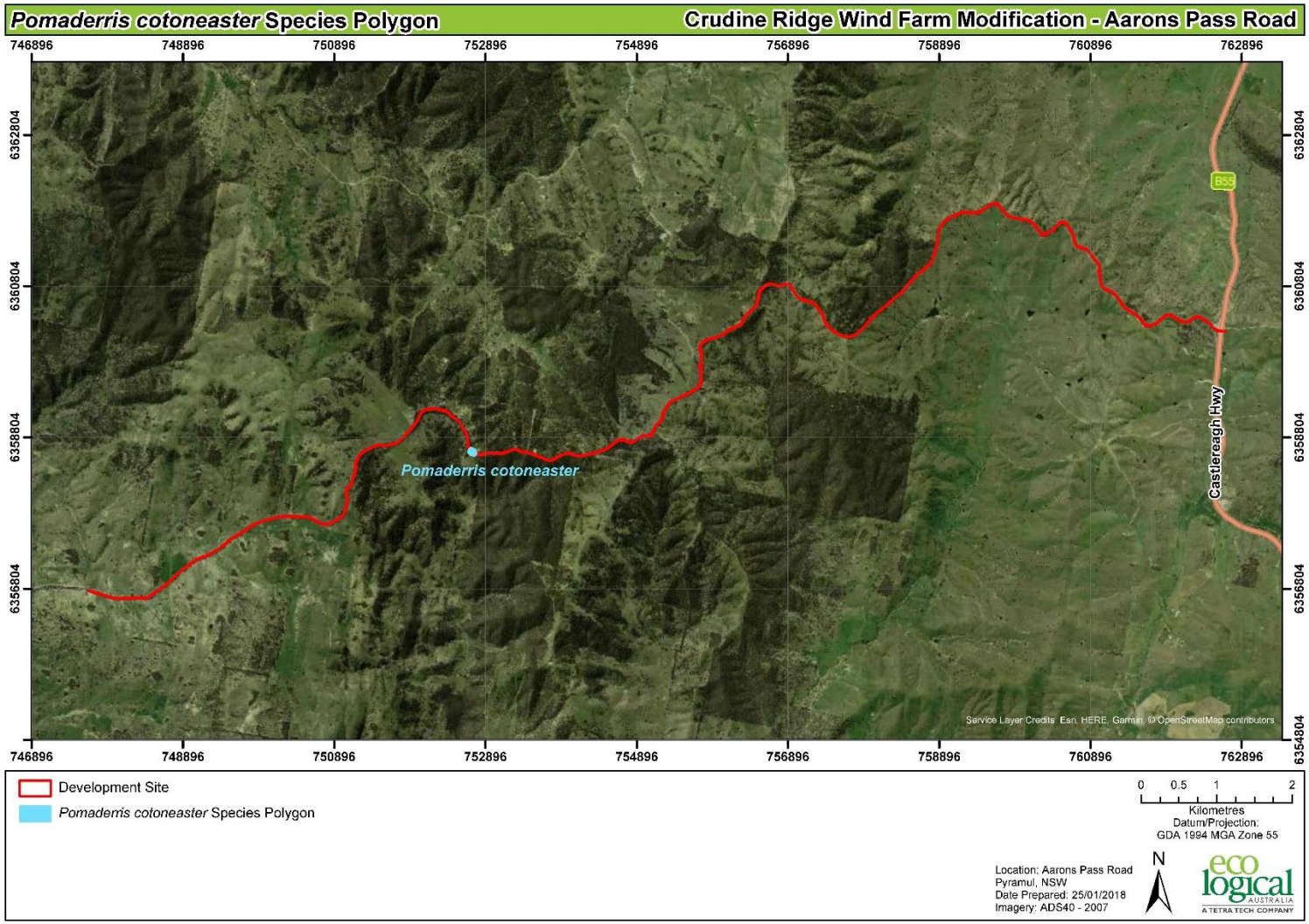

Figure 8: Species polygon for *Pomaderris cotoneaster*

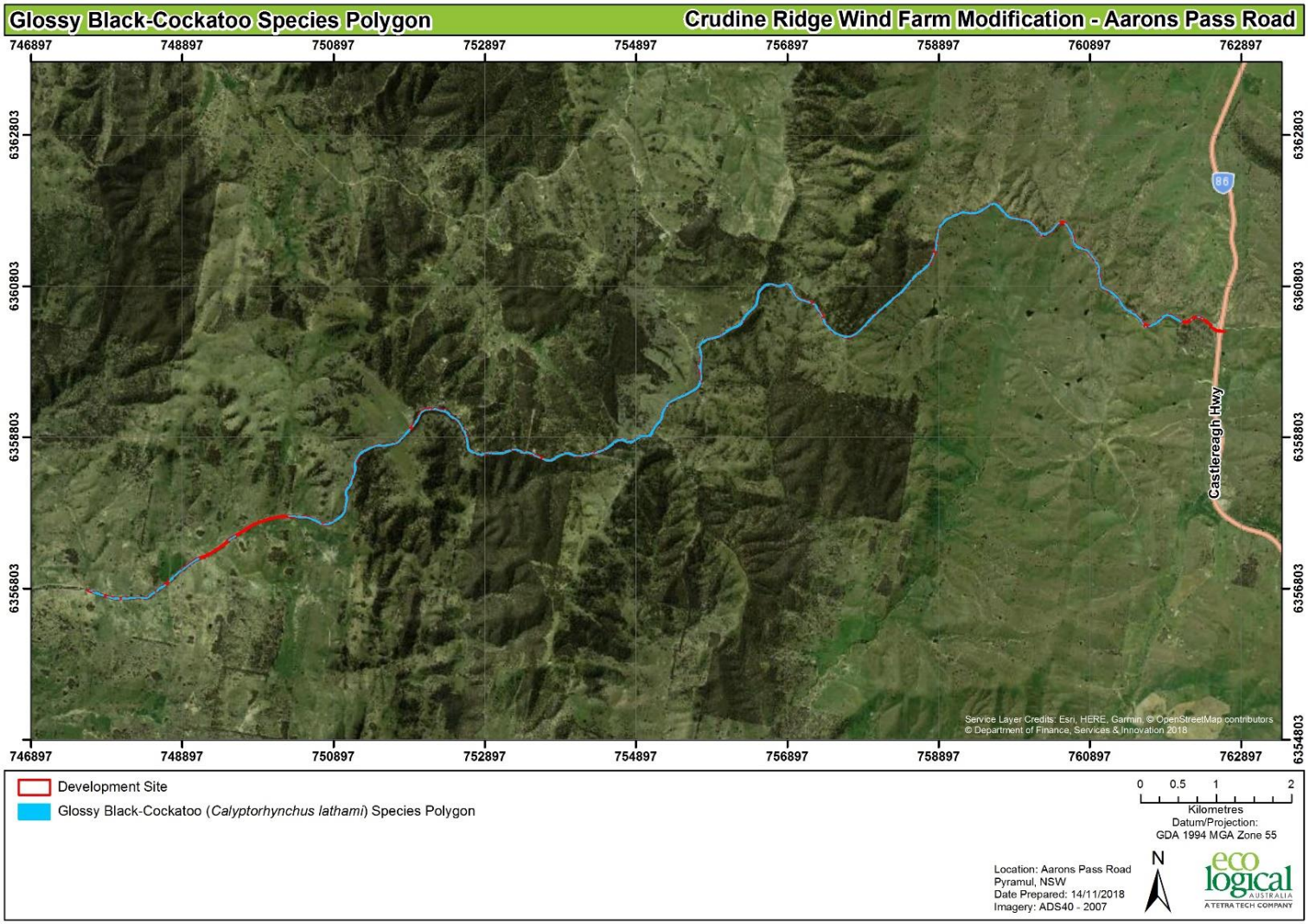

Figure 9: Species polygon for *Calyptorhynchus lathami*

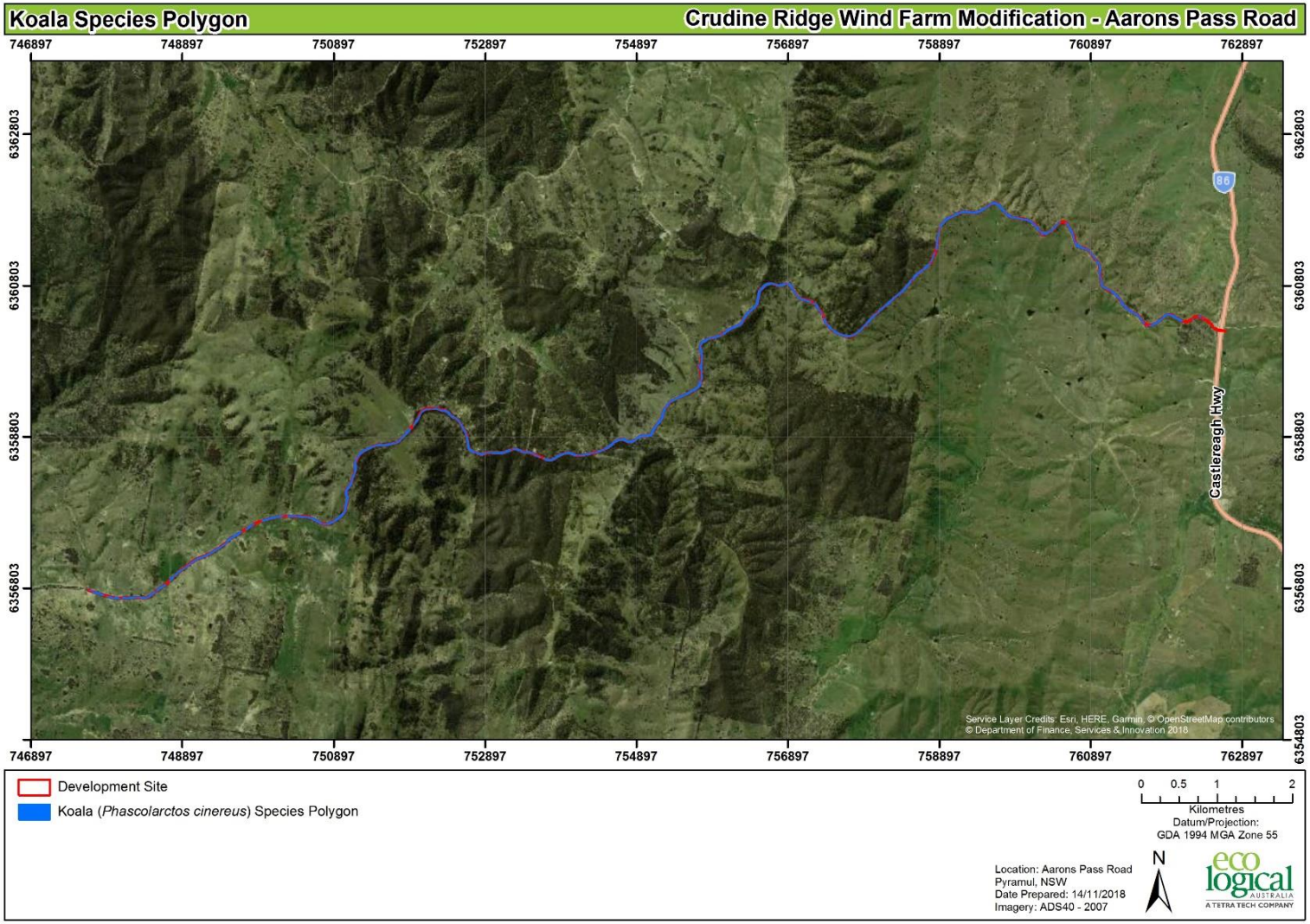

Figure 10: Species polygon for *Phascolarctos cinereus*

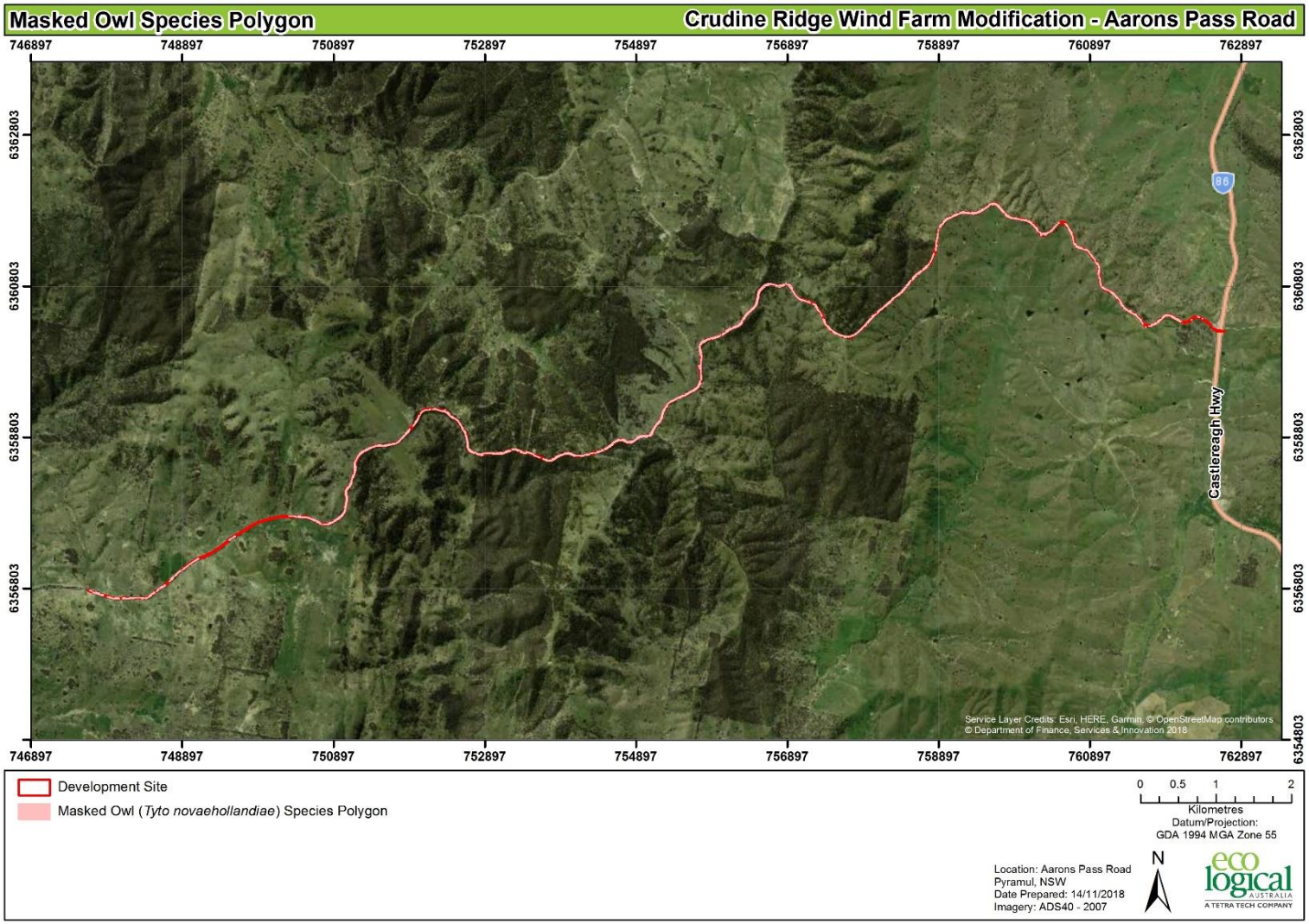

Figure 11: Species polygon for *Tyto novaehollandiae*

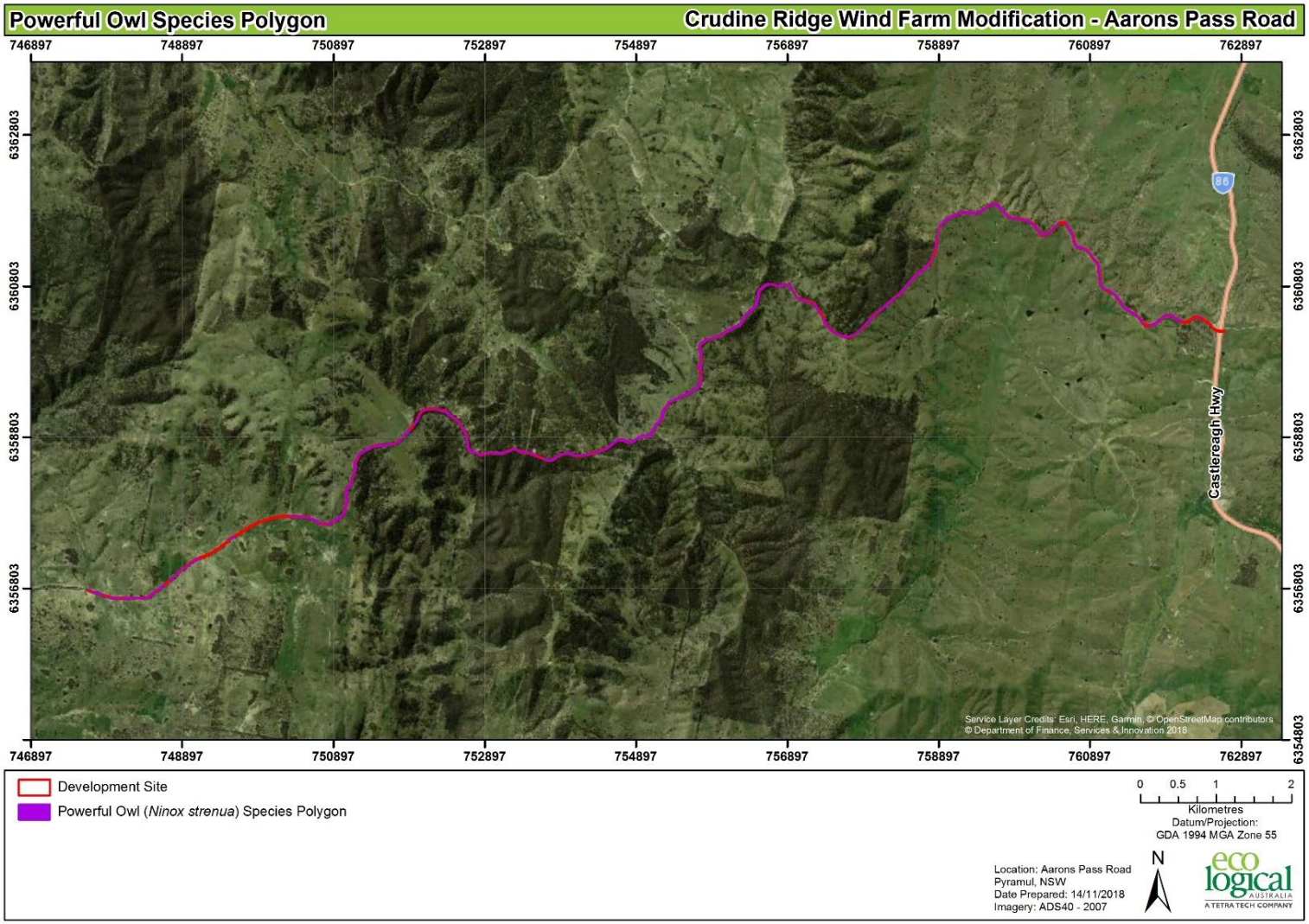

Figure 12: Species polygon for *Ninox strenua*

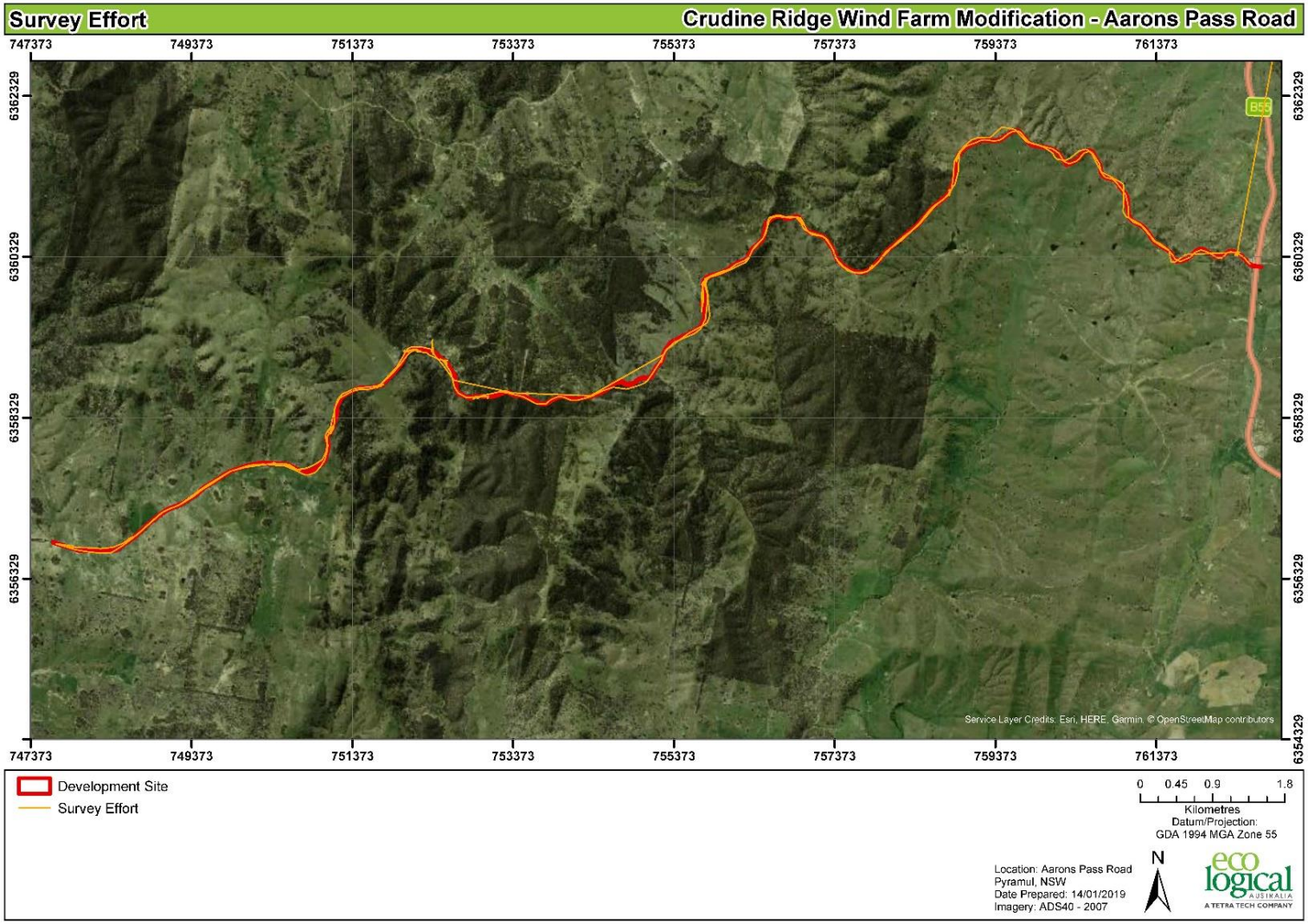

Figure 13: Transects for fauna searches along Aarons Pass Road

1.6.2 Results of targeted survey

Weather conditions during the targeted surveys were deemed to be ideal. Common Brushtail Possums (*Trichosurus vulpecula*) and Sugar Gliders (*Petaurus breviceps*) were observed under spotlight. Images of Yellow-footed antechinus (*Antechinus flavipes*) and Sugar Gliders were also captured on cameras. The presence of Sugar Gliders was confirmed based on the size of the head, body and tail in ratio to the size of the bait station, and the shape of the head and the width of the base of tail (Dr. Rodney Armistead pers comms, 2019). Scratches on trees and the presence of a single scat may indicate the presence of Koalas, however no individuals were observed whilst spotlighting or searching trees. There were no responses to call play-back.

1.6.3 Use of local data

The use of local data is not proposed.

1.6.4 Expert reports

Expert reports have not been used as part of this BDAR.

2. Stage 2: Impact assessment (biodiversity values)

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 20.

Table 20: 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 with reduced biodiversity values have been utilised within the development footprint.	The footprint and access route has been adjusted multiple times to avoid areas of higher biodiversity values and EEC. Whilst 5.05 ha of vegetation has been assessed as being impacted, not all of this vegetation will be cleared. Areas of temporary direct impacts exist associated with road construction, along with areas where wind turbine blades will pass over vegetation (blade swept path) which will be pruned or left in situ.
locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition	The access route along Aarons Pass Rd avoids areas of higher quality vegetation and species habitat.	Alternative routes were investigated and clearing regimes have been modified to minimise impacts to species. Vegetation has been retained

Approach	How addressed	Justification
		wherever possible, particularly within the blade swept path.
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 access route along Aarons Pass Rd avoids areas of higher quality vegetation and species habitat	Alternative routes were investigated and clearing regimes have been modified to minimise impact to species. Nearby 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	The development site avoids impediments to connectivity.	The development site contains limited habitat connectivity and is largely located within a fragmented landscape. Lands directly adjoining the development site are heavily grazed or cropped with some patches of vegetated and connected areas directly adjoining the site. Given that not all vegetation will be removed within the total 5.05 ha footprint, the development will not impact on the 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 21.

Table 21: Designing a project to avoid and minimise impacts on vegetation and habitat

Approach	How addressed	Justification
reducing the clearing footprint of the project	Alternative access routes were investigated, and the removal of vegetation has been modified to minimise impacts to species. Knowledge of the location of the Cotoneaster Pomaderris has allowed transport options to be modified, and project activities able to ensure that direct impacts upon this species will be minimal (1 individual).	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. Whilst 5.05 ha of vegetation has been assessed as being impacted, not all of this vegetation will be cleared. Areas of temporary direct impacts exist associated with road construction, along with areas where wind turbine blades will pass over vegetation (blade swept path) which will be pruned or left in situ. The height of the blade of the turbine on the transport vehicles is above the height of the Cotoneaster Pomaderris present within the blade swept path. This has ensured that impact to this species is avoided wherever possible,

Approach	How addressed	Justification
		with the potential for pruning to be undertaken to ensure impacts are minimised.
providing structures to enable species and genetic material to move across barriers or hostile gaps	Whilst assessment has been considered for the entire removal of 5.05 ha of vegetation not all of this will be removed, sections will be pruned, and trees will be avoided where possible. Only small patches along the total length of Aarons Pass Road, approximately 20 km will be removed.	The access route and road modification has been planned to avoid the removal of vegetation where possible and allow for pruning of vegetation. All existing corridors off-site allowing for the movement of species and genetic material will be retained.
making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on the development site.	Impacts to the vegetation will occur in small areas along the 20 km length of Aarons Pass Road	The total development site covers an area of 6.59 ha. Of this 1.54 ha has already been approved for clearing under the CRWF Development Consent (SSD-6697) and given the like-for-like vegetation communities, it is considered that the SSD-6697 approved 1.54 ha can be directly exchanged for the same area within the development site. Therefore, the additional area of native vegetation clearing for the development site the subject of this BDAR is 5.05 ha. Not all of this will be cleared, where possible areas will be only partially disturbed with select tree removal and pruning of vegetation.
Efforts to avoid and minimise impacts through design must be documented and justified	Modifications and strategic planning to avoid and minimise impacts to species.	The footprint has been adjusted multiple times to avoid areas of higher biodiversity values and EEC.

2.1.3 Prescribed biodiversity impacts

The development site has the prescribed biodiversity impacts as outlined in Table 22.

Table 22: 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 access route and road modification has been planned to avoid the removal of vegetation where possible and allow for trimming. All existing corridors off-site allowing for the movement of species and genetic material will be retained	Koala.

Prescribed biodiversity impact	Description in relation to the development site	Threatened species or ecological communities effected
impacts of development on movement of threatened species that maintains their lifecycle	The access route and road modification has been planned to avoid the removal of vegetation where possible and allow for trimming. All existing corridors off-site allowing for the movement of species and genetic material will be retained	Koala.
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, the roadside vegetation may be used as a corridor to facilitate movement. Koalas have been struck by vehicles in the vicinity of the development site (OEH 2018). The development site consists of the removal of a total of 5.05 ha of vegetation across the 20km length of road. Only particular sections of the road will be widened, and other areas will have vegetation pruned and large trees removed. The development site contains limited habitat connectivity and is located within a fragmented landscape. It is unlikely that vehicle strikes on threatened animals will increase.	Koala

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 23.

Table 23: 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 access route and road modification has been planned to avoid and minimise the removal of vegetation where possible. Not all vegetation within the 5.05 ha footprint will be removed.	The route and access have been planned and modified to avoid areas of high biodiversity values and reduce the impact by allowing for vegetation trimming rather than removal.
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 access route and road modification has been planned to avoid and minimise the loss of vegetation and connectivity.	Alternative routes and access have been investigated. The road modification development site has been modified to minimise impacts to species. 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 24.

Table 24: 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 species.	The 5.05 ha footprint includes areas that will not be totally cleared of vegetation. There is a 0.5 m civil works buffer zone and a blade swept path that will enable vegetation to be trimmed rather than complete removal.

2.2 Assessment of Impacts

2.2.1 Direct impacts

The direct impacts of the development on:

- native vegetation are outlined in Table 25
- threatened ecological communities are outlined in Table 26
- threatened species and threatened species habitat is outlined in Table 27
- prescribed biodiversity impacts is outlined in Section 2.2.2
- Direct impacts including the final project footprint (construction and operation) are shown on Figure 12.

Table 25: Direct impacts to native vegetation

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)
277	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion.	Western Slopes Grassy Woodlands	Grassy Woodlands	0.67 ha
290	Red Stringybark – Red Box – Long-leaved Box – Inland Scribbly Gum tussock grass shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion.	Upper Riverina Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrub/grass sub formation)	4.38 ha

Table 26: Direct impacts on threatened ecological communities

PCT ID	BC Act			EPBC Act		
	Listing status	Name	Direct impact (ha)	Listing status	Name	Direct impact (ha)
277	TEC	*White Box Yellow Box Blakely's Red Gum Woodland*	0.67	CEEC	*White Box Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland*	0.32

Table 27: 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
FLORA				
Acacia meiantha		59 individuals / 0.1 ha	Endangered	Endangered
Pomaderris cotoneaster	Cotoneaster Pomaderris	1 individual / 0.01 ha	Endangered	Endangered
FAUNA				
Calyptorhynchus lathami	Glossy Black-Cockatoo	4.97 ha	Vulnerable	Not Listed
Ninox strenua	Powerful Owl	4.97 ha	Vulnerable	Not Listed
Phascolarctos cinereus	Koala	5.05 ha	Vulnerable	Vulnerable
Tyto novaehollandiae	Masked Owl	4.97 ha	Vulnerable	Not Listed

2.2.2 Change in vegetation integrity

The change in vegetation integrity as a result of the development is outlined in Table 28.

Table 28: Change in vegetation integrity

Veg Zone	PCT ID	Condition	Area (ha)	Current vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity
1	277	Intact	0.32	56.5	0	-56.5
2	277	Degraded	0.35	40.4	0	-40.4
3	290	Intact	1.55	69.3	0	-69.3
4	290	Degraded	2.83	61	0	-61

2.2.3 Indirect impacts

The indirect impacts of the development are outlined in Table 29. Indirect impact zones are assumed to be within 10 m of the impact footprint.

Table 29: 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

Indirect impact	Project phase	Nature	Extent	Frequency	Duration	Timing
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 *Pomaderris cotoneaster* and *Acacia meiantha* 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

2.2.4 Prescribed biodiversity impacts

The development site has the prescribed biodiversity impacts as outlined in Table 30.

Table 30: Direct impacts on prescribed biodiversity impacts

Prescribed biodiversity impact	Nature	Extent	Frequency	Duration	Timing
impacts of development on movement of threatened species that maintains their lifecycle	Reduction in habitat for Koala	Decline in population	Daily, during construction works	Throughout project period	Potentially long-term impacts
impacts of vehicle strikes on threatened species or on animals that are part of a TEC.	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

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 31.

Table 31: Measures proposed to mitigate and manage impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Displacement of resident fauna	Minor	Negligible	Impacts to fauna will be minimised initially through active management, avoidance and pre-clearing procedures identified in Section 4.1 and 4.2 of the BMP. Inspections are to be undertaken by the EPC Environment Officer who will identify habitat and engage a qualified ecologist.	Relocation of fauna in a sensitive manner	Prior to and during removal of HBT	Project Manager / Ecologist
timing works to avoid critical life cycle events such as breeding or nursing	Minor	Negligible	Impacts to fauna will be minimized initially through active management, avoidance and pre-clearing procedures as per Section 4 of the BMP.	Relocation of fauna in a sensitive manner	During clearing works	Project 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	Minor	Negligible	The EPC Environment Officer will inspect areas prior to disturbance and if required engage a qualified ecologist as per Section 4.2 of the BMP.	Any fauna utilising habitat within the development site area will be identified and managed to ensure clearing works minimise the likelihood of injuring resident fauna	During clearing works	Project Manager/ Ecologist

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
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	Minor	Negligible	The EPC Environment Officer will inspect areas prior to disturbance and engage an qualified ecologist if required as per Section 4.2 of the BMP	Any areas within the development site area that will be trimmed to partially cleared will be identified and managed to ensure clearing works minimise the likelihood of causing inadvertent damage	During clearing works	Project Manager/ Ecologist
sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment	Moderate	Minor	Where an erosion or soil management risk is identified the contractor will prepare an Erosion and Sediment Control Plan in accordance with the Environmental Management Strategy. The Environment Officer will ensure the site is managed and monitored in accordance with the Plan.	Control of erosion and sedimentation	Duration of the project	Project Manager
noise barriers or daily/seasonal timing of construction and operational	Minor	Negligible	Daily timing of construction activities is recommended in accordance with the development consent (SSD-6697)	Noise impacts associated with the development will be managed in accordance with guidelines.	For the duration of construction works	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
activities to reduce impacts of noise			Monday to Friday 7.00am to 6.00pm Saturday 8.00am to 1.00pm No work on Sunday or public holidays Noise generated by any construction or decommissioning activities is managed in accordance with the best practice requirements outlined in the *Interim construction noise guidelines* (DECC, 2009).			
light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill	Minor	Negligible	Operating times will only occur during daylight hours, and night lights will not be used	Light impacts associated with construction and operation will be avoided as works will occur during daylight hours	For the duration of the project	Project Manager
adaptive dust monitoring programs to control air quality	Moderate	Minor	Dust suppression measures	Mitigate dust created during construction/operation	For the duration of the project	Project Manager
programming construction activities to avoid impacts; for example, timing construction activities for when migratory species are absent from	Minor	Negligible	Timing of construction works should be planned to actively manage breeding and nesting species as per section 4.4 of the Biodiversity Management Plan (2017).	impacts to fauna during breeding/nesting avoided	During clearing works	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
the site, or when particular species known to or likely to use the habitat on the site are not breeding or nesting						
hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	Moderate	Minor	Implementation of the Weed Management Program in accordance with the requirements of Section 4.8 of the BMP. There are currently no weeds on the Development Site listed under the NSW Biosecurity Act 2015. Future weed infestations should be managed/removed as per the BMP.	Prevent the spread of weeds or pathogens	Duration of project	Project manager
staff training and site briefing to communicate environmental features to be protected and measures to be implemented	Minor	Negligible	Prior to commencement of works on site, all site personnel will be required to undertake a site induction identifying their responsibilities under the BMP and EMS.	All staff entering the Development Site are fully aware of all environmental aspects relating to the development and know what to do in case of any environmental emergencies	To occur for all staff entering / working at the Development Site and when environmental issues become apparent	Project Manager, all staff
development control measures to regulate activity in	Moderate	Minor	Installation of signage to indicate No Go zones, rubbish disposal guidance, prohibition of wood	Protection of flora and fauna surrounding the Development Site	Prior to the commencement of construction	Client

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
vegetation and habitat adjacent to development including controls on pet ownership, rubbish disposal, wood collection, fire management and disturbance to nests and other niche habitats			collection, prohibition from lighting fires, prohibition of disturbance to vegetation outside of the Development Site, and pest & disease management As per section 3.4.2 and Table B-1 of the EMS, refer to the Biodiversity Management Plan and Contamination and Waste Management Plan.			

2.2.6 Serious and Irreversible Impacts (SAII)

The development site contains three Serious and Irreversible Impacts (SAII) candidate entity identified in Table 32. Detailed consideration of whether impacts on candidate species are serious and irreversible is included in Table 33, Table 34 and on TECs is included in Table 35.

Table 32: Candidate Serious and Irreversible Impacts

Species / Community	Common Name	Principle	Direct impact individuals / area (ha)	Threshold
White Box Yellow Box Blakely's Red Gum Woodland	Box Gum Woodland	Principle 1 and Principle 2	Removal of 0.67 ha	Not yet published
Acacia meiantha		Principle 3	Removal of 59 individuals from a known population of 750-1000	Not yet published

Table 33: 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 development site will result in a loss of 0.67 ha of White Box Yellow Box Blakely's Red Gum Woodland
If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible? Note:	The proposed development will remove 0.67 ha of EEC. Within 1000 ha of the development site, White Box Yellow

Determining whether impacts are serious and irreversible	Assessment
where candidate entities have no listed threshold, any impact is considered likely to be serious and irreversible	Box Blakely's Red Gum Woodlands cover approximately 45% of the area. The removal of 0.67 ha represents less than 0.21% of these lands. Within 10,000 ha of the development site, the White Box Yellow Box Blakely's Red Gum Woodlands cover approximately 48% of the area. The removal of 0.67 ha represents just 0.02% ha of these lands within 10,000 ha (OEH 2017). Within the IBRA subregion the area remaining after impact will be 99.99% (OEH 2015). The area reserved within the IBRA region is 7,672 ha and 360 ha within the IBRA subregion. 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.
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?	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	
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. *Acacia meiantha* has limited geographic distributions.
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. *A. meiantha* is known from three disjunct populations within the Central Tablelands within 100 km from each other. The population along Aarons Pass Road is primarily confined to approximately 1.5 km of road easement. The population of *Acacia meiantha* along Aarons Pass Road is estimated to be between 750 and 1000 individuals (Eldridge 2015). Removing or pruning 59 individuals (0.1 ha) from the population may result in a loss of 8% of the population which may lead to a long-term decrease in the size of the population.
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?	NA
b. 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.	

Table 34: 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.	All individual *A. meiantha* have been tagged and GPS located to ensure individuals are not inadvertently impacted during the development. Additionally, the development site footprint has been altered to reduce the impact on individuals and where possible individuals will be trimmed rather than removed. Any individuals that are required to be removed will be translocated using measures to be developed in the BMP to the satisfaction of DPE. The BMP requires that site staff are inducted to be aware of environmental values and the plan will be updated to include a requirement for staff to be familiarised with the threatened species management protocols. It has been recommended that an ecologist be on site to assist with the familiarisation of this species with construction staff.
the size of the local population directly and indirectly impacted by the development.	The proposed development will remove a small area of occupancy of *Acacia meiantha*, however a larger area of occupancy will remain undisturbed and will be managed to support continuation of the remaining population. It is estimated that 59 individual *A. meiantha* will be impacted. Removing these individuals may impact on the local population. However, *A. meiantha* individuals will be translocated, propagated or pruned if required in accordance with measures to be adopted in the BMP to the satisfaction of DPE.
the extent to which the impacts exceeds any thresholds	No published thresholds exist for the TEC or the one threatened plant species. Therefore, a threshold of 0 has been assumed and any loss of individuals is likely to have an impact. Therefore, the Proponent has committed to avoiding impacts where possible, pruning individuals within the blade swept path or translocating and propagating individuals to a safe area.
An estimation of change in habitat available to the local population as a result of the proposed development	*A. meiantha* occurs along a 1.5 km linear strip of roadside vegetation. Not all the vegetation will be removed and 59 individual *A. meiantha* will be directly impacted either by pruning or translocating to another area. There is available habitat along Aarons Pass Road for the population to expand.
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	The existing road currently intersects the known populations of *A. meiantha* with individuals identified on either side of the road. The proposed road widening will remove a small area of occupancy of available habitat although there are areas of 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,	The removal of individuals can disrupt breeding and pollination required to maintain genetic diversity. Given the already small population occurring on the development site

Impact Assessment Provision	Assessment
germination), genetic diversity and long-term evolutionary development	the loss of the small number of individuals that are to be impacted it is possible that genetic diversity and long-term evolutionary development will be impeded. The Proponent will incorporate management strategies for the removal and /or pruning of individuals which may include but is not limited to translocation and /or propagation from cuttings collected from site. This will enable the genetic diversity and long-term evolutionary development to be retained.
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 number of individuals that will be affected, the ecology and biology of the residual population is unlikely to be impacted. The removal or pruning of 59 *A. meiantha* is unlikely to affect the remaining population post development. Translocating and or propagating individuals of *A. meiantha* will maintain genetic diversity and long-term evolutionary development of the species.
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 the known populations of *A. meiantha* with individuals identified on either side of the road. 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	*A. meiantha* is known from three disjunct populations within the Central Tablelands within 100 km from each other. There is no genetic exchange between the extant populations. There is no likely genetic exchange with other populations. Given the small number of individuals that will be impacted it is unlikely that 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	The development site will be managed in accordance with the CRWF BMP to ensure that the spread of weeds and soil and plant diseases are controlled. Weeds will be managed in accordance with the BMP to identify the mitigation measures and monitoring requirements to ensure the spread of weeds 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.	The development site will protect against the spread of weeds and the movement of pathogens into adjoining similar vegetation and will not directly, or otherwise indirectly impact areas outside of the development site area footprint.

Table 35: 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 footprint and access route has been modified numerous times to avoid EEC and CEEC. Additionally, not all areas will be totally cleared, individual

Impact Assessment Provisions	Assessment
	trees will be removed, and vegetation trimmed to facilitate access. A total of 0.67 ha of TEC will be impacted.
1. the area and condition of the TEC to be impacted directly and indirectly by the proposed development	The development site will remove 0.32 ha of derived Box Gum Woodland in a good condition, with integrity scores of 56.5 in the BAMC. The development site will also remove 0.35 ha of derived Box Gum Woodland in low condition with an integrity score of 40.4 in the BAMC.
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 0.67 ha has exceeded the threshold. However, given the small areas to be impacted a SAII is unlikely.
2. the extent and overall condition of the TEC within an area of 1000 ha, and then 10000 ha, 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	Detailed mapping of the local occurrence of the EEC is not available. Much of the landscape consists of lands similar to that of the Work Site. These areas have been highly disturbed/grazed and have not been mapped by any vegetation mapping programs as a native vegetation community. Within 1000 ha of the development site, these White Box Yellow Box Blakely's Red Gum Woodlands cover approximately 45% of the area. The removal of 0.67 ha represents less than 0.21% of these lands. Within 10,000 ha of the development site, the White Box Yellow Box Blakely's Red Gum Woodlands cover approximately 48% of the area. The removal of 0.67 ha represents just 0.02% ha of these lands within 10,000 ha (OEH 2017). Within the IBRA subregion the area remaining after impact will be 99.99% (OEH 2015). The area reserved within the IBRA region is 7,672 ha and 360 ha within the IBRA subregion. 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. Within the IBRA region 7,672 ha of this EEC is within reserve system and 360 ha reserved within the subregion.
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 proposal will reduce the extant area of the EEC by 0.67 ha. Considering the very small area and reduced quality of the vegetation to be removed, 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 I149,530 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 36, Table 37 and Table 38 respectively.

Table 36: 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 37: 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 38: 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 39: Risk assessment

Potential impact	Project phase	Risk (pre-mitigation)	Risk (post mitigation)
Vegetation clearing	Construction / operation	Low	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

Potential impact	Project phase	Risk (pre-mitigation)	Risk (post mitigation)
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
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

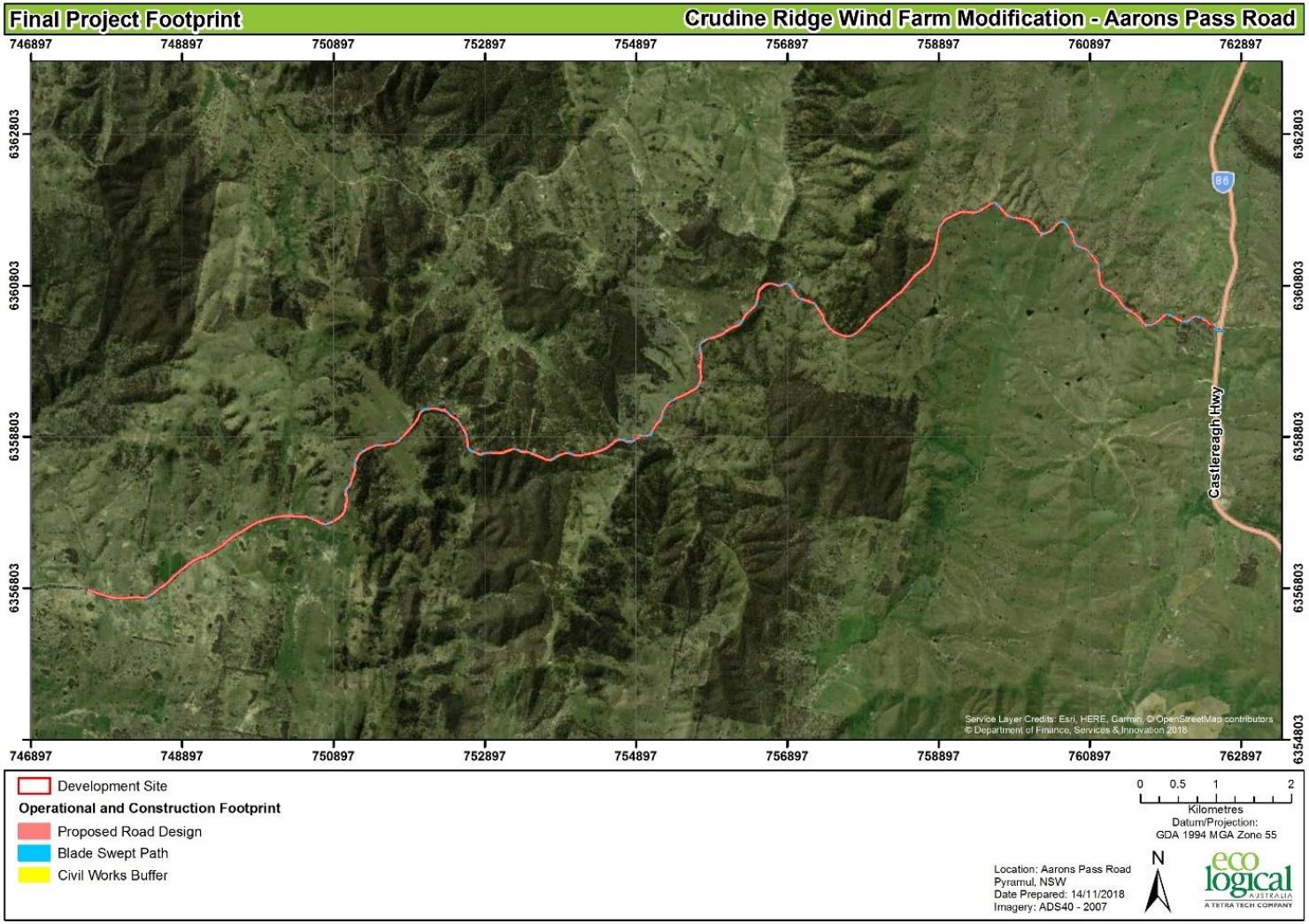

Figure 14: Final project footprint including construction and operation

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, and *A. meiantha* have not yet been published by the OEH, all impacts are potentially SAII. Considering the degraded nature of Box Gum Woodland in the development site and small area to be removed (0.32 ha with vegetation integrity score of 56.5 and 0.35 ha with vegetation integrity score of 40.4), it is unlikely that the development would have a SAII.

The removal or pruning of 59 individuals of *A. meiantha* (8%) may have an impact on the population. However, the Proponent has committed to avoiding individuals within the impact zone where possible through a detailed design process in accordance with the BMP. Where the impacts cannot be avoided, pruning individuals within the blade swept path will be undertaken with propagation to be undertaken to mitigate the potential for impacts to the population. Where removal of plants is required, *A. meiantha* will be salvaged from site and translocated within the development area or to a nearby conservation area to be determined by a qualified botanist. Pruning, propagation and translocation measures will be defined and adopted within the BMP, to be updated to the satisfaction of the Secretary of DPE, following approval of the Modification. Given these measures it is unlikely that a SAII will occur.

2.4.2 Impacts requiring offsets

The impacts of the development requiring offset for native vegetation are outlined in Table 40 and shown on Figure 15. The impacts of the development requiring offset for threatened species and threatened species habitat are outlined in Table 41 and Figure 15.

Table 40: Impacts to native vegetation that require offsets

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)
277	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (0.94 ha).	Western Slopes Grassy Woodlands	Grassy Woodlands	0.67 ha
290	Red Stringybark – Red Box – Long-leaved Box – Inland Scribbly Gum tussock grass shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion (5.51 ha).	Upper Riverina Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrub/grass sub formation)	4.38 ha

Table 41: 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 meiantha		59 individuals / 0.1 ha	Endangered	Endangered
Pomaderris cotoneaster	Cotoneaster Pomaderris	1 individuals / 0.01 ha	Endangered	Endangered

Species	Common Name	Direct impact number of individuals / habitat (ha)	NSW listing status	EPBC Listing status
Calyptorhynchus lathami	Glossy Black-Cockatoo	4.97 ha	Vulnerable	Not Listed
Ninox strenua	Powerful Owl	4.97 ha	Vulnerable	Not Listed
Phascolarctos cinereus	Koala	5.05 ha	Vulnerable	Vulnerable
Tyto novaehollandiae	Masked Owl	4.97 ha	Vulnerable	Not Listed

2.4.3 Impacts not requiring offsets

The impacts of the development not requiring offset are those areas of cleared land dominated by exotic species which do not provide habitat for threatened species. Species that are not threatened or form part of an EEC were not assessed. These areas were identified in Figure 3.

2.4.4 Areas not requiring assessment

Areas consisting of exotic vegetation were not assessed (Figure 3 and Figure 16).

2.4.5 Credit summary

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. A biodiversity credit report is included in Appendix C.

Table 42: Ecosystem credits required

PCT ID	PCT Name	Vegetation Formation	Direct impact (ha)	Credits required
277	Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Grassy Woodlands	0.67 ha	16
290	Red Stringybark – Red Box – Long-leaved Box – Inland Scribbly Gum tussock grass shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion.	Dry Sclerophyll Forests (Shrub/grass sub formation)	4.38 ha	123

Table 43: Species credit summary

Species	Common Name	Direct impact number of individuals / habitat (ha)	Credits required
Acacia meiantha		59 individuals / 0.1 ha	5
Pomaderris cotoneaster	Cotoneaster Pomaderris	1 individual / 0.01 ha	0
Calyptorhynchus lathami	Glossy Black-Cockatoo	4.97ha	154
Tyto novaehollandiae	Masked Owl	4.97 ha	154
Phascolarctos cinereus	Koala	5.05 ha	156
Ninox strenua	Powerful Owl	4.97 ha	154

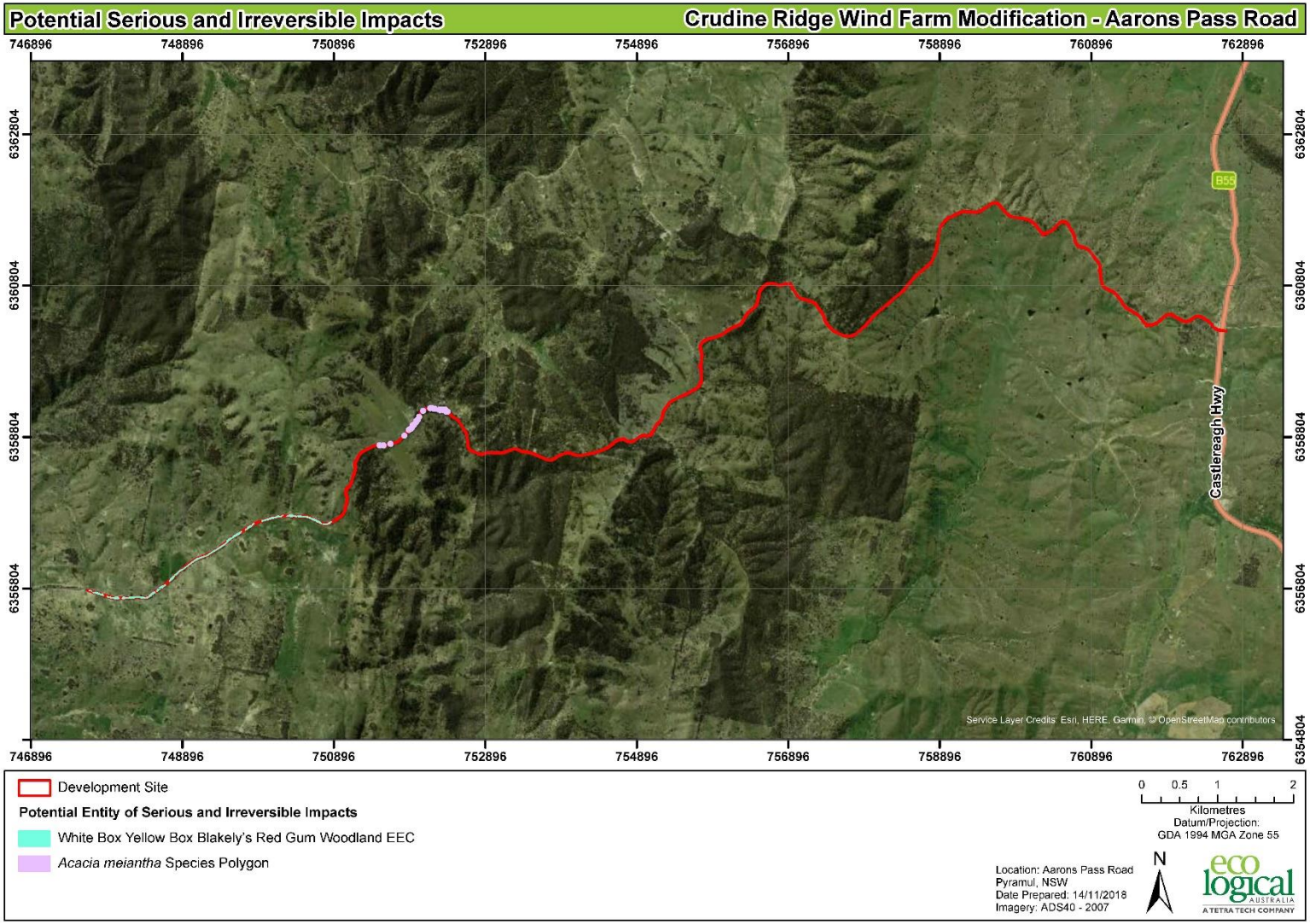

Figure 15: Serious and Irreversible Impacts

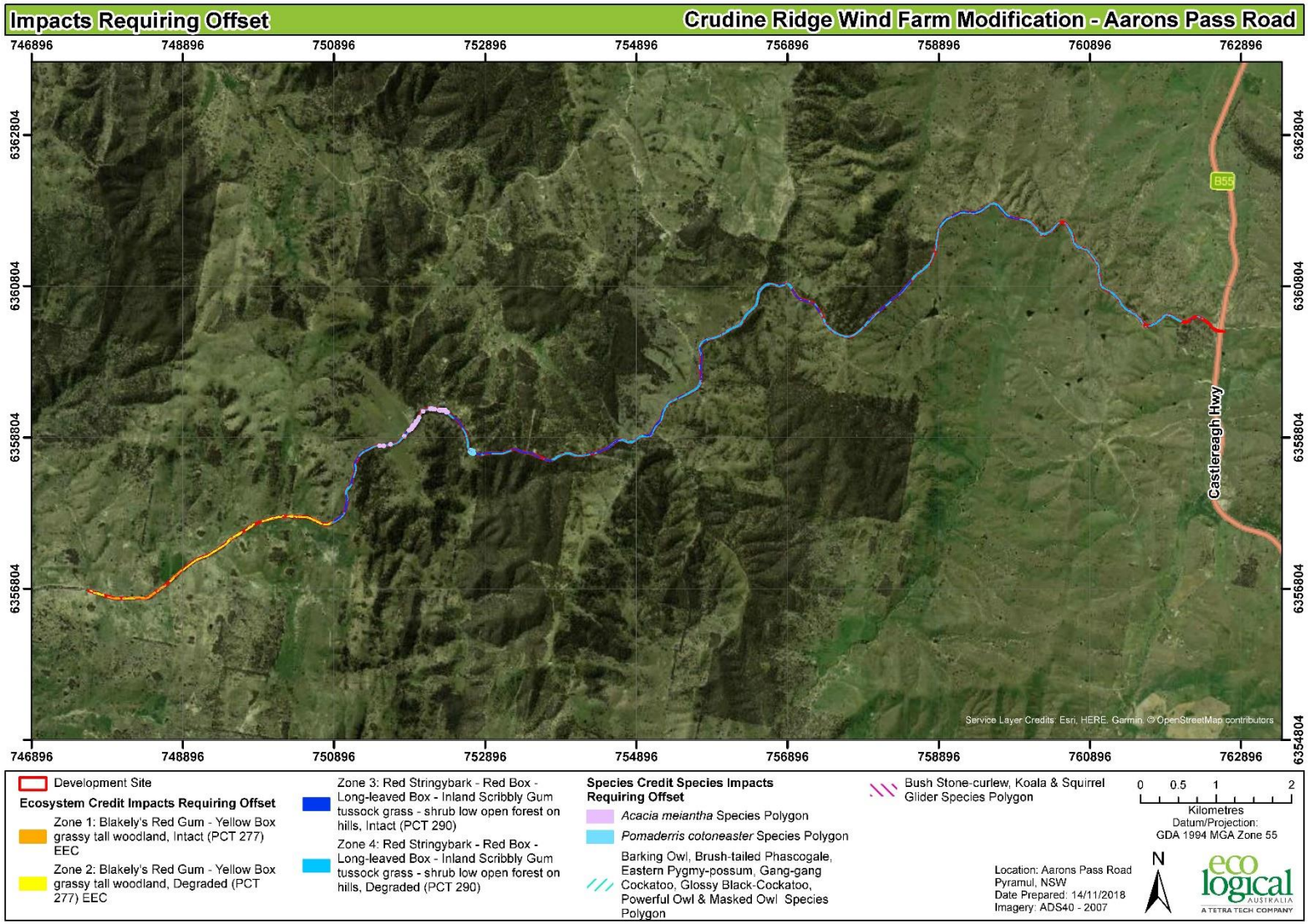

Figure 16: Impacts requiring offset

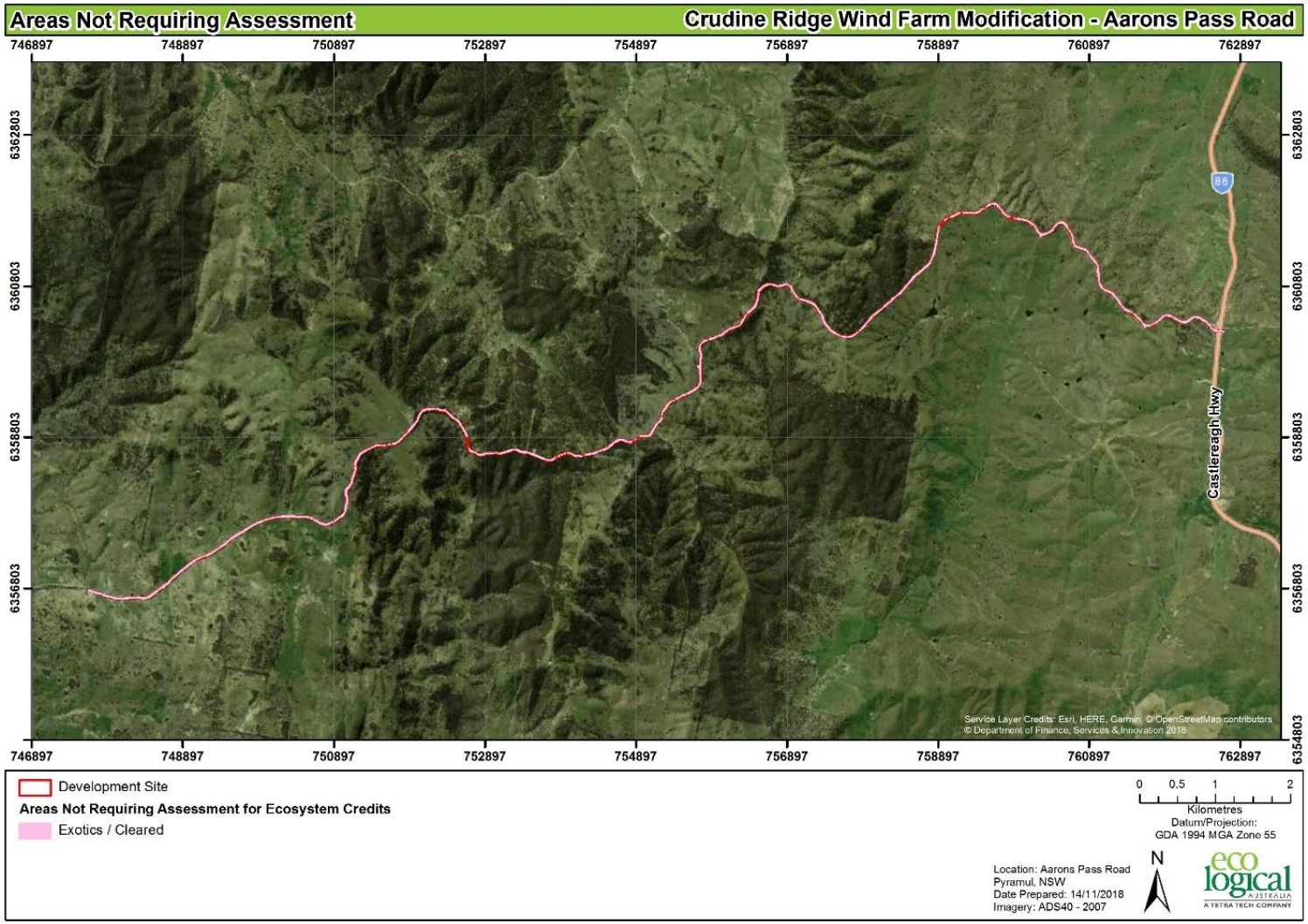

Figure 17: Areas not requiring assessment

2.5 Consistency with legislation and policy

Additional matters relating to impacts on flora and fauna which are not covered by the BC Act must also be addressed for the proposed development. Potential impacts on MNES in accordance with the EPBC Act and SEPP 44 Koala Habitat have been addressed below.

2.5.1 *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where MNES may be affected. Under the Act, any action which 'has, will have, or is likely to have a significant impact on a matter of MNES' is defined as a 'controlled action', and requires approval from the Commonwealth Department of the Environment (DotE), which is responsible for administering the EPBC Act (DotE 2013).

The process includes conducting an Assessment of Impact for listed threatened species and ecological communities that represent a MNES that will be impacted as a result of the proposed action. Significant impact guidelines (DotE 2013) that outline a number of criteria have been developed by the Commonwealth, to provide assistance in conducting the Assessment of Significance and help decide whether or not a referral to the Commonwealth is required.

Seven MNES were assessed under the EPBC Act:

1. White Box Yellow Box Blakely's Red Gum Grassy Woodland DNG – listed as critically endangered under the EPBC Act
2. *Acacia meiantha* - listed as endangered under the EPBC Act
3. *Pomaderris cotoneaster* - listed as endangered under the EPBC Act
4. Regent Honeyeater - listed as critically endangered under the EPBC Act
5. Painted Honeyeater - listed as Vulnerably under the EPBC Act
6. Swift Parrot - listed as critically endangered under the EPBC Act
7. Koala - listed as vulnerable under the EPBC Act

2.5.1.1 *White Box Yellow Box Blakely's Red Gum Grassy Woodland (WBYBBRG)*

An action is likely to have a significant impact on a critically endangered ecological community if there is a real chance of possibility that it will:

- **reduce the extent of an ecological community**

The proposal involves the removal of 0.32 ha of WBYBBRG along a 20 km stretch of Aaron's Pass Road. The extent of the CEEC will be reduced but this reduction is not considered significant given the extent of the community within the locality. The proposed disturbance of 0.32 ha by the development is able to be undertaken in compliance with the EPBC Approval (2011-6206) approval limit for TEC disturbance (3.28 ha) and is not considered to be in addition to that already approved.

- **fragment or increase fragmentation of an ecological community**

The proposed works will remove a maximum of 0.32 ha of vegetation which meets the listing criteria for this community. The disturbance area only forms a small part of a larger patch of the community and as such, the proposed development site will not permanently fragment the ecological community.

- **adversely affect habitat critical to the survival of an ecological community**

The small scale of temporary disturbance will not adversely affect habitat critical to the survival of this CEEC.

- **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**

Mitigation measures provided for the proposed road widening have specified construction of appropriate sediment controls. No groundwater or surface water is proposed to be extracted through implementation of the proposed road widening. As such, the proposed development site will not modify or destroy abiotic factors necessary for the survival of the CEEC.

- **cause a substantial change in the species composition of an occurrence of an ecological community; including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting**

The proposed development site will not cause substantial change to species composition of the CEEC due to the small scale of the proposed disturbance.

- **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**
  - **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**

Weed control mitigation and management measures have been included within the approved BMP for the Crudine Ridge Wind Farm. Weeds and exotic species will be management within the development site to avoid the spread of existing weeds and to management any incursions that may arise. Regular inspections form part of the management activities proposed for control of invasive species. These management measures will ensure that invasive species, should they occur, are adequately controlled.

There will be no materials or compounds used during the clearing of vegetation that will inhibit the ecological community. As such, the proposed development site will not cause a reduction in the quality or integrity of CEEC.

- **interfere with the recovery of an ecological community**

Due to the small scale of the disturbance, the proposed development site will not interfere with the recovery of the CEEC. In addition to this, the proposed disturbance of 0.32 ha of disturbance proposed by the development is able to be undertaken in compliance with the EPBC Approval (2011-6206) approval limit for TEC disturbance. Therefore, given the small area proposed to be disturbed and the ability to undertake the disturbance in compliance with current EPBC approvals for the Crudine Ridge Wind Farm, referral is not recommended.

2.5.1.2 *Acacia meiantha*

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:

- **lead to a long-term decrease in the size of a population**

The disturbance to approximately 59 *Acacia meiantha* individuals from the known population of 750-1,000 is not likely to lead to a long-term decrease in the size of the population. Long-term survival of the remaining individuals outside of the study area will continue unimpeded by the development and, over time, would be expected to compensate for the loss of any individuals from within the impact area.

- **reduce the area of occupancy of the species**

The proposed development will remove a small area of occupancy of *Acacia meiantha,* however, a larger area of occupancy will remain undisturbed and will be managed to support continuation of the remaining population. Areas of undisturbed potential habitat for this species will remain outside of the proposed development footprint.

- **fragment an existing population into two or more populations**

The existing road currently intersects the known population of *Acacia meiantha*, with individuals currently fragmented on either side of the road. The proposed road widening works will not further increase the likelihood of fragmentation of the existing population.

- **adversely affect habitat critical to the survival of a species**

Acacia meiantha occurs in a range of sclerophyll forest communities (OEH 2018). No critical habitat has been defined for this species (Department of the Environment and Energy [DotEE] 2018).

- **disrupt the breeding cycle of a population**

Removal of individual specimens can disrupt breeding cycles, however, processes critical to the species lifecycle, such as pollination and maintenance of genetic variability, will continue unimpeded in the remaining population given the small number of individuals to be impacted.

- **modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

Removal of potential habitat for this species will occur as a result of the development site. Areas of intact equivalent habitat will remain outside of the study area

- **result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat**

The development will be managed in accordance with the CRWF BMP to ensure that weeds and feral /invasive pest species are controlled. Weed management procedures will be undertaken in accordance with the BMP to identify the mitigation measures and monitoring requirements to ensure the spread of weeds is prevented and that incursions are adequately managed.

- **introduce disease that may cause the species to decline, or**

The development will be managed in accordance with the CRWF BMP to ensure that the spread of both soil and plant diseases are controlled. The remaining population of *Acacia meiantha* will be undisturbed

by the development, further preventing the introduction of disease. Equipment that is brought to site for use in the road construction works will be cleaned prior to site to ensure that spread of disease that may cause the species to decline is minimised.

- **interfere with the recovery of the species.**

Due to the small scale of the disturbance, the proposed development will not interfere with the recovery of *Acacia meiantha*.

2.5.1.3 *Pomaderris cotoneaster* (Cotoneaster Pomaderris)

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:

- **lead to a long-term decrease in the size of a population**

The potential disturbance to one individual Cotoneaster Pomaderris from the known population of 52 individuals is not likely to lead to a long-term decrease in the size of the population. The local population is potentially higher than this, given that this species is clonal and therefore a conservative approach has been used to estimate population size. Long-term survival of the remaining individuals will continue unimpeded by the development. Impacts to this individual will be avoided wherever possible or it will be translocated to a safe area. Three individuals are also within the blade swept path but these are below the 2 m height and therefore will not be removed, and only minimal pruning may be required.

- **reduce the area of occupancy of the species**

The proposed development will remove a small area of occupancy of Cotoneaster Pomaderris, however, a larger area of occupancy will remain undisturbed and will be managed to support continuation of the remaining population. Areas of undisturbed potential habitat for this species will remain outside of the proposed development footprint.

- **fragment an existing population into two or more populations**

The existing road currently intersects the known population of Cotoneaster Pomaderris, with individuals identified on either side of the road. The proposed road widening works will unlikely to further increase the fragmentation of the existing population.

- **adversely affect habitat critical to the survival of a species**

Cotoneaster Pomaderris occurs in a range of sclerophyll forest communities (OEH 2018). No critical habitat has been defined for this species (Department of the Environment and Energy [DotEE] 2018).

- **disrupt the breeding cycle of a population**

Removal of individual specimens can disrupt breeding cycles, however, processes critical to the species lifecycle, such as pollination and maintenance of genetic variability, will continue unimpeded in the remaining population given the one individual to be removed.

- **modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

Removal of potential habitat for this species will occur as a result of the development. Areas of intact equivalent habitat will remain, including that associated with all individuals which will remain undisturbed by the development site.

- **result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat**

The development site will be managed in accordance with the CRWF BMP to ensure that weeds and feral /invasive pest species are controlled. Weed management will be undertaken in accordance with the BMP to identify the mitigation measures and monitoring requirements to ensure the spread of weeds is prevented and that incursions are adequately managed.

- **introduce disease that may cause the species to decline,**

The development site will be managed in accordance with the CRWF BMP to ensure that the spread of both soil and plant diseases are controlled. The remaining population of Cotoneaster Pomaderris will be undisturbed by the development, further preventing the introduction of disease. Equipment that is brought to site for use in the road construction works will be cleaned prior to site to ensure that spread of disease that may cause the species to decline is minimised.

- **interfere with the recovery of the species.**

Cotoneaster Pomaderris has been assigned to the Site-managed species management stream under the OEH *Saving our Species* program.

2.5.1.4 *Anthochaera Phrygia (*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:

- **lead to a long-term decrease in the size of a population**

The proposed road widening will only remove a small area (5.05 ha) of potential habitat comprising woodland. Given this, and the large area of alternate habitat surrounding the study area and the high mobility of the species, the proposed works are unlikely to lead to a long-term decrease in the size of an important population of the species.

- **reduce the area of occupancy of the species**

The proposed works will remove a small area of occupancy of the species and a larger area of potential habitat will remain undisturbed and will be managed to support continuation of potential remaining populations. Areas of undisturbed potential habitat for this species will remain outside of the proposed works footprint.

- **fragment an existing population into two or more populations**

The proposed road widening works will not increase fragmentation of the existing population given that the species is highly mobile.

- **adversely affect habitat critical to the survival of a species**

Review of the Department of the Environment and Energy Species Profile and Threats Database showed that critical habitat registered for this species is any breeding or foraging habitat in areas where the

species is likely to occur. Key areas in NSW are Mudgee-Wollar and the Capertee Valley, Bundarra-Barraba, Pilliga Woodlands and the Hunter Valley areas.

- **disrupt the breeding cycle of a population**

Due to the species being highly mobile it is unlikely to that disturbance to foraging habitat will disrupt the breeding cycle of an important population.

- **modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The road widening will impact upon only a small area of potential foraging habitat for this species. Due to the species being highly mobile it is unlikely the clearing will modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Areas of intact equivalent habitat will remain outside of the study area, undisturbed by the development site.

- **result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat**

The road widening will not result in invasive species that are harmful to a vulnerable species becoming established in the species' habitat.

- **introduce disease that may cause the species to decline, or**

The road widening will not introduce disease that may cause the species to decline or interfere substantially with the recovery of the species.

- **interfere with the recovery of the species.**

The long term objectives of the Regent Honeyeater Recovery Plan were to: ensure that the species persists in the wild; to achieve a down-listing from nationally endangered to vulnerable by stabilising the population decline and securing habitat extent and quality in the main areas of occupancy, and, to achieve increasing reporting rates (5% per annum) in areas previously used regularly. As no records of this species have been made within the clearing area, and limited suitable habitat is going to be removed, no impact is expected on any individuals or populations of Regent Honeyeater. It is therefore believed that the action proposed remains consistent with the objectives of the recovery plan for this species.

2.5.1.5 *Lathamus discolour (Swift Parrot)*

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:

- **lead to a long-term decrease in the size of a population**

The proposed road widening will only remove a small area (5.05 ha) of potential habitat comprising woodland. Given this, and the large area of alternate habitat surrounding the study area and the high mobility of the species, the proposed works are unlikely to lead to a long-term decrease in the size of an important population of the species.

- **reduce the area of occupancy of the species**

The proposed works will remove a small area of occupancy of the species and a larger area of occupancy will remain undisturbed and will be managed to support continuation of the remaining population. Areas of undisturbed potential habitat for this species will remain outside of the proposed works footprint.

- **fragment an existing population into two or more populations**

The proposed road widening works will not increase fragmentation of the existing population given that the species is highly mobile.

- **adversely affect habitat critical to the survival of a species**

No critical habitat has been defined for this species.

- **disrupt the breeding cycle of a population**

Due to the species being highly mobile it is unlikely to that disturbance to foraging habitat will disrupt the breeding cycle of an important population. In addition, this species breeds in Tasmania therefore the proposed development will not impact upon the breeding cycle for this species.

- **modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The road widening will impact upon only a small area of potential foraging habitat for this species. Due to the species being highly mobile it is unlikely the clearing will modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Areas of intact equivalent habitat will remain outside of the study area, undisturbed by the development site.

- **result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat**

The road widening will not result in invasive species that are harmful to a vulnerable species becoming established in the species' habitat.

- **introduce disease that may cause the species to decline, or**

The road widening will not introduce disease that may cause the species to decline or interfere substantially with the recovery of the species.

- **interfere with the recovery of the species.**

The overall objectives of the Swift Parrot Recovery Plan were to: prevent further decline of the Swift Parrot population; and achieve a demonstrable sustained improvement in the quality and quantity of Swift Parrot habitat to increase carrying capacity. As no records of this species have been made within the clearing area, and a limited area of suitable is not going to be removed, no impact is expected on any individuals or populations of Swift Parrot. It is therefore believed that the action proposed remains consistent with the objectives of the recovery plan for this species.

2.5.1.6 *Grantiella picta (*Painted Honeyeater*)*

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- **substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species**

The proposed road widening will result in the removal of 5.05 ha of woodland, which represent potential foraging habitat for this species. Given the highly mobile nature of this species and the availability of alternate habitat outside of the study area within the locality, the proposed works do not have the potential to modify, destroy or isolate an area of important habitat for this species.

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

No harmful invasive species are expected to become established in areas of potential habitat for this species as a result of the proposed works. Weed, sediment and erosion controls will be in place during the proposed works to mitigate the potential spread and/or introduction of invasive species.

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

The proposed road widening will not impact upon breeding habitat for this species, and the potential foraging habitat which occurs in the study area would form at most a fraction of the species' range within the locality. Given this, the proposed clearing of vegetation is unlikely to seriously disrupt the lifecycle of any proportion of the species.

2.5.2 SEPP 44 Koala habitat Assessment

The proposed road upgrade was assessed against the SEPP 44. MWRC is listed as one of the Councils to which SEPP 44 applies.

Under SEPP 44, there are two categories of koala habitat:

- Core Koala habitat, meaning an area with a resident population of koalas, evidenced by attributes such as breeding females, recent sightings and historical records. The impact area is not considered Core koala habitat as:
  - No koalas were identified during previous field survey effort (ELA 2011). There are only five (5) isolated historical records of koalas within a 10 km boundary of the road, dating from between 1980 to 2011.
- Potential Koala habitat, meaning areas of native vegetation where the key koala feed trees of the types listed in Schedule 2 of SEPP 44 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component. The impact area is not considered Potential koala habitat as:
  - The only key koala feed trees of the types listed in Schedule 2 identified in the impact area were three (3) White Box. These trees were found within a patch of vegetation comprising

in excess of 100 trees, therefore, they did not constitute 15% of the total number of trees in the upper or lower strata of the tree component.

As the categories of koala habitat scheduled in SEPP 44 do not apply, a koala management plan will not be required for the development site. The koala is considered as a species with the potential to occur in the impact area, in low numbers.

The development site has been further assessed using the 'EPBC Act referral guidelines for the vulnerable Koala' (Department of the Environment [DoE], 2014). A decision as to whether a proposed action will have or is likely to have a significant impact on the koala is made using two key considerations outlined in the EPBC guidelines:

- Adversely affecting habitat critical to the survival of the koala and/or
- Interfering substantially with the recovery of the koala through the introduction or exacerbation of key threats in areas of habitat critical to the survival of the koala (section 8).

Habitat destruction is recognised as the primary adverse effect on habitat critical to the survival of the koala. Whether or not there are other impacts, the loss of habitat critical to the survival of the koala can be sufficient to trigger a significant impact. Application of the koala habitat assessment tool from the proposed impact area was undertaken, resulting in a score of 5/10. A score of five or greater means that an assessment of significance is required.

In summary, the assessment score can be attributed to the following key factors:

- Low numbers of preferred feed trees within the footprint clearing will not present a significant impact to the overall habitat quality of the surrounding environment.
- The BMP reduces risk of harming koalas by conducting inspections prior to felling. In the event that habitat features or protected species are present tree felling is to be conducted under the supervision of a qualified ecologist.
- Fragmentation and isolation of populations will not occur as a result of this action due to the narrow width of areas to be cleared.
- The potential for impacts from the clearing of woodland vegetation to substantially interfere with the recovery of the koala have been assessed as follows.
- Increasing koala fatalities in habitat critical to the survival of the koala due to dog attacks to a level that is likely to result in multiple, ongoing mortalities.
- The project will not result in the introduction of domestic dogs to the area. Wild dogs are present in the region. Although not directly related to the application, Local Land Services recently completed their 2018 autumn wild dog baiting in the region, further reducing the chance of dog attacks.
- Increasing koala fatalities in habitat critical to the survival of the koala due to vehicle-strikes to a level that is likely to result in multiple, ongoing mortalities.
- Koala fatalities will not be increased due to the absence of a permanent koala population. Vehicle movements will increase during the construction of the CRWF, however, increases to permanent traffic volumes are not expected to increase significantly throughout the life of the

project. The approved TMP and BMP for the CRWF includes detail on speed limit restrictions to reduce fauna strike.

- Facilitating the introduction or spread of disease or pathogens for example Chlamydia or *Phytophthora cinnamomi*, to habitat critical to the survival of the koala, that are likely to significantly reduce the reproductive output of koalas or reduce the carrying capacity of the habitat.
- The increased risk of disease introduction is minimal due to the existing use of the study area as a road open to public traffic movements. The approved BMP details recommended vehicle washdown and hygiene measures to prevent the spread of pathogens.
- Creating a barrier to movement to, between or within habitat critical to the survival of the koala that is likely to result in a long-term reduction in genetic fitness or access to habitat critical to the survival of the koala.
- The road upgrade will follow the existing road and will not result in the creation of any additional barriers to movement.
- Changing hydrology which degrades habitat critical to the survival of the koala to the extent that the carrying capacity of the habitat is reduced in the long-term.
- The road upgrade will follow the existing road and will not result in the creation of any significant long term changes to hydrology.

The koala is considered as a species with the potential to occur in the impact area, in low numbers. The above assessment has concluded that impacts to koala from the proposed road upgrade will not be significant, therefore, no further assessment under the EPBC Act has been undertaken.

3. Conclusion

This BDAR has been prepared to meet the requirements of the BAM established under Section 6.7 of the BC Act. This BDAR considers 5.05 ha of disturbance for a proposed upgrade to Aarons Pass Road and has considered total removal of the vegetation within three categories of disturbance proposed (permanent clearing, temporary disturbance and the blade swept path). The 5.05 ha assessed in the BDAR was assigned to two (2) Plant Community Types (PCT):

1. PCT 277 - Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (0.67 ha)
2. PCT 290 - Red Stringybark – Red Box – Long-leaved Box – Inland Scribbly Gum tussock grass shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion (4.38 ha).

The entire area of PCT 277 (0.67 ha) meets the criteria for EEC listed under the BC Act, with smaller patches totaling 0.32 ha meeting the CEEC listing criteria under the EPBC Act:

- White Box Yellow Box Blakely's Red Gum Woodland (listed as EEC under the BC Act)
- White Box Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (listed as CEEC under the EPBC Act).

Nine threatened flora species were identified from the data audit as known, likely or having the potential to occur within the development site area, with two (2) of these identified and confirmed during the field survey. *Acacia meiantha*, listed as Endangered under both the BC Act and EPBC Act was identified, along with *Pomaderris cotoneaster* (Cotoneaster Pomaderris), which is also listed as Endangered under the BC Act and EPBC Act. Fifty-nine individual *A. meiantha* have been identified for removal within the development site. One *Pomaderris cotoneaster* has been identified for removal within the development site.

Thirty-one threatened fauna species were identified from the data audit as known, likely or having the potential to occur within the development site area, with three of these identified and confirmed during the field survey. *Artamus cyanopterus cyanopterus* (Dusky Woodswallow), *Daphoenositta chrysoptera* (Varied Sittella) and *Petroica boodang* (Scarlet Robin) were identified, all are listed as Vulnerable under the BC Act and identified as ecosystem credit species within the BAMC. Threatened fauna habitat was assessed, comprising mainly 150 individual hollow-bearing trees to be removed within the development site. Ten threatened species credit species were identified from the BAMC, seven were surveyed in December – January 2018/19, (Bush stone curlew, Gang-gang Cockatoo, Eastern Pygmy Possum, Squirrel Glider, Brush tailed Phascogale, Barking Owl, and Koala) whilst three species (Glossy Black-Cockatoo, Powerful Owl, Masked Owl) were assumed to be present. Koala scratches and possible scats, together with recent records indicate that they are likely to be present and have the potential to be impacted by the development.

Serious and Irreversible Impacts (SAII) values have been considered as part of this assessment. These values include '*White Box Yellow Box Blakely's Red Gum Woodland*' and the threatened flora species *Acacia meiantha* which is also listed as candidate SAII. A threshold of 0 is assumed and therefore it is

possible that SAII could occur given the small and isolated populations of this species. Subject to the outcomes of the detailed design process, and the implementation of avoidance measures adopted within, including trimming and translocation, serious impacts are unlikely.

For vegetation zone 1 – PCT 277 Intact, the BAM Credit Calculator (BAMC) generated a vegetation integrity score of 56.5. Nine ecosystem credits are required to offset the removal of 0.32 ha for vegetation zone 1. For vegetation zone 2 – PCT 277 Degraded, the BAMC generated a vegetation integrity score of 40.4. Seven ecosystem credits are required to offset the removal of 0.4 ha for vegetation zone 2). For vegetation zone 3 – PCT 290 Intact, the BAMC generated a vegetation integrity score of 69.3. 47 ecosystem credits are required to offset the removal of 1.6 ha of vegetation zone 3. For vegetation zone 4 – PCT 290 Degraded, the BAMC generated a vegetation integrity score of 61. 76 ecosystem credits are required to offset the removal of 2.8 ha for vegetation zone 4. Additionally, a total of five species credits are required to offset the impact on *Acacia meiantha*, and no species credits are required to offset the impact on *Pomaderris cotoneaster*. Fauna surveys were conducted in December 2018 – January 2019. Of the 10 species credit species identified, one species is likely to occur (Koala) with an additional three (3) species of fauna were presumed to be present (Glossy Black-Cockatoo, Powerful Owl, and Masked Owl) due to the presence of suitable habitat on site. 156 species credits are required to offset Koala and 154 species credits each are required to offset the impacts on Glossy Black-Cockatoo, Powerful Owl, and Masked Owl.

An assessment of the Commonwealth Significant Impact Criteria (Commonwealth of Australia 2013) was applied to one threatened community (White Box Yellow Box Blakely's Red Gum Grassy Woodland) and six threatened species listed under the EPBC Act, including one mammal, *Phascolarctos cinereus* (Koala), four bird species, *Anthochaera phrygia* (Regent Honeyeater), *Grantiella picta* (Painted Honeyeater), *Lathamus discolor* (Swift Parrot) and two (2) endangered flora species, *Pomaderris cotoneaster* and *Acacia meiantha*. The assessment concluded that the project would not have a significant impact on the above-mentioned species.

All impacts to MNES and BC Act listed entities have been avoided as far as practicable and all impacts have been assessed in accordance with Commonwealth guidelines. Mitigation strategies have been put into place to manage potential impacts to MNES and BC Act listed entities. The development footprint has been modified, reduced and access routes have been altered to avoid impacts to EEC, CEEC and critical habitat for listed species. Additionally, the removal of vegetation will be avoided where possible by vegetation trimming rather than removal wherever possible.

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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).
Mitchell landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.

Terminology	Definition
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
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.

Terminology	Definition
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.
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 B.1: Species matrix (species recorded by plot)

Scientific Name	Exotic	Form	Cover (%) Plot 1	Cover (%) Plot 2	Cover (%) Plot 3	Cover (%) Plot 4	Cover (%) Plot 5
Acacia buxifolia		SG			0.1	0.2	
Acacia dealbata		TG	1	4	0.1		0.2
Acacia decora		SG					
Acacia implexa		SG			0.1	0.1	0.5
Alternanthera spp.		FG				0.1	
Amyema spp.		OG	0.1			0.1	
Anagallis arvensis	*	FG	0.1	0.1			
Aristida ramosa		GG	0.1		0.1		
Asperula conferta		FG	0.1	0.1			0.1
Austrostipa scabra		GG	1				
Austrostipa scabra		GG					
Bothriochloa macra		GG	0.1				
Brachychiton populneus subsp. populneus		TG	0.1				
Bromus diandrus	*	GG	0.8				
Bromus hordeaceus	*	GG		0.2			
Bulbine bulbosa		FG					0.1
Bursaria spinosa		SG					0.1
Cassinia arcuata		SG	0.5	1	0.1		
Cassinia quinquefaria		SG				0.1	0.3
Chrysanthemum spp.	*	FG					0.1
Chrysocephalum apiculatum		FG				0.2	0.1
Cirsium vulgare	*	FG	0.1	0.5			
Cynoglossum australe		FG	0.1	0.1			
Dianella revoluta		FG	0.1		0.2	2	0.1
Dichelachne spp.		GG			0.1		0.1
Diuris spp.		FG			0.1	0.1	
Echium plantagineum	*	FG		0.2			
Einadia hastata		FG	0.1				
Einadia nutans		FG	0.1				

Scientific Name	Exotic	Form	Cover (%) Plot 1	Cover (%) Plot 2	Cover (%) Plot 3	Cover (%) Plot 4	Cover (%) Plot 5
Eragrostis spp.	*	GG		0.8			
Eucalyptus blakelyi		TG	10	0.8			
Eucalyptus bridgesiana		TG		2			
Eucalyptus globoidea		TG			25	20	5
Eucalyptus macrorhyncha		TG	1				
Eucalyptus melliodora		TG	10	2			
Eucalyptus polyanthemos		TG			2	2	
Eucalyptus rossii		TG			2	15	20
Geranium solanderi		FG	0.1			0.1	0.1
Glycine tabacina		OG			0.1	0.1	
Goodenia hederacea		FG			0.1	0.2	0.1
Hardenbergia violacea		OG			0.1	0.1	0.2
Hibbertia obtusifolia		SG			0.1	0.2	0.1
Hibbertia spp.		SG				0.1	
Hydrocotyle laxiflora		FG	0,1			0.1	
Hypericum perforatum	*	FG	0.1	0.1			
Hypochaeris radicata	*	FG	0.1	2			0.1
Lepidosperma spp.		GG				0.1	
Lissanthe strigosa		SG	0.1				
Lolium rigidum	*	GG	7	5			0.5
Lomandra confertifolia		GG	0.1				
Lomandra filiformis		GG			0.1	0.1	0.1
Lomandra glauca		GG			0.1		
Lomandra multiflora		GG	0.5		0.2	0.1	0.1
Melicytus dentatus		SG	2	0.2			0.1
Modiola caroliniana	*	FG					0.1
Olearia viscidula		SG					
Oxalis perennans		FG		0.1			
Oxalis spp.		FG					0.1
Ozothamnus spp.		SG			0.1	0.5	0.1
Persoonia linearis		SG			0.5	0.4	
Phalaris aquatica	*	GG	5	20			5
Plantago lanceolata	*	FG	0.1	10			1
Poa sieberiana		GG	0.1		0.5		
Podolobium ilicifolium		SG			0.2	0.5	

Scientific Name	Exotic	Form	Cover (%) Plot 1	Cover (%) Plot 2	Cover (%) Plot 3	Cover (%) Plot 4	Cover (%) Plot 5
Pultenaea microphylla		SG				0.2	0.1
Pultenaea microphylla		SG			0.1		
Pultenaea spp.		SG			0.1		
Rapistrum spp.	*	FG					0.1
Rubus spp.	*	SG	0.1	0.1			1
Rumex brownii		FG	0.1				
Rytidosperma caespitosum		GG			0.1		
Rytidosperma pallidium		GG			0.2	10	0.5
Rytidosperma spp.		GG	0.5			0.5	0.1
Senecio quadridentatus		FG	0.2	0.2	0.1		0.1
Solanum nigrum	*	SG					0.1
Sonchus spp.	*	FG	0.1	0.1			
Sonchus spp.	*	FG					0.1
Stypandra glauca		FG				0.1	
Styphelia triflora		SG					0.3
Taraxacum officinale	*	FG	0.5	2			
Themeda triandra		GG	0.1	0.5			
Trifolium campestre	*	FG	0.1	5			
Trifolium spp.	*	FG	0.1	0.1			
Uknownn	*	FG		0.7			
Veronica plebeia		FG	0.1			0.1	
Vicia spp.	*	FG		0.2			1
Vulpia bromoides	*	GG	0.1				
Wahlenbergia spp.		FG	0.1	0.1		0.1	0.1

Tree (TG), Shrub (SG), Grass & Grasslike (GG), Forb (FG), Fern (EG), Other (OG). Plot 1 and 2 were located in PCT 277 and plots 3-5 were located in PCT 290.

Table B.2 Vegetation integrity data (Composition, Structure and Function)

Plot location data						
Plot no.	**PCT**	**Vegetation Zone**	**Condition**	**Eastings**	**Northings**	**Bearing**
1	277	1	Intact	748377	6356687	80
2	277	2	Degraded	749953	6357700	60
3	290	2	Degraded	757954	6360280	50
4	290	1	Intact	785310	6360650	210
5	290	2	Degraded	759970	6361688	290

Composition (number of species)						
Plot no.	Tree	Shrub	Grass	Forb	Fern	Other
1	5	4	7	10	0	1
2	4	3	2	5	0	0
3	4	9	5	4	0	0
4	4	9	3	10	0	3
5	3	9	3	9	0	0

Structure (Total cover)						
Plot no.	Tree	Shrub	Grass	Forb	Fern	Other
1	22	3	2	1	0	0
2	9	1	1	1	0	0
3	29	1	1	1	0	0
4	37	2	1	3	0	0
5	25	3	0	1	0	0

Function											
Plot no.	Large Trees	Hollow trees	Litter Cover	Length Fallen Logs	Tree Stem 5- 9	Tree Stem 10-1 9	Tree Stem 20-2 9	Tree Stem 30-49	Tree Stem 50-79	Tree Regen	High Threat Weed Cover
1	26	6	64	72	1	1	1	1	1	1	1
2	5	0	13.2	35	1	1	1	1	1	1	0
3	7	3	99	110	1	1	1	1	1	1	0
4	10	3	62	96	1	1	1	1	1	1	0
5	9	3	75	105	1	1	1	1	1	1	0

Appendix C: Biodiversity credit report

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00013288//19/00013289	Aarons Pass Road Modification -SSD_6697 Mod	04/01/2019
Assessor Name	Report Created	BAM Data version *
Cheryl O'Dwyer	13/02/2019	6
Assessor Number	* 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.	
BAAS18153		

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

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Candidate SAII	Ecosystem credits
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion								
1	277_Intact	56.5	0.3	0.25	High Sensitivity to Potential Gain	2.00	TRUE	9
2	277_Degraded	40.4	0.4	0.25	High Sensitivity to Potential Gain	2.00	TRUE	7
							Subtotal	**16**

Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion								
3	290_Intact	69.3	1.6	0.25	High Sensitivity to Potential Gain	1.75		47
4	290_Degraded	61.0	2.8	0.25	High Sensitivity to Potential Gain	1.75		76
							Subtotal	**123**
							Total	**139**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Candidate SAII	Species credits
Acacia meiantha / Acacia meiantha (Flora)						
290_Intact	69.3	0.1	0.25	3	True	5
					Subtotal	**5**
Calyptorhynchus lathami / Glossy Black-Cockatoo (Fauna)						
277_Intact	56.5	0.32	0.25	2	N/A	9
277_Degraded	40.4	0.27	0.25	2	N/A	5
290_Intact	69.3	1.55	0.25	2	N/A	54
290_Degraded	61.0	2.83	0.25	2	N/A	86
					Subtotal	**154**

Ninox strenua / Powerful Owl (Fauna)						
277_Intact	56.5	0.32	0.25	2	N/A	9
277_Degraded	40.4	0.26	0.25	2	N/A	5
290_Intact	69.3	1.55	0.25	2	N/A	54
290_Degraded	61.0	2.83	0.25	2	N/A	86
					Subtotal	**154**
Phascolarctos cinereus / Koala (Fauna)						
277_Intact	56.5	0.32	0.25	2	N/A	9
277_Degraded	40.4	0.35	0.25	2	N/A	7
290_Intact	69.3	1.55	0.25	2	N/A	54
290_Degraded	61.0	2.83	0.25	2	N/A	86
					Subtotal	**156**
Pomaderris cotoneaster / Cotoneaster Pomaderris (Flora)						
290_Intact	69.3	0.01	0.25	2	False	0
					Subtotal	**0**
Tyto novaehollandiae / Masked Owl (Fauna)						
277_Intact	56.5	0.32	0.25	2	N/A	9
277_Degraded	40.4	0.26	0.25	2	N/A	5

290_Intact	69.3	1.55	0.25	2	N/A	54
290_Degraded	61.0	2.82	0.25	2	N/A	86
					Subtotal	**154**