

# Uungula Wind Farm

## Appendix B

Eco Logical Australia:  
**Biodiversity**

November 2020

2 November 2020

Our ref: 20MUD/16397

CWP Renewables Pty Ltd  
PO Box 1708  
Newcastle NSW 2300

Attention: Matthew Flower

Dear Matthew,

**RE: Uungula Wind Farm EIS – Response to Submissions – Biodiversity**

ELA has undertaken a review of the key submissions received on the Uungula Wind Farm Environmental Impact Statement that specifically relate to the biodiversity assessment. These include:

- The Biodiversity Conservation Division comments
- The combined public submissions.

Most of the content of the submissions is addressed in an updated Biodiversity Assessment Report (BAR) and associated mapping, and an updated Assessment of Significance for Commonwealth Matters.

This key themes of the submissions addressed are:

- Vegetation mapping and detailed justification of PCT selection
- Threatened Ecological Community mapping and quantification of upper limit of disturbance
- Update to threatened species impacts
- Impacts to birds and bats.

A short summary of the responses is included below. An assessment of the likelihood of impacts to birds and bats, the updated Assessments of Significance for Commonwealth Matters, and the updated BAR and mapping are included as attachments to this memo.

Regards,



Kalya Abbey  
Senior Environmental Consultant



## 1. Native vegetation

BCD submission	Public submission	Relevant updated section of BAR
<ul style="list-style-type: none"> <li>• Justify PCT selection</li> <li>• Comparison of vegetation zones against PCT</li> <li>• Description of differences between condition types of PCT</li> <li>• Comparison of PCTs against TEC</li> <li>• Detailed mapping, finer scale, showing: <ul style="list-style-type: none"> <li>○ PCTs</li> <li>○ TECs</li> <li>○ Veg zones</li> <li>○ Plot locations</li> <li>○ Species polygons</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Detailed, finer scale vegetation mapping</li> <li>• Additional contemporary plots</li> </ul>	<ul style="list-style-type: none"> <li>• Section 3.4 details the justification for selection of vegetation communities, and description of condition states for each Vegetation Zone. Assessment for TECs is enhanced.</li> <li>• Appendix A - Map book created, series of maps in fine detail showing Vegetation Zones, BVTs, Plots and TEC</li> <li>• Additional plots completed along Twelve Mile Road</li> </ul>

The BAR has been updated to provide great detail on the vegetation assessment and mapping for the Study Area, clipped to the current Development Footprint. Descriptions of each vegetation community, mapped to BioMetric Vegetation Type (BVT), has been enhanced. Further detail is provided on the assessment against Threatened Ecological Community listing advice for both NSW and Commonwealth communities.

Detailed map books have been prepared for the Development Corridor and are included in Appendix A of the revised BAR.

## 2. Threatened Ecological Communities

BCD submission	Public submission	Relevant updated section of BAR
<ul style="list-style-type: none"> <li>• Quantify EEC/CEEC upper limit</li> <li>• Calculate credits</li> </ul>	<ul style="list-style-type: none"> <li>• Justification to exclude CW112 moderate/good_poor and CW211 Moderate/good_poor as EEC</li> <li>• Further assessment on the significance of impact to the CEEC</li> </ul>	<ul style="list-style-type: none"> <li>• Sections 3.3 and 3.4 include vegetation zone descriptions and justification for inclusion or exclusion of CEEC.</li> <li>• Section 8.1 calculates credits for all CEEC in the Development Corridor as a worst case scenario</li> <li>• Appendix A - Map book created, series of maps in fine detail showing Vegetation Zones and TEC in detail</li> </ul>

The BAR has been revised to provide further justification on the selection of vegetation types and assessment against Threatened Ecological Community listing advice for both NSW and Commonwealth

communities. Detailed map books have been prepared for the Development Corridor and are included in Appendix A of the revised BAR.

The Development Footprint has undergone further adjustments and is considered to provide a maximum impact scenario. Infrastructure has been buffered and the actual area of disturbance is expected to be reduced based on the final design and construction. Credits have been calculated on the current Disturbance Footprint accordingly.

The Assessment of Significance of impact in accordance with the Commonwealth Guidelines, originally included in Appendix H of the EIS, have been updated for the CEEC to provide further detail and consideration of mitigation and controls to reduce impacts. The updated assessments of significance are included as an ATTACHMENT to this memo.

### 3. Threatened species

BCD submission	Public submissions	Relevant updated section of BAR
<ul style="list-style-type: none"> <li>• Brush-tailed Rock Wallaby – provide further justification to confirm absence based on habitat</li> <li>• Eastern pygmy possum – identify habitat and calculate credits. Design appropriate survey method and complete to confirm credits prior to commencement of construction.</li> <li>• Regent Honeyeater – obtain expert report.</li> <li>• Calculate upper limit credits for threatened species.</li> </ul>	<ul style="list-style-type: none"> <li>• 20km buffer instead of 10km for database searches</li> <li>• Justification for use of old data</li> <li>• Threatened flora survey - seasonally appropriate surveys, qualified ecologists.               <ul style="list-style-type: none"> <li>○ Swainsona sp</li> <li>○ Zieria obcordata</li> <li>○ Diuris tricolor</li> </ul> </li> <li>• Threatened fauna:               <ul style="list-style-type: none"> <li>○ Bird survey and microbat survey specifics</li> <li>○ Impacts to the following species:                   <ul style="list-style-type: none"> <li>- Booroolong frog</li> <li>- Brush-tailed Rock-wallaby</li> <li>- Eastern Pygmy-possum</li> <li>- Regent Honeyeater</li> <li>- Superb parrot</li> <li>- Quoll</li> <li>- Glossy black cockatoos</li> <li>- Bush Stone-curlew</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Section 4 of the BAR has been updated to include further assessment and justification for the inclusion or exclusion of threatened species.</li> <li>• Section 6 has been updated to provide further assessment of specific species.</li> <li>• An expert report has been prepared for Regent Honeyeater and is included as an attachment to the BAR.</li> <li>• Section 7 has been updated for Commonwealth species, and the Assessment of Significance updated and included as an Attachment.</li> <li>• Candidate species credit species have been refined, species polygons updated and credits for upper limit impacts calculated in Section 8.</li> <li>• Further impacts to birds and bats are addressed in Section 4 (below) of this Response to Submissions memo.</li> </ul>

#### 3.1 Database results

The database review has been conducted on a 20km radius and the likelihood of occurrence for threatened species is based on these results. However, due to the size and extent of the Study Area,

only the 10km buffer is shown in the BAR mapping. Whilst there is an increase in the number of records, there are no further species in the 20km radius that don't occur in the 10km radius.

### 3.2 Threatened flora

There are no threatened flora records within the Study Area, and none were identified in the field surveys. Targeted flora surveys were undertaken by ERM in the 2013 EIA, and vegetation validation surveys undertaken in optimal survey time periods (September 2018) by ELA experienced ecologists, although it is acknowledged the ELA surveys were not undertaken in accordance with any guideline methods.

Further field survey for habitat assessment was undertaken by ELA in July 2020. Whilst this is outside the survey period for the target flora species (specifically *Swainsona sp.*), it is noted that these species were in flower and readily identifiable at numerous reference sites in the region from April 2020 through to spring, due to above average rainfall. They were not identified in the Study Area.

Nonetheless, four (4) threatened flora candidate species are identified as having the potential to occur in the Development Corridor based on the associated vegetation, presence of suitable habitat and nearby previous records:

- *Dichanthium setosum* (Bluegrass)
- *Swainsona sericea* (Silky Swainson-pea)
- *Swainsona recta* (Small Purple-pea)
- *Zieria obcordata*.

The calculation of species credits for threatened flora requires determination of the number of individuals to be impacted. As no records exist, this has not been undertaken. The Proponent will commit to undertaking pre-clearing surveys in areas of suitable habitat in suitable seasonal conditions in an effort to identify any previously unrecorded individuals. The seasonal conditions experienced in 2020, particular higher rainfall, are expected to provide optimal opportunity to identify threatened flora species.

Design considerations and micro-siting of infrastructure will be employed to avoid any impact to previously unrecorded threatened flora species.

#### 3.2.1 *Zieria obcordata*

Section 6.3 of the BAR has been updated to specifically assess the potential impacts to this species.

### 3.3 Threatened fauna

Impacts to threatened fauna have been reviewed in Section 4 of the BAR. Further detail of the survey methods and findings have been included. Specifically, candidate species credit species have been refined, species polygons updated and credits for upper limit impacts calculated in Section 8.

Impacts to Commonwealth species have been reviewed and the list of species updated in Section 7 of the BAR. The Assessments of Significance included as an appendix to the EIS have been updated, and are Attached.

## 4. Impacts to birds and bats

BCD submission	Public submission	Relevant section of BAR
<ul style="list-style-type: none"> <li>Assess impacts of birds and bats - commitment to Bird and Bat Adaptive Management Plan (BBAMP)</li> <li>Species potentially affected</li> <li>Cumulative impacts from surrounding wind farms</li> </ul>	<ul style="list-style-type: none"> <li>Impact to Superb Parrot from blade strike</li> </ul>	<ul style="list-style-type: none"> <li>Section 4 of the BAR has been updated to include further assessment and justification for the inclusion or exclusion of threatened species.</li> <li>Sections 6 and 7 of the BAR have been updated to further address impacts to populations of specific birds and bats.</li> <li>The development of the BBAMP has progressed, including a literature review and development of appropriate methodology. This is included below and will be incorporated into the BBAMP to be finalised closer to the commencement of construction. This has included a thorough review of the threatened species survey data and an assessment of potentially impacted species, included below.</li> </ul>

### 4.1 Introduction

Operational wind farms pose a potential risk to birds and bats through a number of different scenarios, including:

- Collision - fatalities and injuries can occur through collision with the moving blades (blade strike) or with associated infrastructure, such as powerlines or guy wires;
- Lighting – lighting on WTGs may also pose an increased risk to bats by attracting insects causing bats to forage within proximity to the moving blades, potentially leading to blade strike;
- Turbulence – turbulence created by the rotors may also affect species and result in a low level of mortality. Such impacts are particularly likely for smaller birds and bats, which would be less able to divert course away from the blades or strong turbulence, once caught in the turbulence zone; and
- Barotrauma - death of birds and bats due to pressurised air at the blade tips, is less likely to impact birds due to the rigidity of their lungs, than it is likely to impact upon bats (Baerwald et al, 2008).

There are a number of important factors that influence bird and bat mortality as a result of blade strike, turbulence and barotrauma, with the location of wind farms seen as a major factor, with those sited near wetlands, critical habitat areas, or along migratory flight paths having greatest impacts. The rates of collisions and impacts from turbulence can be influenced by adverse weather conditions and poor

visibility, flight characteristics of and an individual species' ecology (e.g. migratory species may be less familiar with the area).

## 4.2 Literature review

Collision strike has been well studied within Europe and North America for decades, where seasonal migratory birds and bats are common and more prone to collision with turbines and other structures (Hull and Cawthen, 2013), whereas in Australia, studies are not as well established and the proportion of migratory species is much lower (Menkhorst et al., 2017). Additionally, data relating to bird and bat collision mortality from Australian wind farms is limited, with no data available from operational wind farms with WTGs RSA comparable to that proposed for this project. This is an important point to consider given the height of WTGs RSA (80-250 m) proposed for the project is likely to be beyond the flight height of most Australian bird and bat species and significantly higher than that of existing wind farms (typically 25-150 m) for which collision data is available.

Smales (2015) summarised bird and bat collisions from seven operational wind farms in Victoria and one in South Australia. The summary data has a number of limitations, however, provides a useful insight into the diversity of species and numbers of individuals impacted by turbine collision. A total of 127 individuals, from 24 bird species and four bat species were recorded. Frequency rates of bird collision have been calculated for multiple operational wind farms across eastern Australia including 1.5 birds per turbine per year at Waubra Wind Farm (Acciona Energy, 2012), 1.7 birds per turbine per year at Bluff Point Wind Farm and 0.9 birds per turbine per year at Studland Bay Wind Farm (Hull et al., 2013).

Data relating to bat collision mortality rates within Australia is more limited. Bluff Point Wind Farm recorded 1.86 bats per turbine per year (Brett Lane & Associates, 2011), whilst Mussleroe Wind Farm recorded 0.67 bats per turbine per year (Woolnorth Wind Farm Holdings Pty Ltd, 2019).

Collision risk models have been developed to assess identified risk species (mostly threatened bird and bat species) at wind farms within eastern Australia. In 2005, a report produced for the Department of Environment and Heritage, modelled cumulative impacts of wind farm developments on the Swift Parrot, across its south-eastern Australia range (Smales, 2005). Based upon the modelling, the report concluded that the number of Swift Parrots that might be killed by collision on average per year at each wind farm, according to three avoidance rates, was cumulatively between 0.08 and 0.13 Swift Parrots per year. To date, no Swift Parrot mortalities have been recorded from wind farms.

A comparative study of modelled collision risk estimates versus carcass monitoring data for White-bellied Sea-Eagle and Wedge-tailed Eagle (Tasmanian subspecies) at two Tasmanian wind farms, was undertaken in 2013 (Smales et al., 2013). The results found that the modelled estimates compare well with actual mortality of both eagle species at both wind farms, with modelled fatalities at a 95% avoidance rate (0.4-1.5 per year), consistent with actual mortality rate from carcass monitoring (0.0-1.5).

## 4.3 Project collisions risk assessment

A collision risk assessment was undertaken for the project by ERM in 2013 to calculate the collision risk for the Project upon both White-throated Needletail and Wedge-tailed Eagle, included as an appendix to the EIS. The collision risk assessment used data from a significant bird utilisation survey effort conducted by ERM, detailed in the BAR with full fauna species lists included as an appendix.

The White-throated Needletail was prioritised for further assessment due to the species listing under the EPBC Act, combined with the large number of individuals (n = 45) recorded flying within the Rotor Swept Area (RSA) (80 – 250 m above the ground) during bird utilisation surveys. The Wedge-tailed Eagle was also prioritised for further assessment given the species known risk of turbine collision within existing wind farms in south-eastern Australia (Smales 2015), combined with the abundant records of the species flying within the RSA (n = 18) during bird utilisation surveys. A large flock of both Little Black Cormorants (n=25) and Straw-necked Ibis (n=50) were also recorded flying within RSA height during bird utilisation surveys, however, these species were not assessed in a collision risk model given their secure status and the overall low frequency at which they are likely to fly within RSA height (only one flock of each species was recorded). The potential impact to these species has been assessed further in the table below.

The results of the collision risk model indicated that at a 99% avoidance rate, 2.544 White-throated Needletail's per year may collide with the WTGs, and 0.468 Wedge-tailed Eagle's per year may collide with the WTGs. This analysis was undertaken over a larger WTG layout and Study Area than the current proposed WTG layout and as such is likely to present an overestimation of collisions.

#### 4.4 Assessment of impacts to birds and bats of the Study Area

The direct, indirect and cumulative impacts of all threatened bird and bat species recorded in the Study Area, along with threatened species previously recorded in the region of heightened conservation concern (e.g. Regent Honeyeater and Swift Parrot) is assessed in the table below. Survey methods and full species lists are included in the BAR. Additionally, the following non-threatened species; Wedge-tailed Eagle, Little Black Cormorant and White-striped Freetail Bat, are also assessed as they were recorded within RSA height and/or are known to be at risk of turbine collision at operational wind farms in eastern Australia (Smales, 2015; Hull and Cawthen, 2013). A Bird and Bat Adaptive Management Plan (BBAMP) will be prepared for the project to describe the mechanisms for further reduction and mitigation of potential impacts, on the bird and bat species detailed below.

## 5. References

Acciona Energy (2012). Bird monitoring - Waubra Wind Farm Newsletter(18).

Baerwald E, D'Armous, G, Klug, B and Barclay, R (2008). Barotrauma is a significant cause of bat fatalities at wind turbines, *Current Biology*, 18:695-696.

Birdlife Australia (2020). Australian bird profiles. Available online: <http://www.birdlife.org.au/bird-profile/>. Accessed: September, 2020. **(13)**

Brett Lane & Associates (BL&A) (2011). *Proposed Rugby Wind Farm Flora and Fauna Assessment Report No. 9193 (2.3)*, report to Suzlon Energy Australia Pty Ltd.

Churchill, S (2008). Australian Bats. Allen & Unwin, Sydney. **(1)**

Department of Planning Industry and Environment (2020a). Regent Honeyeater and Swift Parrot Important Areas Mapping. Available Online: [https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM\\_ImportantAreas](https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM_ImportantAreas). Accessed: September, 2020. **(5)**

Department of Planning, Industry and Environment (2020b). NSW BioNet Atlas. Available Online: [https://www.environment.nsw.gov.au/atlaspublicapp/UI\\_Modules/ATLAS\\_/atlasreport.aspx](https://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/atlasreport.aspx). Accessed: September, 2020. **(11)**

Department of the Environment (2015). Conservation Advice Painted Honeyeater (*Grantiella picta*). Australian Government, Canberra. **(6)**

Eco Logical Australia (2020). Expert Report for Regent Honeyeater, Ungula Wind Farm. Prepared by Dr Stephen Debus for CWP Renewables Pty Ltd. **(2)**

Hull, C and Cawthen, L (2013). Bat fatalities at two wind farms in Tasmania, Australia: Bat characteristics and spatial and temporal patterns. *New Zealand Journal of Zoology* 40(1): 1-15. **(12)**

Hull, C.L., Stark, E.M., Peruzzo, S. & Sims, C.C. (2013). Avian collisions at two wind farms in Tasmania, Australia: taxonomic and ecological characteristics of colliders versus non-colliders. *New Zealand Journal of Zoology* 40: 47-62. **(7)**

Kelly, T (2015-2020). Personal observations. **(4)**

Menkhorst, P et al. (2017). The Australian Bird Guide. CSIRO Publishing, Canberra. **(10)**

Probets, C (2006). Press Release on migrating honeyeaters of the Blue Mountains. Available online: <http://www.bmbirding.com.au/hemig.html#press>. Accessed: September, 2006. **(3)**

Smales, I (2015). Fauna Collisions with Wind Turbines: Effects and Impacts, Individuals and Populations. What Are We Trying to Assess? Wind and Wildlife, C. Hull (eds.). **(8)**

Tarburton, M (2014). Status of the White-throated Needletail *Hirundapus caudacutus* in Australia: Evidence for a marked decline. *Australian Field Ornithology*, 31: 122-140. **(9)**

## Attachment 1: Birds and Bats – Assessment of likelihood of impact

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE	No	Foraging habitat	Forages within the canopy, but is only likely to occur across the Study Area in small numbers during mass flowering events. Given, the small population and scarcity of contemporary records both surrounding the Study Area and to its west (combined with its location west of regional key breeding areas), it is unlikely that this species would migrate through the Study Area (2), and should it do so would likely fly well below RSA, consistent with other honeyeater species migratory movements	The project will remove potential foraging habitat. This species is unlikely to be impacted by turbine blade strike given its low flight level, well below the RSA (80-250 m).	Given the absence of breeding habitat and mapped Important Areas for this species (5), combined with the scarcity of contemporary records surrounding the Study Area (2), the development is unlikely to have significant indirect impacts by making critical habitat unavailable to the species.	The proposed Study Area, as well as surrounding operational (Bodangora) and approved (Crudine Ridge, Flyers Creek and Liverpool Range) wind farms do not coincide with mapped Important Areas for this species (5). Combined with the limited nature of direct and indirect impacts of the project, it is unlikely to result in significant cumulative impacts to the species.	The species was not recorded from surveys in the Study Area with two records within 20 km of the Study Area from the last 20 years (October 2000 and March 2001), and no records from the last 10 years. No mapped Important Areas for this species coincides with the Study Area, and it is only considered to provide potential foraging habitat during mass-flowering events, during which times the species would likely occur in small numbers and well below RSA height. Given the above, it is unlikely that the species will be subject to significant direct, indirect or cumulative impacts from the proposed development.



Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
						in the surrounding region (3; 4).				
<i>Grantiella picta</i>	Painted Honeyeater	V	V	No	Foraging habitat	Nomadic species which forages within the canopy primarily on mistletoe. May migrate through the Study Area in small numbers, well below RSA, consistent with	The project will remove potential foraging habitat. This species is unlikely to be impacted by	Given this species is highly mobile and capable of long-distance movements (10), combined with the	The combined habitat removal associated with operational and approved wind farms is unlikely to result in significant	The species was not recorded from surveys in the Study Area with one record within 20 km of the Study Area (11). Despite this, small numbers of birds have the potential to occupy the

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
						other honeyeater species migratory movements in the surrounding region (3; 4).	turbine blade strike given its low flight level, below the RSA.	presence of suitable habitat surrounding the Study Area, the project is unlikely to result in significant indirect impacts to the species.	cumulative impacts to the species given the availability of the suitable habitat for the species which will continue to occur at a much larger scale to that removed as a result of these projects, combined with the ability of this highly mobile species to utilise the remaining habitat.	Study Area, though would fly well below RSA height. Given the above, it is unlikely that the species will be subject to significant direct, indirect or cumulative impacts from the proposed development.

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Lathamus discolor</i>	Swift Parrot	E	CE	No	Foraging habitat	A non-breeding migratory visitor to mainland Australia which forages within the canopy, but is only likely to occur across the Study Area in small numbers during mass flowering events. Given, the small population and scarcity of contemporary records surrounding the Study Area, it is unlikely that this species would migrate through the Study Area (11), and should it do so, would likely fly well below RSA, consistent with other nectarivorous parrot species movements in the surrounding region (4).	The project will remove potential foraging habitat but not impact on any mapped Important Area for this species (5). This species is unlikely to be impacted by turbine blade strike given its flight level, below the RSA.	Given the absence of mapped Important Areas (5), combined with the scarcity of contemporary records surrounding the Study Area (11), the development is unlikely to have significant indirect impacts by making critical habitat unavailable to the species.	The proposed Study Area, as well as surrounding operational (Bodangora) and approved (Crudine Ridge, Flyers Creek and Liverpool Range) wind farms do not coincide with mapped Important Areas for this species (5). Combined with the limited nature of direct and indirect impacts of the project, it is unlikely to result in significant cumulative impacts to the species.	The species was not recorded from surveys in the Study Area with three records within 20 km of the Study Area from the last 20 years (11). No mapped Important Areas for this species coincides with the Study Area, and it is only considered to have the potential to utilise the Study Area for foraging during mass-flowering events, during which times it would likely occur in small numbers and well below RSA height. Given the above, it is unlikely that the species will be subject to significant direct, indirect or cumulative impacts from the proposed development.

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Hirundapus caudacutus</i>	White-throated Needletail		M	Yes	Foraging habitat	Summer migrant which forages aerially and may also migrate through the site within the RSA.	A collision risk model was run which calculated a collision rate of 2.544 individuals per annum, though this rate is well above rates of actual collisions of this species recorded at operational wind farms across south-eastern Australia (7; 8). This rate of collision is not considered significant in the context of the broader population of the species (10).	Given this species is highly mobile and manoeuvrable and capable of long-distance movements (9), combined with the presence of suitable habitat surrounding the Study Area, the project is unlikely to result in significant indirect impacts to the species.	The combined habitat removal and risk of collision strike associated with surrounding operational and approved wind farms is unlikely to result in significant cumulative impacts to the species given the availability of suitable habitat for the species which will continue to occur at a much large scale to that removed as a result of these projects, combined with the total population size of the species and the ability of this highly mobile species to utilise the remaining habitat.	The potential direct impacts to this species has been assessed through a collision risk model. Given the highly mobile and manoeuvrable nature of the species, its wide range, total population size, combined with the presence of suitable habitat outside of the Study Area, the project is unlikely to result in significant direct, indirect or cumulative impacts to the species. Given the species prior occurrence within the Study Area at RSA height and recorded fatalities of this species from operational wind farms within eastern Australia (7; 8), it will be a focus of the proposed BBAMP.

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Polytelis swainsonii</i>	Superb Parrot	V	V	Yes	Foraging habitat	Forages on the ground and within the canopy (10). May travel across portions of the Study Area above the canopy, however well below RSA.	The project will remove potential foraging habitat. This species is unlikely to be impacted by turbine blade strike given its flight level, below the RSA.	Given the mobile and wide-ranging nature of this species (10), combined with the availability of large areas of suitable habitat outside of the Study Area, the project is unlikely to have significant indirect impacts by making critical habitat unavailable to the species.	No data is available regarding the species interactions with the operational Bodangora Wind Farm, located in close proximity to the Study Area, however, the species is still regularly observed in large numbers (>40) in the locality (4). The mobile nature of the species and abundance of available habitat in the locality, relative to the combined area of the two wind farms makes it unlikely that the species will be subject to significant cumulative impacts.	This species was recorded in the Study Area during surveys. Due to its wide-ranging, (relatively) low flying and mobile nature, combined with the abundance of suitable habitat outside of the Study Area, the species is considered unlikely to be subject to significant direct, indirect or cumulative impacts as a result of the proposed project. Given the species frequent occurrence within the Study Area, it will be a focus of the proposed BBAMP.

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Yes	Foraging habitat	This species can forage 40-50 km from roost camps, with two seasonal camps (Wellington and Mudgee) located within this proximity to the Study Area (1; 4), however, only one deceased individual was recorded tangled in a fence during surveys. The species disperses widely across its range in eastern Australia, including at heights within RSA (1).	The project will remove potential foraging habitat for the species. This species has the potential to be impacted by turbine blade strike given it is known to fly within the RSA.	Given the mobile and wide-ranging nature of this species (1), combined with the availability of large areas of suitable habitat outside of the Study Area, the project is unlikely to have significant indirect impacts by making habitat unavailable to the species.	The combined habitat removal and risk of collision strike associated with surrounding operational and approved wind farms is unlikely to result in significant cumulative impacts to the species given the availability of suitable habitat for the species which will continue to occur at a much large scale to that removed as a result of these projects, combined with the total population size of the species and the ability of this highly mobile species to utilise the remaining habitat.	Given the highly mobile and manoeuvrable nature of the species, its wide range, total population size, combined with the presence of suitable habitat outside of the Study Area, the project is unlikely to result in significant indirect or cumulative impacts to the species. Given the species prior occurrence within the Study Area, the proximity of two seasonal roost camps and the species ability to fly within RSA height, it will be a focus of the proposed BBAMP.

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Burhinus grallarius</i>	Bush Stone-curlew	E		Yes - historical record	Breeding and foraging habitat	Mostly terrestrial but capable of both short (<20 km) and long-range (>100 km) movements (10; 13), however, little is known about the nature of these movement patterns.	The project will remove habitat for this species. This species is unlikely to be impacted by turbine blade strike given its low flight level, well below the RSA.	Given the lack of contemporary records of the species, combined with the available habitat outside of the Study Area, it is unlikely that the species would be subject to significant indirect impacts.	Given the lack of contemporary records of the species within proximity to operational and approved wind farms in the region, combined with the available habitat outside of these project footprints, it is unlikely that the species would be subject to significant cumulative impacts.	The species was not recorded from surveys however, one record exists within the Study Area from 2002 (12). Given the scarcity of contemporary records within and surrounding the Study Area, combined with the species predominantly terrestrial nature and the availability of habitat beyond the Study Area, it is unlikely to be subject to significant direct, indirect or cumulative impacts resulting from the proposed project.
<i>Stagonopleura guttata</i>	Diamond Firetail	V		Yes	Breeding and foraging habitat	A low-flying sedentary species which favours low-lying areas including watercourses (10; 13).	The project will remove habitat for this species. This species is unlikely to be impacted by turbine blade strike given its low flight	Given, the species preference for low-lying areas around watercourses, it is unlikely to be subject to significant indirect impacts	Operational and approved wind farms in the region have development footprints which largely exclude the preferred low-lying habitat of the species. As such, significant	This species was recorded frequently throughout the Study Area, in native grassland adjacent to woodland and watercourses. These areas have been largely excluded from the Study Area and the species low-flying nature means that

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
							level, well below the RSA.	given, the majority of the Study Area is situated on ridges and hilltops.	cumulative impacts on the species is unlikely.	it is unlikely to be significantly impacted by the proposed project.
<i>Calyptrorhynchus lathami</i>	Glossy Black-Cockatoo	V		Yes	Breeding and foraging habitat	Highly mobile, typically flying at or above canopy height. Can disperse widely (up to 60 km) in search of foraging habitat (10; 13).	The project will remove habitat for this species. This species is unlikely to be impacted by turbine blade strike given its low flight level, below the RSA.	Given the mobile nature of this species (10; 13), combined with the availability of large areas of suitable habitat outside of the Study Area, the project is unlikely to have significant indirect impacts by making habitat unavailable to the species.	The combined habitat removal associated with operational and approved wind farms is unlikely to result in significant cumulative impacts to the species given the availability of suitable habitat for this mobile species, which will continue to occur at a much large scale to that removed as a result of these projects, combined with the total population size of the species within the region.	One pair of this species was recorded within the Study Area. High quality habitat has been excluded where possible from the Study Area, with extensive suitable habitat available to this mobile species outside of the Study Area. This species is unlikely to fly within RSA height. It is unlikely that this species will be subject to significant impacts resulting from the proposed project.



Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V		Yes	Breeding and foraging habitat	Can disperse across territories ranging from 1-50 ha where it typically flies below canopy height.	The project will remove habitat for this species. This species is unlikely to be impacted by turbine blade strike given its low flight level, well below the RSA.	Given the mobile nature of this species (10; 13), combined with the availability of large areas of suitable habitat outside of the Study Area, the project is unlikely to have significant indirect impacts by making habitat unavailable to the species.	The combined habitat removal associated with operational and approved wind farms is unlikely to result in significant cumulative impacts to the species given the availability of suitable habitat for this mobile species, which will continue to occur at a much large scale to that removed as a result of these projects, combined with the total population size of the species within the region.	This species was recorded during surveys in the Study Area. High quality habitat has been excluded where possible from the Study Area, with extensive suitable habitat available to this mobile species outside of the Study Area. Combined with this species low-flying nature, well below RSA height, it is unlikely that it will be subject to significant impacts resulting from the proposed project.

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Melanodryas cucullata subsp. cucullata</i>	Hooded Robin (south-eastern form)	V		Yes	Breeding and foraging habitat	Can disperse across territories up to 300 ha where it typically flies below canopy height.	The project will remove habitat for this species. This species is unlikely to be impacted by turbine blade strike given its low flight level, well below the RSA.	Given the mobile nature of this species (10; 13), combined with the availability of large areas of suitable habitat outside of the Study Area, the project is unlikely to have significant indirect impacts by making habitat unavailable to the species.	The combined habitat removal associated with surrounding operational and approved wind farms is unlikely to result in significant cumulative impacts to the species given the availability of suitable habitat for this mobile species, which will continue to occur at a much large scale to that removed as a result of these projects, combined with the total population size of the species within the region.	One individual of this species was recorded during surveys in the Study Area. High quality habitat has been excluded where possible from the Study Area, with extensive suitable habitat available to this mobile species outside of the Study Area. Combined with this species low-flying nature, well below RSA height, it is unlikely that it will be subject to significant impacts resulting from the proposed project.

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Petroica boodang</i>	Scarlet Robin	V		Yes	Breeding and foraging habitat	Maintains a breeding territory where it typically flies well below canopy height, generally foraging from low perches and taking invertebrates from the ground (10; 13).	The project will remove habitat for this species. This species is unlikely to be impacted by turbine blade strike given its low flight level, well below the RSA.	Given the mobile nature of this species (10; 13), combined with the availability of large areas of suitable habitat outside of the Study Area, the project is unlikely to have significant indirect impacts by making habitat unavailable to the species.	The combined habitat removal associated with operational and approved wind farms is unlikely to result in significant cumulative impacts to the species given the availability of suitable habitat for this mobile species, which will continue to occur at a much large scale to that removed as a result of these projects, combined with the total population size of the species within the region.	One individual of this species was recorded during surveys in the Study Area. High quality habitat has been excluded where possible from the Study Area, with extensive suitable habitat available to this mobile species outside of the Study Area. Combined with this species low-flying nature, well below RSA height, it is unlikely that it will be subject to significant impacts resulting from the proposed project.

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Chthonicola sagittata</i>	Speckled Warbler	V		Yes	Breeding and foraging habitat	Sedentary species which spends the majority of its time foraging on the ground and perching within shrubs and low trees (10; 13).	The project will remove habitat for this species. This species is unlikely to be impacted by turbine blade strike given its low flight level, well below the RSA.	Given the mobile nature of this species (10; 13), combined with the availability of large areas of suitable habitat outside of the Study Area, the project is unlikely to have significant indirect impacts by making habitat unavailable to the species.	The combined habitat removal associated with operational and approved wind farms is unlikely to result in significant cumulative impacts to the species given the availability of suitable habitat for this mobile species, which will continue to occur at a much large scale to that removed as a result of these projects, combined with the total population size of the species within the region.	This species was recorded within woodland habitat in the Study Area. High quality habitat has been excluded where possible from the Study Area, with extensive suitable habitat available to this mobile species outside of the Study Area. Combined with this species low-flying nature, well below RSA height, it is unlikely that it will be subject to significant impacts resulting from the proposed project.

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V		Yes	Breeding and foraging habitat	Sedentary species which spends the majority of its time foraging within the canopy, where it probes for invertebrates in a characteristic downward movement (10; 13).	The project will remove habitat for this species. This species is unlikely to be impacted by turbine blade strike given its low flight level, well below the RSA.	Given the mobile nature of this species (10; 13), combined with the availability of large areas of suitable habitat outside of the Study Area, the project is unlikely to have significant indirect impacts by making habitat unavailable to the species.	The combined habitat removal associated with operational and approved wind farms is unlikely to result in significant cumulative impacts to the species given the availability of suitable habitat for this mobile species, which will continue to occur at a much large scale to that removed as a result of these projects, combined with the total population size of the species within the region.	This species was recorded within woodland habitat in the Study Area. High quality habitat has been excluded where possible from the Study Area, with extensive suitable habitat available to this mobile species outside of the Study Area. Combined with this species low-flying nature, well below RSA height, it is unlikely that it will be subject to significant impacts resulting from the proposed project.

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Circus assimilis</i>	Spotted Harrier	V		Yes	Breeding and foraging habitat	Typically flies at low (<10 m) above open areas and is known to disperse nomadically across regional scales in search of prey (10). One individual was recorded flying at 30 m within the Study Area, still well below RSA.	The project will remove habitat for this species. This species is unlikely to be impacted by turbine blade strike given its low flight level, well below the RSA.	Given the mobile and nomadic nature of this species (10), combined with the availability of large areas of more suitable habitat outside of the Study Area in low-lying areas as opposed to ridgetops where turbines will be located, the project is unlikely to have significant indirect impacts by making habitat unavailable to the species.	The proposed Study Area, as well as surrounding operational (Bodangora) and approved (Crudine Ridge, Flyers Creek and Liverpool Range) are unlikely to result in significant cumulative impacts to the species, given the abundance of preferred low-lying habitat which will remain available to this mobile species.	This species was recorded in the Study Area during surveys. Due to its (relatively) low flying and mobile nature, combined with the abundance of suitable habitat outside of the Study Area, the species is considered unlikely to be subject to significant direct, indirect or cumulative impacts as a result of the proposed project.

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V		Yes	Breeding and foraging habitat	Typically flies fast above the canopy, though will fly at low levels over open areas. The species has been recorded undertaking a general southerly migration during summer however, little is known about this aspect of the species movements (1). It is unlikely that the species would travel within the RSA.	The project will remove habitat for this species. This species is unlikely to be impacted by turbine blade strike or barotrauma given its flight level, below the RSA.	Given the mobile and wide-ranging nature of this species (1), combined with the availability of large areas of suitable habitat outside of the Study Area, the project is unlikely to have significant indirect impacts by making habitat unavailable to the species.	Development of the proposed Study Area, as well as surrounding operational (Bodangora) and approved (Crudine Ridge, Flyers Creek and Liverpool Range) are unlikely to result in significant cumulative impacts to the species, given the abundance of suitable habitat which will remain available to this mobile and wide-ranging species.	This species was recorded in low levels in the northern portion of the Study Area during surveys. Due to its wide-ranging and mobile nature, combined with the abundance of suitable habitat outside of the Study Area, the species is considered unlikely to be subject to significant direct, indirect or cumulative impacts as a result of the proposed project. This species has recorded fatalities at operational wind farms in eastern Australia (9), albeit with turbines with substantially lower RSA heights than the proposed project (12). Regardless, this species will be a focus of the proposed BBAMP.

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V		Yes	Foraging	Typically flies above canopy in woodland / forest areas and near the ground in open areas. Populations disperse within about 300 km range of maternity caves; however, little is known about the specific of this aspect of their movement (1). It is unlikely that the species would travel within the RSA.	The project will remove foraging habitat for this species. This species is unlikely to be impacted by turbine blade strike given its flight level, below the RSA.	Given the absence of roosting / breeding habitat, combined with the mobile and wide-ranging nature of the species, the project is unlikely to have significant indirect impacts by making important areas of habitat unavailable to the species.	Development of the proposed Study Area, as well as surrounding operational (Bodangora) and approved (Crudine Ridge, Flyers Creek and Liverpool Range) are unlikely to result in significant cumulative impacts to the species, given the abundance of suitable habitat which will remain available to this mobile and wide ranging species.	This species was recorded throughout the Study Area during surveys. No roosting/breeding habitat is present, with only foraging habitat present. Given the absence of roosting/breeding habitat, the species flight height below RSA and wide-ranging nature, it is unlikely that the species will be subject to significant direct, indirect or cumulative impacts from the proposed development.



Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Aquila audax</i>	Wedge-tailed Eagle			Yes	Breeding and foraging habitat	Flies high above ridges and valleys, often within and above the RSA throughout a variable home range generally exceeding 10 square kms (10). Juveniles may disperse up to several hundred kms to establish their own home range.	A collision risk model was run for this species which calculated a collision rate of 0.468 individuals per annum. This rate of collision is not considered significant in the context of the local population of the species, with this species amongst the most abundant recorded during bird utilisation surveys (n=46).	Given this species is highly mobile and known to be undeterred post turbine installation (8), combined with the presence of suitable habitat surrounding the Study Area, the project is unlikely to result in significant indirect impacts to the species.	The combined habitat removal and risk of collision strike associated with surrounding operational and approved wind farms is unlikely to result in significant cumulative impacts to the species given its defined home range at a scale not prone to intersect multiple wind farm sites. There is the potential that some individuals or pairs home range may overlap between the Study Area and the nearby Bodangora Wind Farm, however, no post-construction data is available for this site and the abundance of records from the Study Area means a	The potential direct impacts to this species has been assessed through a collision risk model. Given the highly mobile nature of the species, its home range and the presence of suitable habitat outside of the Study Area, the project is unlikely to result in significant direct, indirect or cumulative impacts to the species. Given the species abundant occurrence within the Study Area at RSA height and the recorded fatalities of this species from operational wind farms within eastern Australia (7; 8), it will be a focus of the proposed BBAMP.

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	

significant cumulative impact is unlikely.

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant			Yes		Mostly occupies freshwater waterbodies where it perches on logs, rocks and trees. Flies above the water surface before diving to catch prey. May travel at RSA height between water sources, often in a 'V' formation (10; 13)	The species was recorded flying at RSA height, however, given the lack of available habitat and its wide-ranging and manoeuvrable nature, it is unlikely that the species would be subject to significant direct impacts	Given the Study Area does not provide foraging or breeding habitat for the species, no indirect impacts are likely to result from the proposed project	Given the lack of available habitat within the Study Area and at surrounding operational (Bodangora) and approved (Crudine Ridge, Flyers Creek and Liverpool Range) there is unlikely to be any significant cumulative impacts to the species	One flock (n=25) of this species was recorded transiting at RSA across the Study Area. Given the lack of available habitat, combined with the wide-ranging and manoeuvrable nature of the species, it is unlikely to be subject to significant direct, indirect or cumulative impacts.

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Threskiornis spinicollis</i>	Straw-necked Ibis			Yes	Foraging	Mostly found foraging on the ground in paddocks, croplands and the margins of swamps and lagoons. The species soars soaring at height (often above RSA) over open areas and is highly mobile throughout its range across the majority of the Australian continent (10).	The project will remove foraging habitat of the species, though large areas of more suitable low-lying habitat will remain outside of the Study Area. The species was recorded flying at RSA height, however, given its wide-ranging and manoeuvrable nature, it is unlikely that the species would be subject to significant direct impacts.	Given the mobile and wide-ranging nature of this species, combined with the availability of large areas of suitable habitat outside of the Study Area, the project is unlikely to have significant indirect impacts by making habitat unavailable to the species.	Given the wide-ranging and mobile nature of the species (10), along with secure populations status it is unlikely that development within the Study Area and at surrounding operational (Bodangora) and approved (Crudine Ridge, Flyers Creek and Liverpool Range) will result in any significant cumulative impacts to the species.	One flock (n=50) of this species was recorded soaring at RSA height within the Study Area. Given the wide-ranging and manoeuvrable nature of the species, combined with its secure population, it is unlikely to be subject to significant direct, indirect or cumulative impacts. This species has recorded fatalities at operational wind farms in eastern Australia (8) and as such, will be a focus of the proposed BBAMP.

Species		Conservation status		Recorded within Study Area	Potential presence		Potential impact			Discussion
Scientific Name	Common Name	BC Act	EPBC Act		Habitat	Movement pattern	Direct	Indirect	Cumulative	
<i>Austronomus australis</i>	White-striped Freetail Bat			Yes	Breeding and foraging habitat	Forages above the canopy, although unlikely at heights within the RSA. Can undertake nightly foraging within a large range from 2.5 - 20 km (1).	The project will remove habitat for this species. This species is unlikely to be impacted by turbine blade strike or barotrauma given its flight level is likely to be below the RSA.	Given the mobile and wide-ranging nature of this species (1), combined with the availability of large areas of suitable habitat outside of the Study Area, the project is unlikely to have significant indirect impacts by making habitat unavailable to the species.	Development of the proposed Study Area, as well as surrounding operational (Bodangora) and approved (Crudine Ridge, Flyers Creek and Liverpool Range) are unlikely to result in significant cumulative impacts to the species, given the abundance of suitable habitat which will remain available to this mobile and wide ranging species.	This species was recorded in low levels in the northern portion of the Study Area during surveys. Due to its wide-ranging and mobile nature, combined with the abundance of suitable habitat outside of the Study Area, the species is considered unlikely to be subject to significant direct, indirect or cumulative impacts as a result of the proposed project. This species has recorded fatalities at operational wind farms in eastern Australia (8), albeit with turbines with substantially lower RSA heights than the proposed project (12). Regardless, this species will be a focus of the proposed BBAMP.

## Attachment 2: Update Assessments of Significance for Commonwealth Matters

## Updated assessments of Significance - EPBC Act Significant Impact Guidelines

### EPBC Act Significant Impact Guidelines

The EPBC Act Administrative Guidelines on Significance set out 'Significant Impact Criteria' that are to be used to assist in determining whether a proposed action is likely to have a significant impact on matters of national environmental significance. Matters listed under the EPBC Act as being of national environmental significance relevant to this BAR include:

- Listed threatened species and ecological communities
- Listed migratory species

'Significant Impact Criteria' are provided under the Act with specific criteria provided for threatened species, and ecological communities listed as Endangered or Critically Endangered. The relevant Significant Impact Criteria have been applied to the following species and communities:

- *Anthochaera phrygia* (Regent Honeyeater)
- *Chalinolobus dwyeri* (Large-eared Pied Bat)
- *Delma impar* (Striped Legless Lizard)
- *Grantiella picta* (Painted Honeyeater)
- *Hirundapus caudacutus* (White-throated Needletail)
- *Lathamus discolour* (Swift Parrot)
- *Myiagra cyanoleuca* (Satin Flycatcher)
- *Nyctophilus corbeni* (Corben's Long-eared Bat)
- *Phascolarctos cinereus* (Koala)
- *Polytelis swainsonii* (Superb Parrot)
- *Pseudomys novaehollandiae* (New Holland Mouse)
- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Dichanthium setosum* (Bluegrass)
- *Prasophyllum petilum* (Tarengo Leek Orchid)
- *Swainsona recta* (Small Purple-pea)
- *Zieria obcordata*
- White Box – Yellow Box – Blakely's Red Gum Woodland and Derived Native Grasslands CEEC

	Nomadic nectarivorous birds – Regent Honeyeater and Painted Honeyeater	Hollow dependant Migratory birds – Superb Parrot and Swift Parrot
Criterion 1: lead to a long-term decrease in the size of an important population of a species	<p>The Commonwealth defines an important population as a population that is necessary for a species long term survival and recovery. This may include populations that are a key source populations for either breeding or dispersal, populations that are necessary for maintaining genetic diversity or populations that are near the limit of the species range (DotE 2013).</p> <p>There is no known population of either of these species in the locality. These species were not identified in the ERM bird surveys and there are no records within the Study Area. Isolated records for Regent Honeyeater exist to the south of the Study Area, on the banks of Burrendong Dam. The closet record of this species is 7.5 km from the Study Area and was recorded in 1984 (Atlas of Living Australia 2020).</p>	<p>The Project is not located within any key breeding areas for the Superb Parrot or Swift Parrot and therefore is considered unlikely to support an important population. Both of these species have known and defined breeding habitats, to the south around Boorowa NSW and Tasmania respectively. These species may use the locality sporadically for foraging on flowering plants during their migratory flights, in particular, the Superb Parrot has been recorded within the Study Area.</p> <p>Isolated records exist for Swift Parrot to the south of the Study Area, on the banks of Burrendong Dam. The closest record of this species is approximately 7.5 km from the Development Footprint and was recorded in 1991 (Atlas of Living Australia 2020).</p>
Criterion 2: reduce the area of occupancy of an important population	The Study Area contains suitable foraging habitat for this species in the form of flowering eucalypts. In the absence of a known local population, there is potential for this species to forage sporadically in the area. Approximately 143 ha of the current Development Footprint contains moderate to good condition vegetation which may be considered suitable foraging habitat for this species, of the total approximately 626 ha of native vegetation to be removed for the Project. This area is likely to be revised down following a detailed design process.	The Project is not located within any key breeding areas for the Superb Parrot or Swift Parrot and therefore is considered unlikely to support an important population.
Criterion 3: fragment an existing important population into two or more populations	<p>The existing landscape within the IBRA subregion has been significantly altered since European settlement. Gentle slopes have been cleared to increase grazing areas however, areas with steeper, rugged ridges and rangers or areas close to creek lines, along roadsides and property boundaries remain vegetated. The Development Footprint generally follows ridgelines and will not impact connectivity between the more vegetated valleys.</p> <p>Both of these species are highly mobile and capable of long-distance movements therefore they are not considered highly susceptible to fragmentation. The Project is considered unlikely to fragment the any existing populations of the Regent Honeyeater and Painted Honeyeater.</p>	The Project is not located within any key breeding areas for the Superb Parrot or Swift Parrot and therefore is considered unlikely to support an important population.
Criterion 4: adversely affect habitat critical to the survival of a species	<p>The Study Area contains suitable foraging habitat for this species in the form of flowering eucalypts. In the absence of a known local population, there is potential for this species to forage sporadically in the area. Approximately 143 ha of the current Development Footprint contains moderate to good condition vegetation which may be considered suitable foraging habitat for this species, of the total approximately 626 ha of native vegetation to be removed for the Project. This area is likely to be revised down following a detailed design process.</p> <p>The habitat impacted within the development footprint is typical of the locality and extends well beyond the development footprint. The loss of habitat is not expected to be significant. Therefore, it is considered unlikely that the proposed works will adversely affect habitat critical to the survival of a species.</p>	The habitat impacted within the development footprint, is typical of the locality and extends well beyond the development footprint. The loss of habitat is not expected to be significant. Therefore, it is considered unlikely that the proposed action will adversely affect habitat critical to the survival of these species.
Criterion 5: disrupt the breeding cycle of an important population	The Development Footprint does not occur within any known key breeding areas for these species. Therefore, the proposed works will not disrupt the breeding cycle.	The Development Footprint does not occur within any known key breeding areas for these species. The Development footprint contains no breeding habitat for the Swift Parrot and Superb Parrot; therefore, the proposed works will not disrupt the breeding cycle of an important population.
Criterion 6: modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The loss of habitat is considered unlikely to significantly impact the use of the area for foraging by these species. Therefore, it is expected that the area will continue to provide foraging resources for these species, and as such a reduction in quality and availability of habitat to the extent that the species is likely to decline is considered unlikely to result from the proposed works.	<p>The Development Corridor contains suitable foraging habitat for these species. In the absence of a known local population, there is potential for these species to forage sporadically in the area. Approximately 143 ha of the current Development Footprint contains moderate to good condition vegetation which may be considered suitable foraging habitat for this species, of the total approximately 626 ha of native vegetation to be removed for the Project. This area is likely to be revised down following a detailed design process.</p> <p>The existing landscape within the IBRA subregion has been significantly altered since European settlement. Gentle slopes have been cleared to increase grazing areas however, areas with steeper, rugged ridges and rangers or areas close to creek lines, along roadsides and property boundaries remain vegetated. The Development Footprint generally follows ridgelines and will not impact connectivity between the more vegetated valleys.</p>
Criterion 7: result in invasive species that are harmful to an endangered or vulnerable species becoming established in the species' habitat	The proposed works would not result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered species' habitat.	Impacts to these species will be limited to a reduction in foraging habitat from vegetation removed within the Development Footprint.
Criterion 8: introduce disease that may cause the species to decline.	The proposed works would not introduce disease that may cause the species to decline.	The proposed works would not introduce disease that may cause the species to decline.



	Nomadic nectarivorous birds – Regent Honeyeater and Painted Honeyeater	Hollow dependant Migratory birds – Superb Parrot and Swift Parrot
Criterion 9: interfere with the recovery of a vulnerable species.	<p>There is currently no Recovery Plan for the Painted Honeyeater. A key threatening process for this species is habitat loss or degradation at a landscape scale. As the Development Footprint is in a modified, degraded and fragmented state, it is unlikely that the scale of clearing for the proposed works will interfere substantially with the recovery of this species.</p> <p>The objectives of the Regent Honeyeater Recovery Plan (DoE 2016) were to:</p> <ul style="list-style-type: none"> <li>Reverse the long-term population trend of decline and increase the numbers of regent honeyeaters to a level where there is a viable, wild breeding population; and</li> <li>Enhance the condition of habitat across the regent honeyeaters range to maximise survival and reproductive success.</li> </ul> <p>As no records of this species have been made within the Development Footprint, combined with the lack of nearby records, it is unlikely that there will be impacts on any individuals or populations of Regent Honeyeater. It is therefore believed that the proposed works will not interfere with the recovery plan for this species.</p>	<p>The objectives of the Swift Parrot Recovery Plan (DoE 2011):</p> <ul style="list-style-type: none"> <li>To identify and prioritise habitats and sites used by the species across its range, on all land tenures.</li> <li>To implement management strategies to protect and improve habitats and sites on all land tenures</li> <li>To monitor and manage the incidence of collisions, competition and Beak and Feather Disease.</li> <li>To monitor population trends and distribution throughout the range.</li> </ul> <p>The objectives of the Superb Parrot Recovery Plan (DoE 2011):</p> <ul style="list-style-type: none"> <li>To determine populations trends in the Superb Parrot</li> <li>To increase the level of knowledge of the Superb Parrot's ecological requirements.</li> <li>Develop and implement threat abatement strategies</li> <li>Increase community involvement in and awareness of the Superb Parrot recovery program.</li> </ul> <p>The Project will not interfere with the objectives of the recovery plans. There is limited potential for mortality due to rotor collisions as this species typically flies below Rotor Swept Area (RSA) height. The Proponent may consider monitoring programs to contribute to the knowledge of the species. Records of Superb Parrot will be submitted by ELA to the NSW Government database under scientific licence obligations.</p>
	Koala	Corben's Long-eared Bat
Criterion 1: lead to a long-term decrease in the size of an important population of a species	Koala is known from nearby records and is considered to have the potential to occur, albeit in low numbers, in the Development Corridor. It is not considered to occur as an important population at the site. Targeted surveys in the 2012 – 2013 ERM assessment did not identify koala or any evidence of occupation. Nonetheless, a precautionary approach has been undertaken and offsets have been calculated accordingly under the NSW BC Act. Given this, the proposed works are unlikely to lead to a long-term decrease in the size of an important population of a species.	<p>The proposed works would remove potential foraging habitat from within the Development Footprint in the form of open woodland. The proposed works will also remove tree hollows which provide roosting habitat for this species, with micro-siting undertaken to avoid clearing HBTs were possible. Suitable foraging and sheltering habitat would remain abundant within the surrounding adjacent vegetation.</p> <p>The Development Footprint may provide foraging habitat and roosting habitat for this species, however the level of fragmentation is unlikely to support a key source population. Given this, the proposed works are unlikely to lead to a long-term decrease in the size of an important population of a species.</p>
Criterion 2: reduce the area of occupancy of an important population	The Development Footprint has not been identified as supporting an important population and is not near the limit of the species range. Therefore, the proposed works would not reduce the area of occupancy of an important population.	The Development Footprint has not been identified as supporting an important population and is not near the limit of the species range. Therefore, the proposed works would not reduce the area of occupancy of an important population.
Criterion 3: fragment an existing important population into two or more populations	The loss of a small proportion of potential habitat from the locality is considered unlikely to impact the species. The Development Footprint has not been identified as supporting an important population and is not near the limit of the species range. Therefore, the proposed works would not fragment an existing important population into two or more populations.	The Development Footprint has not been identified as supporting an important population and is not near the limit of the species range. Therefore, the proposed works would not fragment an existing important population into two or more populations.
Criterion 4: adversely affect habitat critical to the survival of a species	The Project would remove approximately 143 ha of additional potential Koala habitat from within the proposed works area. Individual specimens of Koala feed-tree species may be removed. Koala has not been identified within the site and the site is not considered to include habitat critical to the survival of the species.	The proposed works would remove 143 ha of potential good condition woodland habitat for this species. This species is highly mobile, and a large expanse of suitable habitat is available in the areas surrounding the Development Footprint. It is therefore unlikely that the proposed works would affect habitat critical to the survival of a species.
Criterion 5: disrupt the breeding cycle of an important population	The Development Footprint does not support an important population of Koala, nor have there been any sightings of breeding females. Therefore, it is unlikely that the proposed works would disrupt the breeding cycle of an important population.	No important populations are known in the Development Footprint. Due to the species being highly mobile it is unlikely that disturbance to foraging habitat would disrupt the breeding cycle of an important population.
Criterion 6: modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed works would remove approximately 143 ha of potential habitat for this species. Suitable habitat will remain in the greater Study Area and general locality. It is therefore unlikely that the proposed works would affect habitat to the extent that it would cause a decline to this species.	The proposed works would remove 143 ha of potential woodland habitat for this species. A large expanse suitable habitat is available in the areas surrounding the Development Footprint. It is therefore unlikely that the proposed works would affect habitat to the extent that it would cause a decline to this species.
Criterion 7: result in invasive species that are harmful to an endangered or vulnerable species becoming established in the species' habitat	The proposed works would not result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered species' habitat.	The proposed works would not result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered species' habitat.
Criterion 8: introduce disease that may cause the species to decline.	The proposed works would not introduce disease that may cause the species to decline.	The proposed works would not introduce disease that may cause the species to decline.

	Koala	Corben's Long-eared Bat
Criterion 9: interfere with the recovery of a vulnerable species.	There is currently no Recovery Plan for the Koala. A key threatening process for this species is habitat loss or degradation at a landscape scale. The Project would remove approximately 143 ha of additional potential Koala habitat from within the proposed works area. Individual specimens of Koala feed-tree species may be removed. Suitable habitat will remain in the greater Study Area and general locality. It is therefore unlikely that the proposed works would affect habitat to the extent that it would cause a decline to this species.	There is currently no Recovery Plan for the Corben's Long-eared Bat. A key threatening process for this species is habitat loss or degradation at a landscape scale. As the Development Footprint is in a modified, degraded and fragmented state, it is unlikely that the scale of clearing for the proposed works will interfere substantially with the recovery of this species. There is limited potential for mortality due to rotor collisions as this species typically flies below RSA height.
	Large-eared Pied Bat	Striped Legless Lizard
Criterion 1: lead to a long-term decrease in the size of an important population of a species	The potential breeding habitat of this species (cliff lines, caves and rocky outcrops) has not been identified within the development Footprint, therefore it is unlikely to support an important population and is not near the limit of the species range. Alternative habitat would remain in surrounding areas; therefore, it is unlikely that the removal of habitat from the proposed works would lead to the long-term decrease in the size of an important population of the Large-eared Pied Bat.	Habitat for this species includes grassland dominated by perennial, tussock-forming grasses. It can be found in either native or exotic dominated grasslands. No records exist within the Development Corridor and it was not identified in targeted surveys by ERM in 2012 - 2103. Given this, it is unlikely to lead to a long-term decrease in the size of an important population of this species.
Criterion 2: reduce the area of occupancy of an important population	The Development Footprint has not been identified as supporting an important population and is not near the limit of the species range. Therefore, the proposed works would not reduce the area of occupancy of an important population.	There are no records of this species in the Development Corridor and it has not been identified as supporting an important population. An expanse of similar and suitable habitat is available in the areas surrounding Development Footprint. Therefore, the proposal would not reduce the area of occupancy of an important population.
Criterion 3: fragment an existing important population into two or more populations	The Development Footprint has not been identified as supporting an important population and is not near the limit of the species range. The Development footprint is already fragmented with few well-connected areas of vegetation. As this species is obligate cave roosting species, sufficient connectivity would need to occur from the suitable roosting sites into suitable foraging areas within the Development Footprint. It is not anticipated that any suitable vegetation corridors will be fragmented as part of the proposal.	The Development Corridor has not been identified as supporting an important population as there have been no records of this species within the Development Footprint. The proposed works is not likely to prevent any significance barrier to the movement across the landscape. Therefore, the proposal would not fragment an existing important population into two or more populations.
Criterion 4: adversely affect habitat critical to the survival of a species	The proposed works would remove an additional 626 ha of native vegetation which would serve as potential foraging habitat. This species is highly mobile, and a large expanse of continuous and suitable habitat is available in the areas surrounding the Development Footprint. It is therefore unlikely that the proposed works would affect habitat critical to the survival of a species.	The proposal would remove approximately 626 ha of native vegetation, including pockets of potential habitat for this species. A large expanse of adjoining and suitable habitat is available in the areas surrounding the Development Corridor. It is therefore unlikely that the proposal would affect habitat critical to the survival of the species.
Criterion 5: disrupt the breeding cycle of an important population	No cliff lines, caves and rocky outcrops occur within Development Footprint. Therefore, it is unlikely that the proposed works would disrupt the breeding cycle of an important population of Large eared Pied Bat. There is limited potential for mortality due to rotor collisions as this species typically flies below RSA height.	No records of this species or important populations are known within the Development Footprint. Therefore, it is unlikely that the proposal would disrupt the breeding cycle of an important population.
Criterion 6: modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed works would remove 626 ha of potential foraging habitat only for this species. A large expanse of suitable habitat is available in the areas surrounding the Development Footprint. It is therefore unlikely that the proposed works would affect habitat to the extent that it would cause a decline to this species.	The proposal would remove approximately 626 ha of native vegetation, including pockets of potential habitat for this species. A large expanse of adjoining and suitable habitat is available in the greater Study Area surrounding the Development Footprint.
Criterion 7: result in invasive species that are harmful to an endangered or vulnerable species becoming established in the species' habitat	The proposed works would not result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered species' habitat.	The proposed works would not result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered species' habitat.
Criterion 8: introduce disease that may cause the species to decline.	The proposed works would not introduce disease that may cause the species to decline.	The proposed works would not introduce disease that may cause the species to decline.
Criterion 9: interfere with the recovery of a vulnerable species.	<p>A national recovery plan has been prepared for the Large-eared Pied Bat. The objective of the recovery plan is "to ensure the persistence of viable populations of the large-eared pied bat throughout its geographic range".</p> <p>As no key populations have been identified in the area surrounding the Development Footprint, the proposed works would not interfere with this recovery objective.</p>	<p>A national recovery plan has been prepared for the Striped Legless Lizard. The objective of the recovery plan is "to ensure the long-term survival of <i>D. impar</i> throughout its distribution" (NPWS 1999).</p> <p>No records exist within the Development Corridor and it was not identified in targeted surveys by ERM in 2012 – 2103, therefore, the proposal would not interfere with this recovery objective. Mitigation measures including pre-clearing surveys and micro-siting of infrastructure will be employed to avoid impacts to any previously unrecorded individuals to ensure the Project does not interfere with the recovery of this species.</p>
	Grey-headed Flying-fox	<i>Dichanthium setosum</i> (Bluegrass), <i>Swainsona recta</i> (Small Purple-pea) and <i>Zieria obcordata</i>
Criterion 1: lead to a long-term decrease in the size of an important population of a species	A Grey-headed Flying Fox camp has been recorded in Wellington, NSW approximately 14 km west of the Development footprint. Roosting camps are generally located within 20 km of regular food source, although this species can travel up to 50 km from the camp to forage. Therefore, this species has the potential to utilize the Development Footprint, particularly the flowering White Box during seasons of prolific flowering.	<p>No threatened flora species have been recorded in the Study Area.</p> <p>Populations of <i>Zieria obcordata</i> have been recorded nearby, although this species appears to grow exclusively within rocky granite outcrop. There is one record of <i>Dichanthium setosum</i> north of the Development Footprint, although this species is much more abundant within the Nandewar Bioregion. <i>Swainsona recta</i> is known from</p>

Grey-headed Flying-fox		<i>Dichanthium setosum</i> (Bluegrass), <i>Swainsona recta</i> (Small Purple-pea) and <i>Zieria obcordata</i>
	<p>There is potential for mortality due to rotor collisions as this species typically flies at RSA height. It is anticipated that this species will be spread out across the landscape and therefore reducing the number of individuals being subjected to rotor strike. The species has good eyesight and is a manoeuvrable, therefore it is expected that the majority of individuals would be able to avoid wind turbines.</p> <p>It is considered unlikely that the proposed action will lead to a long-term decrease in the size of the population, however there is uncertainty over how the locality may be used by the species in future seasons.</p>	<p>the locality and records occur to the south of the Development Corridor at Lake Burrendong, and to the west around Wellington.</p> <p>It is unlikely that a previously undiscovered important population of any of these species occurs within the Development Footprint. Nonetheless, mitigation measures including pre-clearing surveys and micro-siting of infrastructure will be employed to avoid impacts to any previously unrecorded threatened flora. Consideration to the timing of clearing activities will be given to ensure seasonal limitations to the identification of threatened flora are observed.</p>
Criterion 2: reduce the area of occupancy of an important population	The proposed action would impact up to approximately 626 ha of potential foraging habitat. The Grey-headed Flying-fox will mainly utilise Eucalypt species for foraging at times of flowering. There are no records of this species within the Development Footprint, and therefore is not considered core or important habitat for the species. This species is very mobile and is likely to remain unaffected by loss of a small area of seasonal foraging habitat.	<p>No threatened flora species have been recorded in the Study Area.</p> <p>It is unlikely that a previously undiscovered important population of any of these species occurs within the Development Footprint. Nonetheless, mitigation measures including pre-clearing surveys and micro-siting of infrastructure will be employed to avoid impacts to any previously unrecorded threatened flora.</p>
Criterion 3: fragment an existing important population into two or more populations	Fragmentation of woodland habitat associated within the proposal is likely to be limited to the widening of existing tracks, corridors for transmission lines and clearing for crane pads and turbines. As the Grey-headed Flying-fox is very mobile, the proposal is unlikely to fragment an existing important population into two or more populations.	<p>No threatened flora species have been recorded in the Study Area.</p> <p>It is unlikely that a previously undiscovered important population of any of these species occurs within the Development Footprint. Nonetheless, mitigation measures including pre-clearing surveys and micro-siting of infrastructure will be employed to avoid impacts to any previously unrecorded threatened flora.</p>
Criterion 4: adversely affect habitat critical to the survival of a species	The proposal would impact approximately 626 ha of potential foraging habitat. This species will mostly utilise flowering Eucalypts, particularly White Box. This species is highly mobile and a large expanse of contiguous and suitable habitat is available in the areas surrounding the Modification Disturbance Footprint. It is therefore unlikely that the Project would affect habitat critical to the survival of a species.	<p>No specific habitat for these threatened flora species has been identified in the Development Corridor. Where known populations of these species exist in the locality, they will remain undisturbed by the Project.</p> <p>Nonetheless, mitigation measures including pre-clearing surveys and micro-siting of infrastructure will be employed to avoid impacts to any previously unrecorded threatened flora.</p>
Criterion 5: disrupt the breeding cycle of an important population	There are no known maternity roosts within the area, which typically occur in more fertile and productive areas close to permanent water sources. Therefore, the proposal is unlikely to disrupt the breeding cycle of an important population.	<p>No threatened flora species have been recorded in the Study Area.</p> <p>It is unlikely that a previously undiscovered important population of any of these species occurs within the Development Footprint. Nonetheless, mitigation measures including pre-clearing surveys and micro-siting of infrastructure will be employed to avoid impacts to any previously unrecorded threatened flora.</p>
Criterion 6: modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Approximately 626 ha of seasonal foraging habitat will be impacted by the proposal. Use of this habitat is likely to be sporadic and small amounts of clearing is unlikely to affect the species. The Development Footprint and locality is dominated by scattered White Box and large amounts will remain unaffected by the proposal. Therefore, the proposal is unlikely to modify, destroy, remove or isolate the availability of habitat to the extent that the species is likely to decline.	<p>No specific habitat for these threatened flora species has been identified in the Development Corridor. Where known populations of these species exist in the locality, they will remain undisturbed by the Project.</p> <p>Nonetheless, mitigation measures including pre-clearing surveys and micro-siting of infrastructure will be employed to avoid impacts to any previously unrecorded threatened flora. Consideration to the timing of clearing activities will be given to ensure seasonal limitations to the identification of threatened flora are observed.</p>
Criterion 7: result in invasive species that are harmful to an endangered or vulnerable species becoming established in the species' habitat	The proposed works would not result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered species' habitat.	A BMP would be developed, which would include weed management protocols. Assessment of priority weeds in the Project Footprint will be undertaken and appropriate management measures to minimise risk of spreading weeds outside of the Development Footprint will be implemented.
Criterion 8: introduce disease that may cause the species to decline.	The proposed works would not introduce disease that may cause the species to decline.	A BMP would be developed, which would include plant disease and pathogen management protocols.
Criterion 9: interfere with the recovery of a vulnerable species.	There is currently no Recovery Plan for the Grey headed Flying fox. A key threatening process for this species is habitat loss or degradation at a landscape scale. As the Development Footprint is in a modified, degraded and fragmented state, it is unlikely that the scale of clearing for the proposed works will interfere substantially with the recovery of this species.	These species are found in known locations throughout their regional habitat distribution and are not known to occur in the Development Corridor. Mitigation measures including pre-clearing surveys and micro-siting of infrastructure will be employed to avoid impacts to any previously unrecorded threatened flora to ensure the Project does not interfere with the recovery of these species.
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland - CEEC occurs in both the woodland and DNG forms (CW112 and CW211)		
Criterion 1: reduce the extent of an ecological community	The current Development Footprint includes approximately 14 ha of the CEEC to be impacted, although this number may increase or decrease following detailed design and micro-siting of infrastructure.	
Criterion 2: fragment or increase fragmentation of an ecological community	Mapped CEEC is concentrated in areas associated with the upgrade to Twelve Mile Road and the overhead transmission line easements, where potential exists to avoid. In particular, grassland forms of the CEEC would remain undisturbed outside of areas of direct impact. Project infrastructure would be concentrated on ridgelines, where potential pockets of mapped CEEC are assumed to exist in a degraded state with good condition vegetation remaining undisturbed on valleys and slopes.	

**White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland - CEEC occurs in both the woodland and DNG forms (CW112 and CW211)**

Existing agricultural clearing has led to existing fragmentation of the community in the Development Footprint. The Project is unlikely to increase fragmentation of this community, given the small patches to be removed are already fragmented.

Criterion 3: adversely affect habitat critical to the survival of an ecological community

Good condition areas of this CEEC are known in the landscape outside of the Development Footprint, in particular those associated with National Parks. Preliminary assessments have been undertaken on three properties for potential land-based offsets for the Project, which has included desktop review of publicly available vegetation community mapping. The preliminary assessments have shown that the vegetation communities on neighbouring properties are largely consistent with those in the Development Footprint, including vegetation communities associated with the CEEC. Therefore, the CEEC is highly likely to persist in the locality.

Criterion 4: modify or destroy abiotic factors necessary for an ecological community’s survival, including reduction in groundwater levels, or substantial alteration of surface water drainage patterns.

The proposed works will not significantly impact on abiotic factors such as nutrient and water availability.

Criterion 5: cause substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species.

The Project would not significantly change the species composition of the total CEEC occurrence within the surrounding area. Inspection of previously modified DNG forms of this CEEC in the Development Footprint showed that there were imperceptible differences between surrounding vegetation and the modified areas, such as those containing roads or tracks.

Criterion 6: 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

A BMP would be developed, which would include weed management protocols. Assessment of priority weeds in the Project Footprint will be undertaken and appropriate management measures to minimise risk of spreading weeds outside of the Development Footprint will be implemented.

The key threats to the viability of landscape-managed ecological communities are loss, fragmentation and degradation of habitat, and widespread pervasive factors such as impacts of climate change. Many of these threats are addressed by NSW planning, native vegetation, and biodiversity legislation, policy and programs including the offsets program (as undertaken for this Project).

Criterion 7: interfere with the recovery of an ecological community.

Preliminary assessments have been undertaken on three properties for potential land-based offsets for the Project, which has included desktop review of publicly available vegetation community mapping. The preliminary assessments have shown that the vegetation communities on neighbouring properties are largely consistent with those in the Development Footprint, including vegetation communities associated with the CEEC. Land-based offsets would provide a mechanism to secure and preserve areas of CEEC in perpetuity, assisting with the recovery effort in the surrounding landscape.

Conservation management measures will be implemented under the Biodiversity Management Plan for the Project offsets including working to increase woodland patch sizes and condition, and reconnecting fragmented patches using appropriate landscape configurations, plant species and provenances. Enhancement of structural complexity and remnant size/configuration and of use genetic material of appropriate provenance in plantings. Connectivity and restoration planting will be considered to provide functional habitat to ensure predation of leaf eating insects by insectivores is occurring at a functional rate.

**Migratory birds – Satin Flycatcher, Fork-tailed Swift and White-throated Needle-tail**

Criterion 1: 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

There are no areas of habitat within the Development Footprint which are considered unique or particularly important for migratory species. No large aggregations of migratory species have been recorded within the Development footprint, nor are they expected to occur based on the available habitat within the development footprint. The proposed works is unlikely to modify, destroy or isolate any habitat that is important to a migratory species.

Criterion 2: result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or

The Development Footprint does not provide an area of important or unique habitat for a migratory species. The proposed works will involve the construction and operation of a wind farm. Impacts on the environment will be mitigated or controlled through the Biodiversity Management Plan. It is thus unlikely that the action would result in an invasive species becoming established in the Development Footprint.

Criterion 3: seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

No ecologically significant proportions of a migratory species population have been identified within the development footprint. The action would involve the construction and operation of a wind farm.

The siting of the wind farm has considered known migratory flight patterns and bird utilization, and field surveys did not record species migrating over the Development Footprint. A residual collision risk is present for migratory species, however due to the low numbers of migratory species recorded, this is not likely to have any affect to populations of migratory species within the locality. It is thus considered unlikely that the proposed works will seriously disrupt the lifecycle of an ecologically significant proportion of the population of a migratory species.

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## Attachment 3: Updated Biodiversity Assessment Report and Biodiversity Offset Strategy



A stylized topographic map with green contour lines is positioned on the left side of the page, extending from the top to the bottom. The lines represent elevation changes, with some forming circular peaks and others following a more irregular, wavy path.

Uungula Wind Farm

BIODIVERSITY ASSESSMENT REPORT AND  
BIODIVERSITY OFFSET STRATEGY

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**CWP Renewables Pty Ltd**

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## DOCUMENT TRACKING

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Template 2.8.1



## Executive Summary

### INTRODUCTION

CWP Renewables Pty Ltd (CWPR) plans to develop the Uungula Wind Farm (UWF), herein referred to as the Project, within the Dubbo Regional Council Local Government Area, approximately 14 km east of Wellington, NSW. The Project generally consists of the installation, operation, maintenance and decommissioning of up to 97 Wind Turbine Generators (WTGs), an Energy Storage Facility (ESF), Ancillary Infrastructure and Temporary Facilities. The Project is designed to accommodate a contemporary WTG of up to 250 m in height with a nameplate capacity of approximately 4 megawatts (MW) or greater.

Eco Logical Australia (ELA) was engaged by CWPR to prepare a Biodiversity Assessment Report (BAR) and Biodiversity Offset Strategy (BOS) to support the Environmental Impact Statement (EIS) for the Project. The BAR and BOS respond directly to the Secretary's Environmental Assessment Requirements (SEARs) issued for the Project, which require biodiversity to be assessed and biodiversity offsets to be calculated in accordance with the Framework for Biodiversity Assessment (FBA).

The BAR provides an assessment of the biodiversity values which may be affected by the Project, identified through a comprehensive data audit and literature review, Geographic Information Systems (GIS) analysis and series of ecological field surveys.

### PROJECT BACKGROUND

The Project was assessed under the former BioBanking Assessment Methodology (BBAM) in 2013 by Environmental and Resource Management (ERM), on a Study Area roughly three times the size of the current Project Development Footprint. The ERM assessment included a significant field survey effort completed in 2012 – 2013 undertaken in accordance with Director General's Requirements (DGRs) issued for the Project in 2011 (superseded by the current SEARs), which has been considered in the preparation of this BAR. In particular, vegetation mapping and the data collected from vegetation plots under the BBAM has been used, which is consistent with the FBA plot data collection methodology.

Consultation was undertaken with the (former) NSW Office of Environment and Heritage (OEH) in October 2018 regarding the use of the ERM data for this assessment. It was concluded that the ERM data and assessment undertaken in 2012 – 2013 was remained relevant and was appropriate for use in the contemporary assessment, and that supplementary field survey was only required to address gaps in the data or changes in the Development Footprint. The document has been further updated to respond to submissions received on the UWF EIS, lodged in 2020, and uses an updated Development Footprint which has been revised slightly since the submission of the EIS.

### STUDY AREA

The Study Area subject to assessment includes all infrastructure associated with the Project within a 100 m Development Corridor buffer surrounding the Development Footprint, and the proposed External Road Upgrades extending outside of the Development Corridor. The Development Footprint comprises the extent of predicted ground disturbance required for the Project which forms the basis for assessment of impacts and offset calculations in the BAR. The Development Footprint will be subject to a detailed design process and is subject to change on the final design. Therefore, the Study Area includes

the entire Development Corridor to allow for flexibility, although it is expected that the overall area of disturbance will be reduced.

The Study Area further extends to include the extent of the area surveyed for the ERM assessment, which includes detailed vegetation mapping and survey data extending well outside the Development Footprint and Development Corridor. Approximately 1,880 ha of native vegetation has been mapped within a 1,927 ha Study Area, compared with the current Development Footprint disturbance area of 667 ha.

Due to the scale of the Project, mapped vegetation communities, plot locations and mapped Threatened Ecological Communities (TECs) are shown in detail over a series of maps for both the proposed wind farm layout and Twelve Mile Road. The map books are included in **Appendix A**.

### NATIVE VEGETATION

Native vegetation in the Study Area was mapped from a series of extensive field surveys undertaken by ERM in 2012 - 2013. The ERM assessment was supplemented by a series of further field surveys undertaken by ELA in 2018, 2019 and 2020, primarily to validate previously mapped vegetation and to assess any gaps due to changes in the Development Footprint, including the addition of the Twelve Mile Road transport route. Vegetation data was compiled to produce a single combined vegetation mapping layer for the entire Study Area.

Vegetation was mapped to Biometric Vegetation Type (BVT) as required by the FBA. Five BVTs were identified in the Development Corridor, clipped to 667 ha within the Development Footprint. The vegetation comprises predominately modified grassland communities (72%) interspersed with pockets of remnant native vegetation remaining in open forests and woodlands mainly along ridgelines and slopes (22%). The remaining 6% comprises farm dams or cleared land/non-native vegetation. Vegetation was stratified into 13 vegetation Zones based on vegetation condition. Plot and transect data was compiled from the ERM assessment in accordance with the minimum number required for each vegetation Zone prescribed in the FBA, with supplementary plots completed in the field by ELA where gaps existed.

### THREATENED ECOLOGICAL COMMUNITIES

Approximately 29 ha of the vegetation mapped within the Development Footprint is associated with one Threatened Ecological Community (TECs) listed under the NSW *Biodiversity Conservation Act 2016* (BC Act):

- White Box Yellow Box Blakely's Red Gum Woodland

Approximately 14 ha of the BC Act listed TEC meets the listing criteria for the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed TEC:

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland

This TEC is listed as a Critically Endangered Ecological Community (CEEC) under both the State and Commonwealth Acts.

## THREATENED SPECIES

Threatened species known, likely or with the potential to be impacted by the Project were identified from the ERM assessment, which included significant field survey in 2012 – 2013, supplemented by an updated desktop assessment, additional field survey and habitat mapping.

No threatened flora species have been previously recorded within the Study Area. Four (4) threatened flora candidate species were identified as having the potential to occur in the Development Corridor based on the associated BVTs, presence of suitable habitat and nearby previous records:

- *Dichanthium setosum* (Bluegrass)
- *Swainsona sericea* (Silky Swainson-pea)
- *Swainsona recta* (Small Purple-pea).
- *Zieria obcordata*.

Whilst none of the above flora species have been recorded in the Study Area, The Proponent will commit to undertaking pre-clearing surveys in areas of suitable habitat prior to vegetation clearing. Micro-siting of infrastructure will be employed to avoid any impact to previously unrecorded threatened flora species.

There are a number of threatened fauna species records in and around the Study Area, including those identified through the field survey effort. However, the majority of threatened fauna known, likely or with the potential to occur are ecosystem credit species and will be offset accordingly through vegetation offsets.

Four (4) potential species credit candidate species were identified as having the potential to occur in the Study Area. Only one of these was identified in the Study Area from the targeted field surveys undertaken by ERM, although not within the current Development Corridor:

- *Petaurus norfolcensis* (Squirrel Glider)

Three (3) further threatened fauna candidate species are considered to have the potential to occur within the Study Area, based on the presence of potential habitat and records within a 20 km radius of the Development Corridor:

- *Cercartetus nanus* (Eastern Pygmy-possum)
- *Phascolarctos cinereus* (Koala)
- *Anthochaera phrygia* (Regent honeyeater).

Koala is known from nearby records and is considered to have the potential to occur, albeit sporadically, within the Study Area due to the presence of suitable habitat including key feed tree species. Due to the cryptic nature of this species, it was determined that despite targeted surveys undertaken by ERM in 2012/2013 which didn't record the species, it is not possible to definitively exclude Koala from the Development Corridor.

An expert report has been prepared to determine the likelihood of Regent Honeyeater presence. The expert report found that potential foraging habitat for the Regent Honeyeater was present in the Study

Area, but that breeding habitat was unlikely based on the lack of key breeding habitat features. The expert report concluded that the Regent Honeyeater has the potential to occur in the Study Area during times of mass flowering events to utilise the available foraging habitat.

Consultation was sought with the Biodiversity and Conservation Division (BCD) to determine the potential to confirm presence or absence of both the Squirrel Glider and Eastern Pygmy-possum through targeted survey. A field survey for specific potential habitat, based on expert advice, was undertaken in August 2020 to refine the areas of habitat and develop a targeted survey methodology, which will be undertaken later in 2020. Offset requirements for these two species will be reviewed following the results of the targeted surveys.

### COMMONWEALTH MATTERS

Threatened species and communities protected under the EPBC Act which may be affected by the Project have been identified in this report, and justification is provided where impacts are considered unlikely. Impacted species and communities will be offset through either ecosystem or species credit species under the FBA. Further assessment of EPBC Act protected species and communities is included in this BAR and in the EIS for the Project.

### MITIGATION

The Development Footprint has been subject to considerable revision and reduction since it was first conceptualised and is currently approximately one third the size of the original Project design. Consideration of biodiversity constraints has, and will continue, to provide significant input into the final Development Footprint. Avoidance of CEEC and threatened species habitat through design consideration will continue through to construction, including detailed ecological preclearing surveys prior to construction and micro-siting of infrastructure to avoid impacts to any previously unrecorded threatened species. Ongoing management measures will be implemented to manage unavoidable impacts at all stages of the Project and will be detailed in a comprehensive Biodiversity Management Plan to be developed for the Project post-approval.

### OFFSET REQUIREMENT

Vegetation Zones mapped to the current Development Footprint were entered into the BioBanking Credit Calculator for Major Projects (BBCC) supported by plot and transect data from the ERM assessment. Due to changes in the Development Footprint since the plots were completed, plot data was entered from plots undertaken in the greater Study Area (adjacent to, but not directly within, the Development Footprint). The number of credits required to offset impacts to each BVT was calculated.

A total of 26,421 ecosystems credits would be required; however, it is expected that the offset requirement will be recalculated once the final Development Footprint is determined. This may result in changes to the credits calculated for individual BVTs, but is expected to decrease in area resulting in an overall reduction in the number of credits.

Species credits for Koala, Regent Honeyeater, Eastern Pygmy-possum, Squirrel Glider were calculated from species polygons created for each of the four candidate species, based on their associated habitat within the Development Footprint. Species credits have been calculated on the area (ha) of the species polygons for these species, and are considered to represent an upper-maximum of the credits required.

The final credit requirement will be confirmed following the targeted field surveys for Squirrel Glider and Eastern Pygmy-possum and the final Development Footprint.

It is noted that credits calculated by the BBCC following assessment under the FBA will require determination of reasonable equivalent credits as determined by the current Biodiversity Offset Scheme under the BC Act, determined by the Biodiversity Assessment Method (BAM). Due to differences between the FBA and the BAM regarding offsets for threatened species foraging and breeding habitat, it is expected that the equivalent credits required to offset Regent Honeyeater under the BC Act and the BAM will be for foraging habitat only (ecosystem credits), and the mechanism to secure offsets via area (ha) of appropriate associated vegetation type will be appropriate. That is, BAM species credits for Regent Honeyeater will not be required.

### BIODIVERSITY OFFSET STRATEGY

Following the refinement of the final development footprint, CWPR will recalculate the credits required to offset the impacts and implement a BOS for the Project. The BOS would use one, or a combination, of the following:

- acquiring or retiring credits by:
  - creating new credits by establishing a land-based offset area
  - purchasing existing credits
- making payments into an offset fund.

CWPR has commenced consultation with surrounding landowners to investigate the option of purchasing a neighbouring property as a land-based offset. Preliminary assessments have been undertaken on three properties which has included desktop review of publicly available vegetation community mapping and entry into the BAM Calculator (BAMC). The preliminary assessments have shown that the vegetation communities on neighbouring properties are largely consistent with those in the Development Footprint, including vegetation communities associated with the EPBC and BC Act listed CEEC. Further investigation is required to refine and validate vegetation mapping to determine the offset potential, however, the presence and area (ha) of equivalent vegetation communities indicates that land-based offsets will provide a viable mechanism to secure and retire the required biodiversity offset credits.

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## Abbreviations

Abbreviation	Description
AHD	Australian Height Datum
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Calculator
BAR	Biodiversity Assessment Report
BBAM	BioBanking Assessment Methodology
BBAMP	Bird and Bat Adaptive Management Plan
BBCC	BioBanking Credit Calculator for Major Projects
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BCT	Biodiversity Conservation Trust
BCD	Biodiversity and Conservation Division of the NSW Department of Planning, Industry and Environment
BMP	Biodiversity Management Plan
BOS	Biodiversity Offset Strategy
BVT	Biometric Vegetation Type
CEEC	Critically Endangered Ecological Community
CWPR	CWP Renewables Pty Ltd
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DECC	(former) NSW Department of Environment and Climate Change
DGRs	Director General's Requirements
DPIE	NSW Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
EES	Environment, Energy and Science division of the NSW Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
ELA	Eco Logical Australia
EP&A Act	NSW <i>Environmental Protection and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
ERM	Environmental Resources Management Pty Ltd
ERP	Emergency Response Plan
ESF	Energy Storage Facility
FBA	Framework for Biodiversity Assessment
GIS	Geographic Information Systems
IBRA	Interim Biogeographic Regionalisation of Australia
MW	Megawatt

Abbreviation	Description
OEH	NSW Office of Environment and Heritage (former)
SEARs	Secretary's Environmental Assessment Requirements
SPRAT	Species Profile and Threats (EPBC Act)
TEC	Threatened Ecological Community
TSC Act	NSW <i>Threatened Species Conservation Act 1995</i> (now repealed)
UWF	Uungula Wind Farm
WTG	Wind Turbine Generators

# 1. Introduction

CWP Renewables Pty Ltd (The Proponent) plans to develop the Uungula Wind Farm (UWF), herein referred to as the Project, within the Dubbo Regional Council Local Government Area, approximately 14 km east of Wellington, NSW (Figure 1.1). The Project generally consists of the installation, operation, maintenance and decommissioning of up to 97 Wind Turbine Generators (WTGs), an Energy Storage Facility (ESF), Ancillary Infrastructure and Temporary Facilities. The Project is designed to accommodate a contemporary WTG of up to 250 m in height with a nameplate capacity of approximately 4 megawatts (MW) or greater. The full Project Description is detailed in the Environmental Impact Statement (EIS) for the Project.

Eco Logical Australia (ELA) was engaged by CWPR to prepare this Biodiversity Assessment Report (BAR) and Biodiversity Offset Strategy (BOS) as part of the EIS to support the application for Development Consent under the *Environmental Planning and Assessment Act 1979* (EP&A Act). This BAR and BOS have been developed in accordance with the NSW Framework for Biodiversity Assessment (FBA) in response to the Secretary's Environmental Assessment Requirements (SEARs) which were issued for the Project on 11 November 2019, detailed below in Table 1.1. Further updates have been made to the BAR in response to submissions received on the UWF EIS. The BAR includes a comprehensive assessment of native vegetation, threatened species and vegetation communities which may be affected by the Project, and calculation of the offset requirements. The BOS presents an overview of the strategy available to CWPR to appropriately retire biodiversity offsets for the Project.

**Table 1.1: Project SEARs - biodiversity**

SEARs	Response
<b>Biodiversity</b> – including:	
Assess biodiversity values and the likely biodiversity impacts of the development in accordance with the NSW Biodiversity Offsets Policy for Major Projects (OEH, 2014) and Framework for Biodiversity Assessment (OEH, 2014), unless otherwise agreed by the Biodiversity and Conservation Division (BCD) (terrestrial biodiversity) or DPI Fisheries (aquatic biodiversity)	This BAR has been prepared under the FBA and includes a detailed assessment of the vegetation to be affected by the Project, as well as any impacts to threatened species, populations or endangered ecological communities.
Assess the impact of the development on birds and bats, including blade strike, low air pressure zones at the blade tips (barotrauma), alteration to movement patterns, and cumulative impacts of other wind farms in the vicinity.	It is noted that bird and bat strike associated with wind farm developments are not a component of the BAR consistent with Section 2.3 of the FBA. Impacts to birds and bats are addressed in the UWF EIS main document, in the Commonwealth matters section of this BAR and in the response to submissions on the EIS.

This BAR and BOS have been prepared and offset requirement calculated by ELA Ecologist Lily Gorrell, Accredited Assessor in accordance with Section 2.2.1 of the FBA.

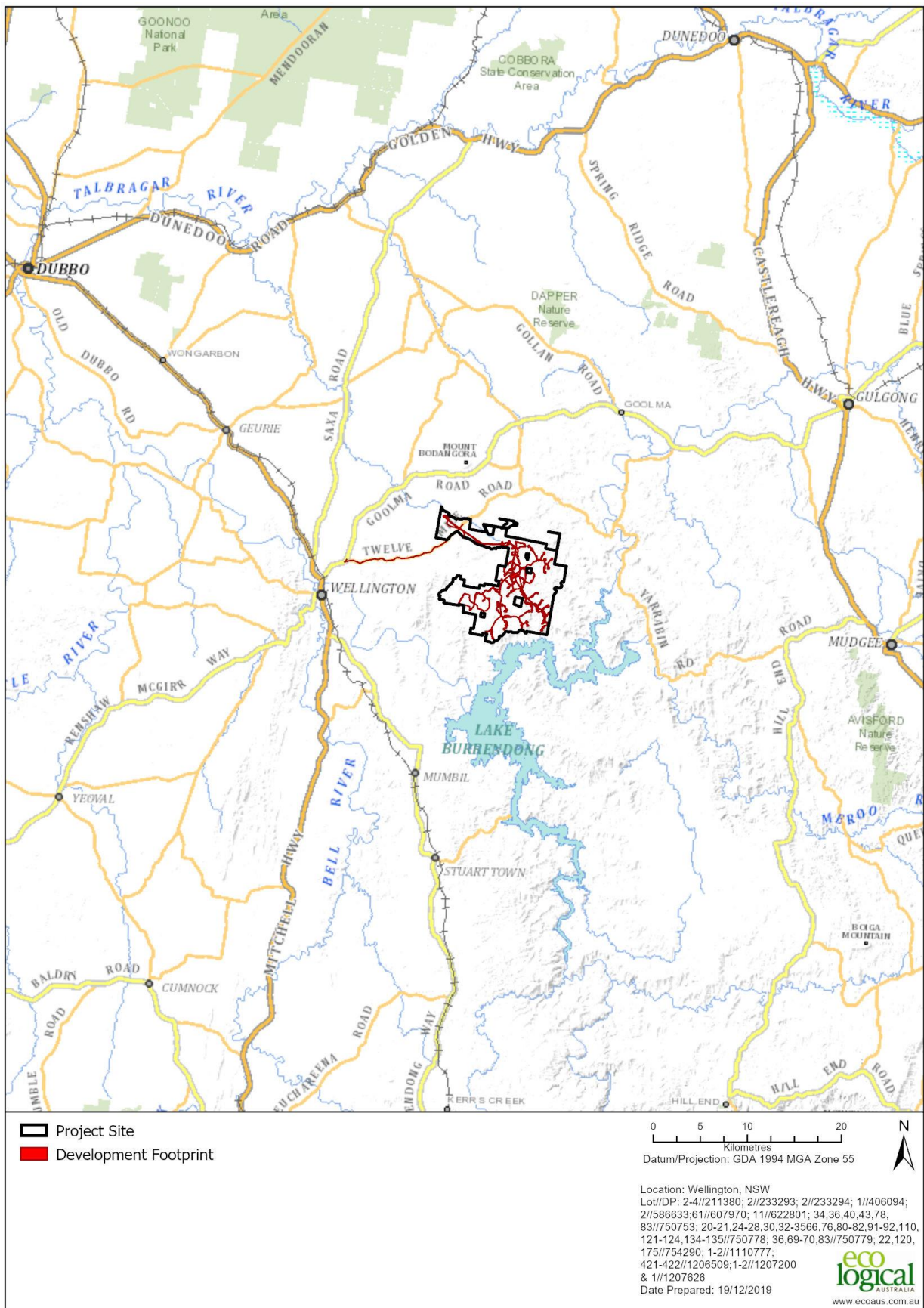


Figure 1.1: Project location

## 1.1 Development Footprint and Development Corridor

The Development Footprint subject to this assessment is the extent of ground disturbance including earthworks associated with Permanent Infrastructure and temporary facilities (other than temporary field laydown areas) in the Development Corridor, as well as ground disturbance required to upgrade external access roads extending beyond the Project Site (the External Road Upgrades).

The Development Corridor extends 100 m either side of the current indicative Development Footprint to support flexibility in the design and final placement (micro siting) of the above components. The entire Development Corridor has been subject to this assessment (the Study Area is further described in **Section 1.3** below).

The Development Footprint described in this assessment is indicative only and has been prepared based on the best knowledge available at the time. The Development Footprint may change within the Development Corridor buffer but is expected to result in an overall decrease in the area of disturbance in the final design. Flexibility is sought in the Development Consent to allow The Proponent to determine the optimal project layout within the limits of the impact assessment and Development Consent, generally in accordance with the EIS, post-Development Consent.

The Development Footprint is summarised below – detailed descriptions of each component is included in the Project EIS.

Permanent infrastructure includes all infrastructure that will remain on the Project Site during the operational phase of the Project, including:

- WTGs
- ESF
- Ancillary infrastructure including but not limited to:
  - substations
  - permanent offices and site compounds
  - underground and overhead electricity transmission lines
  - permanent meteorological masts
  - communication cables
  - water storage tank
  - hardstands
  - internal roads.

In addition, road widening upgrades will be required to two public roads to enable transport of WTG components to the Project Site. Twelve Mile Road, which accesses the western side of the Project Site from Wellington, and a small section of Ilgingery Road connecting the Development Footprint, will be subject to road widening upgrades. Impacts to biodiversity from the required upgrades along both sections of road are included in the Development Footprint for this assessment.

Temporary facilities include all facilities used for the construction, repowering and/or decommissioning of the Project, including but not limited to:

- temporary site offices and compounds

- rock crushing facilities
- concrete or asphalt batching plants
- stockpiles and materials storage compounds
- minor 'work front' construction access roads
- temporary meteorological masts.

In addition to the Development Corridor buffer, the current Development Footprint includes further buffers around all components to ensure the impact assessment has been made on a worst-case scenario to allow the Project to be constructed, operated, maintained and decommissioned within the limits of a typical wind farm Development Consent.

## 1.2 Project background

The Project was assessed under the former BioBanking Assessment Methodology (BBAM) (DECC 2009) in 2013 by Environmental Resources Management Pty Ltd (ERM), on a Study Area roughly three times the size of the current Development Footprint (ERM 2013). The ERM assessment included a significant field survey effort, which although completed in 2012 – 2013, form the basis of biodiversity data assessed in this BAR. In particular, vegetation mapping and the data collected from vegetation plots under the BBAM has been used, which is consistent with the FBA plot data collection methodology.

Consultation was undertaken with the (former) NSW Office of Environment and Heritage (OEH) in October 2018 regarding the use of the ERM data for this assessment. It was concluded that the ERM survey effort from 2102 – 2103 was adequate and the data remained relevant for the assessment.

Data from the ERM assessment includes:

- Native vegetation assessment and mapping
- Threatened Ecological Communities (TEC) assessment and mapping
- Threatened species survey data, including comprehensive species lists.

Supplementary field survey has been undertaken to address gaps due to changes in the Development Footprint and further refinement of vegetation and habitat mapping by ELA in 2018, 2019 and 2020. This includes the addition of the Twelve Mile Road transport route to the Study Area, surveyed by ELA in 2019.

## 1.3 Study Area

The Study Area subject to this assessment includes all infrastructure associated with the Project within the 100 m Development Corridor buffer surrounding the Development Footprint, Ancillary Infrastructure such as transmission lines, and the proposed upgrade to Twelve Mile Road extending outside of the Development Corridor.

The Study Area further extends to include the extent of the area surveyed for the ERM assessment, which includes detailed vegetation mapping and survey data as described above, extending well outside the current Development Footprint and Development Corridor. Approximately 1,880 ha of vegetation has been mapped within a 1,927 ha Study Area, compared with the current Development Footprint disturbance area of 667 ha.

The Study Area is shown below in Figure 1.2. Due to the scale of the Project, mapped vegetation communities, plot locations and mapped TECs are shown in detail over a series of maps for both the proposed layout and Twelve Mile Road. The map books are attached as **Appendix A**.



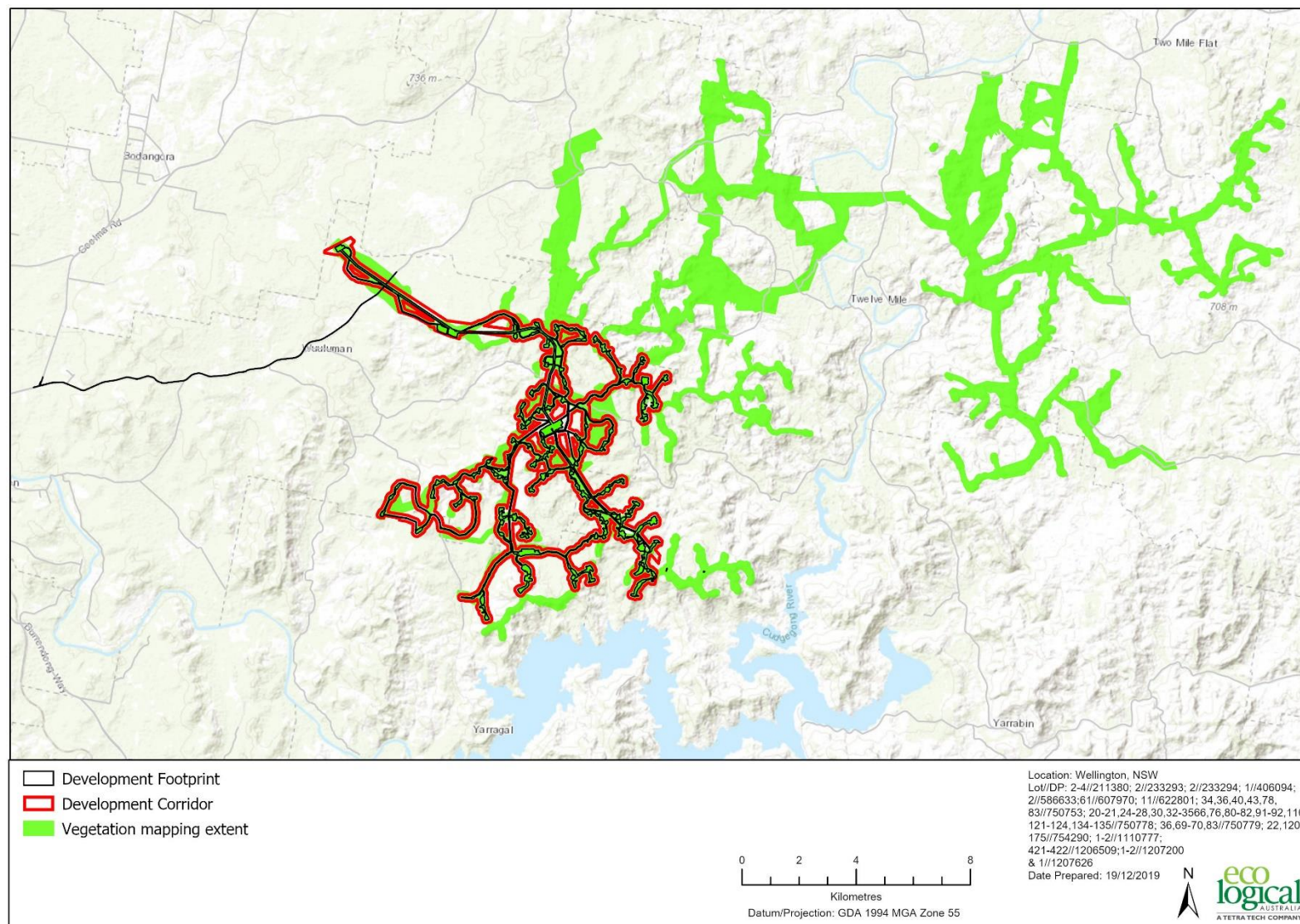


Figure 1.2: Study Area



## 1.4 Information sources

The following databases and literature were reviewed as part of this assessment:

- NSW BioNet Atlas (Department of Planning, Industry and Environment [DPIE] 2020a)
- Threatened Biodiversity Profile Data Collection (DPIE 2020b)
- NSW BioNet Vegetation Classification Database (DPIE 2020c)
- Archived BioMetric and Threatened Species Profiles datasets (DPIE 2020d)
- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool (Department of Agriculture, Water and the Environment [DAWE] 2020a)
- Species Profile and Threats (SPRAT) Database (DAWE 2020b)
- Uungula Wind Farm: Ecological Assessment (ERM 2013); prepared for Wind Prospect CWP Pty Ltd.

As described above, the Project was assessed under the BBAM in 2013 by Environmental Resources ERM, on a Study Area roughly three times the size of the current Development Footprint.

Data from the ERM assessment used in the BAR includes:

- Native vegetation assessment and mapping
- TECs
- Threatened species survey data, including comprehensive species lists
- Collision Risk Assessment.

The Project design has reduced considerably since the ERM assessment, and has reduced the Development Footprint by approximately two thirds.

Supplementary field survey has been undertaken to address gaps due to changes in the Development Footprint and further refinement of vegetation and habitat mapping by ELA in 2018, 2019 and 2020. This includes the addition of the Twelve Mile Road transport route to the Study Area, surveyed by ELA in 2019.

## 1.5 General description of site

### 1.5.1 Landscape

The topography of the Study Area is generally gently undulating to undulating with numerous valleys and peaks. Elevations vary from 359 to 705 m AHD (Australian Height Datum); averaging 543 m AHD. Burrendong State recreation area surrounds Lake Burrendong with elevated ridges to the south of the Study Area. The character of the landscape has shifted considerably over time due to European settlement. Gentle slopes have been cleared to increase grazing areas however, areas with steeper, rugged ridges and rangers or areas close to creek lines, along roadsides and property boundaries remain vegetated.

### 1.5.2 Hydrology

The Study Area is within the Macquarie River catchment area which spans over 74,000 km<sup>2</sup>, originating near Bathurst in Central Western NSW and travelling generally north-west through the towns of Wellington, Dubbo, Narromine and Warren.

Burrendong Dam, approximately 8km south of the southern boundary of the Development Footprint, provides planned environmental water and stock and domestic flows. The NSW Government also manages licensed water for the environment.

The Cudgegong River, a main tributary of the Macquarie River, runs east of the Study Area with several smaller tributaries running through the landscape comprising 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> order Strahler streams and ephemeral creeks, including Uungula Creek, Bourke's Creek, Mitchell Creek, Ben Buckley Creek, Oxley's Creek, Bulls Gully and Ilgingery Creek. Flows from the Cudgegong River confluence with the Macquarie River at Burrendong Dam. The Macquarie River drains to the Macquarie Marshes and the Barwon-Darling River, which joins the Murray River in Southern NSW before flowing into the Southern Ocean.

### 1.5.3 Vegetation

The Study Area was once dominated by open forest and woodland, which has now been extensively cleared for agricultural use. The vegetation comprises predominately modified grassland communities (75%) interspersed with pockets of remnant native vegetation remaining in open forests and woodlands mainly along ridgelines and slopes (22%). The remaining 3% comprises farm dams or cleared land/non-native vegetation. Remnant native vegetation comprises *Eucalyptus macrorhyncha* (Red Stringybark) and *E. dealbata* (Tumbledown Red Gum) on upper slopes with *Callitris endlicheri* (Black Cypress Pine), *Brachychiton populneus* (Kurrajong), *E. sideroxylon* (Mugga Ironbark), *E. albens* (White Box), *E. melliodora* (Yellow Box) and *E. blakelyi* (Blakely's Red Gum) on lower slopes. A comprehensive assessment of native vegetation is included in **Section 3**.

### 1.5.4 Land use

All land within and surrounding the Study Area is zoned RU1 Primary Production. Under existing land management, the Study Area is used predominantly for sheep grazing, with some cattle grazing. The land has been historically cleared and used for livestock grazing and some broadacre cropping. Pastures have been improved with the introduction of exotic species. Whilst cropping operations are located within the landscape, due to the undulating topography and steep elevations in some sections, broad-acre cropping is not suitable across the majority of the Study Area. Surrounding land use includes extensive agriculture, residential dwellings associated with agricultural properties, State Conservation Areas and Lake Burrendong to the south.

## 2. Landscape features

The assessment of landscape features for the Development Footprint was conducted in accordance with Appendix 4 of the FBA as a site based assessment using a 1 : 10 inner and outer assessment circle ratio (Table 2.1). A site-based assessment was chosen as the most suitable assessment method given the overall connected shape of the Development Footprint. The maximum outer assessment circle area allowable under the FBA is 15,000 ha. The Development Footprint is contained within the 15,000 ha outer assessment circle, however, the external transmission lines (with easement) and public road upgrade of Twelve Mile Road also form part of the Development Footprint and extend out of the 15,000 ha.

**Table 2.1: Inner and Outer Assessment Circle 1 : 10 ratio**

Inner Assessment Circle (ha)	Outer Assessment Circle (ha)
1,500	15,000

The landscape features are described below for the inner and outer assessment circles and are shown in a Location Map (Figure 2.1) and Site Map (Figure 2.2) as required by the FBA.

### 2.1 Interim Biogeographic Regionalisation of Australia

#### 2.1.1 Bioregions

The Development Footprint occurs wholly within the NSW South Western Slopes Bioregion (Table 2.2).

**Table 2.2: IBRA Bioregions occurring within the Development Footprint**

IBRA Bioregion Name	Development Footprint
NSW South Western Slopes	100%

**Note: IBRA = Interim Biogeographic Regionalisation of Australia**

#### 2.1.2 Subregions

The Development Footprint occurs wholly within the Inland Slopes Subregion (Table 2.3).

**Table 2.3: IBRA Subregions occurring within the Development Footprint and**

IBRA Subregion Name	Development Footprint
Inland Slopes	100%

## 2.2 Mitchell landscapes

The Mitchell landscapes within the Development Footprint are detailed below in Table 2.4.

**Table 2.4: Mitchell Landscapes occurring within the Development Footprint**

Mitchell Landscape	Cleared within CMA
Ophir – Hargraves Plateau	84%

Mitchell Landscape	Cleared within CMA
Bodangora Granite	98%

## 2.3 Streams and rivers

The Development Footprint is intersected by two 4<sup>th</sup> order streams, Mitchell and Ilgingerry Creeks, as categorised under the Strahler stream ordering system. A riparian buffer of 40 m (20 m either side) is applied as required by Appendix 2 of the FBA.

## 2.4 Wetlands

There are no wetlands within the Development Footprint.

## 2.5 Native vegetation extent

Within the Development Footprint, native vegetation was mapped using Google Satellite aerial imagery (streamed) in increments of 5% at a minimum scale of 1 : 5, 000 and a maximum scale of 1 : 10, 000, combined with the vegetation assessment and mapping completed for the Project (**Section 3**). Native vegetation mapping also considered knowledge of the locality, including potential canopy species, history of disturbance and the extensive assessment data for the Study Area.

## 2.6 Landscape value score

### 2.6.1 Extent of current and future native vegetation cover

The extent of current and future native vegetation percent cover within the assessment circles was calculated in accordance with Appendix 4 of the FBA, shown below in **Table 2.5**.

**Table 2.5: Current and future extent of native vegetation**

	Before Development				After Development				Native veg score
	Native veg (ha)	% Native veg cover	% category	Score	Native veg (ha)	% Native veg cover	% category change	Score	
Inner (1,500ha)	1158	77.2%	76-80	9	1019	67.9%	66-70	8.5	0.5
Outer (15,000ha)	8474	56.5%	56-60	12.6	7849	52.3%	51-55	11.95	0.65
Total native vegetation percent cover score									1.15

### 2.6.2 Patch Size

Patch size was calculated using Google Satellite aerial imagery (streamed) in increments of 5% at a minimum scale of 1 : 5, 000 and a maximum scale of 1 : 10, 000, combined with the vegetation assessment and mapping completed for the Project (**Section 3**). The patch size included all vegetation patches linked to vegetation within the current Development Footprint. Patches within the Development Footprint were considered linked when the adjacent vegetation was:

- in moderate to good condition

- has a patch size of > 1 ha
- is separated by a distance of < 100 m (or < 30 m for non-woody ecosystems)
- is not separated by a large water body, dual carriageway, wider highway, or similar hostile link.

Based on the above criteria, patch size was considered to be extra-large (1001 ha). The percentage of native vegetation cleared within the Ophir – Hargraves Plateau Mitchell Landscape is 84%. Based on this information, the patch size score has been calculated to be 12.

### 2.6.3 Landscape Value Score

Based on the assessment of landscape attributes above, the Landscape Value Score was calculated to be 22.2. The Landscape Value Score was used in combination with the results of the vegetation and threatened species assessment to calculate the offset requirement for the Project presented in **Section 8**.



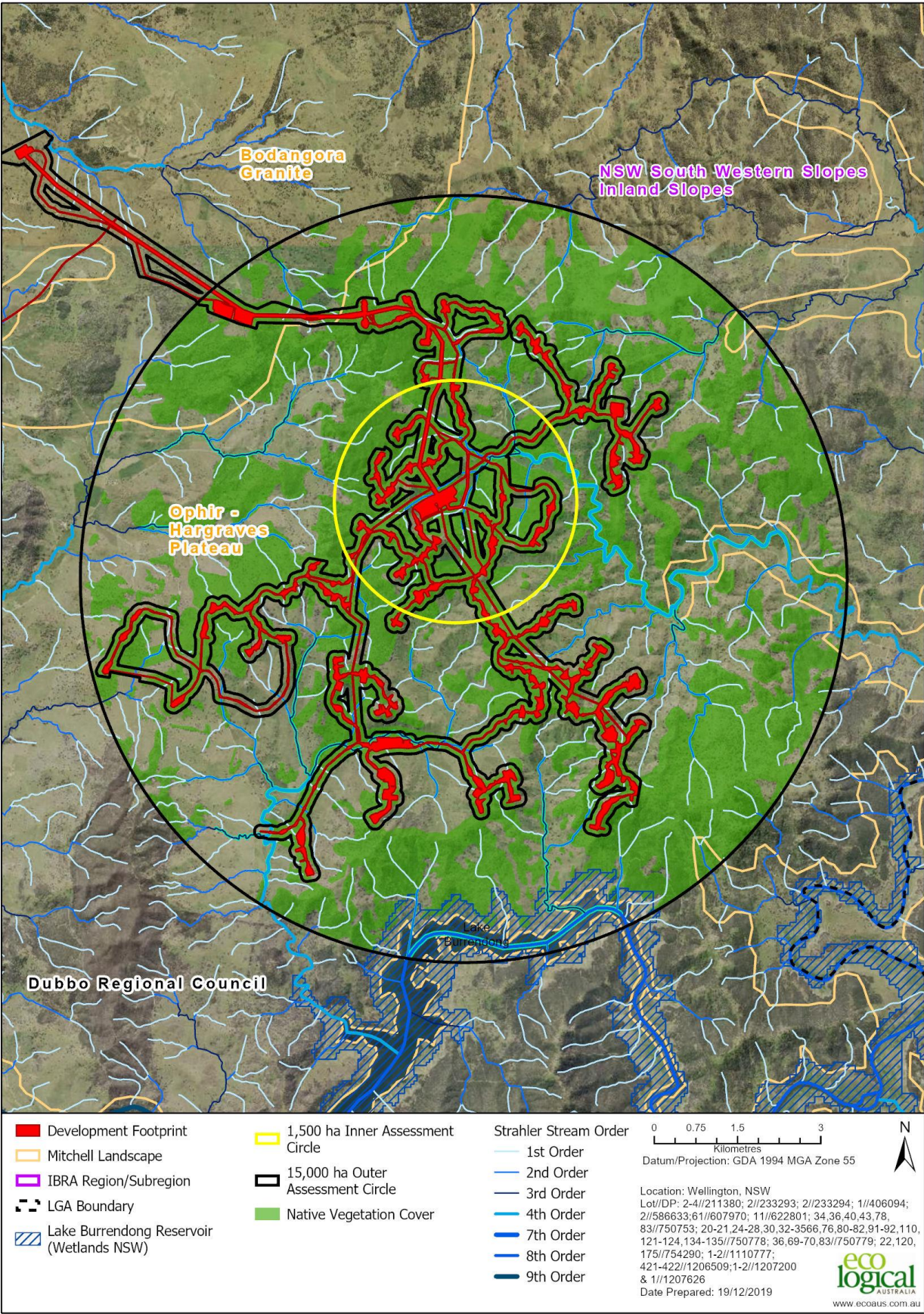


Figure 2.1: Location map



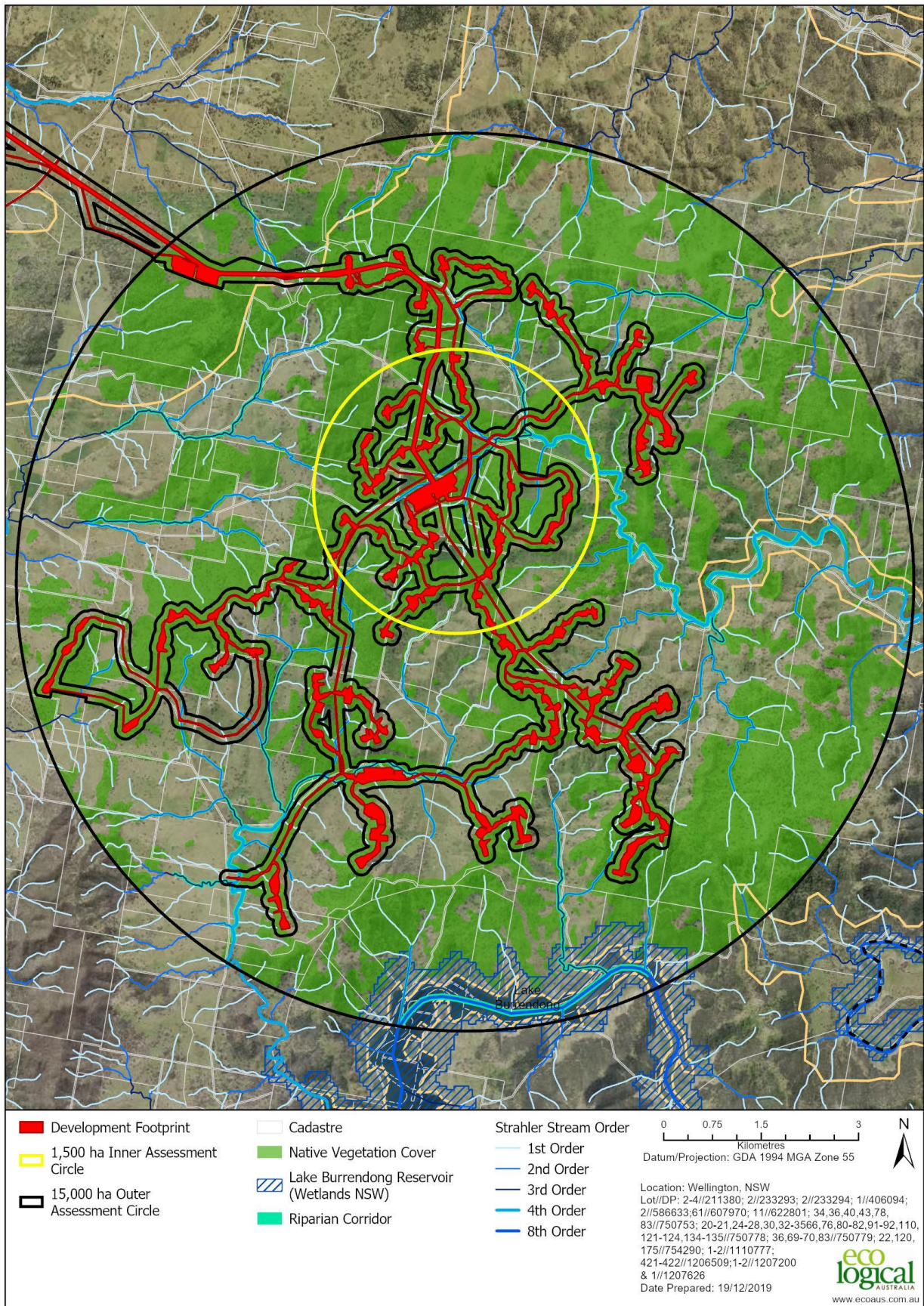


Figure 2.2: Site map



### 3. Native vegetation

Due to the scale of the Project, mapped vegetation communities, plot locations and mapped TECs are shown in detail over a series of maps for both the proposed wind farm layout and Twelve Mile Road. The map books are included in **Appendix A**.

#### 3.1 Vegetation mapping

Vegetation surveys were undertaken by ERM in 2012 and 2013 across the Study Area, roughly three times the size of the current Development Footprint. Vegetation was mapped to Biometric Vegetation Type (BVT) and stratified according to condition class to identify vegetation Zones. Approximately 1,880 ha of native vegetation was mapped within a 1,927 ha Study Area. The current Development Footprint covers a much reduced area of 667 ha within the Study Area.

Field validation of the ERM vegetation mapping was undertaken over a series of field surveys in select portions of the Study Area in September and October 2018 by ELA ecologists, led by Senior Botanist David Allworth and Senior Ecologist Dr Cheryl O'Dwyer. Detailed survey and vegetation mapping for the length of the proposed upgrade to Twelve Mile Road and Ilgingery Road was undertaken by ELA in July 2019, led by ecologists Lily Gorrell and Tomas Kelly. Further field vegetation validation was undertaken by ELA in January, August and October 2020 to address select gaps in the vegetation mapping and changes to the road design from the revised Development Footprint, led by ecologists Dr Cheryl O'Dwyer and Tomas Kelly.

Vegetation assessment methodology included rapid assessments to determine vegetation composition, structure, extent and condition. Rapid assessments were undertaken against the listing criteria for TECs under both the NSW *Biodiversity Conservation Act 2016* (BC Act) and the EPBC Act. Rapid assessments involved describing the vegetation structure, topographic position, soils and any other relevant abiotic factors.

Review of archived BioMetric datasets (DPIE 2020d) was undertaken by ELA for this assessment to refine the vegetation mapping to produce a single combined vegetation mapping GIS layer for the Study Area, clipped to the Development Footprint. Five BVTs were mapped comprising a total of 626 ha of native vegetation to be disturbed by the Development Footprint, including 483 ha of modified grassland vegetation interspersed by pockets of remnant open forest and woodland vegetation totalling 143 ha. A further 41 ha within the Development Footprint could not be assigned to a BVT and contains cleared and exotic dominated vegetation, and farm dams.

Vegetation within the Development Footprint was stratified into 13 Vegetation Zones based on vegetation condition. Vegetation Zones and BVT descriptions are detailed below in Table 3.1.

#### 3.2 Plot and transect surveys

A total of 105 plot and transects were completed by ERM in the Study Area according to the required number by area prescribed by the BBAM. Data collected from BBAM plots is consistent with the plot/transect data required for entry into the BioBanking Credit Calculator for Major Projects (BBCC) for the FBA, therefore the ERM collected data has been used for this BAR. Additional plots were completed by ELA in 2019 and 2020 to address gaps due the changes in the Development Footprint. In accordance



with the number of plots required per Vegetation Zone prescribed in Table 3 of the FBA, a total of 50 plots were used in this assessment.

Plot locations within the current Development Footprint are shown in the Map Books included in **Appendix A**. To fulfil the required number of plots, some plot data was used from plots which fall outside of the current Development Footprint, primarily due to mapping and design refinements. Locations of the plots in the required vegetation Zones, within the Study Area but outside the current Development Footprint, are shown in Figure 3.1. Plot data is included in **Appendix B**.

### 3.3 Threatened Ecological Communities

The assessment of Vegetation Zones as TECs is described for each BVT below and listed against relevant BVTs in Table 3.1. TECs are shown for the entire Development Corridor in the attached map book. Approximately 28.72 ha of the vegetation has been mapped as TEC listed under the BC Act within the Development Footprint:

- White Box Yellow Box Blakely's Red Gum Woodland - listed as an Endangered Ecological Community (EEC).

Approximately 14.15 ha of this TEC has been mapped as the EPBC Act listed community within the Development Footprint:

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland - listed as a Critically Endangered Ecological Community (CEEC).

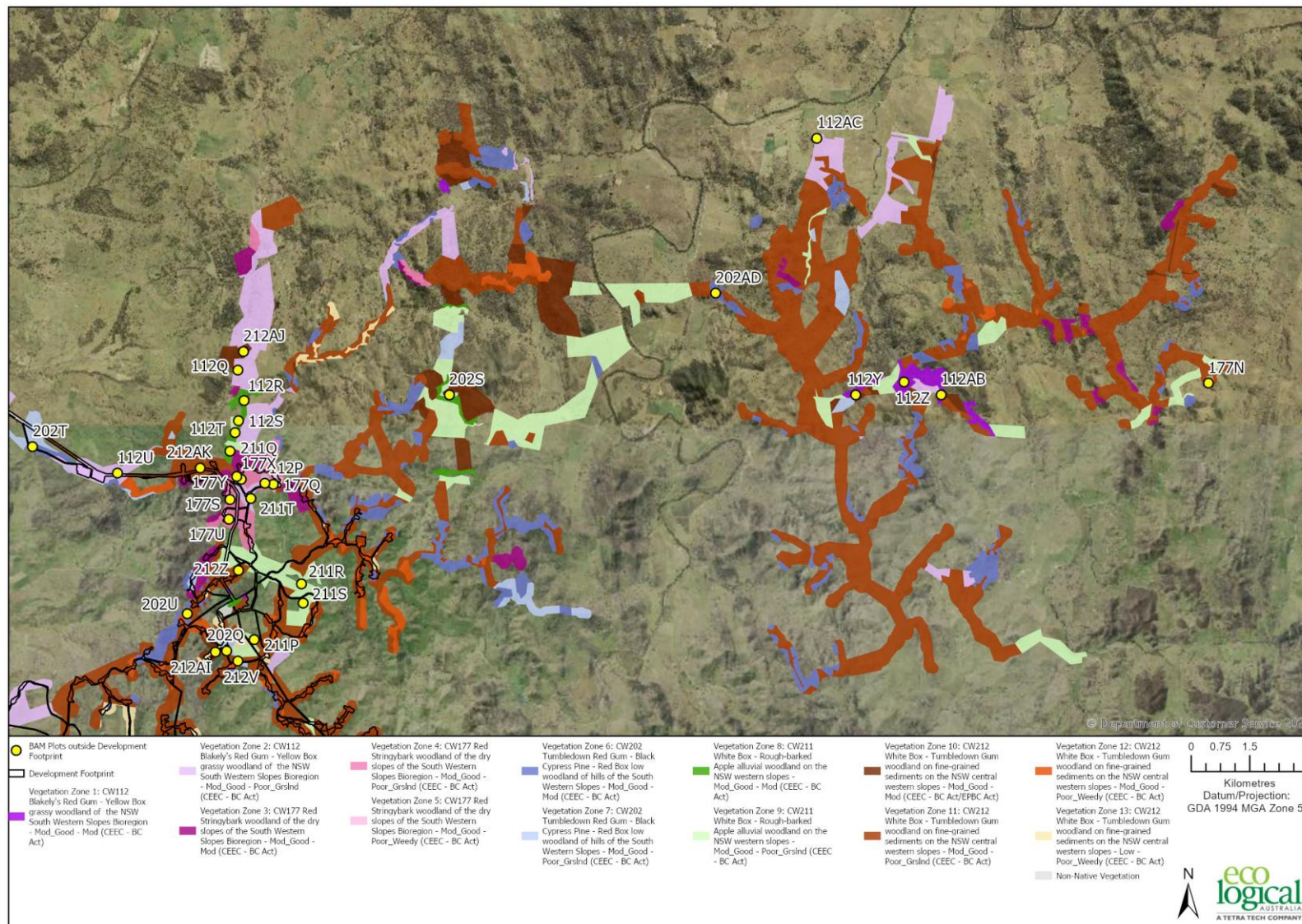
Further detail and justification for TEC assessment is included below in the vegetation community description in **Section 3.4**.

Table 3.1: Vegetation Zones within the Development Footprint

Vegetation Zone	BVT	Description	Condition	Conservation Status		Approx. Area (ha)	Plots required <sup>1</sup>	Plots completed
				BC Act	EPBC Act			
1	CW112	Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion	Moderate/Good_Moderate	White Box Yellow Box Blakely's Red Gum Woodland	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	6.28	3	3
2	CW112	Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion	Moderate/Good_Poor - Grassland	-	-	60.91	5	5
3	CW177	Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion	Moderate/Good_Medium	-	-	18.78	3	3
4	CW177	Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion	Moderate/Good_Poor - Grassland	-	-	26	4	4
5	CW177	Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion	Moderate/Good_Other - Weedy	-	-	7.21	3	3
6	CW202	Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes	Moderate/Good_Moderate	-	-	16.26	3	3
7	CW202	Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes	Moderate/Good_Poor - Grassland	-	-	11.27	3	3
8	CW211	White Box - Rough-barked Apple alluvial woodland on the NSW western slopes	Moderate/Good_Moderate	White Box Yellow Box Blakely's Red Gum Woodland	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	7.87	3	3
9	CW211	White Box - Rough-barked Apple alluvial woodland on the NSW western slopes	Moderate/Good_Poor - Grassland	-	-	45.30	4	4

Vegetation Zone	BVT	Description	Condition	Conservation Status		Approx. Area (ha)	Plots required <sup>1</sup>	Plots completed
				BC Act	EPBC Act			
10	CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	Moderate/Good_Moderate	White Box Yellow Box Blakely's Red Gum Woodland	-	14.56	3	3
11	CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	Moderate/Good_Poor - Grassland	-	-	301.67	7	7
12	CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	Low – Poor_Weedy	-	-	72.15	5	8
13	CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	Moderate/Good_Other - Grassland	-	-	37.11	4	4
Total						625	50	53

<sup>1</sup> Per Table 3 FBA



**Figure 3.1: Plot locations for plots used outside of the Development Footprint**

### 3.4 Vegetation community selection

#### 3.4.1 CW112 Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion

CW112 comprises the following Vegetation Zones:

- Vegetation Zone 1
- Vegetation Zone 2

This BVT is a grassy woodland dominated by *Eucalyptus melliodora* and to a lesser extent, *E. blakelyi*. Also present in lower densities are *Angophora floribunda* (Rough-barked Apple) and White box. There is no mid story present. The lower story is dominated by grasses such as *Aristida vagans* (Threeawn Speargrass), *Bothriochloa macra* (Red Grass) and *Themeda Australia* (Kangaroo Grass).

##### Vegetation Zone 1 – TEC assessment

The 6.28 ha of remnant CW112 remaining in the Development Footprint meets the criteria for both NSW and Commonwealth TEC as it is a grassy woodland dominated by *E. melliodora* trees. It occurs in alluvial parts of the Study Area on the floodplains of drainage lines where the soils are presumably fertile and deep. For these reasons together with the presence of regenerating *E. melliodora* trees, Vegetation Zone 1 also qualifies as the Commonwealth CEEC. It is subject to agricultural impacts including grazing.

##### Vegetation Zone 2 – TEC assessment

CW112 exists predominately as a modified grassland community (Vegetation Zone 2 - 60.91 ha) on foot slopes in the Study Area, and has been historically cleared of the tree layer for agricultural grazing. Vegetation Zone 2 is not considered to meet either the NSW or Commonwealth CEEC listing criteria due to the history of agricultural use, resulting in the absence of a tree canopy layer, insufficient floristic diversity in the ground layer, and the seed bank is considered depleted and unlikely to support regeneration.

#### 3.4.2 CW177 Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion

CW177 comprises the following Vegetation Zones:

- Vegetation Zone 3
- Vegetation Zone 4
- Vegetation Zone 5

This vegetation community is a modified woodland dominated by *E. macrochyna*, and includes *E. rossii* (Inland Scribbly Gum), *E. goniocalyx* (Long-leaved Box), *E. polyanthemos* (Red Box), *E. sparsifolia* (Narrow-leaved ironbark) and to a lesser extent, *E. albens*. There is a narrow shrub layer characterised by *Olearia elliptica* (Stick Daisy-bush) and *Stypandra glauca* (Nodding blue lily) with some *Cassinia sp.* and *Dodonea viscosa* (Sticky Hopbush) present.

This BVT occurs on ridges and rocky areas. It occurs in three modified forms within the Development Footprint, including a grazed woodland community (Vegetation Zone 3 - 18.78 ha), a grassland



community where the tree layer has been removed for agricultural grazing (Vegetation Zone 4 - 26 ha), and a scattered woodland where grazing pressure has reduced the native species component and exotic species (weeds) are prevalent (Vegetation Zone 5 - 7.21 ha). None of this BVT is considered to meet the criteria for TEC listing under either NSW or Commonwealth legislation due to species and structural composition, modification and landscape position.

### 3.4.3 CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes

CW202 comprises the following Vegetation Zones:

- Vegetation Zone 6
- Vegetation Zone 7

This community is a low woodland dominated by *E. dealbata*, *Callitris endlicheri* and *E. polyanthemos*. The mid story is shrubby and is characterised by *Xanthorrhoea Australis* (Austral Grass Tree) and *X. johnsonii* (Johnsons Grass Tree) and *Stypandra glauca*. The ground layer is herb-rich characterised by *Glycine tabacina*, *Calotis lappulacea* (Yellow Burr-Daisy), *Gonocarpus elatus* and *Goodenia hederacea* subsp. *Hederacea* (Forest Goodenia). Grasses are relatively sparse and those characteristic include *Aristida vagans*, *Austrostipa scabra* (Speargrass) and *Rytidosperma longifolium* (Long-leaved Wallaby Grass).

The vegetation community occurs on slopes and ridges as both a woodland community (Vegetation Zone 6 - 16.26 ha) and a modified grassland, with trees cleared for agricultural grazing (Vegetation Zone 7 - 11.27 ha). None of this BVT is considered to meet the criteria for TEC listing under either NSW or Commonwealth legislation due to species composition and landscape position.

### 3.4.4 CW211 White Box - Rough-barked Apple alluvial woodland on the NSW western slopes

CW211 comprises the following Vegetation Zones:

- Vegetation Zone 8
- Vegetation Zone 9

The community is a grassy woodland dominated by *Angophora floribunda* and *E. albens*. A shrub layer is absent, and the dominant grass is *Bothriochloa macra*. Other species present in the ground layer include *Einadia polygonoides*, *Dichondra repens* (Kidney Weed), *Carex appressa* (Tall Sedge), *Glycine tabacina* and *Juncus filicaulis*.

This community occurs along ephemeral drainage lines within the Development Footprint, as both a woodland community (Vegetation Zone 8 - 7.87 ha) and a modified grassland, where the tree layer has been cleared for agricultural grazing (Vegetation Zone 9 - 45.30 ha).

#### Vegetation Zone 8 – TEC assessment

This Vegetation Zone constitutes the NSW CEEC as it is a grassy woodland dominated by *E. albens* and *Angophora floribunda* trees. It occurs across alluvial parts of the Study Area in and adjacent to drainage lines where the soils are presumably fertile and deep. For these reasons together with the presence of

regenerating *E. albens* trees, this Vegetation Zone also qualifies as the Commonwealth CEEC. It is subject to agricultural impacts including grazing.

#### *Vegetation Zone 9 – TEC assessment*

The grassland form of CW211 is not considered to meet either the NSW or Commonwealth CEEC listing criteria due to the history of agricultural use, resulting in the absence of a tree canopy layer, insufficient floristic diversity in the ground layer, and the seed bank is considered depleted and unlikely to support regeneration.

### 3.4.5 CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes

CW212 comprises the following Vegetation Zones:

- Vegetation Zone 10
- Vegetation Zone 11
- Vegetation Zone 12
- Vegetation Zone 13

The remnant woodland form of this community is dominated by *E. dealbata* with *E. albens*, and to a lesser extent, *E. dwyeri* (Dwyer's Red Gum) and *Brachychiton populneus*. There are no shrubs present and a dense grassy ground layer is present characterised by *Aristida vagans*, *Austrostipa scabra* and *Rytidosperma longifolium* with the herb *Cheilanthes sieberi* subsp. *Sieberi* (Poison Rock Fern) prominent.

This vegetation occurs as remnant woodland (Vegetation Zone 10 - 14.56 ha), which meets the listed criteria for TEC (NSW only). Three modified forms of this community are dominant and are the most common type of vegetation occurring within the Development Footprint:

- A grassland where the tree layer has been partially to completely removed and the remaining native grass is utilised for agricultural grazing (Vegetation Zone 11 - 301.67 ha)
- A grassland where the tree layer has been partially to completely removed and exotic species (weeds) are prolific (Vegetation Zone 12 - 72.15 ha)
- A third grassland where grazing pressure has reduced the native species component and exotic species (weeds) are prevalent (Vegetation Zone 13 - 37.11 ha).

#### *Vegetation Zone 10 – TEC assessment*

This Vegetation Zone constitutes the NSW CEEC as it is a grassy woodland dominated by *E. albens*. Co-dominant tree species present include *E. dealbata*, *Brachychiton populneus*, *E. macrochyna* and *E. polyanthemos*. The Vegetation Zone occurs on ridges, hillslopes and undulating country on skeletal soil and outcropping of metamorphosed sedimentary geology. It is subject to agricultural impacts including grazing. However, it is not considered to meet the Commonwealth listing due to the widely spaced tree layer and occurrence on poor, skeletal soils and outcropping geology.

#### *Vegetation Zones 11, 12 and 13 – TEC assessment*

The grassland forms of CW212 are not considered to meet either the NSW or Commonwealth TEC listing criteria due to the history of agricultural use, resulting in the absence of a tree canopy layer, insufficient floristic diversity and presence/dominance of exotic species in the ground layer, and the seed bank is considered depleted and unlikely to support regeneration.



## 4. Threatened species

### 4.1 Threatened species survey effort

The ERM assessment included targeted surveys for threatened species in 2012 and 2013 in the greater Study Area in accordance with the methodology prescribed by the Director General's Requirements (DGRs) issued in 2011 (superseded by the current Project SEARs). The survey methodology and effort are listed below.

Further habitat assessment and surveys were undertaken by ELA in September 2018, June 2019, January and August 2020 by ELA to refine areas of potential habitat for threatened species. An updated desktop assessment was completed in 2020 which included searches of the relevant databases using a 20 km buffer around the Development Corridor.

#### 4.1.1 Habitat assessment

The Study Area is dominated grassland pasture with pockets of remnant open forest and woodlands. Scattered trees are typically remnant trees containing hollows – a total of 110 hollow-bearing trees were recorded in the greater Study Area, with hollow sizes averaging 10 cm in diameter. The larger stands of woodland vegetation occur on the ridges and slopes. Riparian habitat is limited to small ephemeral creek lines and has mostly been cleared.

Habitat features include an abundance of fallen timber and exposed scattered rock through much of the Study Area. No caves or escarpments were identified during any of the field surveys, and discussions with landowners concluded that these features are not present. A number of very old disused mine adits were identified in the slopes and valleys and were surveyed for microbats – these have been excluded from the Development Corridor and will not be affected by the Project.

#### 4.1.2 Threatened species survey methodology

All surveys were undertaken between October and March unless specified otherwise:

- Threatened flora survey:
  - Known reference sites for *Zieria obcordata* to the west of the Development Footprint were surveyed to provide a contextual habitat assessment of the specific habitat for this species, for comparison within the Development Corridor.
  - Random meander, total of 76.1 km of meander transects undertaken for 67 meander transects (ERM 2012 – 2013).
  - General observations during supplementary surveys conducted in September 2018, June 2019, January and August 2020 by ELA.
- Frogs and reptiles:
  - General searches including turning of logs, rocks and other ground debris and identification of frog calls.
  - Observations of several small creeks after heavy rainfall to record frogs.
  - Incidental frog observations during night surveys.
- Bird surveys:

- Bird Utilisation Surveys to assess species prone to blade strike: Two observers recording abundance of bird species for 15 minutes at 28 fixed survey points, and incidental observation of water birds and raptors, over 16 days.  
For each observation, distance from centre height and flight height were recorded, classified using graded height intervals and compared against rotor (blade) swept area.
- Woodland bird surveys: Total of 24 surveys employing 20 minutes of active searching a 2 ha area, including nest searches.
- Call playback and spotlighting over nine nights.
- Opportunistic observations by ELA during supplementary field surveys (2018 – 2020).
- Microbats:
  - Songmeter recordings at 26 locations between November and February, undisclosed frequency.
  - Potential roost site surveys – active daytime searches of disused mine adits within the Study Area (now excluded from the Development Corridor), followed by 30 minutes of active watching at dusk over two evenings.
  - Harp trap at potential roost sites over two nights.
- Mammals:
  - Static camera traps at 25 sites, 21 within woodland or forested areas, four within pasture with scattered trees. Deployed for 70 hours each, 73 full days of data collection. Camera traps were baited with dead chicken to attract the target species *Dasyurus maculatus* (Spotted-tailed Quoll).
  - Spotlighting at seven locations over nine nights, 35 person hours.
- Koala survey:
  - Spotlighting surveys conducted over 9 nights (35 person hours).
  - Koala scat searches conducted around 82 trees in three separate areas. Radius of one metre around base of tree searched by two ecologists until scat found or two minutes was reached.

The locations of the ERM threatened species survey effort in relation to the current Development Footprint and Development Corridor are shown in Figure 4.1.



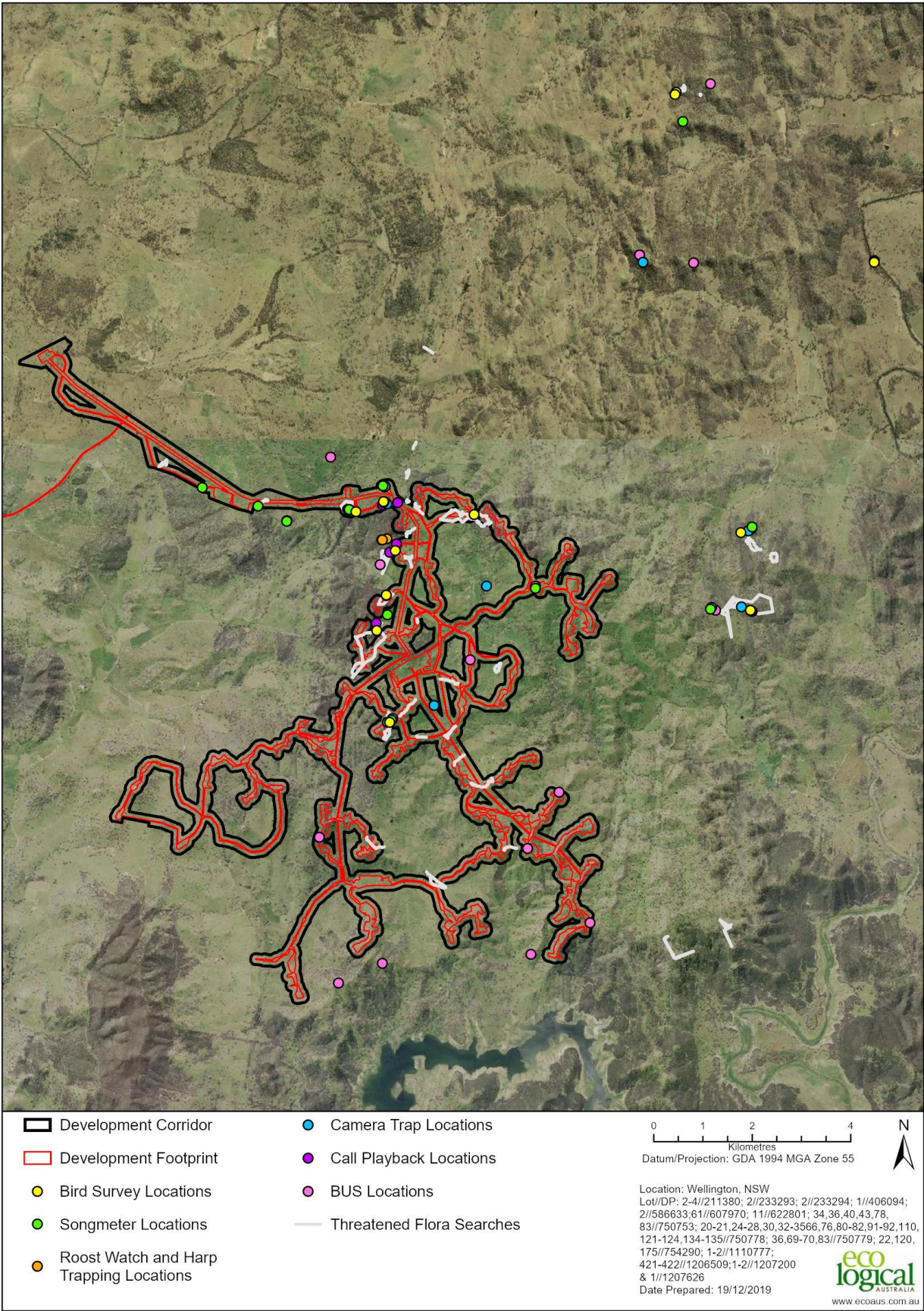


Figure 4.1: ERM Targeted Threatened Species Survey Effort

## 4.2 Threatened species survey results

The full list of species recorded in the ERM surveys is provided in **Appendix C**.

The results of the updated desktop assessment, the ERM assessment and supplementary field surveys undertaken by ELA were analysed to determine the potential presence of threatened species to be impacted by the Project.

No threatened flora species have been identified in the Study Area and there are no previous threatened flora species records within the Development Corridor or greater Study Area. Threatened flora records within a 10 km buffer around the Development Corridor are shown Figure 4.2.

A number of threatened fauna species have been recorded in the greater Study Area and are shown below in and Figure 4.3.

Most of the threatened species records are ecosystem credit species for the FBA, detailed further in **Section 4.3** below. Only one candidate species credit species was recorded in the Study Area, although not within the current Development Footprint:

- *Petaurus norfolcensis* (Squirrel Glider).

Species credit species are detailed further in **Section 4.4** below.



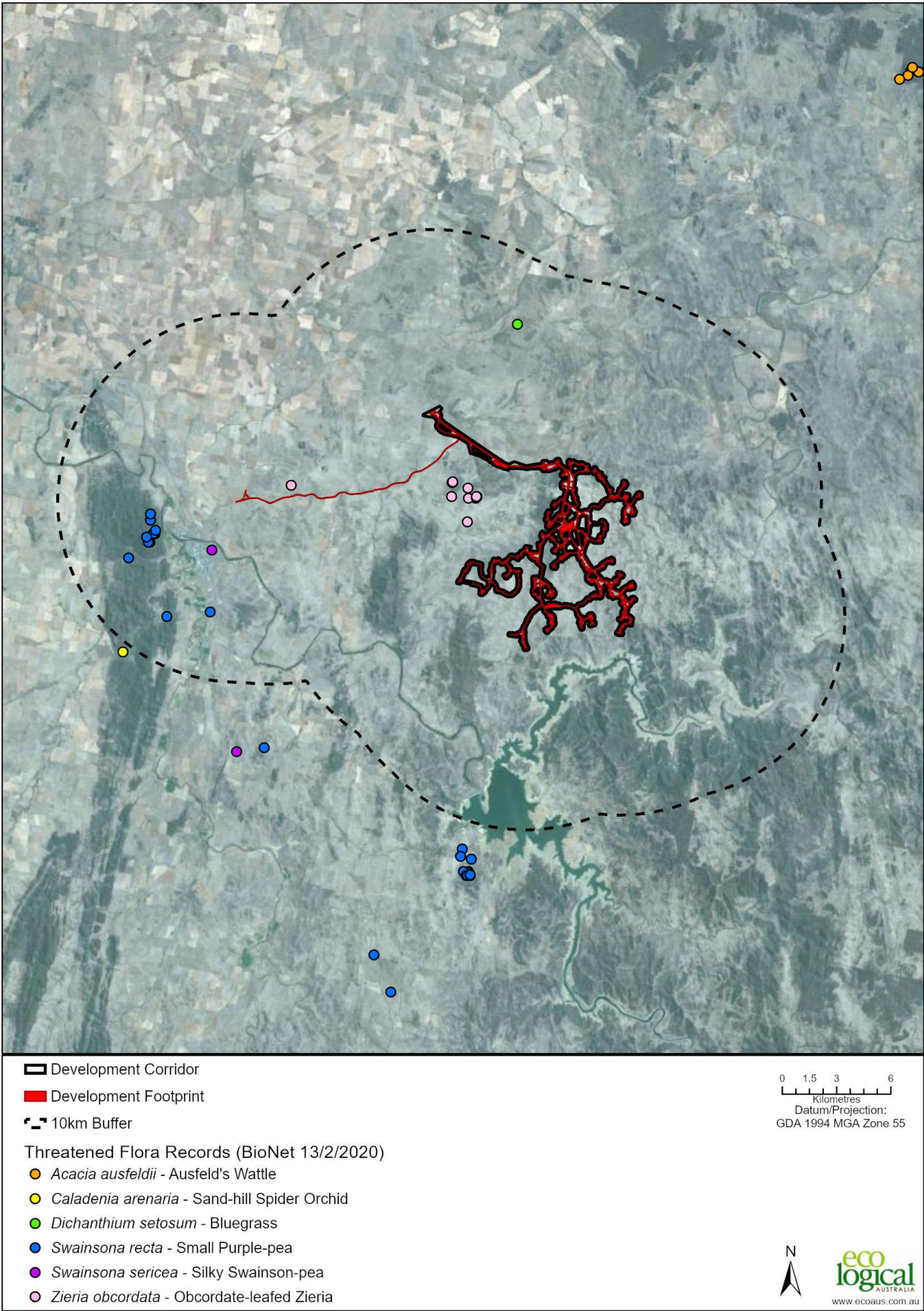


Figure 4.2: Threatened flora records for the Study Area



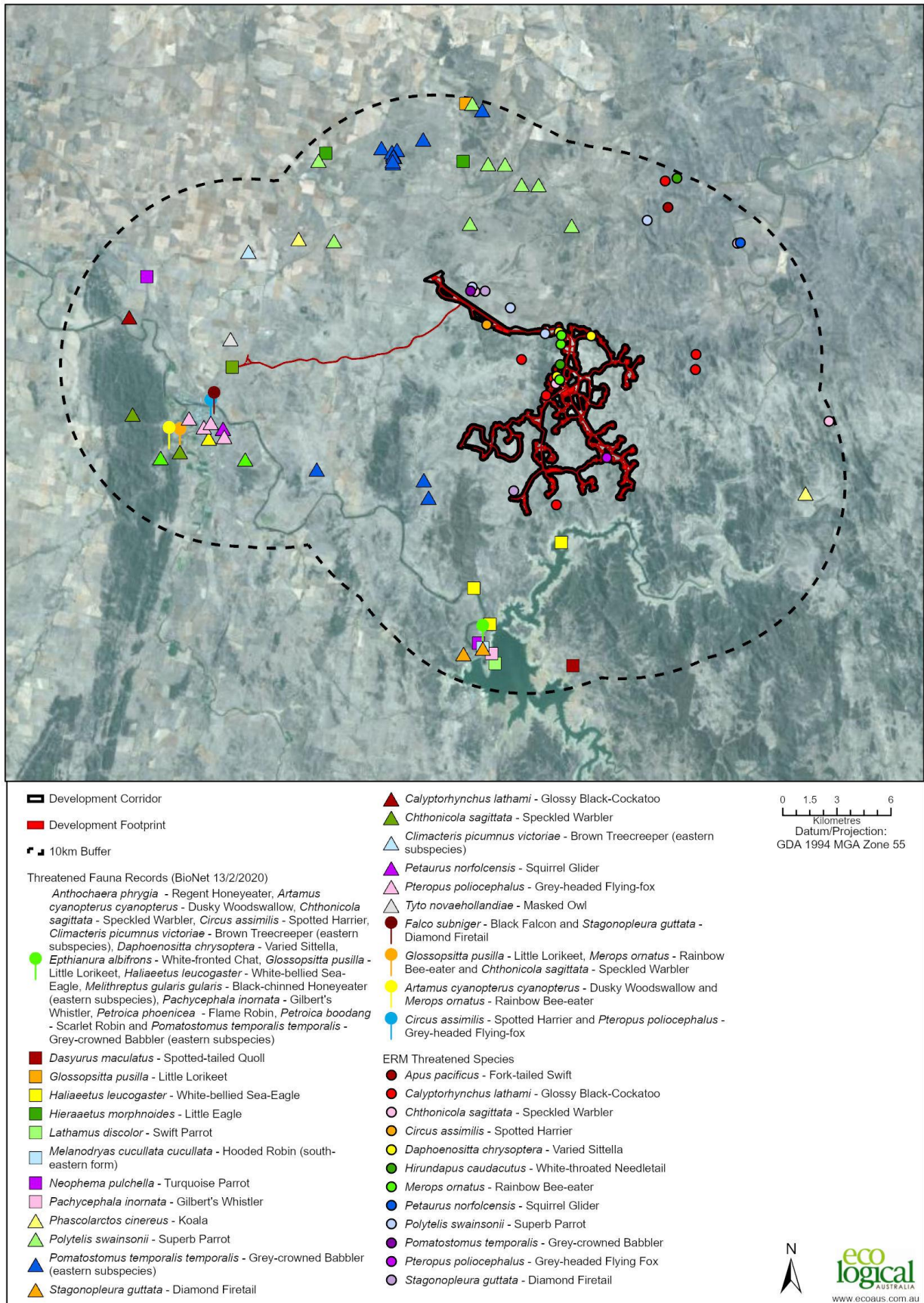


Figure 4.3: Threatened fauna records for the Development Footprint

### 4.3 Ecosystem species

The vegetation Zones identified in **Section 3** were entered into the BBCC to generate a list of predicted ecosystem species. A complete list of all predicted ecosystem species is shown in Table 4.1 below. No further assessment of these species was undertaken as any potential impacts would be accounted for through ecosystem credit offsets.

**Table 4.1: Ecosystem credit species for the Development Footprint**

Common Name	Scientific Name
Australian Painted Snipe	<i>Rostratula australis</i>
Black-chinned Honeyeater (eastern subspecies)	<i>Melithreptus gularis</i> subsp. <i>gularis</i>
Brolga	<i>Grus rubicunda</i>
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus</i> subsp. <i>victoriae</i>
Bush Stone-curlew	<i>Burhinus grallarius</i>
Corben's Long-eared Bat	<i>Nyctophilus corbeni</i>
Diamond Firetail	<i>Stagonopleura guttata</i>
Flame Robin	<i>Petroica phoenicea</i>
Freckled Duck	<i>Stictonetta naevosa</i>
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>
Gilbert's Whistler	<i>Pachycephala inornata</i>
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis</i> subsp. <i>temporalis</i>
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata</i> subsp. <i>cucullata</i>
Large-eared Pied Bat (foraging only)	<i>Chalinolobus dwyeri</i>
Little Eagle	<i>Hieraaetus morphnoides</i>
Little Lorikeet	<i>Glossopsitta pusilla</i>
Little Pied Bat	<i>Chalinolobus picatus</i>
Little Whip Snake	<i>Suta flagellum</i>
Magpie Goose	<i>Anseranas semipalmata</i>
Major Mitchell's Cockatoo	<i>Lophochroa leadbeateri</i>
Masked Owl	<i>Tyto novaehollandiae</i>
New Holland Mouse	<i>Pseudomys novaehollandiae</i>
Painted Honeyeater	<i>Grantiella picta</i>
Powerful Owl	<i>Ninox strenua</i>
Scarlet Robin	<i>Petroica boodang</i>
Speckled Warbler	<i>Chthonicola sagittata</i>
Spotted Harrier	<i>Circus assimilis</i>
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>
Square-tailed Kite	<i>Lophoictinia isura</i>

Common Name	Scientific Name
Swift Parrot	<i>Lathamus discolor</i>
Turquoise Parrot	<i>Neophema pulchella</i>
Varied Sittella	<i>Daphoenositta chrysoptera</i>
Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>

Two further threatened species, classified as ecosystem species under the FBA, have been identified within the Study Area but are not included in the list above:

- *Pteropus poliocephalus* (Grey-headed Flying-fox) – identified from a single carcass caught in barbed-wire fencing (ERM 2012)
- *Polytelis swainsonii* (Superb Parrot) – identified on the site by ERM in the 2012 – 2013 surveys, and again opportunistically by ELA when undertaken vegetation mapping surveys of Twelve Mile Road in 2019.

Both of these species are ecosystem credit species for BVTs identified in the Development Footprint and no further assessment is required under the FBA.

#### 4.4 Species credit species

Species credit species are threatened flora and fauna species that cannot be predicted by vegetation type. Candidate species credit species with the potential to occur within the Development Footprint, based on the presence of suitable habitat, must be surveyed to determine presence or absence.

The list of candidate species credit species for the Development Footprint was generated by the BBCC and is listed in Table 4.2 below. Candidate species credit species have been reviewed in consideration of the ERM assessment, updated NSW BioNet Atlas records and EPBC Protected Matters Search Tool results to determine their likelihood of occurring in the Study Area and Development Corridor.



Table 4.2: Species credit species for the Development Footprint

Common name	Scientific name	Habitat potential	ERM Survey effort (2012 – 2013)	Likelihood of occurrence	Further Required?	Assessment
Ausfeld's Wattle	<i>Acacia ausfeldii</i>	Y	Total of 76.1km of meander transects undertaken for 67 meander transects.	Unlikely – this readily identifiable species was not recorded in any of the field surveys.	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure.	
Booroolong Frog	<i>Litoria booroolongensis</i>	N – This species lives along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses (DPIE 2020b) – no permanent watercourses will be impacted by the Project.	Several small ephemeral creeks were investigated under a range of conditions, including after heavy rainfall, to determine any potential habitat, despite already confirming that no permanent watercourses were present.	Unlikely – habitat not present.		No
Brush-tailed Phascogale	<i>Phascogale tapoatafa</i>	Y	25 camera traps deployed for 70 hours each. 21 within woodland or forested areas, four within pasture with scattered trees. Spotlighting surveys conducted over nine nights (35 person hours).	Unlikely – no records within 20km radius of the Study Area, not identified in survey.		No
Brush-tailed Rock-wallaby	<i>Petrogale penicillata</i>	N – This species occupies rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north (DPIE 2020b), none of which have been identified in the Study Area.	25 camera traps deployed for 70 hours each. 21 within woodland or forested areas, four within pasture with scattered trees. Spotlighting surveys conducted over nine nights (35 person hours).	Unlikely – at the extent of the range for this species, suitable habitat not present.		No

Common name	Scientific name	Habitat potential	ERM Survey effort (2012 – 2013)	Likelihood of occurrence	Further Required?	Assessment
Capertee Stringybark	<i>Eucalyptus cannonii</i>	N	Total of 76.1km of meander transects undertaken for 67 meander transects.	Unlikely – beyond extent of range of this species	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure	
Clandulla Geebung	<i>Persoonia marginata</i>	Y	Total of 76.1km of meander transects undertaken for 67 meander transects.	Unlikely – no records within 20km radius of the Study Area, not identified in survey	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure	
Eastern Pygmy-possum	<i>Cercartetus nanus</i>	Y – Expert advice indicates that the Western range for this species includes woodland habitat with shrubby understorey (detailed below <b>Section 4.6.1</b> ).	25 camera traps deployed for 70 hours each. 21 within woodland or forested areas, four within pasture with scattered trees. Spotlighting surveys conducted over nine nights (35 person hours).	Potential, although no records within 20km of the site	Yes – previous survey effort not specifically targeted to this species. Additional survey will be undertaken (detailed below <b>Section 4.6.1</b> ). Species credits have been calculated.	
Eucalyptus alligatrix subsp. alligatrix	<i>Eucalyptus alligatrix</i> subsp. <i>alligatrix</i>	N	Total of 76.1km of meander transects undertaken for 67 meander transects.	Unlikely – beyond extent of range of this species	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure	
Euphrasia arguta	<i>Euphrasia arguta</i>	N	Total of 76.1km of meander transects undertaken for 67 meander transects.	Unlikely – beyond extent of range of this species	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure	

Common name	Scientific name	Habitat potential	ERM Survey effort (2012 – 2013)	Likelihood of occurrence	Further Required?	Assessment
Grevillea divaricata	<i>Grevillea divaricata</i>	N	Total of 76.1 km of meander transects undertaken for 67 meander transects.	Unlikely – not recorded within 20km of the Study Area, few records exist.	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure	
Koala	<i>Phascolarctos cinereus</i>	Y – Potential habitat in the form of Koala feed trees including <i>E. albens</i> prevalent across the Study Area.	Spotlighting surveys conducted over nine nights (35 person hours). Koala scat searches conducted around 82 trees in three separate areas. Radius of one metre around base of tree searched by two ecologists until scat found or two minutes was reached.	Potential to occur in the Study Area, albeit in low numbers, despite not having been detected in the field surveys. Nearest record 7.6 km from the Study Area.	Yes – species credits calculated. Further detail below in <b>Section 4.6.2.</b>	
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	Foraging. No potential breeding habitat to be affected.	85 songmeter nights across study area. Two nights each of two mine adit entrance watching, songmeter placement and harp trapping.	Unlikely – not identified in the field surveys.	No. This species is only a species credit species for breeding habitat. This species will be offset under the ecosystem credits for foraging habitat.	
Narrow Goodenia	<i>Goodenia macbarronii</i>	N	Total of 76.1 km of meander transects undertaken for 67 meander transects.	Unlikely	No – this species is no longer listed as threatened under the BC Act or EPBC Act.	
Pink-tailed Legless Lizard	<i>Aprasia parapulchella</i>	Y	Four days of reptile surveys. Surveys included turning of logs, rocks and other ground debris.	Unlikely – not recorded within 20km of the Study Area, few records exist.	No	
Prasophyllum Wybong	sp. <i>Prasophyllum Wybong</i>	Y	Total of 76.1 km of meander transects undertaken for 67 meander transects.	Unlikely – not recorded within 20km of the Study Area, few records exist.	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure	

Common name	Scientific name	Habitat potential	ERM Survey effort (2012 – 2013)	Likelihood of occurrence	Further Required?	Assessment
Regent Honeyeater	<i>Anthochaera phrygia</i>	Y – foraging only	24 woodland bird surveys, 20-minute searches of 2 ha areas during spring and summer.	Potential - foraging	Expert report included in <b>Appendix D</b> , species credits calculated. Further detail below in <b>Section 4.6.4</b> .	
Scant Pomaderris	<i>Pomaderris queenslandica</i>	Y	Total of 76.1 km of meander transects undertaken for 67 meander transects.	Unlikely – not recorded within 20km of the Study Area.	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure	
Silky Swainson-pea	<i>Swainsona sericea</i>	Y	Total of 76.1 km of meander transects undertaken for 67 meander transects.	Potential – records nearby.	Yes – pre-clearing survey and micro-siting of infrastructure will be undertaken to avoid any impacts.	
Small Purple-pea	<i>Swainsona recta</i>	Y	Total of 76.1 km of meander transects undertaken for 67 meander transects.	Potential – records nearby	Yes – pre-clearing survey and micro-siting of infrastructure will be undertaken to avoid any impacts.	
Squirrel Glider	<i>Petaurus norfolcensis</i>	Y	25 camera traps deployed for 70 hours each. 21 within woodland or forested areas, four within pasture with scattered trees. Spotlighting surveys conducted over nine nights (35 person hours).	Known – recorded in the Study Area by ERM - not within the current Development Footprint.	Yes – species credits calculated. Further detail below in <b>Section 4.6.3</b> .	
Zieria obcordata	<i>Zieria obcordata</i>	Limited – this species is known from north-facing slopes in sandy loam amongst granite boulders, which occurs only in the north west transmission line area.	Total of 76.1 km of meander transects undertaken for 67 meander transects.	Potential – in the north west transmission line area	Yes – pre-clearing survey and micro-siting of infrastructure will be undertaken to avoid any impacts. Further detail below in <b>Section 6.3</b> .	

Two further potential species credit species were identified for the Study Area from the database searches, detailed below in Table 4.3.

**Table 4.3: Additional potential species credit species**

Common name	Scientific name	Habitat potential	Likelihood of occurrence	Further Assessment Required?
Bluegrass	<i>Dichanthium setosum</i>	Y	Potential – records nearby	Yes – pre-clearing survey and micro-siting of infrastructure will be undertaken to avoid any impacts.
Sand-hill Spider Orchid	<i>Caladenia arenaria</i>	N - requires sandy soils dominated by <i>Callitris glaucophylla</i> (White Cypress Pine)	Unlikely	No – notwithstanding, pre-clearing survey and avoidance will be undertaken during micro-siting of infrastructure.

## 4.5 Species that cannot withstand further loss

In accordance with Sections 6.5.1.12 and 6.5.1.13 of the FBA, species that cannot withstand further loss in the major catchment must be identified. This information was prescribed by the now repealed *Threatened Species Conservation Act 1995* (TSC Act) and is no longer available.

## 4.6 Species polygons

### 4.6.1 Eastern Pygmy-possum

Eastern Pygmy-possum is a small arboreal marsupial listed as Vulnerable under the BC Act). Whilst there are isolated scattered records for this species within western NSW, there is little known about habitat preference within the western extent of their range. Current information on habitat preference and range has been obtained from primarily coastal locations where they show a preference for structurally intact rainforests and heathy woodlands. However, it is possible that within the western extent of their range they reside within Box-Ironbark forests and White box grassy woodlands that are structurally and floristically diverse with a shrubby understory.

Consultation was undertaken with the DPIE BCD to determine the potential to confirm presence or absence of the Eastern Pygmy-possum through targeted survey. Given the paucity of information on habitat preference by Eastern Pygmy -possums within the western extent of its range, targeted surveys will be required to be undertaken within a variety of habitats to exclude this species.

Advice from the BCD and native fauna expert Dr Martin Schultz is that areas of structural diversity identified as good quality, for example, woodland areas with a shrubby understory; and moderate habitat, woodland areas with little to no shrubby understory may provide suitable habitat for the Eastern Pygmy-possum within the Study Area.

Targeted habitat field assessment was undertaken in August 2020 based on this advice. Aerial imagery was used to identify woodland areas within the proposed Development Footprint, which was then groundtruthed. This mapping has been used to develop a species polygon for Eastern Pygmy-possum, 11.61 ha, and species credits have been calculated accordingly. The species polygon is shown below in Figure 4.4.

However, The Proponent intends to undertake additional survey for this survey in an effort to exclude it from the Study Area. The survey method proposed includes a 'saturated remote camera trapping technique' whereby baited remote cameras will be set approximately 100 - 150 m apart in each patch of habitat vegetation to saturate the area (M. Schultz pers comm 2020). The outcome of the survey will be determined post-approval, and therefore credits calculated are considered to be an upper maximum for this species.



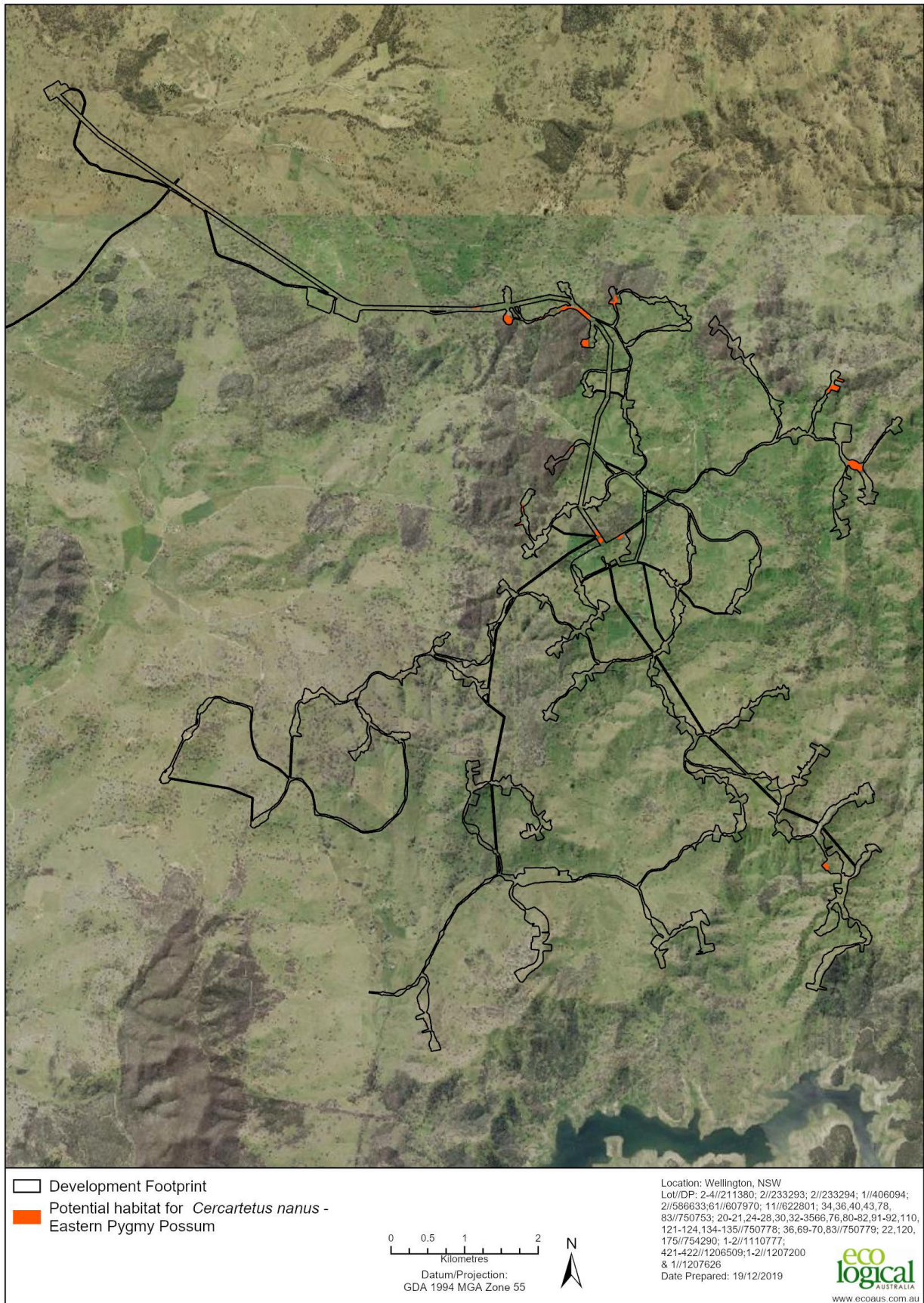


Figure 4.4: Eastern Pygmy-possum species polygon

#### 4.6.2 Koala

The ERM survey effort didn't detect any presence of this species, and the Development Footprint is not included in the recently released DPIE Koala Development Application Map. Nonetheless, the occurrence of nearby records and the presence of suitable habitat indicate that the Koala has the potential to occur in the Development Footprint, albeit in low numbers. A species polygon has been prepared for the Development footprint, excluding grassland and low/poor condition vegetation, totalling approximately 143 ha. Species credits have been calculated accordingly. The koala species polygon is shown below in Figure 4.5.



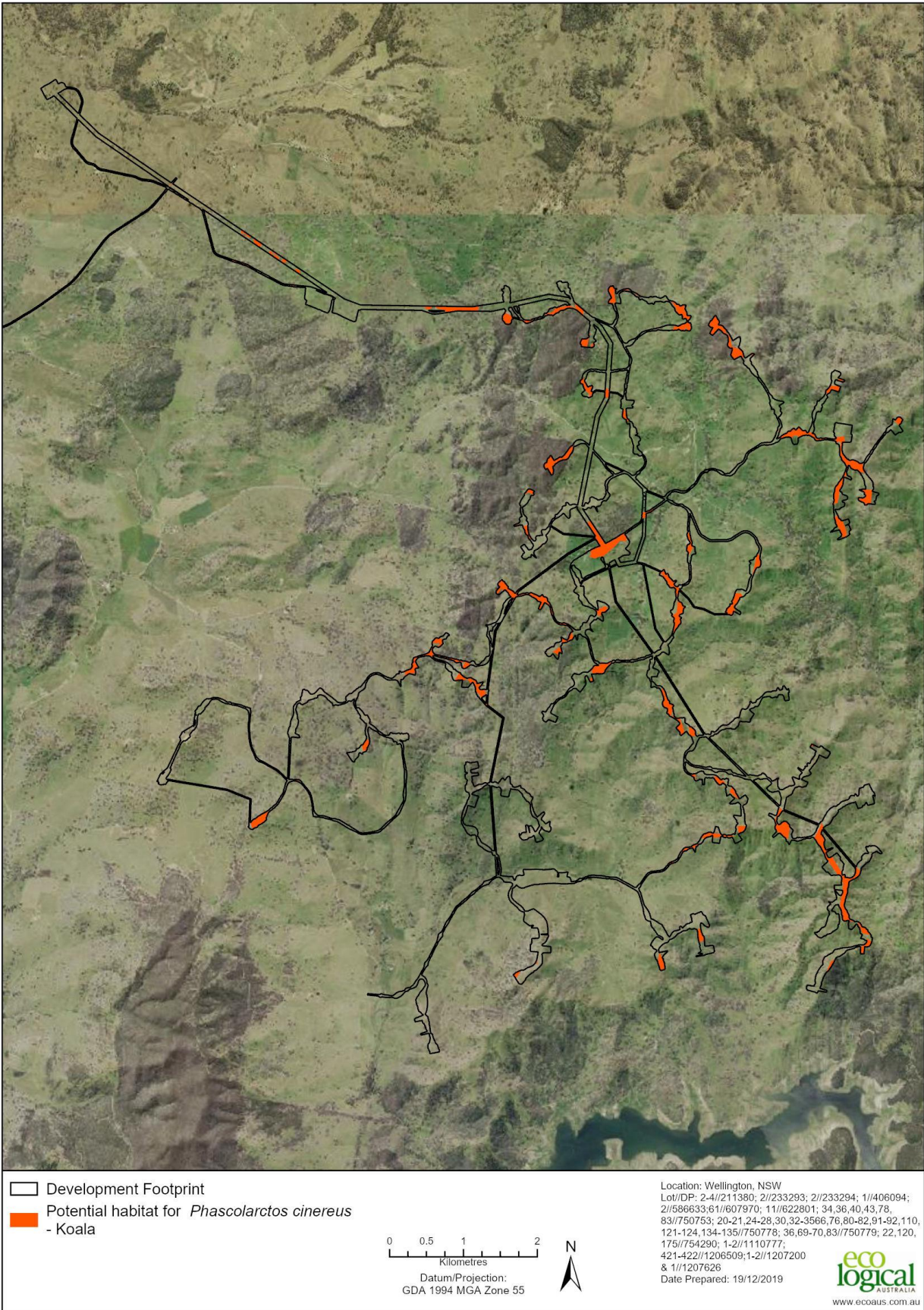


Figure 4.5: Koala species polygon

#### 4.6.3 Squirrel Glider

One individual Squirrel Glider was identified in the ERM field surveys in the riparian corridor adjacent to the Cudgegong River, in an area which has now been excluded from the Development Footprint. It is considered unlikely that this species would occur in the current Development Footprint due to the fragmented nature of the vegetation, however, it is not possible to exclude this species entirely from the good quality woodland vegetation which will be impacted. A species polygon has been prepared for the Development Footprint, excluding grassland and low/poor condition vegetation, totalling approximately 143 ha, shown below in Figure 4.6. Species credits have been calculated accordingly.

Consultation with the BCD and expert advice indicates that the targeted survey effort which will be undertaken for Eastern Pygmy-possum, will also be suitable to confirm presence or absence of Squirrel Glider. Therefore, species credits calculated in the report will present an upper-maximum credit requirement for this species.



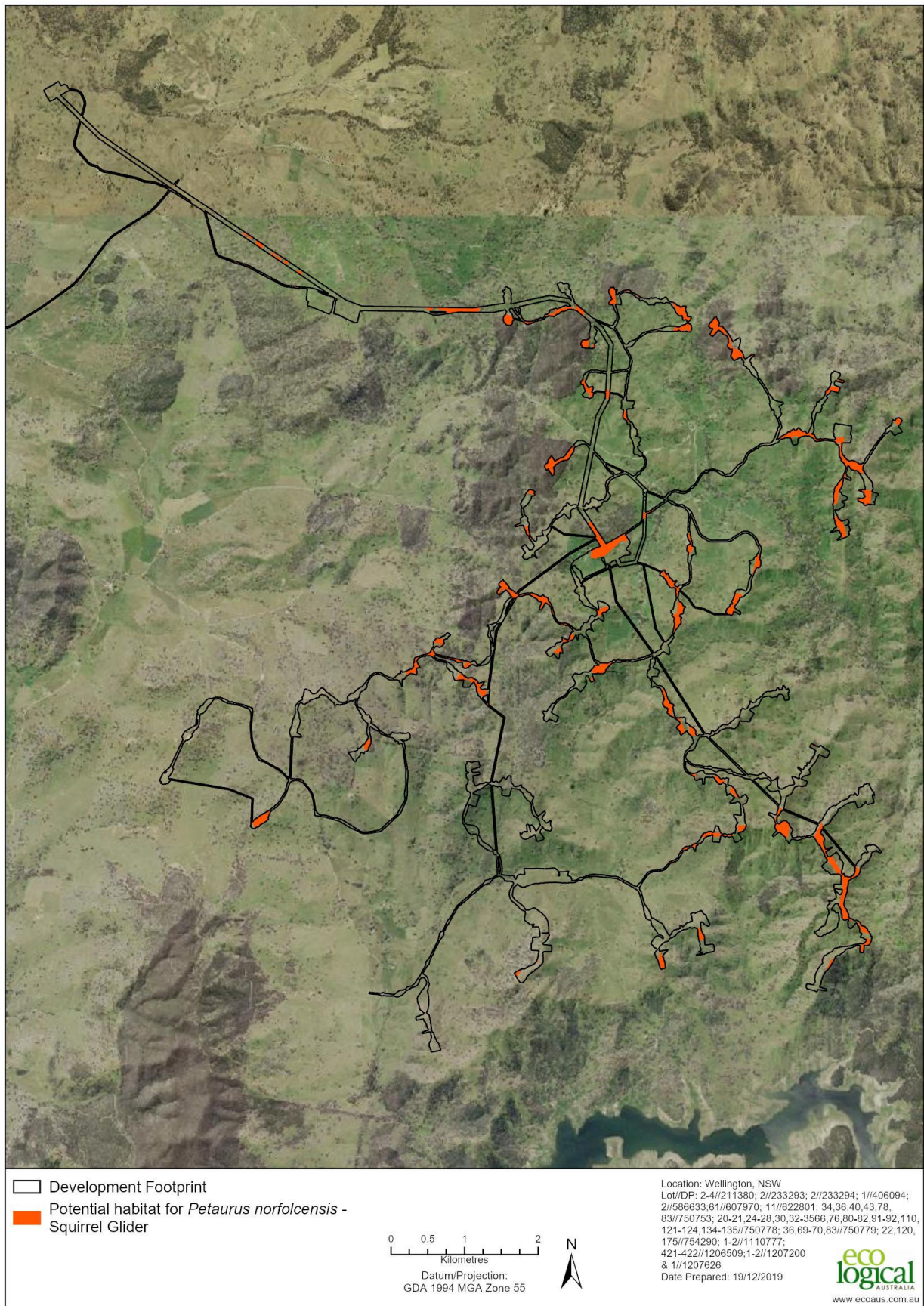


Figure 4.6: Squirrel Glider species polygon

#### 4.6.4 Regent Honeyeater

An expert report has been obtained for the Regent Honeyeater, prepared by DPIE recognised expert Dr Steve Debus, included in **Appendix D**.

The Study Area does not coincide with any mapped Regent Honeyeater Important Area (DPIE 2020), which is strongly correlated with known breeding records of the species. It is unlikely that the Study Area would support Regent Honeyeater breeding, due to the absence of key breeding habitat features, the fragmented nature of the habitat, the abundance of competitor and predatory species and the minimal overlap between the species potential occurrence within the Study Area and the species breeding period.

Potential foraging habitat occurs within an approximate upper-limit of 143 ha within the Development Footprint, within good quality woodland vegetation. During times of widespread flowering of key feed species, particularly *Eucalyptus albens*, the Regent Honeyeater has the potential to occur within this foraging habitat, as supported by the occurrence and timing of nearby records in similar habitat.

Given the above considerations, it is concluded that the Regent Honeyeater has the potential to occur in the Development Footprint during times of mass flowering events to utilise the available foraging habitat. However, it is considered unlikely to utilise the Study Area for breeding. A species polygon has been prepared (Figure 4.7) and credits calculated accordingly.

Credits have been calculated using the BioBanking method. It is the expectation of The Proponent that the equivalent credits required to offset the species under the BC Act and the BAM will be for foraging habitat only (ecosystem credits), and the mechanism to secure offsets via area (ha) of appropriate associated vegetation type will be appropriate. That is, BAM species credits for Regent Honeyeater will not be required.



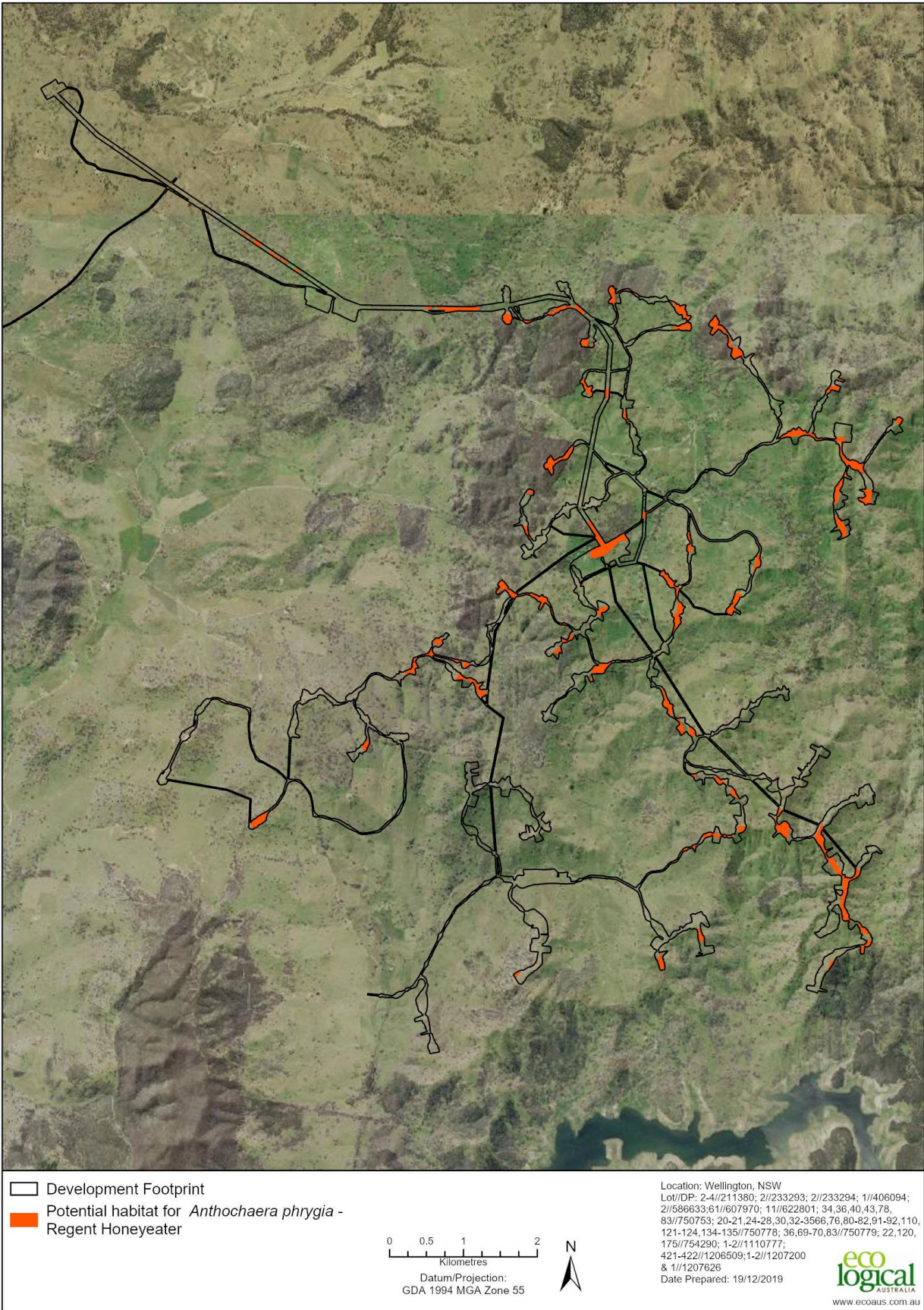


Figure 4.7: Regent Honeyeater species polygon

#### 4.6.5 Threatened flora

No threatened flora species have been recorded within the Study Area from the field surveys and there are no previous records. This includes vegetation validation surveys undertaken in optimal survey time periods (September 2018) by ELA experienced ecologists. However, four (4) threatened flora candidate species are identified as having the potential to occur in the Development Corridor based on the associated vegetation, presence of suitable habitat and nearby previous records:

- *Dichanthium setosum* (Bluegrass)
- *Swainsona sericea* (Silky Swainson-pea)
- *Swainsona recta* (Small Purple-pea)
- *Zieria obcordata*.

The calculation of species credits for threatened flora requires determination of the number of individuals to be impacted. As no records exist, this has not been undertaken. The Proponent will commit to undertaking pre-clearing surveys in areas of suitable habitat in suitable seasonal conditions in an effort to identify any previously unrecorded individuals. The seasonal conditions experienced in 2020, particular higher rainfall, are expected to provide optimal opportunity to identify threatened flora species.

Design considerations and micro-siting of infrastructure will be employed to avoid any impact to previously unrecorded threatened flora species.

## 5. Measures to avoid and minimise impacts

### 5.1 Avoidance of Impacts

Under the FBA The proponent must design the Project to minimise impacts to biodiversity. Specifically, the FBA requires proponents to identify and avoid direct impacts to:

- TECs
- Vegetation communities that contain threatened species habitat
- Areas that contain habitat for vulnerable, endangered or critically endangered threatened species or populations
- An area of land that the NSW Minister for Environment has declared as critical habitat in accordance with Section 47 of the (now repealed) TSC Act
- State significant biodiversity links.

The Development Footprint has been subject to considerable revision and reduction since it was first conceptualised and is currently approximately one third the size of the original Project design. The area of native vegetation to be impacted has reduced from 1,880 ha to 626 ha. Consideration of biodiversity constraints has, and will continue, to provide significant input into the final Development Footprint.

A summary of the impact avoidance methods of the project are provided below in **Table 5.1**.

**Table 5.1: Avoidance of direct impacts**

Direct Impact to be Avoided	Method to Avoid Impact
<i>Impacts to EECs and CEECs</i>	The Development Footprint has been revised and reduced from the original design, taking into consideration the mapped areas of CEEC. This has included removing the eastern extent of the Development Footprint. Further refinements will be made to the Development Footprint for the final design which will aim to avoid and minimise clearing of native vegetation, in particular, the CEEC. It is expected that the overall area of impact will be reduced on the final design.
<i>Impacts to vegetation that contains threatened species habitat</i>	<p>Vegetation mapped within the Study Area has been identified as potential habitat for threatened species as identified in earlier sections of this report.</p> <p>The Development Footprint has been revised and reduced from the original design, to reduce the area of affected vegetation communities that contain threatened species habitat.</p> <p>Infrastructure will be micro-sited prior to construction. This will involve detailed ecological pre-clearing survey to ensure native vegetation clearing is minimised and avoidance of habitat features is prioritised.</p>



Direct Impact to be Avoided	Method to Avoid Impact
<i>Impacts to areas that contain habitat for Vulnerable, Endangered, or Critically Endangered threatened species or populations in accordance with Step 5 in Section 6.5 of the FBA</i>	<p>The Development Footprint provides potential habitat for threatened species identified in <b>Section 3.4</b>.</p> <p>The revision and reduction in size of the Development Footprint has reduced the amount of habitat affected. Further ecological surveys are proposed to determine presence or absence and avoid impacts to threatened fauna species as detailed in <b>Section 8.2</b>.</p> <p>Infrastructure will be micro-sited prior to construction. This will involve detailed ecological pre-clearing survey to ensure disturbance to threatened species habitat, for example, hollow bearing trees, is minimised and habitat is avoided.</p> <p>Further, any threatened flora species identified in the pre-clearing surveys will be avoided through detailed design.</p>
<i>Impacts to areas of land that the Minister for Environment has declared as critical habitat in accordance with s47 of the TSC Act</i>	Critical habitat has not been identified within the Study Area.
<i>Impacts to riparian areas of 4<sup>th</sup> order or higher streams and rivers, important wetlands and estuaries</i>	<p>The Development Footprint includes two 4th order ephemeral streams – Uungula Creek, and Ilgingery Creek. Due to historic agricultural practices and absence of riparian vegetation, the creeks are incised and channel banks show evidence of exacerbated erosion. Further impacts from the Project are considered unlikely, however, a range of mitigation measures will be implemented to avoid impacts and improve biodiversity outcomes. These include:</p> <ul style="list-style-type: none"> <li>• Establishing vegetated riparian zones.</li> <li>• Construction of additional watercourse crossings in areas where watercourses are not meandering, for example on straight sections of channels.</li> <li>• Minimisation of creek crossings for within site access and electrical cabling.</li> <li>• Localised scour protection around building pads.</li> <li>• Sourcing of water from licensed suppliers.</li> </ul>
<i>Impacts to state significant biodiversity links</i>	No state significant biodiversity links have been identified within the Development Footprint.

## 5.2 Site Selection

Site selection was undertaken considering the extent of known biodiversity values, as well as the extent of disturbance within the Development Footprint. A summary of considerations during the selection of the Development Footprint is shown in **Table 5.2**.

**Table 5.2: Avoidance and minimisation of direct impacts through site selection**

Site Selection Criteria	Method to Avoid Impact
<i>Selecting a suitable development site for a Major Project or a route for linear projects, should be informed by knowledge of biodiversity values. An initial desktop assessment of biodiversity values would assist in identifying areas of native</i>	The Project site is located in an area which has been subject to considerable past disturbance through agricultural clearing. Remnant vegetation is generally impacted by grazing and connectivity with surrounding high value vegetation is limited. The Study Area has been subject to comprehensive biodiversity

Site Selection Criteria	Method to Avoid Impact
<i>vegetation cover, EECs or CEECs, and potential habitat for threatened species</i>	assessment to inform the current Development Footprint. These assessments are detailed in earlier sections of this report and include, primarily, the assessment completed by ERM in 2013. Consideration of biodiversity constraints has, and will continue, to provide significant input into the final Development Footprint.
<i>Stage 1 of the FBA will provide the preliminary information necessary to inform project planning. Early consideration of biodiversity values is recommended in site selection, or route selection for linear projects, and the planning phase.</i>	Biodiversity values were identified within the Development Footprint through the assessment process described above. Continued consultation has been undertaken between ELA and CWPR through the development of this BAR to identify any further areas for refinement. Consideration of biodiversity constraints has, and will continue, to provide significant input into the final Development Footprint.
<i>The site/route selection process should include consideration and analysis of the biodiversity constraints of the proposed development site and consider the suitability of the Major Project based on the types of biodiversity values present on the development site</i>	As identified above, the biodiversity assessment stage was conducted to determine areas of biodiversity constraints. The final Development Footprint will reflect the retention, where possible, of existing biodiversity values within the Development Footprint.
<i>When considering and analysing the biodiversity constraints for the purpose of selecting a development site, the following matters should be addressed:</i>  <i>(a) whether there are alternative sites within the property on which the proposed development is located where siting the proposed Major Project would avoid and minimise impacts on biodiversity values</i>  <i>(b) how the development site can be selected to avoid and minimise impacts on biodiversity values as far as practicable</i>  <i>(c) whether an alternative development site to the proposed development site, which would avoid adversely impacting on biodiversity values, might be feasible.</i>	The Development Footprint will be further refined and reduced as far as practicable and has already included removal of roughly two thirds of the Study Area to avoid biodiversity constraints.
<i>For linear projects, the route selection process must include consideration and an analysis of the biodiversity constraints of the various route options. In selecting a preferred option, loss of biodiversity values must be weighed up and justified against social and economic costs and benefits.</i>	This project is not considered a linear project as per the definition in the FBA. A site-based assessment was chosen as the most suitable assessment method given the overall connected shape of the Development Footprint.

### 5.3 Planning

Planning was considered during the selection of the Development Footprint. A summary of criteria utilised is shown in Table 5.3.

**Table 5.3: Avoidance and minimisation of direct impacts through planning**

Planning Criteria	Method to Avoid Impact
<i>Siting of the project – the Major Project should be located in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a lower site value score) or which avoid an EEC or CEEC</i>	Project infrastructure will predominately be situated atop ridges to maximise wind exposure. Ridges within the Development Corridor are typically on skeletal soils and outcropping of metamorphosed sedimentary geology, in generally poorer condition. Grassland and further degraded areas will be prioritised for the siting of infrastructure.  Consideration of biodiversity constraints has, and will continue, to provide significant input into the final Development Footprint.
<i>Minimise the amount of clearing or habitat loss – the Major Project (and associated construction infrastructure) should be located in areas that do not have native vegetation, or in areas that require the least amount of vegetation to be cleared (i.e. the development footprint is minimised), and/or in areas where other impacts to biodiversity will be the lowest</i>	There are no potential alternative locations, rather, the Development Footprint has been revised and will be reduced as far as practicable in consideration of biodiversity constraints.
<i>Loss of connectivity – some developments can impact on the connectivity and movement of species through areas of adjacent habitat. Minimisation measures may include providing structures that allow movement of species across barriers or hostile gaps</i>	The Development Footprint generally follows ridgelines and will not impact connectivity between the more vegetated valleys. Riparian vegetation is lacking or degraded within the Development Footprint and will not be subject to any further disconnection. Establishment of vegetated riparian zones will enhance connectivity in the Development Footprint.

## 5.4 Measures to minimise impacts

The Proponent will implement measures to minimise the impacts of the Project during the construction, operational and decommissioning phase. A Biodiversity Management Plan (BMP) and Bird and Bat Adaptive Management Plan (BBAMP) will be developed to describe the mechanisms for reduction of impacts from the Project. The BMP will address impacts to flora and fauna such as clearing of native vegetation, as well as management for erosion control, and bushfire management. The BMP will include operational measures to reduce impacts of the project such as:

- vegetation clearance protocols
- rehabilitation and revegetation strategies
- weed and pest animal control measures.

Details of measures to minimise impacts during the construction and operational phase are described below.

### 5.4.1 Measures to minimise direct impacts during construction phase

Several considerations have been given to minimising impacts to biodiversity during the construction phase of the Project. These are detailed below in Table 5.4.

**Table 5.4: Minimisation of direct impacts during the construction phase**

Matter considered to minimise impacts	Adopted matters within Development Footprint
<i>Method of clearing – using a method of clearing during the construction phase that avoids damage to retained native vegetation and reduces soil disturbance. For example, removal of native vegetation by chain-saw, rather than heavy machinery, is preferable in situations where partial clearing is proposed</i>	A BMP will be developed, which will describe the measures to minimise impacts during vegetation clearing. These will include the delineation of areas to be cleared, pre-clearance surveys, management of impacts to fauna including specific measures for threatened fauna, and vegetation clearance protocols. Micro-siting will be undertaken to avoid habitat trees and previously unrecorded threatened flora species.
<i>Clearing operations – minimising direct harm to native fauna during actual construction operations through onsite measures such as undertaking pre-clearing surveys, daily fauna surveys and the presence of a trained ecologist during clearing events</i>	<p>Pre-clearing surveys will be undertaken by a qualified ecologist to determine if roosts, nests or dens are present in any trees proposed for clearing</p> <p>An ecologist/wildlife handler will be present to supervise during clearing of identified fauna roosting or nesting habitat, in accordance with best practice methods to relocate fauna in a sensitive manner. Any fauna utilising habitat within the development footprint would be identified and managed to ensure clearing works minimise the likelihood of injuring fauna.</p>
<i>Timing of construction – identifying reasonable measures that minimise the impacts on biodiversity. For example, timing construction activities for when migratory species are absent from the site, or when particular species known to or likely to use the habitat on the site are not breeding or nesting, can minimise the impacts of construction activities on biodiversity</i>	Where possible, timing of vegetation clearance will be planned to occur outside of the period between August and March, during the breeding/nesting/nursing time for the majority of avian and micro-bat species, including the species listed in Section 3.4 of this document, to avoid impacts to fauna during these critical life cycle events. Clearing will be undertaken under the supervision of an ecologist/ wildlife handler to relocate fauna in a sensitive manner in accordance with best practice methods.
<i>Other measures that minimise inadvertent impacts of the Major Project on the biodiversity values – measures such as installing temporary fencing to protect significant environmental features such as riparian zones, promoting the hygiene of construction vehicles to minimise spread of weeds or pathogens, appropriately training and inducting project staff and contractors so that they can implement all measures that minimise inadvertent adverse impacts of the Major Project on biodiversity values.</i>	<p>Other measures to minimise the impacts of the project on biodiversity would include:</p> <ul style="list-style-type: none"> <li>• Micro-siting of infrastructure</li> <li>• Marking of habitat trees for retention</li> <li>• Sediment controls along drainage lines and creeks to prevent impacts downstream</li> <li>• Assessment of priority weeds in the Development Footprint and appropriate management measures to minimise risk of spreading weeds.</li> <li>• Site specific induction to ensure all Project staff and contractors are aware of biodiversity constraints and their obligations and responsibilities under the Development Consent and BMP.</li> </ul>

#### 5.4.2 Measures to minimise indirect impacts during construction phase

During the construction phase the following management actions would be undertaken to minimise indirect impacts during construction as shown in Table 5.5.

**Table 5.5: Minimisation of indirect impacts during the construction phase**

Indirect Impact	Method to avoid indirect impact
<i>Sedimentation and run-off – sediment barriers or sedimentation ponds to minimise impacts of the Major Project on biodiversity values on land that is adjoining the development site, and waterways downstream of the development site</i>	Construction and installation of erosion and sediment control structures in accordance with recognised standards will be undertaken. Further details on erosion and sediment controls proposed can be found in the Project EIS and include the establishment of vegetated riparian zones along creek lines. Regular inspection and maintenance of erosion and sediment controls would be undertaken.
<i>Noise, dust or light spill – adopting onsite measures that can minimise the impacts on biodiversity values from noise, dust or light spill during the construction phase. For example, only undertake construction during daylight hours to avoid impacts from light spill where this may be detrimental to species habitat on adjoining lands</i>	Construction works would be restricted to daytime hours where possible to minimise the risk of light spill to surrounding areas. Dust suppression methods, including the use of water carts, would be utilised on unsealed roads and disturbed areas.
<i>Inadvertent impacts on adjacent habitat or vegetation – considering measures such as retaining vegetation on the development site as a buffer to protect significant environmental features (e.g. riparian zones, likely or known threatened species habitat)</i>	The Development Footprint generally follows ridgelines and will not impact connectivity between the more vegetated valleys. Riparian vegetation is lacking or degraded within the Development Footprint and will not be subject to any further disconnection. Establishment of vegetated riparian zones will enhance connectivity in the Development Footprint.
<i>Feral pest, weed and/or pathogen encroachment into vegetation on land adjoining the development site – one example is using protocols for hygiene that minimise the likelihood of construction vehicles spreading weeds or pathogens from the development site into native vegetation on land adjoining the development site</i>	The BMP to be developed for the Project will include weed and feral animal control protocols. Assessment of priority weeds in the Development Footprint will be undertaken and appropriate management measures to minimise risk of spreading weeds will be implemented.
<i>Impacts that are infrequent, cumulative or difficult to measure – where there are likely to be indirect impacts on biodiversity that are infrequent, cumulative or difficult to measure over time, consideration should be given to how an operational monitoring program can be used to assess the timing and/or extent of these impacts. A proposal for an operational monitoring program should be set out in the BAR. Development of a monitoring program may involve determining the base-line information that will be necessary to measure the impact over time. It should also consider how the results of the monitoring program could be used to inform ongoing operations in order to reduce the extent of indirect impacts</i>	<p>Infrequent, cumulative or difficult to measure impacts are not predicted to occur as a result of the Project.</p> <p>Cumulative impacts due to bird and bat strike from the Project and other wind farms in the region will be managed monitored through the implementation of a BBAMP.</p>
<i>Impacts during the operational phase – measures to avoid or minimise the indirect impacts on threatened species and threatened species habitat on land adjoining the development site, migratory species or flight pathways as a result of the operation of the development. Such measures may include those adopted to avoid and minimise:</i> <ul style="list-style-type: none"> <li>(i) <i>trampling of threatened flora species</i></li> <li>(ii) <i>rubbish dumping</i></li> <li>(iii) <i>noise</i></li> </ul>	<p>Native vegetation will be clearly delineated through pre-clearing and micro-siting surveys to reduce risk of encroachment into these areas. Temporary laydown facilities will be located in cleared areas.</p> <p>The use of lighting will be minimised, such as spacing lights out over the areas, to decrease the contrast between lighting and the night-time landscape of the area.</p> <p>Appropriate management measures to minimise risk of spreading weeds will be implemented.</p>

Indirect Impact	Method to avoid indirect impact
(iv) <i>light spill</i>	An Emergency Response Plan (ERP) will be developed prior to construction commencing, which will include protocols to reduce the risk of fire during the construction phase.
(v) <i>weed encroachment</i>	
(vi) <i>nutrient run-off</i>	
(vii) <i>increased risk of fire, and</i>	
(viii) <i>pest animals.</i>	

#### 5.4.3 Measures to minimise impacts during operational phase

Impacts to biodiversity values would be minimised during the operational phase using the methods described in Table 5.6.

**Table 5.6: Minimisation of Impacts during the Operational Phase**

Operational Phase Impact	Method to Avoid Impact
Seasonal impacts – whether there are likely to be any impacts that occur during specific seasons. Minimisation measures may include amending operational times to minimise impacts on biodiversity during periods when seasonal events such as breeding, or species migration occur	No seasonal management measures are proposed.
Artificial habitats – using ‘artificial habitats’ for fauna where they may be effective in minimising impacts on such fauna. These include nest boxes, glider-crossings or habitat bridges.	Hollow bearing trees and stags removed for the Project will be retained in areas of adjacent habitat where possible (considering the Project’s other land use and environmental management obligations).

## 6. Impacts on biodiversity that require further consideration

The Project SEARs issued in November 2019 do not specifically include a requirement to further consider any specific impacts on biodiversity. The previous SEARs, issued in December 2016, did however include a requirement to further consider impacts to specific threatened species. Correspondence received from the DPIE in relation to consideration of the BC Act for the revised 2019 SEARs, states that the requirements of the 2016 SEARs are unchanged. Therefore, although not specifically detailed in the current SEARs, further consideration is given to those threatened species listed in the 2016 SEARs:

- Swift Parrot
- Regent Honeyeater
- *Zieria obcordata*.

It is noted that the 2016 SEARs specifically exclude the White Box Yellow Box Blakely's Red Gum Woodland EEC from requiring further consideration.

### 6.1 Assessment of further impacts to Swift Parrot

An assessment of further impacts to Swift Parrot in accordance with **Section 9.2.5** of the FBA is detailed below in Table 6.1.

**Table 6.1: Assessment of further impacts to Swift Parrot**

Criteria	Response
<i>The size of the local population directly and indirectly impacted by the development</i>	There is no known population of this species in the locality. This species was not identified in the ERM bird surveys and there are no records within the Study Area.  Isolated records exist to the south of the Study Area, on the banks of Burrendong Dam. The closest record of this species is approximately 7.5 km from the Development Footprint and was recorded in 1991 (Atlas of Living Australia 2020).
<i>The likely impact (including direct and indirect impacts) that the development will have on the habitat of the local population, including but not limited to:</i> <i>(i) an estimate of the change in habitat available to the local population as a result of the proposed development</i> <i>(ii) the proposed loss, modification, destruction or isolation of the available habitat used by the local population, and</i> <i>(iii) modification of habitat required for the maintenance of processes important to the species' life cycle (such as in the case of a plant – pollination, seed set, seed dispersal, germination), genetic diversity and long-term evolutionary development.</i> <i>Atlas records or other documented, quantifiable means must be used by the assessor to estimate what percentage of the species' population and habitat is likely to be lost in the long term within the IBRA subregion due to the direct and indirect impacts of the development</i>	The Development Footprint contains suitable foraging habitat for this species. In the absence of a known local population, there is potential for this species to forage sporadically in the area. Approximately 143 ha of the current Development Footprint contains moderate to good condition vegetation which may be considered suitable foraging habitat for this species, of the total approximately 626 ha of native vegetation to be removed for the Project. This area is likely to be revised down following a detailed design process.  The existing landscape within the IBRA subregion has been significantly altered since European settlement. Gentle slopes have been cleared to increase grazing areas however, areas with steeper, rugged ridges and rangers or areas close to creek lines, along roadsides and property boundaries remain vegetated. The Development Footprint generally follows ridgelines and will not impact connectivity between the more vegetated valleys.



Criteria	Response
<p><i>The likely impact on the ecology of the local population. At a minimum, address the following for fauna:</i></p> <ul style="list-style-type: none"> <li>– breeding</li> <li>– foraging</li> <li>– roosting, and</li> <li>– dispersal or movement pathways</li> </ul>	<p>The Swift Parrot has a defined breeding habitat in Tasmania, migrating north to mainland Australia in the autumn and winter months (DPIE 2020b). Impacts to this species will be limited to a reduction in foraging habitat from vegetation removed within the Development Footprint and will not affect breeding or roosting for this species.</p> <p>The assessment of further impacts to this species from blade strike is included in the Response to Submissions to the EIS.</p>
<i>A description of the extent to which the local population will become fragmented or isolated as a result of the proposed development</i>	In the absence of a known local population, there is potential for this species to forage sporadically in the area. Further fragmentation or isolation is unlikely to occur as a result of the Project.
<i>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</i>	The Swift Parrot has a defined breeding habitat in Tasmania, migrating north to mainland Australia in the autumn and winter months (DPIE 2020b). Impacts to this species will be limited to a reduction in foraging habitat from vegetation removed within the Development Footprint and will not affect breeding, dispersal or genetic viability of this species.
<i>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</i>	Impacts to this species will be limited to a reduction in foraging habitat from vegetation removed within the Development Footprint.
<i>The measure/s proposed to contribute to the recovery of the species in the IBRA subregion.</i>	No specific measures are proposed to contribute to the recovery of this species for the Project. Management of riparian zones including the establishment of vegetation may provide improved habitat to individuals foraging sporadically in the area.

## 6.2 Assessment of further impacts to Regent Honeyeater

An expert report has been prepared for Regent Honeyeater and is included in **Appendix D**. An assessment of further impacts to Regent Honeyeater in accordance with Section 9.2.5 of the FBA is detailed below in **Table 6.2**.

**Table 6.2: Assessment of further impacts to Regent Honeyeater**

Criteria	Response
<i>The size of the local population directly and indirectly impacted by the development</i>	<p>There is no known population of this species in the locality. This species was not identified in the ERM bird surveys and there are no records within the Study Area.</p> <p>Isolated records exist to the south of the Study Area, on the banks of Burrendong Dam. The closest record of this species is 7.5 km from the Study Area and was recorded in 1984 (Atlas of Living Australia 2020).</p>
<i>The likely impact (including direct and indirect impacts) that the development will have on the habitat of the local population, including but not limited to:</i>	The Study Area contains suitable foraging habitat for this species in the form of flowering eucalypts. In the absence of a known local population, there is potential for this species

Criteria	Response
<p>(i) an estimate of the change in habitat available to the local population as a result of the proposed development</p> <p>(ii) the proposed loss, modification, destruction or isolation of the available habitat used by the local population, and</p> <p>(iii) modification of habitat required for the maintenance of processes important to the species' life cycle (such as in the case of a plant – pollination, seed set, seed dispersal, germination), genetic diversity and long-term evolutionary development.</p> <p>Atlas records or other documented, quantifiable means must be used by the assessor to estimate what percentage of the species' population and habitat is likely to be lost in the long term within the IBRA subregion due to the direct and indirect impacts of the development</p>	<p>to forage sporadically in the area. Approximately 143 ha of the current Development Footprint contains moderate to good condition vegetation which may be considered suitable foraging habitat for this species, of the total approximately 626 ha of native vegetation to be removed for the Project. This area is likely to be revised down following a detailed design process.</p> <p>The existing landscape within the IBRA subregion has been significantly altered since European settlement. Gentle slopes have been cleared to increase grazing areas however, areas with steeper, rugged ridges and ranges or areas close to creek lines, along roadsides and property boundaries remain vegetated. The Development Footprint generally follows ridgelines and will not impact connectivity between the more vegetated valleys.</p>
<p>The likely impact on the ecology of the local population. At a minimum, address the following for fauna:</p> <ul style="list-style-type: none"> <li>– breeding</li> <li>– foraging</li> <li>– roosting, and</li> <li>– dispersal or movement pathways</li> </ul>	<p>The Study Area does not coincide with any mapped Regent Honeyeater Important Area (DPIE 2020), which is strongly correlated with known breeding records of the species. It is unlikely that the Study Area would support Regent Honeyeater breeding, due to the absence of key breeding habitat features, the fragmented nature of the habitat, the abundance of competitor and predatory species and the minimal overlap between the species potential occurrence within the Study Area and the species breeding period.</p> <p>Impacts to this species will likely be limited to a reduction in foraging habitat from vegetation removed within the Development Footprint.</p>
<p>A description of the extent to which the local population will become fragmented or isolated as a result of the proposed development</p>	<p>In the absence of a known local population, there is potential for this species to forage sporadically in the area. Further fragmentation or isolation is unlikely to occur as a result of the Project.</p>
<p>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</p>	<p>The Study Area does not coincide with any mapped Regent Honeyeater Important Area (DPIE 2020), which is strongly correlated with known breeding records of the species. It is unlikely that the Study Area would support Regent Honeyeater breeding, due to the absence of key breeding habitat features, the fragmented nature of the habitat, the abundance of competitor and predatory species and the minimal overlap between the species potential occurrence within the Study Area and the species breeding period.</p>
<p>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</p>	<p>Impacts to this species will be limited to a reduction in foraging habitat from vegetation removed within the Development Footprint.</p>
<p>The measure/s proposed to contribute to the recovery of the species in the IBRA subregion.</p>	<p>No specific measures are proposed to contribute to the recovery of this species for the Project. Management of riparian zones including the establishment of vegetation may provide improved habitat to individuals foraging sporadically in the area.</p>

### 6.3 Assessment of further impacts to *Zieria obcordata*

This species occurs on north-facing slopes in sandy loam amongst granite boulders, and is known from only two sites, one being the local subpopulation comprising approximately 209 plants (DPIE 2020b) located approximately 5 km from the western extent of the Development Corridor (shown above in Figure 4.2). The ERM assessment included a comprehensive habitat assessment for this species, commencing with a survey accompanied by OEH Threatened Species Officers of the known local population to review habitat requirements and landscape position. Targeted flora searches were undertaken, and no individuals of this species were identified in the Study Area.

Limited potential habitat occurs to the north west transmission line of the Development Footprint, as indicated in the surface geology mapping shown below in Figure 6.1 – the green coloured areas indicate suitable geology and landscape position. To ensure impacts to this species are avoided, targeted pre-clearing surveys will be undertaken on the final Development Footprint prior to the commencement of construction.

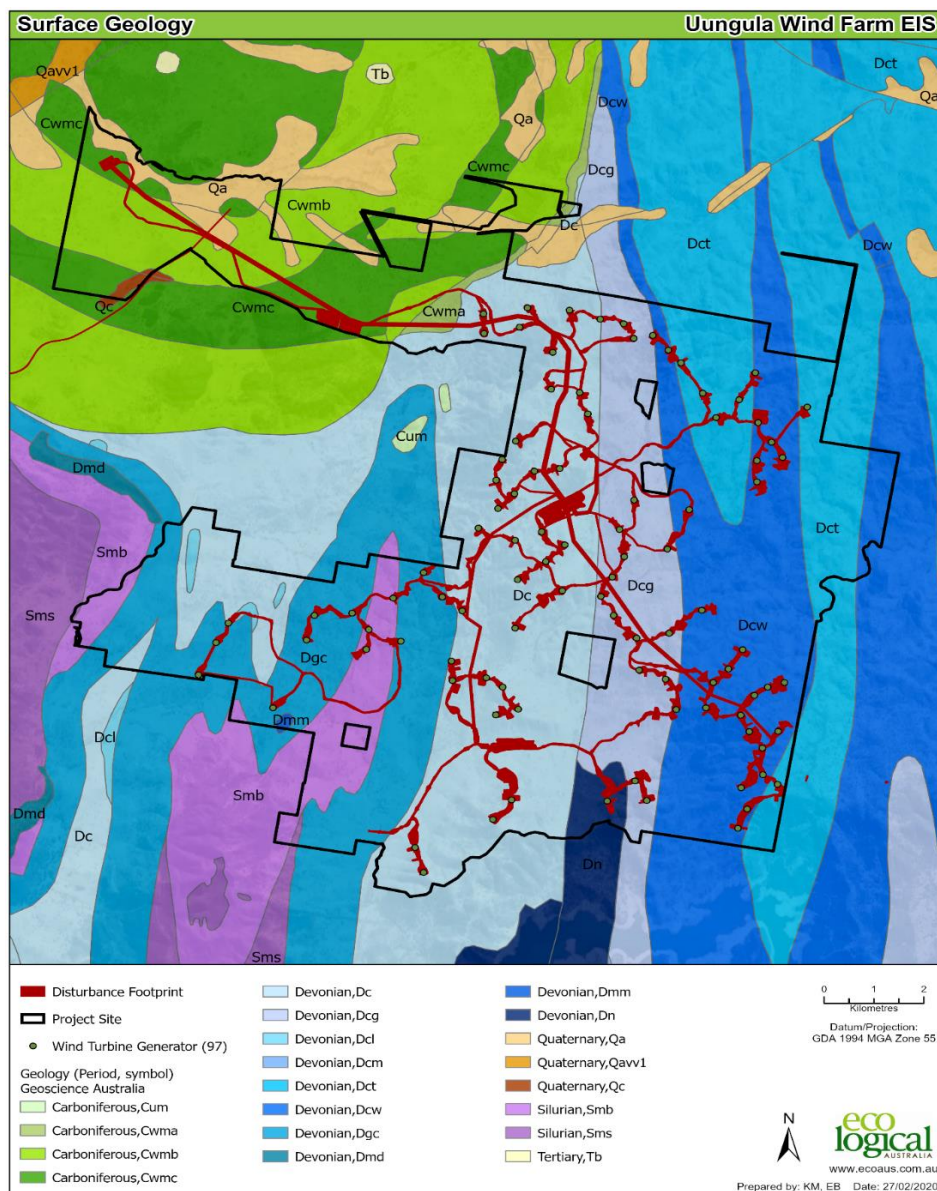


Figure 6.1: Surface Geology of the Project Area

An assessment of further impacts to *Zieria obcordata* in accordance with Section 9.2.5 of the FBA is detailed below in Table 6.3.

**Table 6.3: Assessment of further impacts to *Zieria obcordata***

Criteria	Response
<i>The size of the local population directly and indirectly affected by the development</i>	This species occurs in north-facing slopes in sandy loam amongst granite boulders, and is known from only two sites, one being the local subpopulation comprising approximately 209 plants (DPIE 2020b) located approximately 5 km from the western extent of the Development Footprint. Limited potential habitat occurs to the north west transmission line of the Development Footprint, however, has not been identified from threatened flora searches.
<p><i>The likely impact (including direct and indirect impacts) that the development will have on the habitat of the local population, including but not limited to:</i></p> <p><i>(i) an estimate of the change in habitat available to the local population as a result of the proposed development</i></p> <p><i>(ii) the proposed loss, modification, destruction or isolation of the available habitat used by the local population, and</i></p> <p><i>(iii) modification of habitat required for the maintenance of processes important to the species' life cycle (such as in the case of a plant – pollination, seed set, seed dispersal, germination), genetic diversity and long-term evolutionary development.</i></p> <p><i>Atlas records or other documented, quantifiable means must be used by the assessor to estimate what percentage of the species' population and habitat is likely to be lost in the long term within the IBRA subregion due to the direct and indirect impacts of the development</i></p>	<p>The known local population of this species will not be directly affected by the Project. Further impacts to previously unrecorded individuals or populations will be managed through detailed ecological pre-clearing surveys on the final Development Footprint, and detailed design to avoid any impacts.</p> <p>Pre-clearing surveys will be concentrated in the north west transmission line of the Development Footprint, where the geology support potential habitat for the species.</p>
<p><i>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:</i></p> <ul style="list-style-type: none"> <li><i>– pollination cycle</i></li> <li><i>– seedbanks</i></li> <li><i>– recruitment, and</i></li> <li><i>– interactions with other species (e.g. pollinators, host species, mycorrhizal associations)</i></li> </ul>	The known local population of this species is located approximately 5 km from the western extend of the Development Footprint and will not be directly affected by the Project.
<i>A description of the extent to which the local population will become fragmented or isolated as a result of the proposed development</i>	The known local population of this species is located approximately 5 km from the western extend of the Development Footprint and will not be directly affected by the Project.
<i>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</i>	This species is known from only two sites, one being the local subpopulation, the second being north west of Bathurst comprising approximately 700 plants. The local subpopulation will not be directly affected by the Project and it is unlikely that the two subpopulations interact.

Criteria	Response
<i>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</i>	A BMP would be developed, which would include weed and feral animal control protocols. Assessment of priority weeds in the Project Footprint will be undertaken and appropriate management measures to minimise risk of spreading weeds outside of the Development Footprint will be implemented.
<i>The measure/s proposed to contribute to the recovery of the species in the IBRA subregion.</i>	No specific measures are proposed to contribute to the recovery of this species for the Project.



## 7. Commonwealth matters

Approval was granted by the Commonwealth that the relevant impacts of the proposed action will be assessed by accredited assessment under Part 4 of the NSW EP&A Act, therefore, a separate assessment is not required for Commonwealth matters.

In accordance with the FBA, Commonwealth protected matters that may be affected by the Project must be identified and the significance of impacts assessed. The Protected Matters Search Tool was accessed for the Development Corridor and 20 km radius to identify all EPBC Act listed endangered communities and threatened species, listed in Table 7.1 and Table 7.2 below. Those species and communities warranting further assessment are highlighted and confirmed if they are to be offset under the FBA as either species credit or ecosystem credit species.

Further assessment of EPBC Act protected species and communities is included in the EIS for the Project in accordance with the *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance* (Commonwealth of Australia 2013). It was concluded that no significant impacts will occur to EPBC listed species or communities.

**Table 7.1: EPBC Act listed endangered communities**

Ecological communities			
Name	Likelihood of occurrence	Potential impact	Further EPBC Act assessment required
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	No – not identified in extensive vegetation mapping of the Study Area	No	No
Natural Temperate Grassland of the South Eastern Highlands	No – not identified in extensive vegetation mapping of the Study Area	No	No
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Known – this community has been identified and mapped in the Study Area.	Approximately 14 ha of this CEEC occurs in the current Development Footprint and will potentially be removed for the Project. Minimisation of impacts and avoidance measures will be implemented to reduce the area of disturbance as far as practicable. This CEEC will be offset under the NSW Biodiversity Offset Scheme.	Yes. An updated assessment of significance of impact for the CEEC has been prepared for the Response to Submissions to the EIS.



Table 7.2: EPBC Act listed threatened species

Scientific name (Common name)	Likelihood of occurrence	Potential impact	Further assessment required
<i>Anthochaera phrygia</i> (Regent Honeyeater)	Potential	Removal of potential woodland foraging habitat. This species will be offset under the NSW requirements.	Yes – Updated assessment of significance of impact under the EPBC Act and assessment of blade strike impact prepared for the response to submissions. Expert report attached Appendix D.
<i>Aprasia parapulchella</i> (Pink-tailed Worm Lizard/Pink-tailed Legless Lizard)	Potential	Unlikely – no records nearby, not identified in surveys	No
<i>Botaurus poiciloptilus</i> (Australian Bittern)	Unlikely	No – requires permanent freshwater wetlands	No
<i>Calidris ferruginea</i> (Curlew Sandpiper)	Unlikely	No – requires freshwater wetlands or estuarine habitat	No
<i>Chalinolobus dwyeri</i> (Large-eared Pied Bat)	Potential	Removal of woodland foraging habitat	No – this species was not identified in targeted microbat surveys. This species will be offset under NSW ecosystems credits.
<i>Dasyurus maculatus</i> (Spotted-tail Quoll)	Unlikely	Removal of woodland habitat	No – targeted surveys for this species were completed, as described above in 4.1.2, not identified in the Study Area. This species will be offset under NSW ecosystems credits.
<i>Delma impar</i> (Striped Legless Lizard)	Potential	Removal of habitat through ground disturbance	Updated assessment of significance of impact under the EPBC Act prepared for the response to submissions
<i>Grantiella picta</i> (Painted Honeyeater)	Potential	Removal of woodland foraging habitat	Updated assessment of significance of impact under the EPBC Act and assessment of blade strike impact prepared for the response to submissions
<i>Hirundapus caudacutus</i> (White-throated Needle-tail)	Known	Removal of foraging habitat	Updated assessment of significance of impact under the EPBC Act and assessment of blade strike impact prepared for the response to submissions
<i>Lathamus discolor</i> (Swift Parrot)	Potential	Removal of woodland foraging habitat	Updated assessment of significance of impact under the EPBC Act and assessment of blade strike impact prepared for the response to submissions
<i>Leipoa ocellate</i> (Mallee Fowl)	Unlikely	No – suitable woodland habitat not present	No
<i>Litoria booroolongensis</i> (Booroolong Frog)	No	No - requires permanent water streams	No

Scientific name (Common name)	Likelihood of occurrence	Potential impact	Further assessment required
<i>Motacilla flava</i> (Yellow Wagtail)	Unlikely	No – requires swamp marsh habitat	No
<i>Myiagra cyanoleuca</i> (Satin Flycatcher)	Unlikely	Migratory species, potential removal of foraging habitat	No – not identified in surveys, no nearby records.
<i>Numenius madagascariensis</i> (Eastern Curlew)	Unlikely	No – requires swamp marsh habitat	No
<i>Nyctophilus corbeni</i> (Corben's Long Eared Bat)	Potential	Removal of Woodland habitat	Updated assessment of significance of impact under the EPBC Act prepared for the response to submissions
<i>Petrogale penicillate</i> (Brush-tailed Rock-wallaby)	Unlikely	No – Required Rocky escarpments, outcrops and cliffs not present in the Development Corridor. Not identified in surveys.	No
<i>Phascolarctos cinereus</i> (Koala)	Potential	This species has not been identified from surveys, however due to the presence of potential habitat the precautionary approach has been taken and offsets will be secured under the NSW scheme.	Updated assessment of significance of impact under the EPBC Act prepared for the response to submissions
<i>Polytelis swainsonii</i> (Superb Parrot)	Known	Removal of woodland foraging habitat. This species has been observed within the Development Footprint at a number of sites. This species will be offset under the NSW requirements.	Updated assessment of significance of impact under the EPBC Act and assessment of blade strike impact prepared for the response to submissions
<i>Pseudomys novaehollandiae</i> (New Holland Mouse)	Potential	Removal of Woodland Habitat	Updated assessment of significance of impact under the EPBC Act prepared for the response to submissions
<i>Pteropus poliocephalus</i> (Grey-headed Flying-fox)	Likely	Known Flying Fox camps in Wellington and Mudgee. Potential to use the Study Area as foraging. Known from one carcass identified During surveys.	Updated assessment of significance of impact under the EPBC Act and assessment of blade strike impact prepared for the response to submissions
<i>Rufous Fantail</i> ( <i>Rhipidura rufifrons</i> )	Unlikely	No – Mainly inhabits subtropical and temperate rainforests	No
<i>Rostratula australis</i> (Australian Painted Snipe)	Unlikely	No – Requires swamps dams and marshy areas	No
<i>Dichanthium setosum</i> (Bluegrass)	Unlikely, one record exists to the north of the Study Area.	Removal of cleared woodland and grassland habitat. Although this species hasn't been identified in the Study Area.	Yes - pre-clearing survey and micro-siting of infrastructure will be undertaken to avoid any impacts. Updated assessment of significance of

Scientific name (Common name)	Likelihood of occurrence	Potential impact	Further assessment required
			impact under the EPBC Act prepared for the response to submissions
<i>Eucalyptus alligatrix</i> subsp. <i>alligatrix</i>	Unlikely	No – This species only occurs within one known area located approximately 74 km South east of the Development Footprint.	No
<i>Eucalyptus cannonii</i> (Capertee Stringybark)	Unlikely	No – The nearest record is located 30 km south east of the Development footprint	No
<i>Euphrasia arguta</i>	Unlikely	No – The nearest record is located 60 km south east of the Development footprint	No
<i>Prasophyllum petilum</i> (Tarengo Leek Orchid)	Unlikely	No – The nearest record is located 73 km south east of the Development footprint	No
<i>Prasopghyllum</i> sp. <i>Wybong</i> (C.Phelps ORG 5269)	Unlikely	No – The nearest record is located 140 km East of the Development footprint	No
<i>Persoonia marginata</i> (Clandulla Geebung)	Unlikely	No – Nearest known population is located near Clandulla approximately 75 km South East of the Development footprint	No
<i>Swainsona recta</i> (Small Purple-pea)	Potential	Removal of native grassy understorey habitat	Yes - pre-clearing survey and micro-siting of infrastructure will be undertaken to avoid any impacts. Updated assessment of significance of impact under the EPBC Act prepared for the response to submissions
<i>Tylophora linearis</i>	Unlikely	No – The nearest record is located 42 km North west of the Development footprint	No
<i>Zieria obcordata</i>	Potential	Potential granite boulder habitat in the north west transmission line area	Yes - pre-clearing survey and micro-siting of infrastructure will be undertaken to avoid any impacts. Updated assessment of significance of impact under the EPBC Act prepared for the response to submissions

## 8. Impact Summary

The results of the BAR, including the vegetation and threatened species assessment results, were entered into the BBCC.

The Development Footprint has already been revised and reduced from the original design, taking into consideration the mapped areas of native vegetation, in particular, TECs. This has included removing the eastern extent of the Development Footprint and revising the Development Footprint so that minimal TECs are affected.

Credit calculations have been undertaken on the current Development Footprint, which is considered an upper maximum due to various buffers and easements incorporated into the design. Further refinements will be made to the Development Footprint pre-construction which are expected to further reduce the area of impact; however, flexibility is sought to adjust the Development Footprint within the Development Corridor.

### 8.1 Ecosystem credit requirement

The ecosystem credit requirement for the Project based on the current Development Footprint is presented below in Table 8.1. The full BBCC reports are included in **Appendix E**.

Table 8.1: Project Ecosystem Offset Requirement

Vegetation Zone	BVT	Description	Condition	TEC Status	Approx. Area (ha) (Development Footprint)	Credits
1	CW112	Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion	Moderate/Good_Moderate	BC Act / EPBC Act	6.28	383
2	CW112	Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion	Moderate/Good_Poor - Grassland	-	61.1	3,322
3	CW177	Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion	Moderate/Good_Medium	-	18.78	955
4	CW177	Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion	Moderate/Good_Poor - Grassland	-	26	1,099
5	CW177	Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion	Moderate/Good_Other - Weedy	-	7.21	260
6	CW202	Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes	Moderate/Good_Moderate	-	16.27	993
7	CW202	Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes	Moderate/Good_Poor - Grassland	-	11.27	487
8	CW211	White Box - Rough-barked Apple alluvial woodland on the NSW western slopes	Moderate/Good_Moderate	BC Act / EPBC Act	7.87	449
9	CW211	White Box - Rough-barked Apple alluvial woodland on the NSW western slopes	Moderate/Good_Poor - Grassland	-	45.3	1,859
10	CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	Moderate/Good_Moderate	BC Act	14.56	627
11	CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	Moderate/Good_Poor - Grassland	-	301.67	12,790
12	CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	Moderate/Good_Other - Grassland	-	72.16	2,796

Vegetation Zone	BVT	Description	Condition	TEC Status	Approx. Area (ha) (Development Footprint)	Credits
13	CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	Low – Poor_Weedy	-	37.11	399
Total					625	26,421



## 8.2 Species credit requirement

Species credits calculated based on the current Development Footprint are presented below in Table 8.2. Further refinements will be made to the Development Footprint pre-construction which are expected to further reduce the area of impact; however, flexibility is sought within the Development Corridor. This flexibility, whilst expected to decrease the overall area of impact, may inadvertently increase specific areas of species credit impact.

**Table 8.2: Project Species Credit Offset Requirement**

Scientific name	Common name	Area (ha) habitat loss	Credits
<i>Phascolarctos cinereus</i>	Koala	143.13	3,721
<i>Petaurus norfolcensis</i>	Squirrel Glider	143.13	3,149
<i>Anthochaera phrygia</i>	Regent Honeyeater	143.13	11,021
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	11.61	232

Consultation was sought with the BCD to determine the potential to confirm presence or absence of both Squirrel Glider and Eastern Pygmy-possum through targeted survey. A field survey for specific potential habitat, based on expert advice, was undertaken in August 2020 to refine the areas of habitat and develop a targeted survey methodology, which will be undertaken later in 2020. Credits presented above in Table 8.2 are considered an upper maximum and will be refined following further survey and finalisation of the Development Footprint.

No threatened flora species have been recorded within the Study Area from or since the ERM surveys which were undertaken in accordance with the 2011 DGRs. Four (4) threatened flora candidate species were identified as having the potential to occur in the Development Footprint based on the associated BVTs, presence of suitable habitat and nearby previous records:

- *Dichanthium setosum* (Bluegrass)
- *Swainsona sericea* (Silky Swainson-pea)
- *Swainsona recta* (Small Purple-pea)
- *Zieria obcordata*.

Whilst none of the above flora species have been recorded in the Study Area, The Proponent will commit to undertaking pre-clearing surveys in areas of suitable habitat prior to vegetation clearing and micro-siting of infrastructure will be employed to avoid any impact to previously unrecorded threatened flora species.

## 9. Biodiversity Offset Strategy

The proposed offset strategy for the Project is to acquire and retire all ecosystem credits, based on the impacts of the final Development Footprint, once available, to be calculated using the BBCC. It is noted that credits calculated by the BBCC following assessment under the FBA will require determination of reasonable equivalent credits as determined by the current Biodiversity Offset Scheme under the BC Act, determined by the Biodiversity Assessment Method (BAM).

CWPR is considering the BOS for the Project and the final BOS to be delivered for the Project will include one of the following offsetting options under the FBA:

- Securing land (land-based offset)
- Securing required credits through the open credit market, and/or
- Payments to the Biodiversity Conservation Fund (established under the BC Act). One of the key functions of the NSW Biodiversity Conservation Trust (BCT) is to secure land-based offsets on behalf of developers who pay into the Biodiversity Conservation Fund (BCT 2018). Through this process the BCT is able to combine offset obligations and funds to establish strategic, larger and more viable offset sites in NSW (NSW Government 2018).

### 9.1 Land-based offsets

The mechanism to secure land-based offsets is a practical solution that provides security for the proposed offset, but also allows sufficient flexibility for a portion of land to be managed appropriately. Such mechanisms include a stewardship agreement under the BC Act.

CWPR has commenced consultation with surrounding landowners to investigate the options for establishing land-based offsets on neighbouring properties. Preliminary assessments have been undertaken on three properties which has included desktop review of publicly available vegetation community mapping and entry into the BAM Calculator (BAMC). The preliminary assessments have shown that the vegetation communities on neighbouring properties are largely consistent with those in the Development Footprint, including vegetation communities associated with the TECs detailed in **Section 3.4** of this report.

Further investigation is required to refine and validate vegetation mapping to determine the offset potential, however, the presence and area (ha) of equivalent vegetation communities indicates that land-based offsets will provide a viable mechanism to secure and retire the required biodiversity offset credits.

The final offset strategy, including the mechanism to provide for the long-term security of the offset area will be discussed and agreed upon between DPIE and CWPR.

Once a suitable offset has been identified the following will be provided to DPIE:

- Description of the proposed offset property
- The mechanism proposed to secure the offset for biodiversity outcomes
- Ecosystem credit summary

- Species credits
- Management actions to improve biodiversity values.

Management actions would be implemented to manage native vegetation in the offset following approval of the Project. These include:

- Determining benchmark criteria for native vegetation and habitat condition at the site
- Enhancing the quality of native vegetation and habitat
- Restoring native vegetation and habitat through support of natural regeneration, targeted vegetation establishment, and potentially through the introduction of habitat features (fallen logs, tree hollows)
- Land Management issues such as salinity, erosion, weeds and feral pests through targeted management programs
- Controlling access to the site through installation and maintenance of fencing and gates;
- Bushfire management, including access trails and fire breaks
- A comprehensive monitoring program to determine the success of management actions to improve biodiversity values and progress the condition of the native vegetation and habitat towards the benchmark state.

## 10. References

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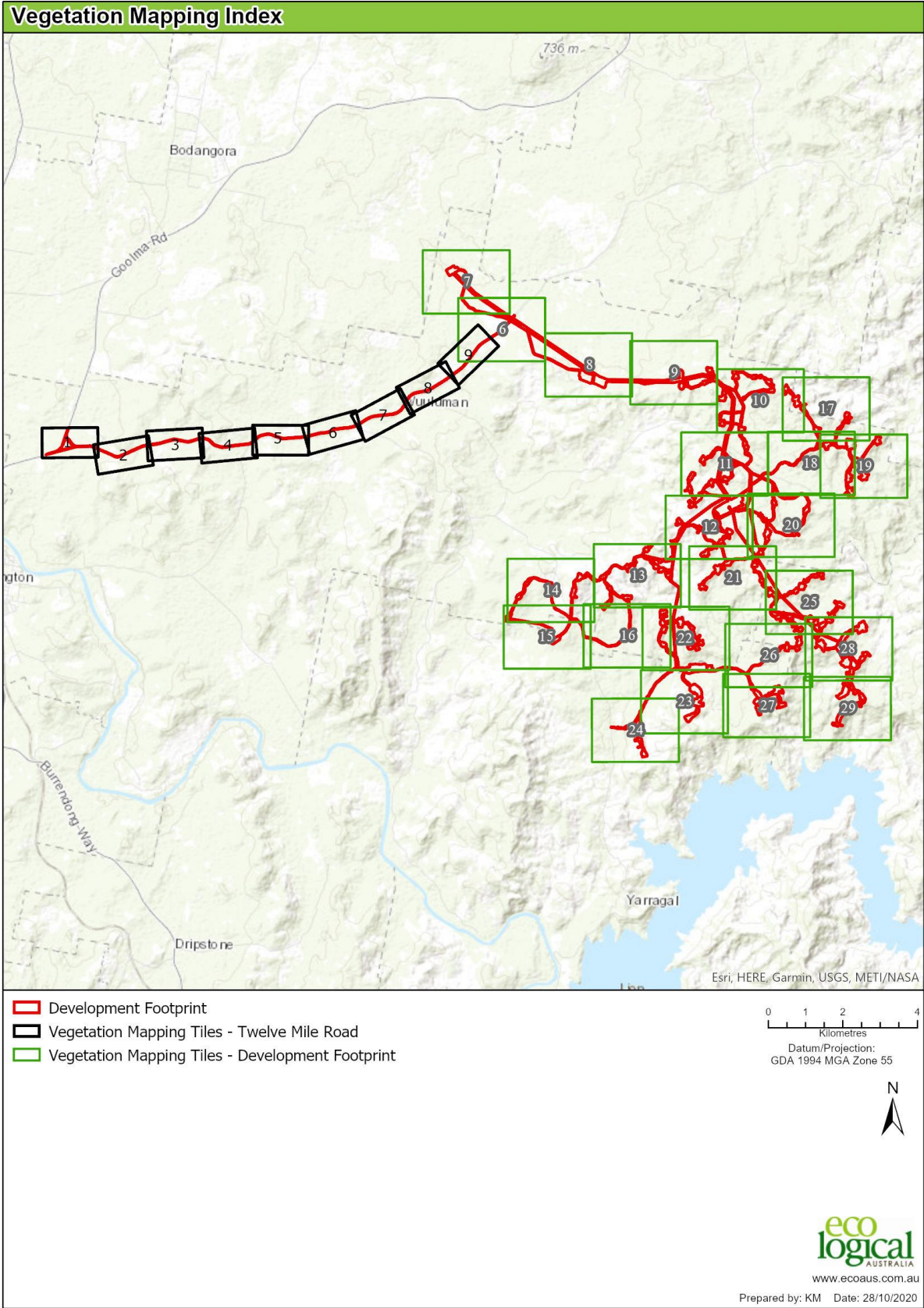
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NSW Department of Planning, Industry and Environment (DPIE) 2020c. NSW BioNet Vegetation Classification.

NSW Department of Planning, Industry and Environment (DPIE) 2020d. Archived BioMetric and Threatened Species Profiles datasets.

Environment and Resource Management (ERM) 2013. *Ungula Wind Farm: Ecological Assessment*, prepared for Wind Prospect CWP Pty Ltd

Appendix A Map Books







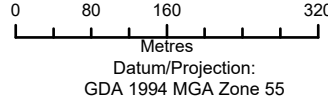


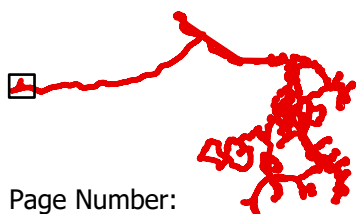
 Development Footprint

 Threatened Ecological Community

Vegetation Zones

-  Vegetation Zone 10: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Mod (CEEC - BC Act)
-  Non-Native Vegetation







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


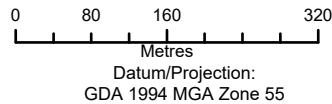




-  Development Footprint
-  Threatened Ecological Community

Vegetation Zones



-  Vegetation Zone 10: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Mod (CEEC - BC Act)
-  Non-Native Vegetation





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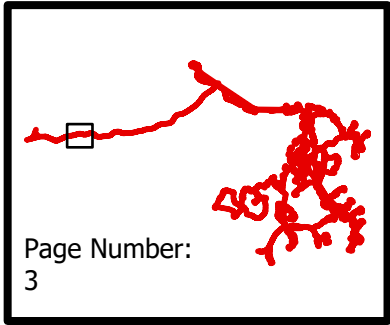
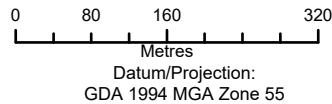




-  Development Footprint
-  Threatened Ecological Community

Vegetation Zones

-  Vegetation Zone 10: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Mod (CEEC - BC Act)
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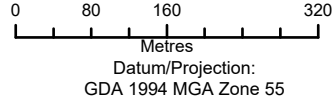
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- Development Footprint
- BBAM Plots outside Development Footprint
- Threatened Ecological Community



Vegetation Zones

- Vegetation Zone 10: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Mod (CEEC - BC Act)
- Non-Native Vegetation

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


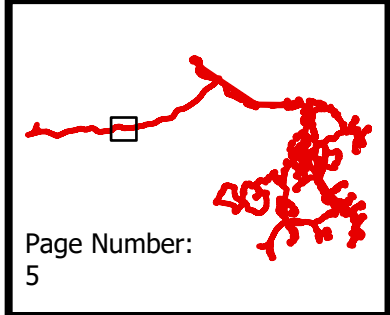
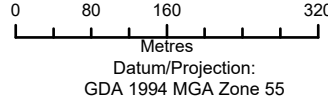


 Development Footprint

 Threatened Ecological Community

Vegetation Zones

-  Vegetation Zone 10: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Mod (CEEC - BC Act)
-  Non-Native Vegetation



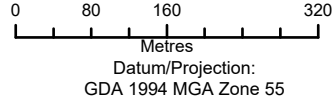
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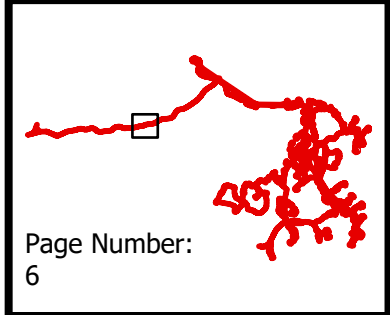


- Development Footprint
- BAM Plots outside Development Footprint
- Threatened Ecological Community



Vegetation Zones

- Vegetation Zone 1: CW112 Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion - Mod\_Good - Mod (CEEC - BC Act/EPBC Act)
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- Vegetation Zone 10: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Mod (CEEC - BC Act)
- Non-Native Vegetation



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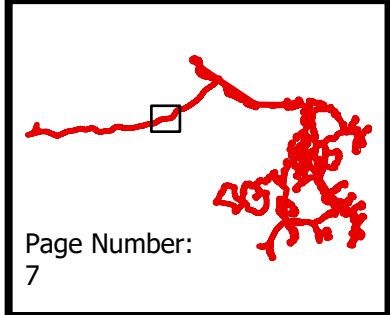
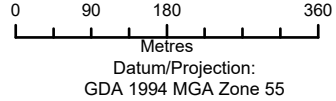




- Development Footprint
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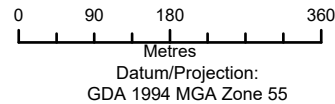




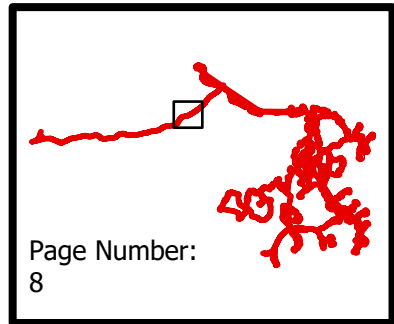
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Vegetation Zones

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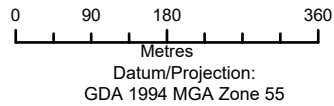




-  Development Footprint
-  Threatened Ecological Community

Vegetation Zones

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-  Vegetation Zone 11: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_GrsInd
-  Non-Native Vegetation

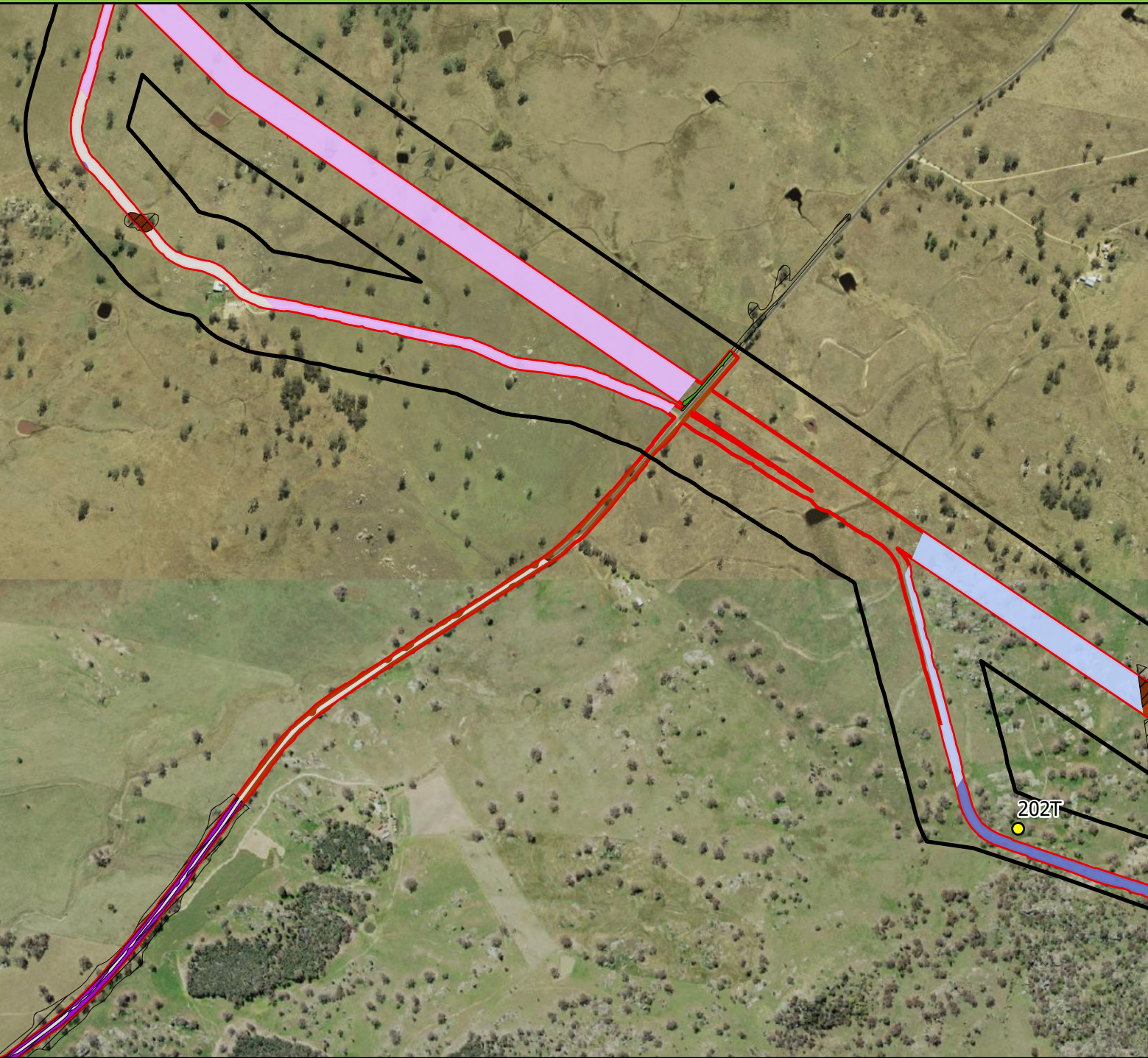


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Vegetation Mapping

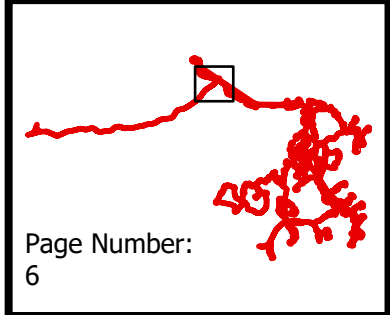
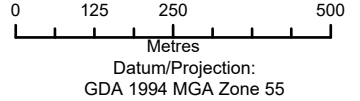


- Development Corridor
- Development Footprint
- BBAM Plots outside Development Footprint
- Threatened Ecological Community

Vegetation Zones

- Vegetation Zone 1: CW112 Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion - Mod\_Good - Mod (CEEC - BC Act/EPBC Act)
- Vegetation Zone 2: CW112 Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion - Mod\_Good - Poor\_GrsInd
- Vegetation Zone 6: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Mod

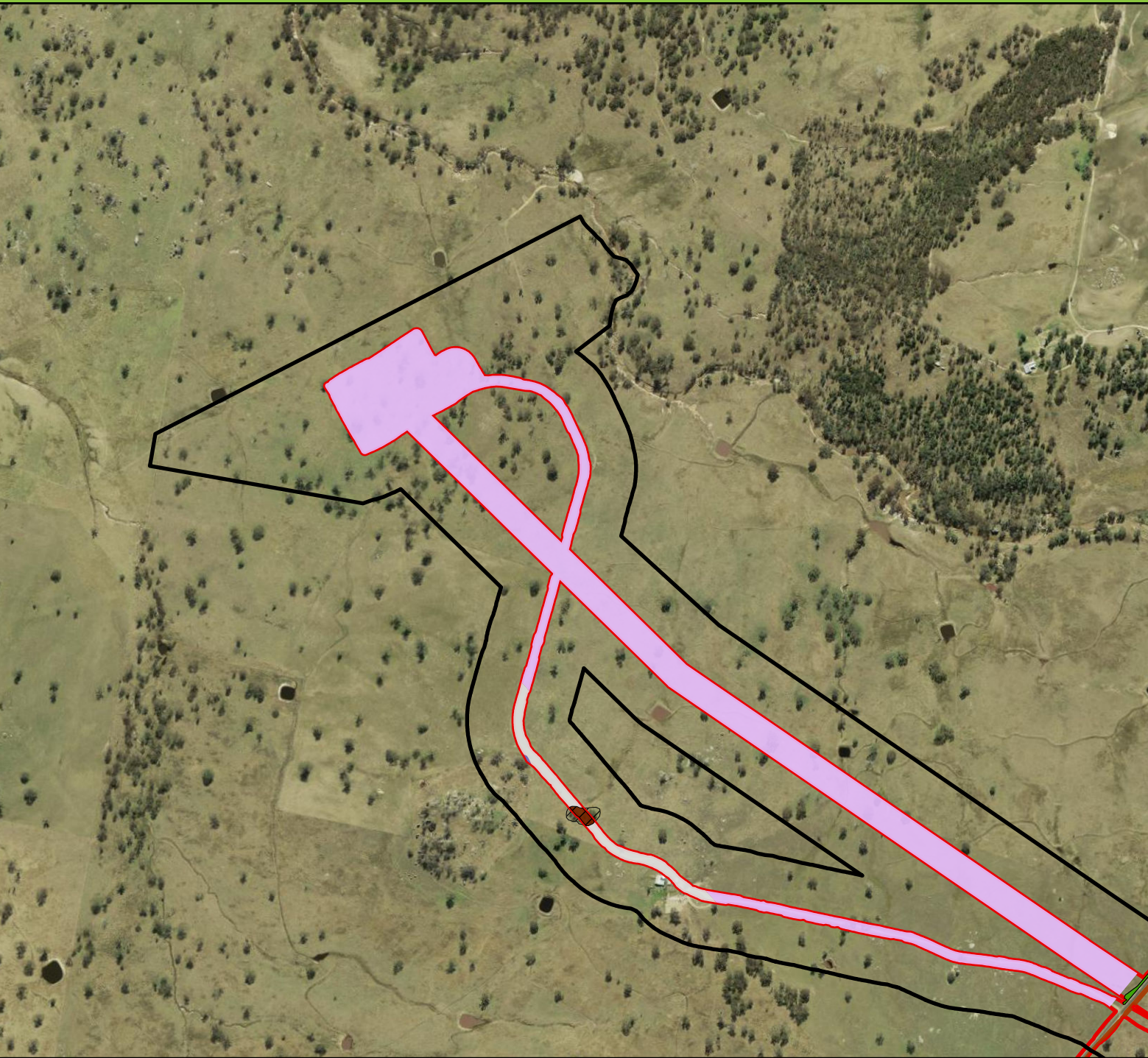
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- Vegetation Zone 8: CW211 White Box - Rough-barked Apple alluvial woodland on the NSW western slopes - Mod\_Good - Mod (CEEC - BC Act/EPBC Act)
- Vegetation Zone 10: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Mod (CEEC - BC Act)
- Vegetation Zone 11: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_GrsInd
- Non-Native Vegetation



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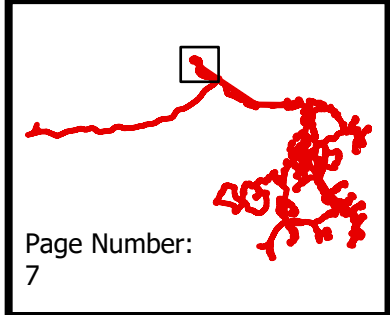
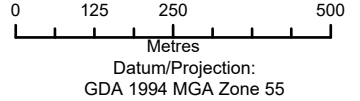


- Development Corridor
- Development Footprint
- Threatened Ecological Community

Vegetation Zones

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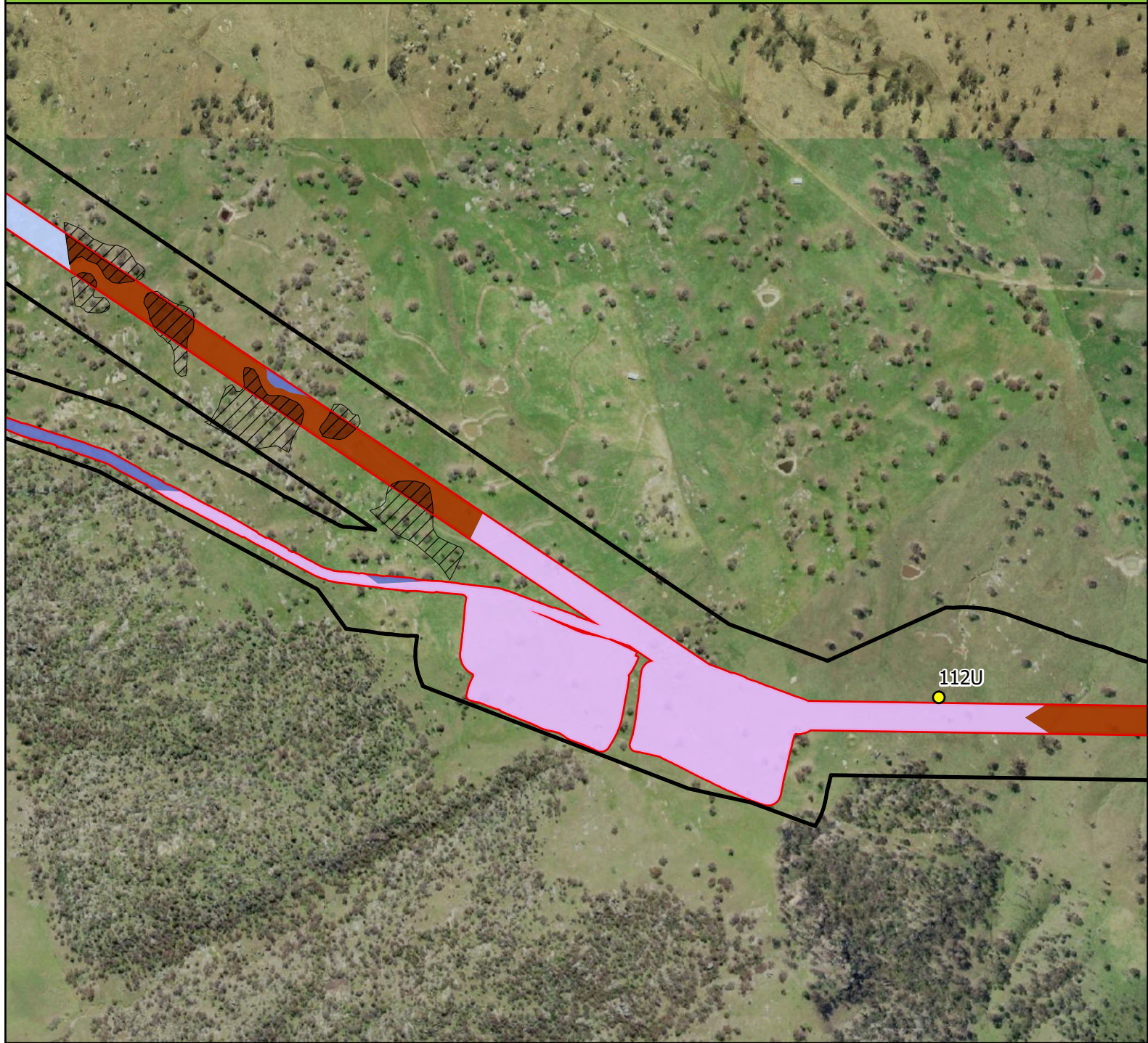
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- Non-Native Vegetation



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# Vegetation Mapping



- Development Corridor
- Development Footprint
- BBAM Plots outside Development Footprint
- Threatened Ecological Community

## Vegetation Zones

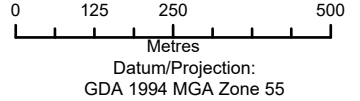
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Vegetation Zone 6: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Mod

Vegetation Zone 7: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Poor\_GrsInd

Vegetation Zone 10: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Mod (CEEC - BC Act)

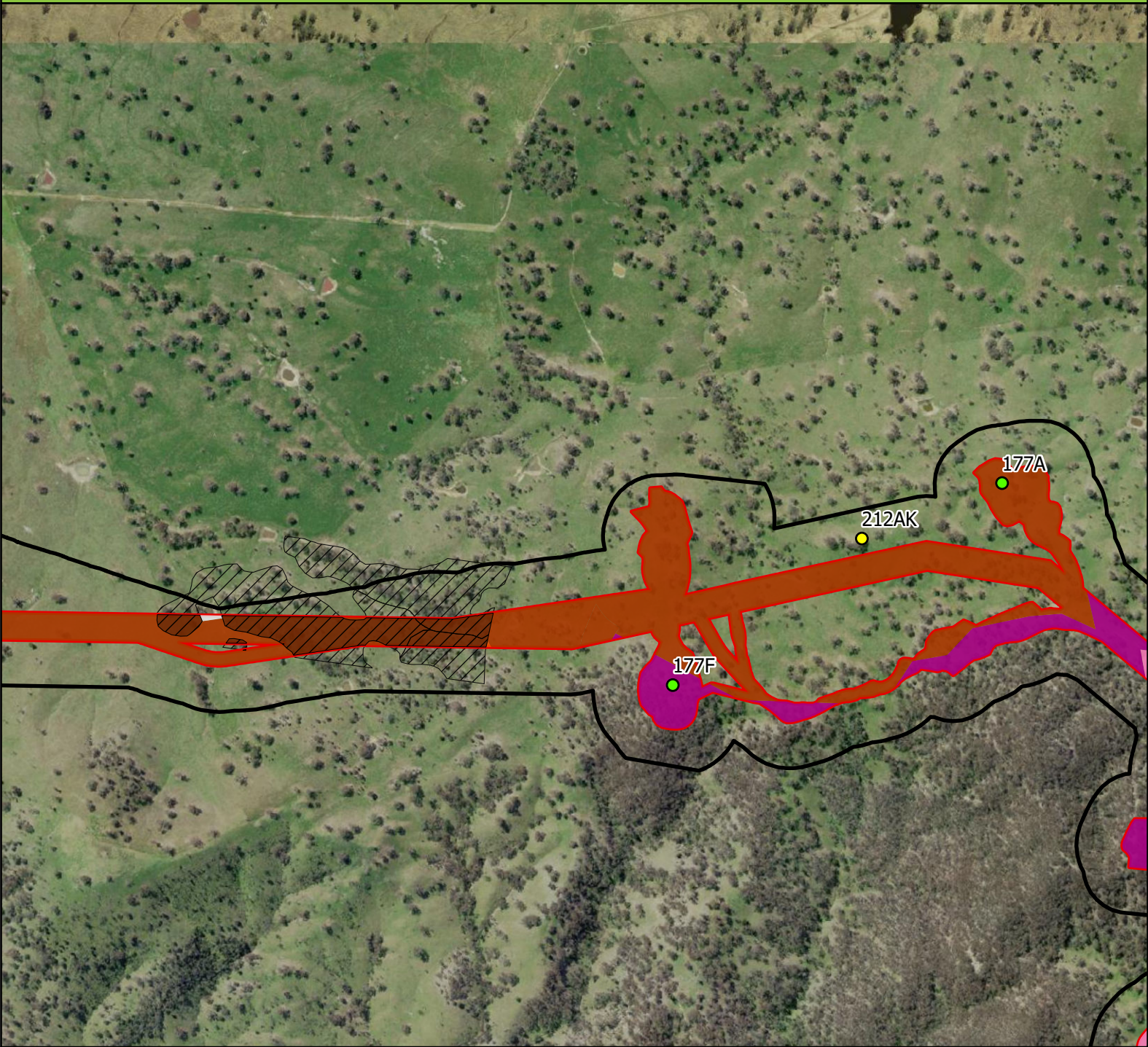
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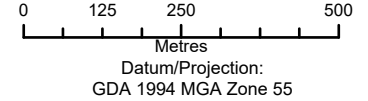
- Development Corridor
- Development Footprint
- BBAM Plots within Development Footprint
- BBAM Plots outside Development Footprint
- Threatened Ecological Community

Vegetation Zones

Vegetation Zone 3: CW177 Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion - Mod\_Good - Mod

Vegetation Zone 4: CW177 Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion - Mod\_Good - Poor\_GrsLnd

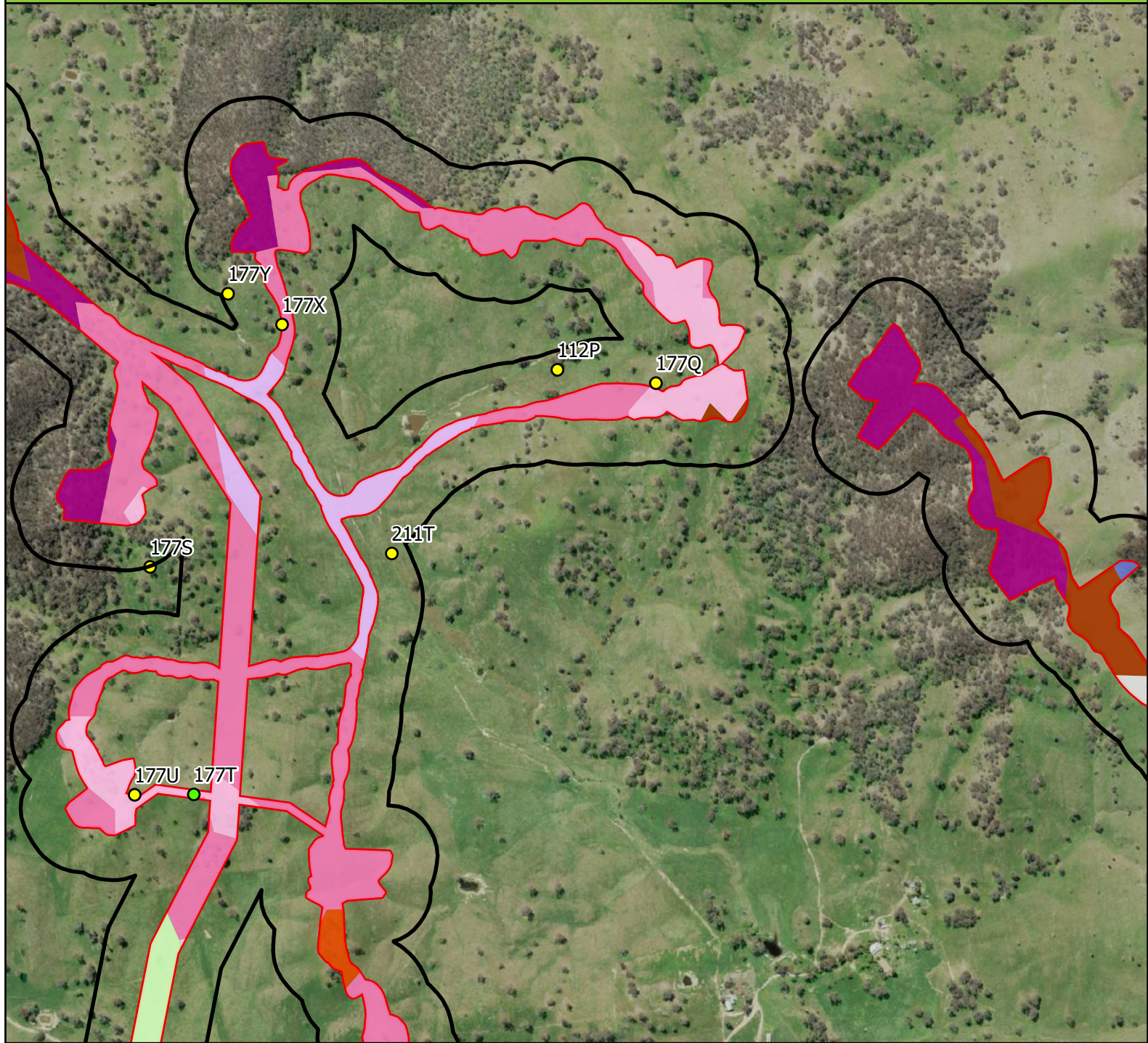
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- Vegetation Zone 11: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_GrsLnd
- Vegetation Zone 12: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_Weedy
- Non-Native Vegetation



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Vegetation Mapping

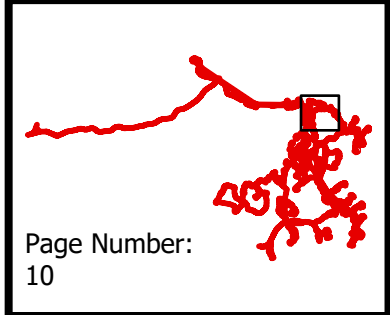
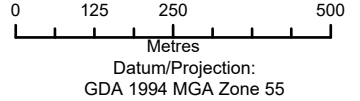


- Development Corridor
- Development Footprint
- BBAM Plots within Development Footprint
- BBAM Plots outside Development Footprint

Vegetation Zones

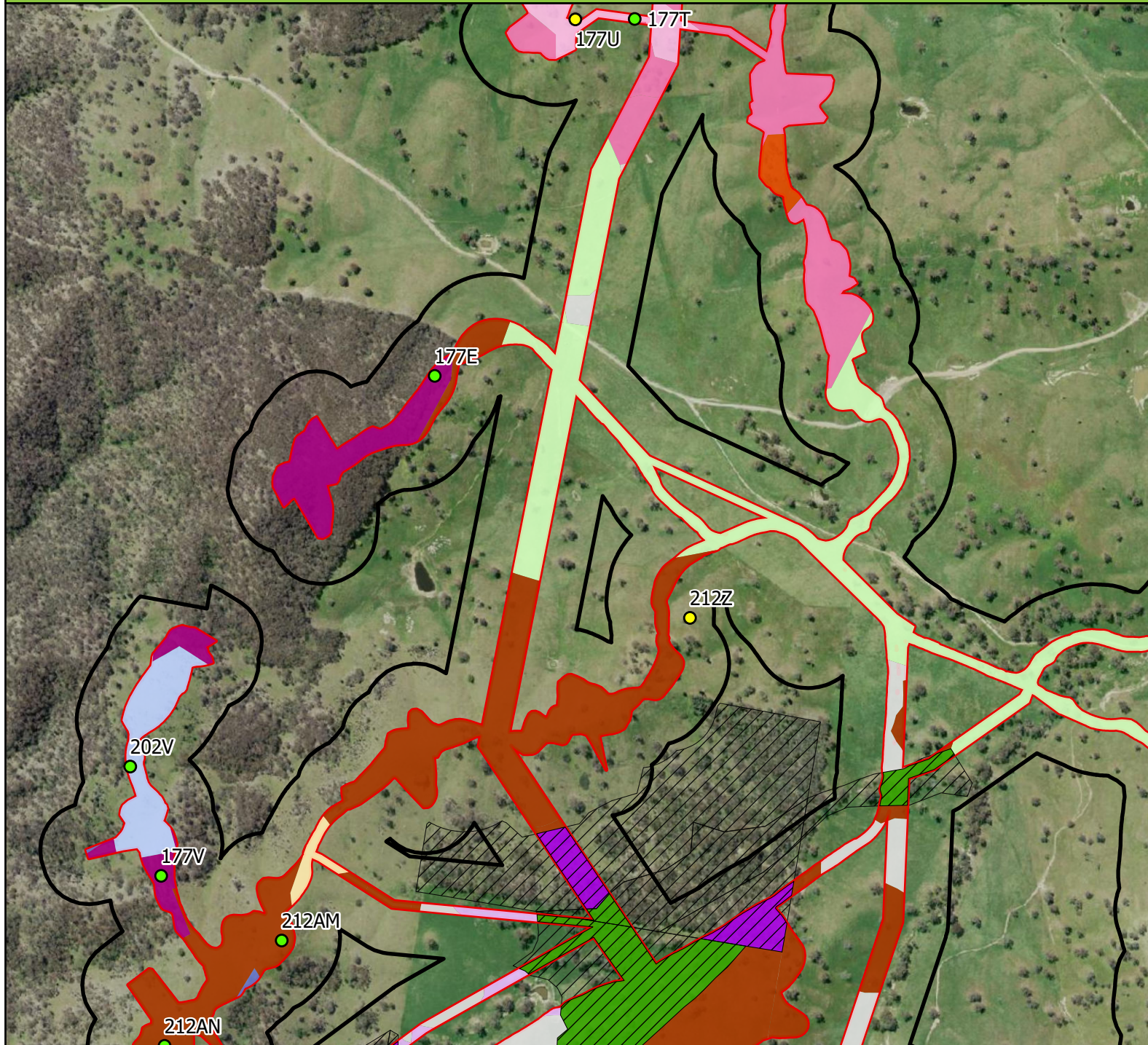
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- Vegetation Zone 3: CW177 Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion - Mod\_Good - Mod
- Vegetation Zone 4: CW177 Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion - Mod\_Good - Poor\_GrsInd

- Vegetation Zone 5: CW177 Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion - Mod\_Good - Poor\_Weedy
- Vegetation Zone 6: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Mod
- Vegetation Zone 9: CW211 White Box - Rough-barked Apple alluvial woodland on the NSW western slopes - Mod\_Good - Poor\_GrsInd
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- Vegetation Zone 12: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_Weedy
- Non-Native Vegetation





# Vegetation Mapping

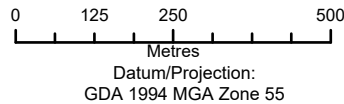


- Development Corridor
- Development Footprint
- BBAM Plots within Development Footprint
- BBAM Plots outside Development Footprint
- Threatened Ecological Community

## Vegetation Zones

- Vegetation Zone 1: CW112 Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion - Mod\_Good - Mod (CEEC - BC Act/EPBC Act)
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- Vegetation Zone 11: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_GrsInd
- Vegetation Zone 12: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_Weedy
- Vegetation Zone 13: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Low - Poor\_Weedy
- Non-Native Vegetation



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GDA 1994 MGA Zone 55



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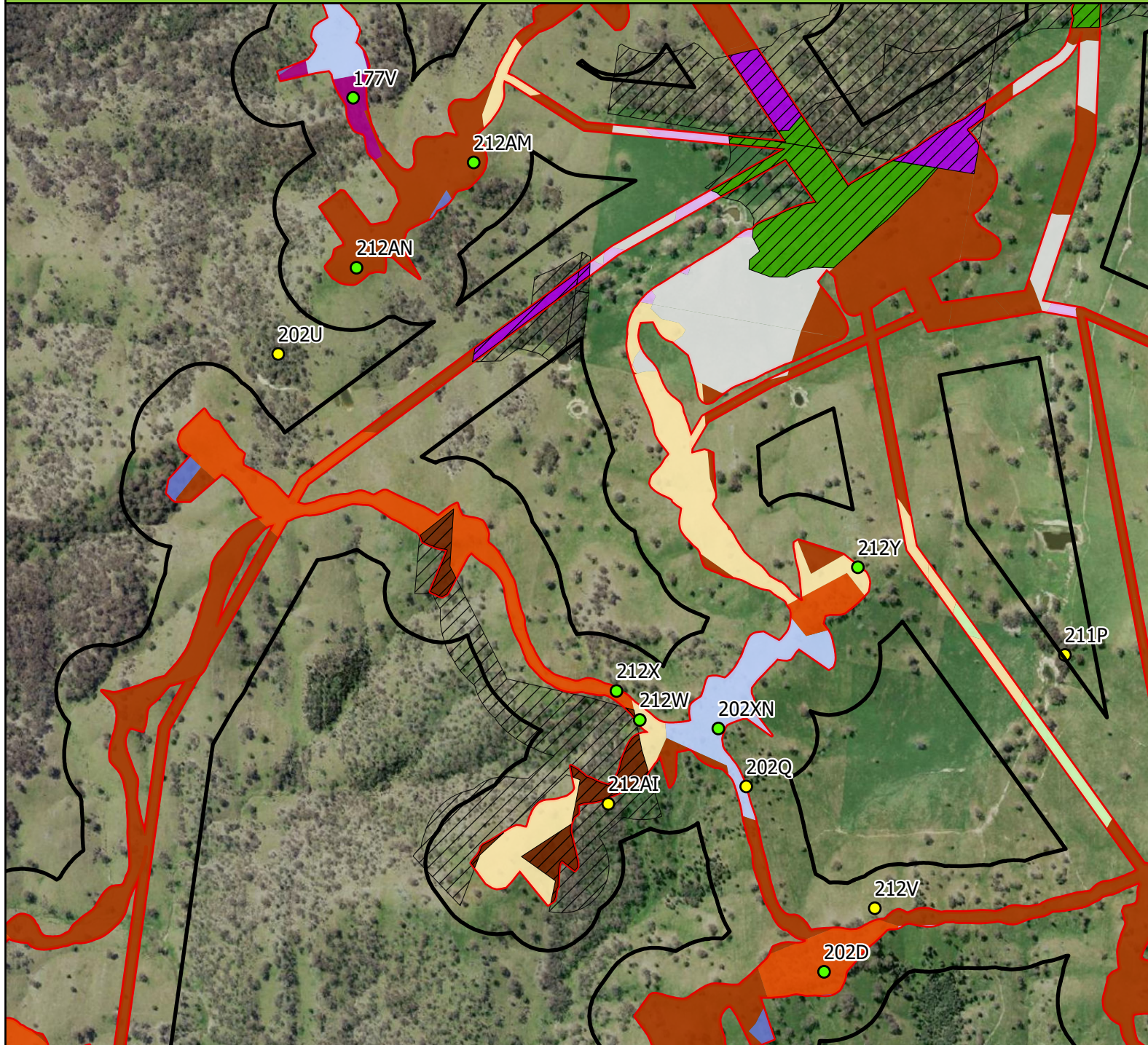


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# Vegetation Mapping



Development Corridor

Development Footprint

BBAM Plots within Development Footprint

BBAM Plots outside Development Footprint

Threatened Ecological Community

## Vegetation Zones

Vegetation Zone 1: CW112 Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion - Mod\_Good - Mod (CEEC - BC Act/EPBC Act)

Vegetation Zone 2: CW112 Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion - Mod\_Good - Poor\_GrsInd

Vegetation Zone 3: CW177 Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion - Mod\_Good - Mod

Vegetation Zone 6: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Mod

Vegetation Zone 7: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Poor\_GrsInd

Vegetation Zone 8: CW211 White Box - Rough-barked Apple alluvial woodland on the NSW western slopes - Mod\_Good - Mod (CEEC - BC Act/EPBC Act)

Vegetation Zone 9: CW211 White Box - Rough-barked Apple alluvial woodland on the NSW western slopes - Mod\_Good - Poor\_GrsInd

Vegetation Zone 10: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Mod (CEEC - BC Act)

Vegetation Zone 11: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_GrsInd

Vegetation Zone 12: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_Weedy

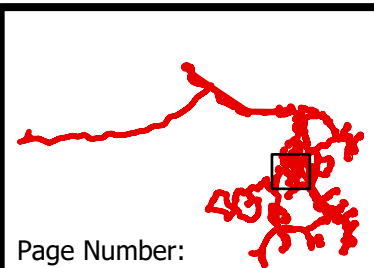
Vegetation Zone 13: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Low - Poor\_Weedy

Non-Native Vegetation

0 125 250 500

Metres

Datum/Projection:  
GDA 1994 MGA Zone 55



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Prepared by: EB/KM Date: 28/10/2020



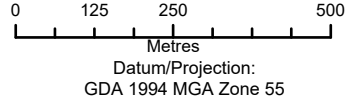


- Development Corridor
- Development Footprint
- Threatened Ecological Community

Vegetation Zones

- Vegetation Zone 6: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Mod
- Vegetation Zone 10: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Mod (CEEC - BC Act)

- Vegetation Zone 11: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_GrsInd
- Vegetation Zone 12: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_Weedy
- Vegetation Zone 13: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Low - Poor\_Weedy



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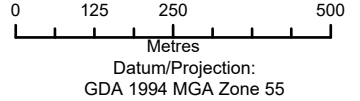


- Development Corridor
- Development Footprint
- Threatened Ecological Community

Vegetation Zones

Vegetation Zone 2: CW112 Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion - Mod\_Good - Poor\_GrsInd

- Vegetation Zone 6: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Mod
- Vegetation Zone 10: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Mod (CEEC - BC Act)
- Vegetation Zone 11: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_GrsInd
- Non-Native Vegetation

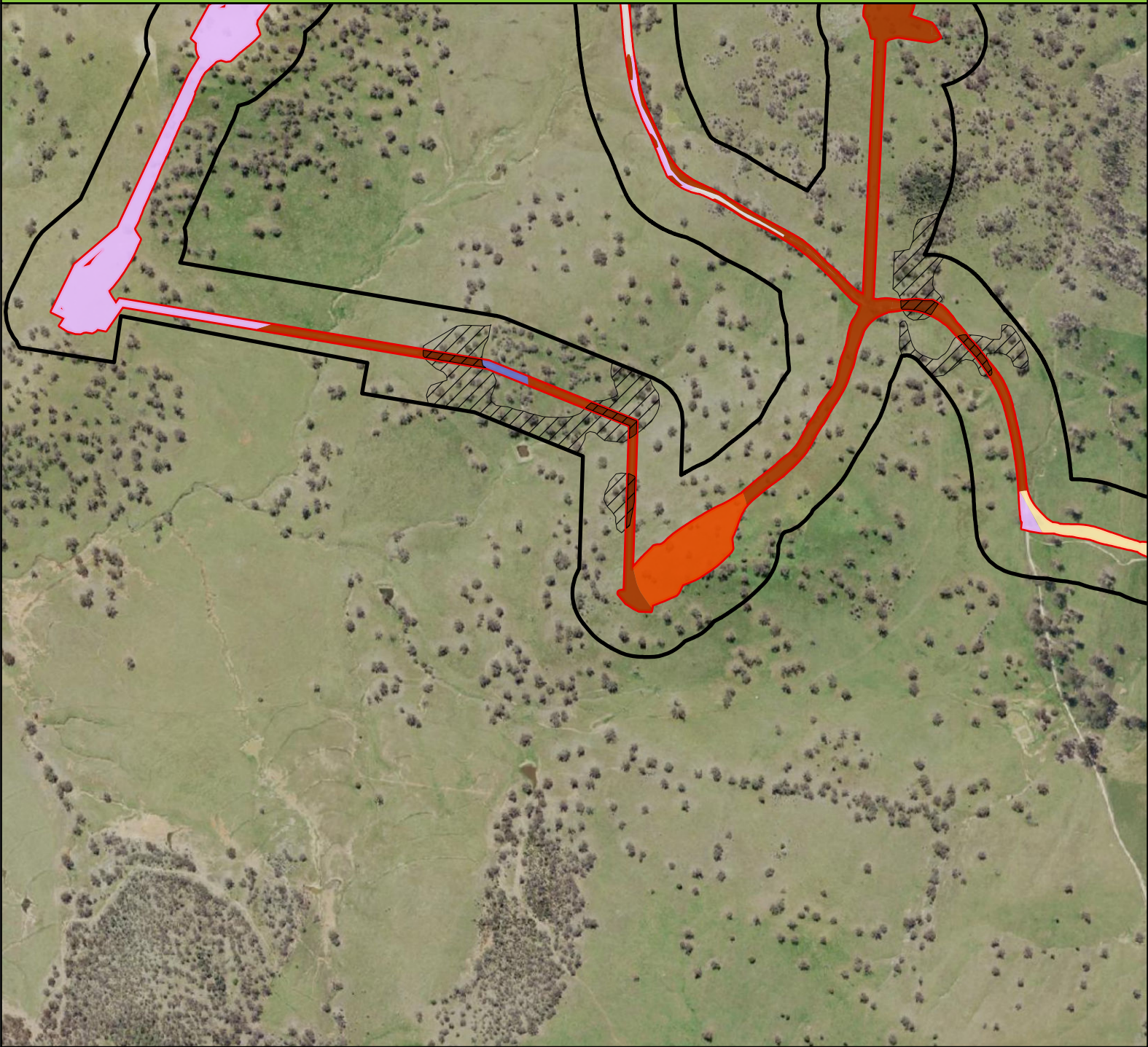


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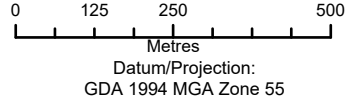
- Development Corridor
- Development Footprint
- Threatened Ecological Community

Vegetation Zones

Vegetation Zone 2: CW112 Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion - Mod\_Good - Poor\_GrsInd

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- Vegetation Zone 10: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Mod (CEEC - BC Act)
- Vegetation Zone 11: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_GrsInd
- Vegetation Zone 12: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_Weedy
- Vegetation Zone 13: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Low - Poor\_Weedy
- Non-Native Vegetation



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2020



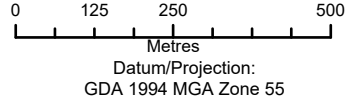


- Development Corridor
- Development Footprint
- Threatened Ecological Community

Vegetation Zones

- Vegetation Zone 2: CW112 Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion - Mod\_Good - Poor\_GrsLnd
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- Vegetation Zone 9: CW211 White Box - Rough-barked Apple alluvial woodland on the NSW western slopes - Mod\_Good - Poor\_GrsLnd
- Vegetation Zone 10: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Mod (CEEC - BC Act)
- Vegetation Zone 11: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_GrsLnd
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- Non-Native Vegetation

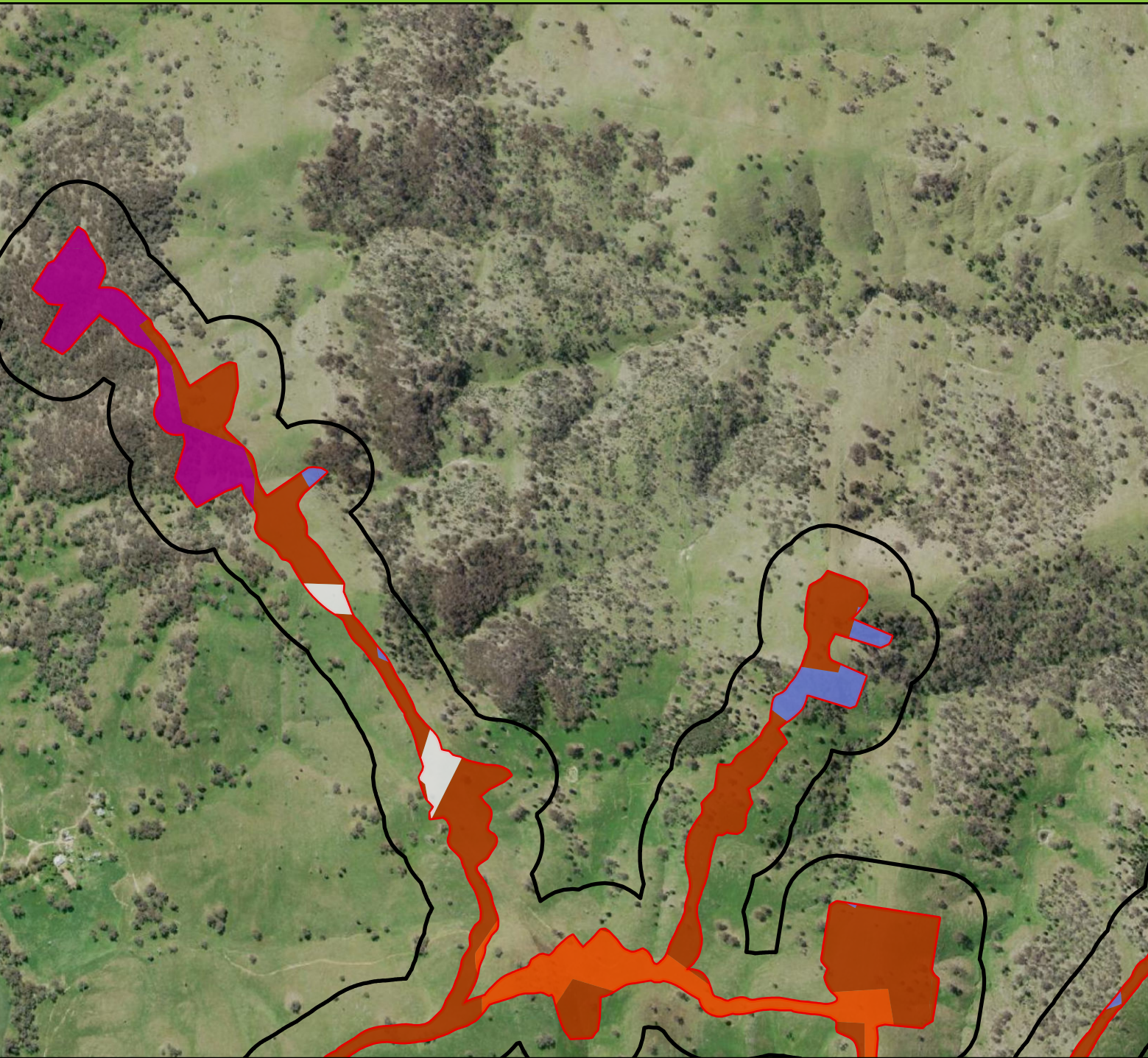


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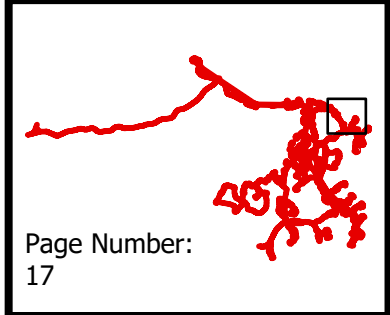
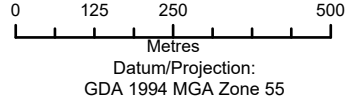
Development Corridor

Development Footprint

Vegetation Zones

- Vegetation Zone 3: CW177 Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion - Mod\_Good - Mod
- Vegetation Zone 6: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Mod

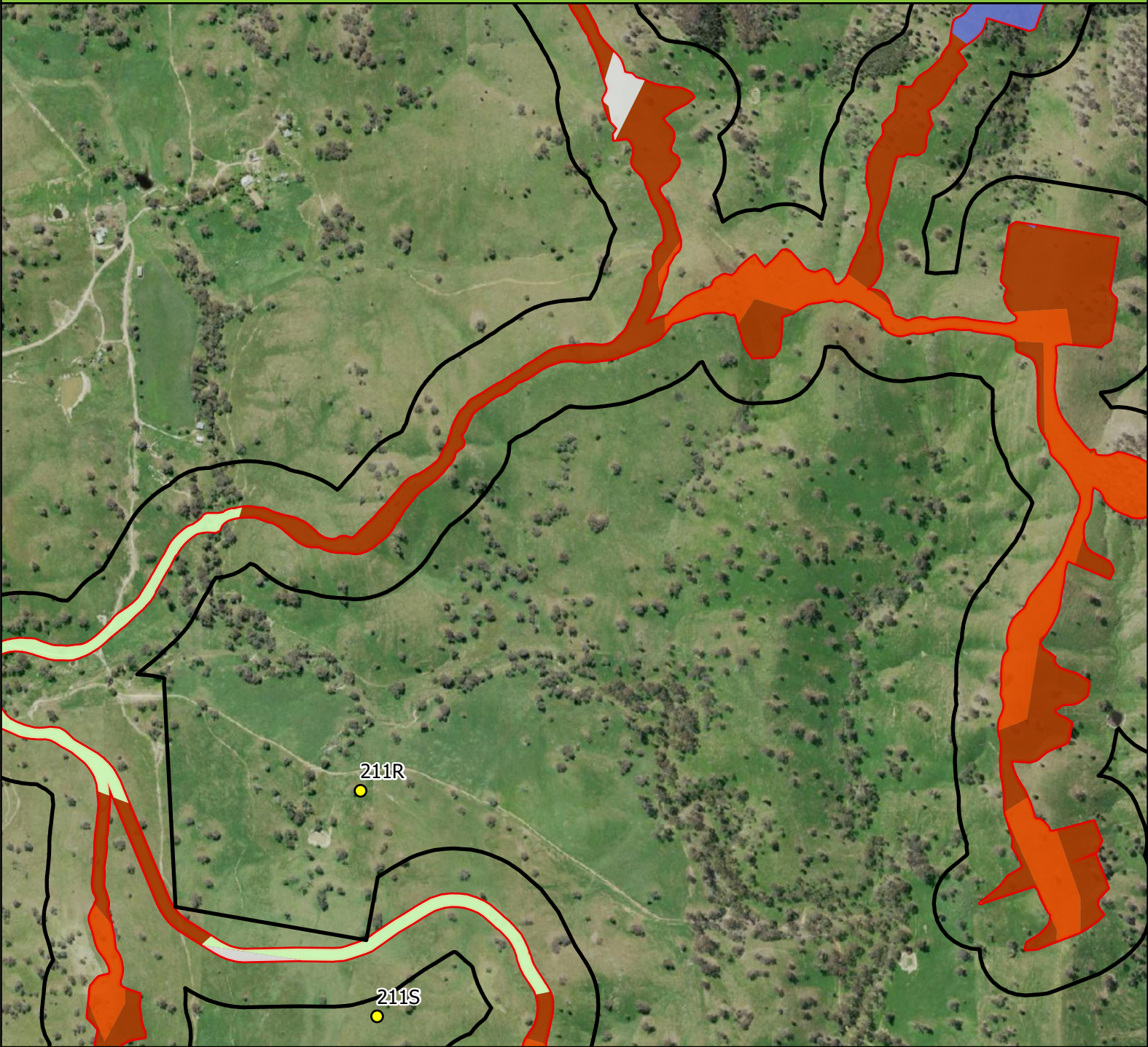
- Vegetation Zone 11: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_GrsInd
- Vegetation Zone 12: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_Weedy
- Non-Native Vegetation



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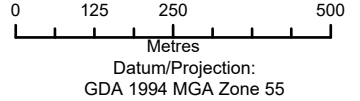


- Development Corridor
- Development Footprint
- BBAM Plots outside Development Footprint

Vegetation Zones

Vegetation Zone 6: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Mod

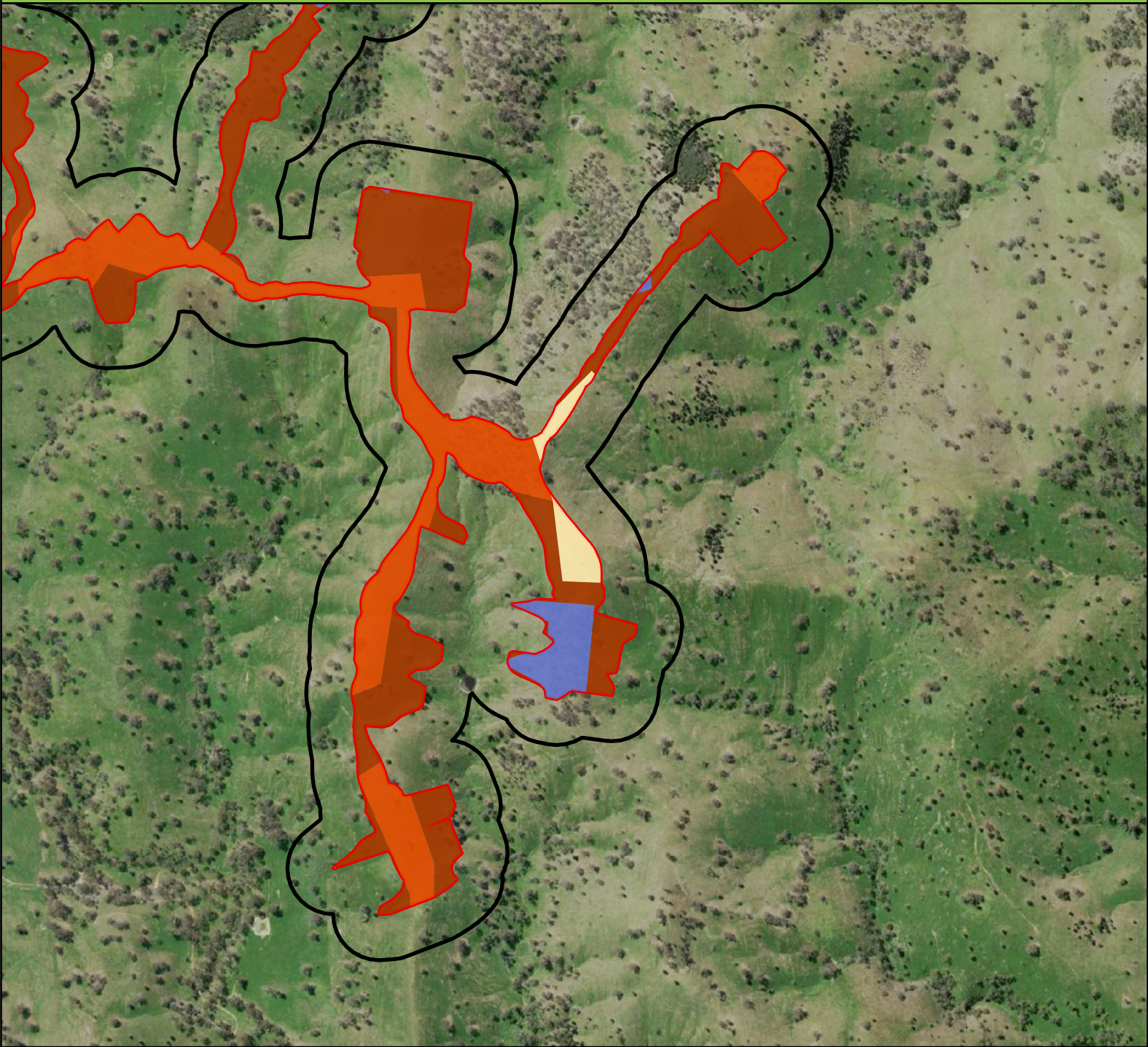
- Vegetation Zone 9: CW211 White Box - Rough-barked Apple alluvial woodland on the NSW western slopes - Mod\_Good - Poor\_GrsLnd
- Vegetation Zone 11: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_GrsLnd
- Vegetation Zone 12: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_Weedy
- Non-Native Vegetation



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Development Corridor

Development Footprint

Vegetation Zones

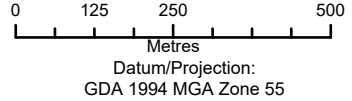
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Vegetation Zone 13: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Low - Poor\_Weedy

Non-Native Vegetation



Datum/Projection: GDA 1994 MGA Zone 55



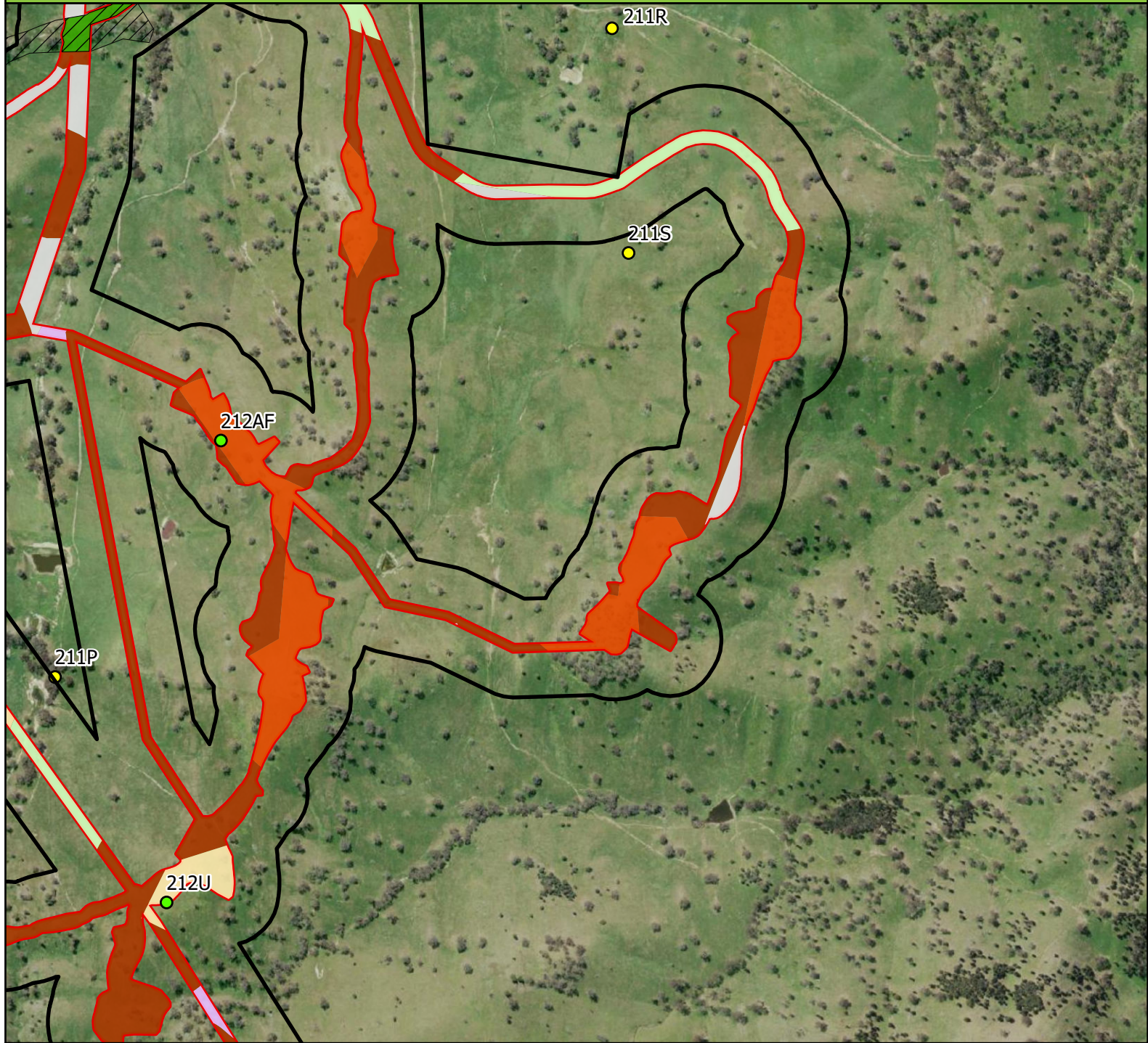
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# Vegetation Mapping



- Development Corridor
- Development Footprint
- BBAM Plots within Development Footprint
- BBAM Plots outside Development Footprint
- Threatened Ecological Community

## Vegetation Zones

Vegetation Zone 2: CW112 Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion - Mod\_Good - Poor\_GrsLnd

Vegetation Zone 8: CW211 White Box - Rough-barked Apple alluvial woodland on the NSW western slopes - Mod\_Good - Mod (CEEC - BC Act/EPBC Act)

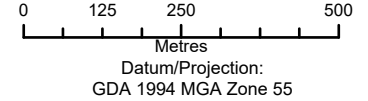
Vegetation Zone 9: CW211 White Box - Rough-barked Apple alluvial woodland on the NSW western slopes - Mod\_Good - Poor\_GrsLnd

Vegetation Zone 11: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_GrsLnd

Vegetation Zone 12: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_Weedy

Vegetation Zone 13: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Low - Poor\_Weedy

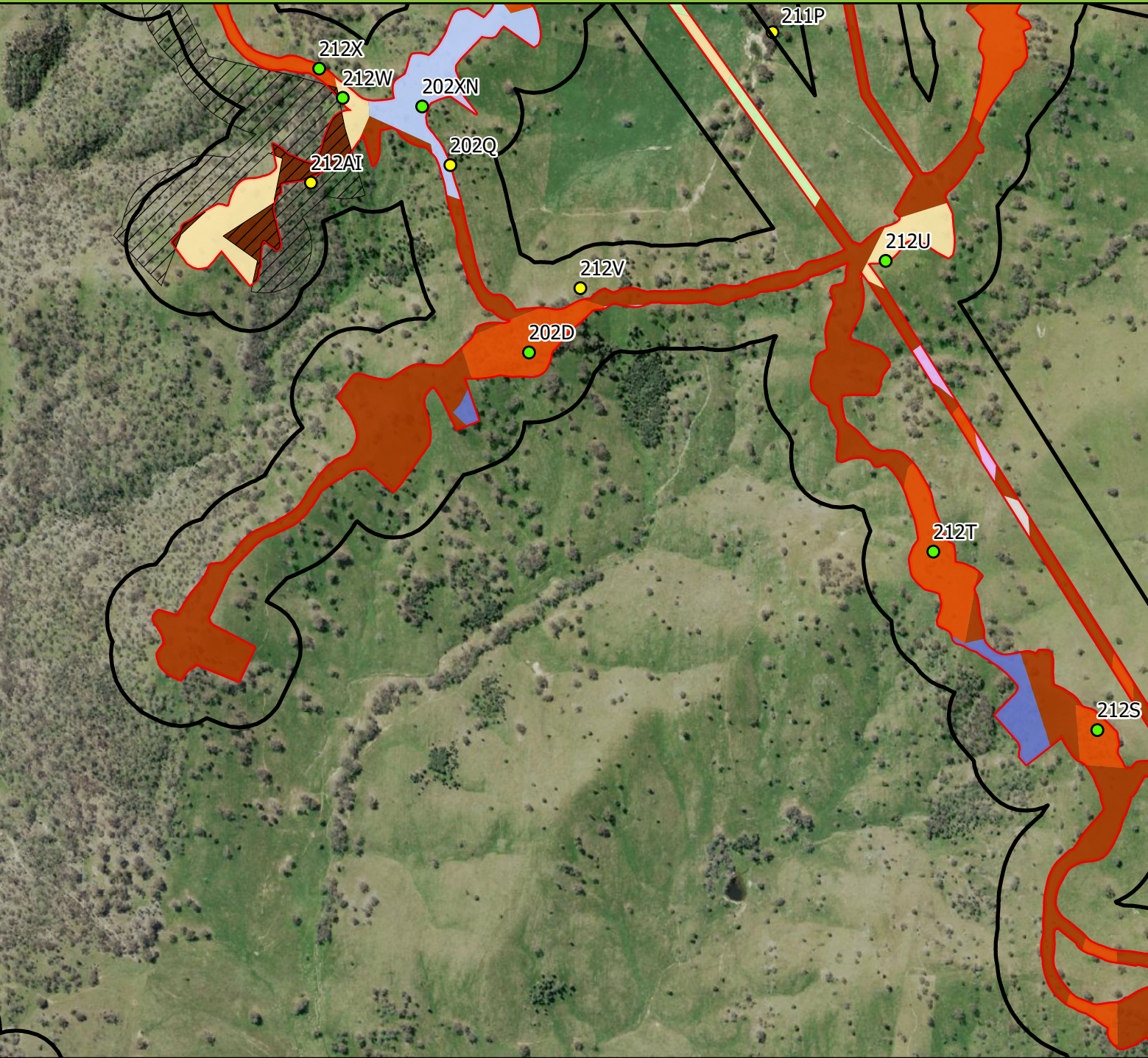
Non-Native Vegetation



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# Vegetation Mapping

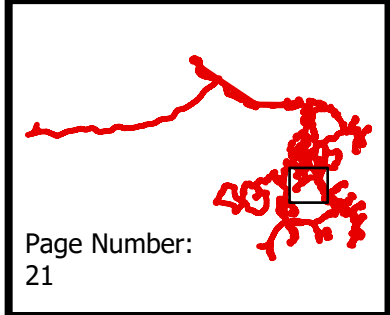
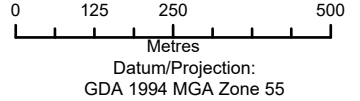


- Development Corridor
- Development Footprint
- BBAM Plots within Development Footprint
- BBAM Plots outside Development Footprint
- Threatened Ecological Community

## Vegetation Zones

- Vegetation Zone 2: CW112 Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion - Mod\_Good - Poor\_GrsInd
- Vegetation Zone 6: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Mod
- Vegetation Zone 7: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Poor\_GrsInd

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- Vegetation Zone 11: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_GrsInd
- Vegetation Zone 12: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_Weedy
- Vegetation Zone 13: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Low - Poor\_Weedy
- Non-Native Vegetation







- Development Corridor
- Development Footprint
- BBAM Plots within Development Footprint
- Threatened Ecological Community

Vegetation Zones

Vegetation Zone 6: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Mod

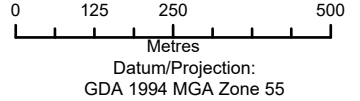
Vegetation Zone 9: CW211 White Box - Rough-barked Apple alluvial woodland on the NSW western slopes - Mod\_Good - Poor\_GrsLnd

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Vegetation Zone 13: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Low - Poor\_Weedy

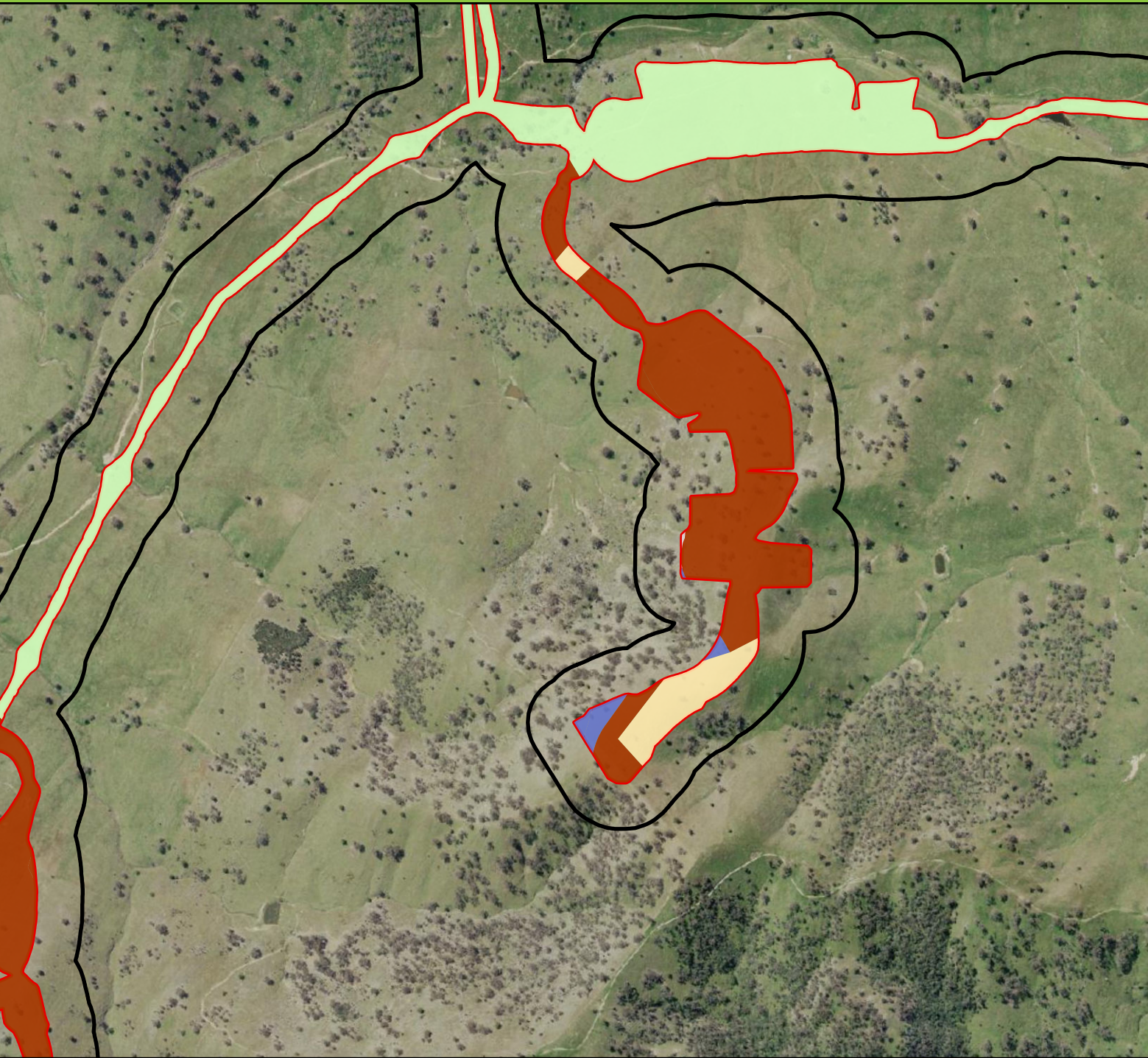
Non-Native Vegetation



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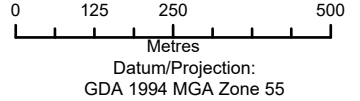


- Development Corridor
- Development Footprint

Vegetation Zones

- Vegetation Zone 6: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Mod
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- Vegetation Zone 13: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Low - Poor\_Weedy
- Non-Native Vegetation



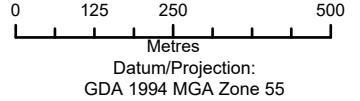
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- Development Corridor
- Development Footprint



Vegetation Zones

- Vegetation Zone 9: CW211 White Box - Rough-barked Apple alluvial woodland on the NSW western slopes - Mod\_Good - Poor\_GrsInd
- Vegetation Zone 11: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_GrsInd
- Vegetation Zone 13: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Low - Poor\_Weedy
- Non-Native Vegetation

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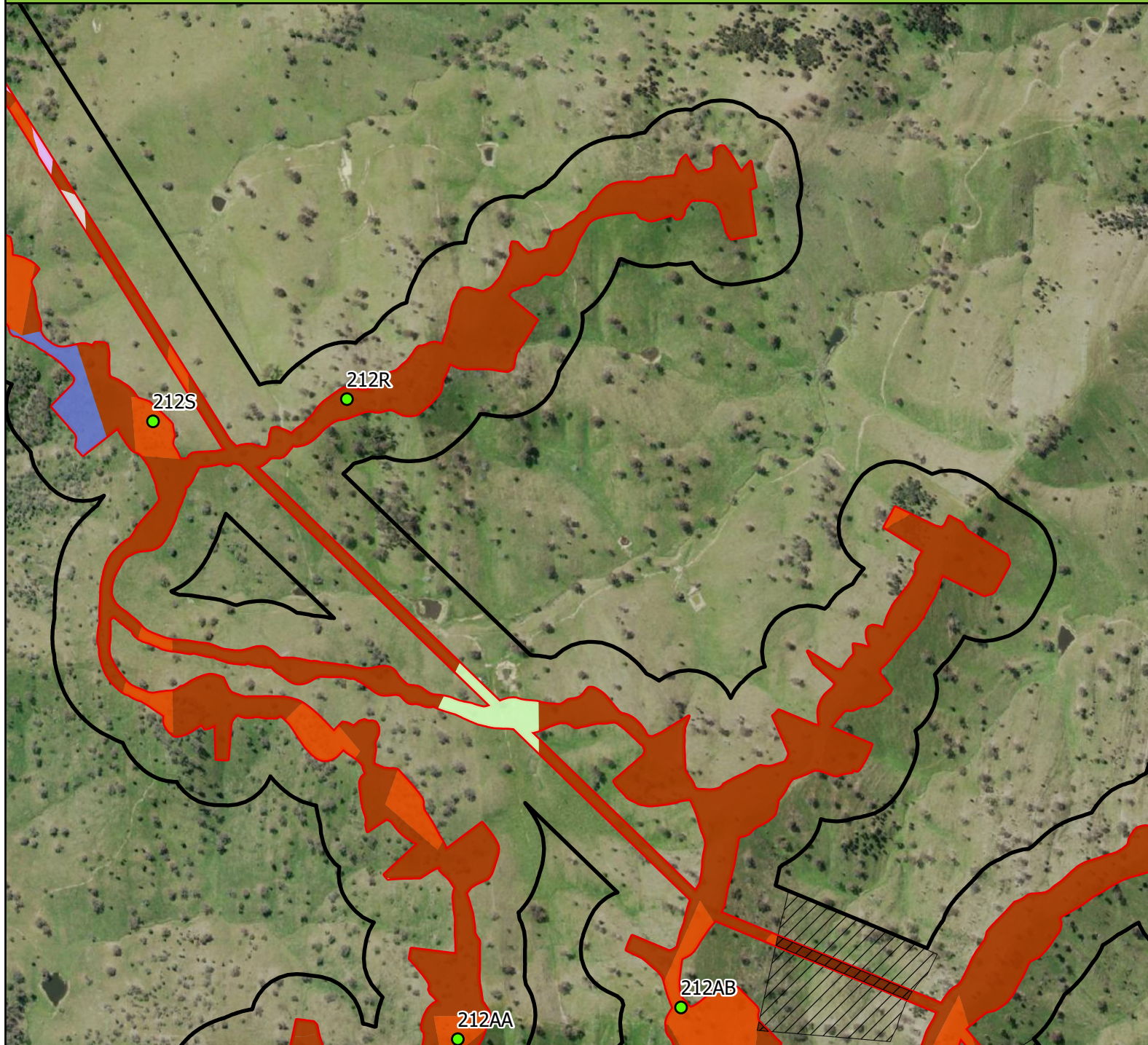
An inset map showing a larger geographical area with a red line indicating the location of the study area. A small black box on the map indicates the specific area shown in the main map.

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# Vegetation Mapping



- Development Corridor
- Development Footprint
- BBAM Plots within Development Footprint
- Threatened Ecological Community

## Vegetation Zones

Vegetation Zone 2: CW112 Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion - Mod\_Good - Poor\_GrsLnd

Vegetation Zone 6: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Mod

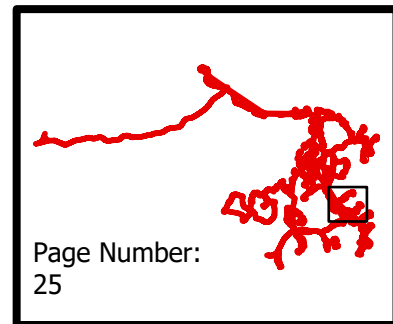
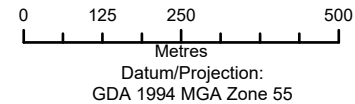
Vegetation Zone 9: CW211 White Box - Rough-barked Apple alluvial woodland on the NSW western slopes - Mod\_Good - Poor\_GrsLnd

Vegetation Zone 10: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Mod (CEEC - BC Act)

Vegetation Zone 11: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_GrsLnd

Vegetation Zone 12: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_Weedy

Non-Native Vegetation

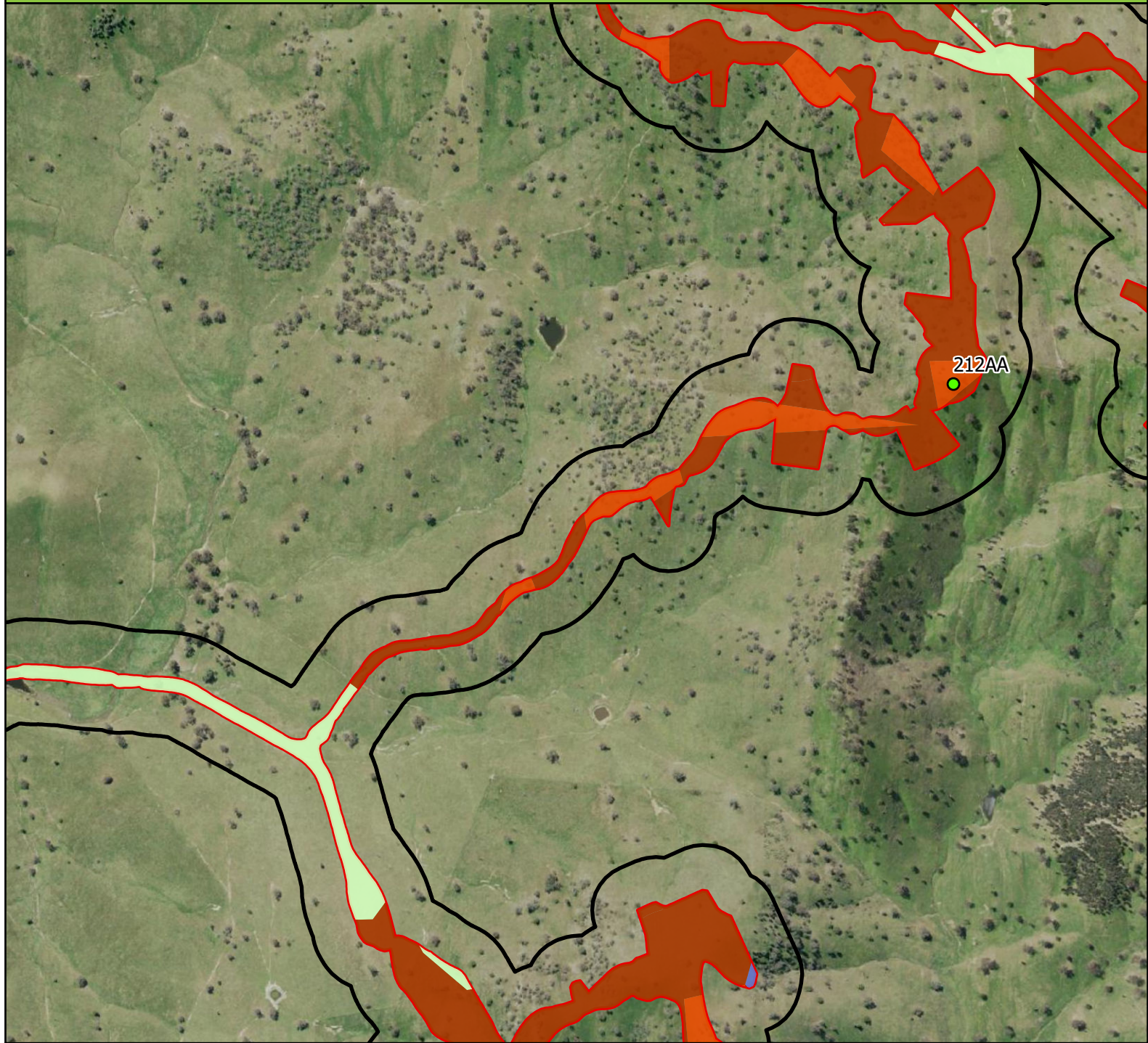


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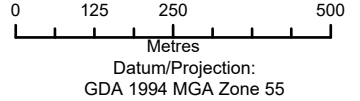


- Development Corridor
- Development Footprint
- BBAM Plots within Development Footprint

Vegetation Zones

Vegetation Zone 6: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Mod

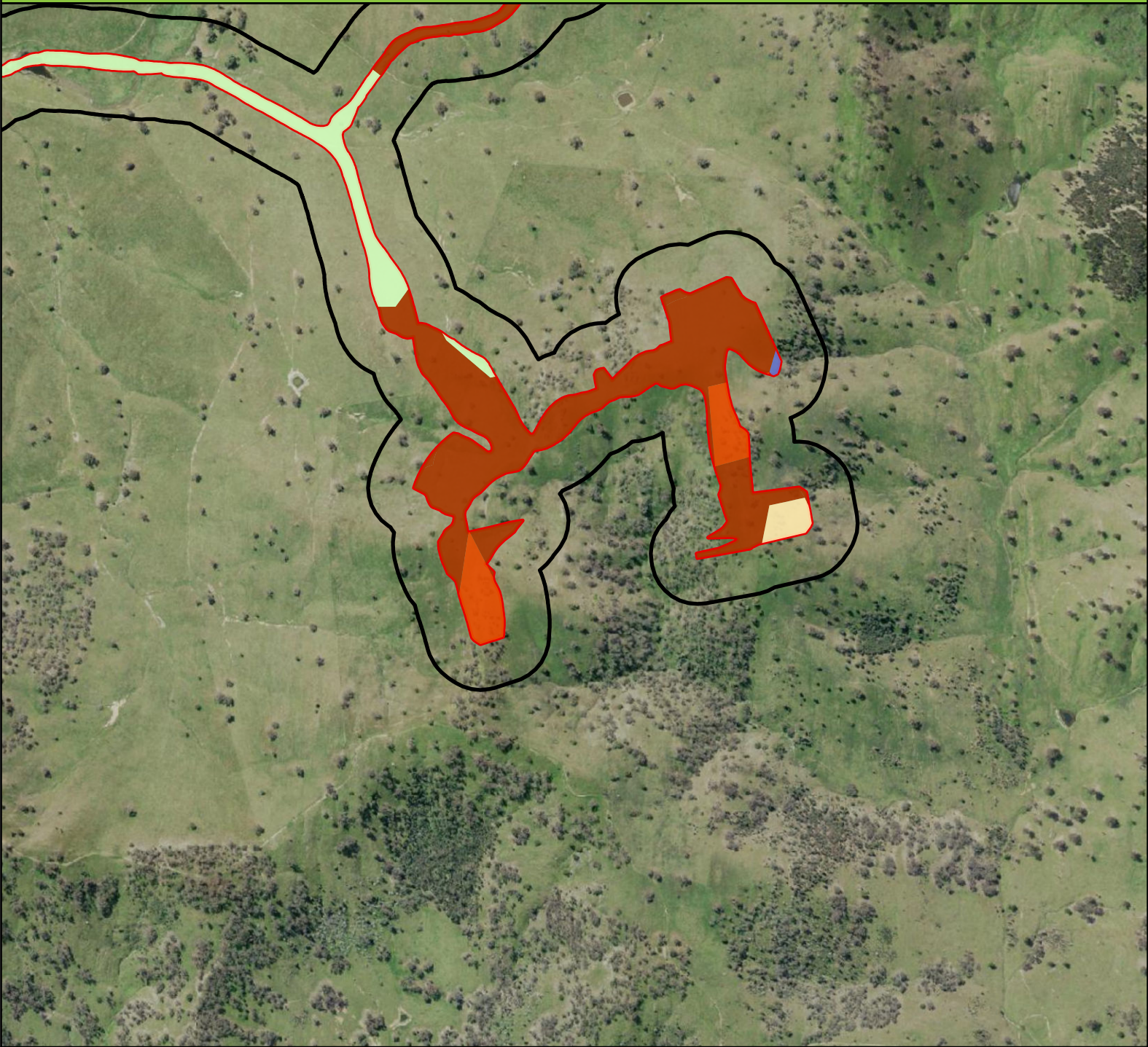
- Vegetation Zone 9: CW211 White Box - Rough-barked Apple alluvial woodland on the NSW western slopes - Mod\_Good - Poor\_GrsInd
- Vegetation Zone 11: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_GrsInd
- Vegetation Zone 12: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_Weedy
- Non-Native Vegetation



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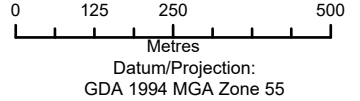


- Development Corridor
- Development Footprint

Vegetation Zones

- Vegetation Zone 6: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Mod
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- Vegetation Zone 13: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Low - Poor\_Weedy



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Vegetation Mapping



- Development Corridor
- Development Footprint
- BBAM Plots within Development Footprint
- Threatened Ecological Community

Vegetation Zones

Vegetation Zone 6: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Mod

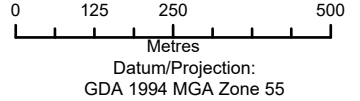
Vegetation Zone 9: CW211 White Box - Rough-barked Apple alluvial woodland on the NSW western slopes - Mod\_Good - Poor\_GrsLnd

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Vegetation Zone 12: CW212 White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes - Mod\_Good - Poor\_Weedy

Non-Native Vegetation

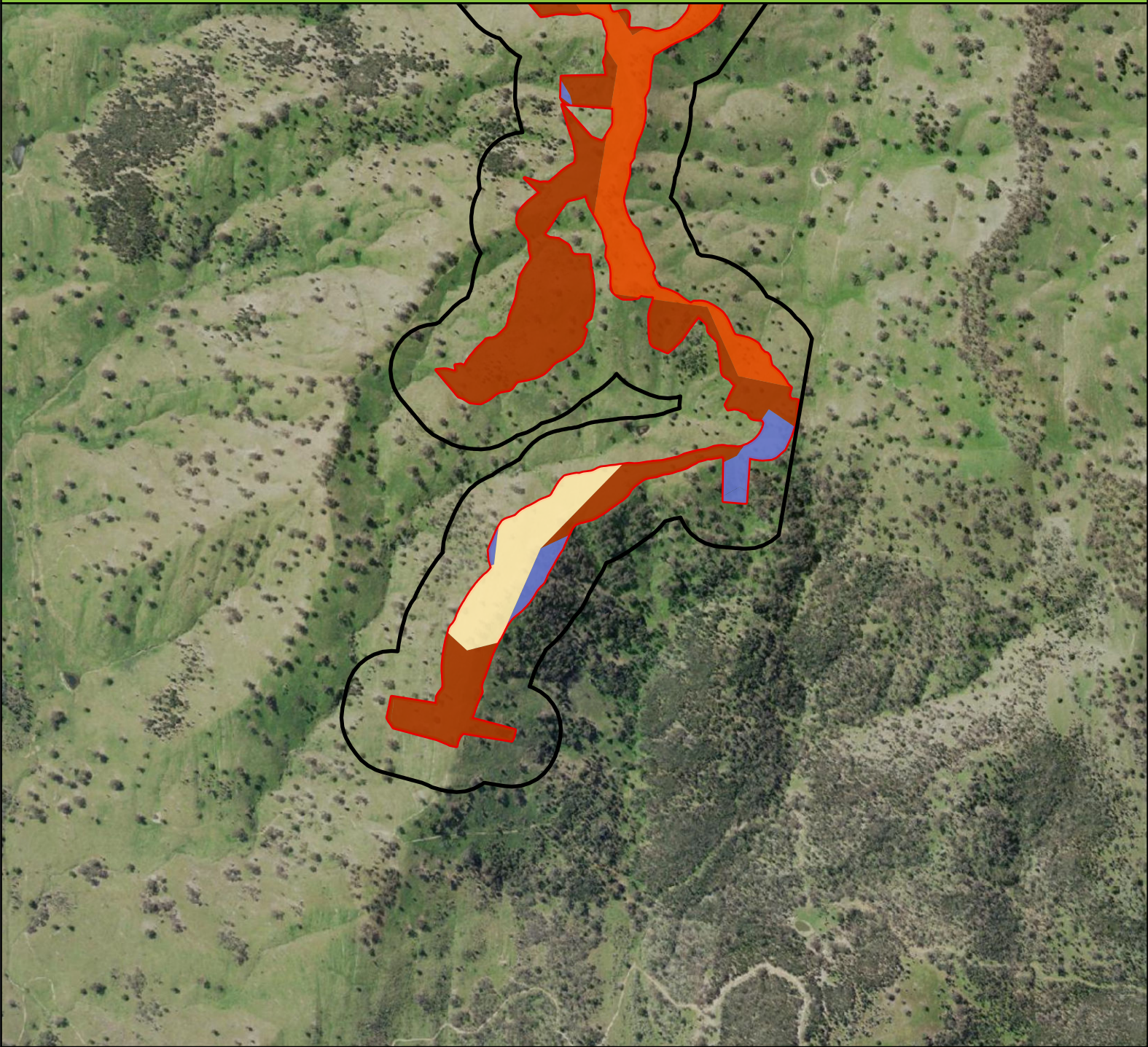


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An inset map of Australia with a red outline indicating the location of the study area in the south-western part of the country.

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Development Corridor

Development Footprint

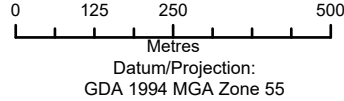
Vegetation Zones

Vegetation Zone 6: CW202 Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes - Mod\_Good - Mod

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## Appendix B Plot and transect data

PCT	Condition Zone	Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Easting	Northing	Zone
CW112	Moderate/Good_Medium	CW112Y	16	26.5	8.5	64	0	10	0	0	1	31	718795.9	6403786	55
CW112	Moderate/Good_Medium	CW112AB	20	13.5	3	74	0	6	8	0	1	23	720974.4	6403791	55
CW112	Moderate/Good_Poor	CW112AF	10	0	5	28	0	44	28	0	0	0	703290.4	6401130	55
CW112	Moderate/Good_Poor	CW112P	7	2.7	0	0	0	30	70	0	0	44	703652.3	6401532	55
CW112	Moderate/Good_Poor	CW112U	15	0	0	64	0	26	6	0	0	0	699876.7	6401780	55
CW112	Moderate/Good_Poor	CW112Q	15	29.5	0.5	42	0	4	32	0	1	71.5	702965.4	6404427	55
CW112	Moderate/Good_Poor	CW112AC	16	0	0	54	0	12	28	0	0	0	717800.1	6410366	55
CW177	Moderate/Good_Medium	CW177V	22	28.5	6	32	2	14	0	0	0	122	701826	6398737	55
CW177	Moderate/Good_Medium	CW177E	5	7.5	0	0	0	0	100	2	1	31	702422	6399826	55
CW177	Moderate/Good_Medium	CW177F	25	26	1.5	32	0	18	4	0	0	177	701581	6401603	55
CW177	Moderate/Good_Poor	CW177S	6	16.7	0	0	0	6	50	0	0	102	702762.1	6401101	55
CW177	Moderate/Good_Poor	CW177X	23	5.5	0	78	1	2	0	0	0.33	50	703050.5	6401631	55
CW177	Moderate/Good_Poor	CW177Y	24	6	0	82	2	6	2	0	0	104	702932.4	6401698	55
CW177	Moderate/Good_Poor	CW177N	12	60	0	4	0	0	56	2	0	89	727819.4	6404089	55
CW177	Moderate/Good_Other	CW177U	9	28.7	0	2	0	8	38	3	0	54	702728.4	6400603	55
CW177	Moderate/Good_Other	CW177T	12	0	0	6	0	6	58	0	0	27	702857.7	6400604	55
CW177	Moderate/Good_Other	CW177Q	13	12	0	20	4	14	4	0	0	53	703867.7	6401503	55
CW202	Moderate/Good_Medium	CW202U	22	38.5	9	20	9	18	6	1	1	110	701662.9	6398178	55
CW202	Moderate/Good_Medium	CW202T	12	2.5	0	22	0	8	56	0	0	13	697709.4	6402464	55
CW202	Moderate/Good_Medium	CW202AD	19	34	0.5	32	0	16	6	0	0.33	127	715202.3	6406394	55
CW202	Moderate/Good_Poor	CW202W	22	3	0	48	0	40	4	0	0	184	702621.8	6397362	55



PCT	Condition Zone	Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Easting	Northing	Zone
CW202	Moderate/Good_Poor	CW202V	17	0	7.5	56	0	22	6	0	1	71	701758.7	6398975	55
CW202	Moderate/Good_Poor	CW202Q	12	10	0	24	0	8	32	0	0	143	702682.4	6397236	55
CW211	Moderate/Good_Medium	CW211O	24	33	1	48	0	10	0	0	0.66	46	702766.7	6402342	55
CW211	Moderate/Good_Medium	CW211AD	18	4.5	12	52	1	2	38	0	0	12	702887.2	6402816	55
CW211	Moderate/Good_Medium	CW211AB	25	32	0	62	0	8	14	0	0	38	703121.8	6403644	55
CW211	Moderate/Good_Poor	CW211P	13	51.5	0	0	3	2	88	1	0.5	50	703376.8	6397522	55
CW211	Moderate/Good_Poor	CW211S	10	0	0	54	0	14	28	0	0	0	704630.1	6398449	55
CW211	Moderate/Good_Poor	CW211R	15	0	0	56	0	26	16	0	0	1	704594	6398941	55
CW211	Moderate/Good_Poor	CW211AC	14	0	0	94	0	2	6	0	0.33	0	702974	6403119	55
CW212	Moderate/Good_Medium	CW212AI	3	22	0	0	0	0	8	0	0	26	702382	6397198	55
CW212	Moderate/Good_Medium	CW212AX	14	8.3	0	58	0	30	4	1	2	77	708379.1	6403789	55
CW212	Moderate/Good_Medium	CW212AJ	28	37.5	0	50	0	18	6	0	0.5	34	703106	6404897	55
CW212	Moderate/Good_Poor	CW212R	10	0	0	0	0	16	84	0	0	70	704499.2	6396067	55
CW212	Moderate/Good_Poor	CW212AN	12	0	0	78	0	12	6	0	0	22	701833.5	6398366	55
CW212	Moderate/Good_Poor	CW212AM	16	2.5	0	76	0	14	4	1	0	52	702088.7	6398596	55
CW212	Moderate/Good_Poor	CW212AZ	14	29	18	6	38	46	0	1	0.67	115	702298	6402043	55
CW212	Moderate/Good_Poor	CW212V	12	0	0	28	0	10	58	2	0	40	702962.6	6396971	55
CW212	Moderate/Good_Poor	CW212Z	12	0	0	16	0	6	44	0	0	45	702978.1	6399299	55
CW212	Moderate/Good_Poor	CW212AK	14	21.5	0	74	0	4	8	0	0	59	701992.7	6401922	55
CW212	Moderate/Good_Other	CW212AC	7	9.5	0	0	0	4	78	2	0	20	705796.8	6394585	55
CW212	Moderate/Good_Other	CW212AA	10	21	0	0	0	4	66	1	0	50	704740.7	6394672	55
CW212	Moderate/Good_Other	CW212S	10	4.7	0	2	0	2	80	5	0	38	704076.8	6396018	55
CW212	Moderate/Good_Other	CW212B	3	27	0	0	0	0	94	4	0	78	702852	6396832	55
CW212	Moderate/Good_Other	CW212AF	7	2	0	18	0	4	62	0	0	46	703739.3	6398039	55

PCT	Condition Zone	Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Easting	Northing	Zone
CW212	Moderate/Good_Other	CW212AB	7	1.7	0	0	0	0	94	1	0	64	705227	6394741	55
CW212	Moderate/Good_Other	CW212T	5	5.7	0	0	0	2	11	10	0	65	703723	6396402	55
CW212	Moderate/Good_Other	CW212X	9	37	0	0	0	10	16	0	0	53	702399	6397443	55
CW212	Low	CW212AD	8	0	0	0	0	14	92	0	0	6	702121	6394701	55
CW212	Low	CW212U	8	0	0	20	0	6	54	0	0	0	703620.5	6397029	55
CW212	Low	CW212W	5	0.4	0	0	0	2	36	2	0	34	702450.5	6397381	55
CW212	Low	CW212Y	6	1	0	0	0	24	22	1	0	55	702925.6	6397713	55



## Appendix C Species lists (ERM 2013)

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			Introduced?	CW202AB	CW202AC	CW202AD	CW202AE	CW202M	CW202O	CW202Q	CW202T	CW202U	CW202V	CW202W	CW211AA	CW211AB	CW211AC	CW211AD	CW211M	CW211N	CW211O	CW211P	CW211R	CW211S	CW211U	CW211Y	CW211Z	CW212AA	CW212AAA	CW212AAB	CW212AB	CW212AC	CW212AD	CW212AE	CW212AF	CW212AI	CW212AJ	CW212AK	CW212AL	
Family	Binomial	Common Name																																						
Aizoaceae	<i>Zaleya galericulata</i>	Hogweed			2	2	1																																	
Amaranthaceae	<i>Alternanthera pungens</i>	Khaki Weed	*																																					
Amaranthaceae	<i>Alternanthera</i> sp.	-																																						
Amaranthaceae	<i>Alternanthera denticulata</i>	Lesser Joyweed																																						
Amaranthaceae	<i>Alternanthera</i> sp. A Flora of New South Wales	-																																						
Amaranthaceae	<i>Gomphrena celosioides</i>	Gomphrena Weed	*																																					
Amaranthaceae	<i>Guilleminea densa</i>	Small Matweed	*																																					
Anacardiaceae	<i>Ailanthus altissima</i>	Tree of Heaven	*																																					
Anthericaceae	<i>Arthropodium milleflorum</i>	Pale Vanilla-lilly																																						
Anthericaceae	<i>Arthropodium minus</i>	Small Vanilla-lilly																																						
Anthericaceae	<i>Tricoryne elatior</i>	Yellow Autumn-lily		2			2					2														2														
Apiaceae	<i>Apiaceae</i> sp.	-	*																																					
Apiaceae	<i>Ciclospermum leptophyllum</i>	Slender Celery	*																																					
Apiaceae	<i>Daucus glochidiatus</i>	Native Carrot																																						
Apiaceae	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort																																						
Asphodelaceae	<i>Bulbine bulbosa</i>	Golden Lily																																						
Aspleniaceae	<i>Pleurosorus rutifolius</i>	Bristly Cloak Fern																																						
Asteraceae	<i>Ageratina adenophora(?)</i>	Crofton Weed	*																			i																		
Asteraceae	<i>Ambrosia ?tenuifolia</i>	Lacy Ragweed	*		2	1					2					1	1					1	1						2			3	5	3	2			2		2
Asteraceae	<i>Aster subulatus</i>	Wild Aster	*														1				1																			
Asteraceae	<i>Asteraceae</i> sp. (indet)	-	*																	1							2													
Asteraceae	<i>Asteraceae</i> sp. (indet)	-	*																																					
Asteraceae	<i>Asteraceae</i> sp. (indet)	-	*																																					
Asteraceae	<i>Asteraceae</i> sp. (indet)	-	*																																					
Asteraceae	<i>Asteraceae</i> sp. (indet)	-	*					1																																
Asteraceae	<i>Bidens pilosa</i>	Farmers Friend	*																				1	1																
Asteraceae	<i>Calotis lappulacea</i>	Yellow Burr-daisy			2	1	1				1											1													1	1				
Asteraceae	<i>Carduus nutans subp. nutans</i>	Nodding Thistle	*																	2																				
Asteraceae	<i>Carthamus lanatus</i>	Saffron Thistle	*																1	2	1		1	1				2	3							1				
Asteraceae	<i>Cassinia aculeata</i>	Dogwood																																						
Asteraceae	<i>Cassinia uncata</i>	Sticky Cassinia										2																												
Asteraceae	<i>Centaurea solstitialis</i>	St Barnaby's Thistle	*								2						1																						1	
Asteraceae	<i>Chondrilla juncea</i>	Skeleton Weed	*								1					2	2	2		1																		1	1	2
Asteraceae	<i>Chrysocephalum apiculatum</i>	Common Everlasting																																						
Asteraceae	<i>Conyza bonariensis</i>	Flaxleaf Fleabane	*														2	2			1	1					2												1	
Asteraceae	<i>Cymbonotus lawsonianus</i>	Bears Ear										2	2																											
Asteraceae	<i>Euchiton involucratus</i>	Star Cudweed																																						
Asteraceae	<i>Gamochaeta purpurea</i>	Purple Cudweed	*																																					
Asteraceae	<i>Glossocardia bidens</i>	Cobbler's Tack		1	1	1																																		
Asteraceae	<i>Hedynopsis rhagadioloides subsp. cretica</i>	Cretan Weed	*	2							2	2	1		2						1			1															2	
Asteraceae	<i>Hypochaeris radicata</i>	Catsear	*																	2						2														
Asteraceae	<i>Olearia elliptica</i>	Sticky Daisy-Bush																																						
Asteraceae	<i>Onopordum acanthium</i>	Scotch Thistle	*			1									2	2		2				2	2	1														1		
Asteraceae	<i>Ozothamnus diosmifolius</i>	Rice Flower																																						
Asteraceae	<i>Senecio quadridentatus</i>	Cotton Fireweed															2	2			2												1	2						
Asteraceae	<i>Silybum marianum</i>	Variagated Thistle	*																																		1			
Asteraceae	<i>Sonchus oleraceus</i>	Common Sowthistle	*													1																							1	
Asteraceae	<i>Sonchus</i> sp.	-	*																																					
Asteraceae	<i>Tagetes minuta</i>	Stinking Roger	*																																					
Asteraceae	<i>Taraxacum officinale</i>	Dandelion	*												2	1		1							2	2											1			
Asteraceae	<i>Triptilodiscus pygmaeus</i>	Common Sunray																																						
Asteraceae	<i>Vittadinia cervicalis</i>	-																																	2					
Asteraceae	<i>Vittadinia cuneata</i>	Fuzzweed									1												1		1														1	
Asteraceae	<i>Vittadinia muelleri</i>	-			2								2																											
Asteraceae	<i>Vittadinia pterochaeta</i>	Winged New Holland Daisy																																						
Asteraceae	<i>Vittadinia tenuissima</i>	Western New Holland Daisy																																						
Asteraceae	<i>Xanthium occidentale</i>	Noogoora Burr	*		i																												1							
Asteraceae	<i>Xanthium spinosum</i>	Bathurst Burr	*				1							1						2									2											
Boraginaceae	<i>Echium plantagineum</i>	Paterson's Curse	*																																					
Boraginaceae	<i>Echium vulgare</i>	Viper's Bugloss	*																																					
Brassicaceae	<i>Lepidium africanum</i>	-	*								1												1																	
Brassicaceae	<i>Lepidium</i> sp.	-	*																																	2				
Brassicaceae	<i>Sisymbrium officinale</i>	Hedge Mustard	*		1	i					2			2		1		1					2	2																



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			Introduced?	CW202AB	CW202AC	CW202AD	CW202AE	CW202M	CW202O	CW202Q	CW202T	CW202U	CW202V	CW202W	CW211AA	CW211AB	CW211AC	CW211AD	CW211M	CW211N	CW211O	CW211P	CW211R	CW211S	CW211U	CW211Y	CW211Z	CW212AA	CW212AAA	CW212AAB	CW212AB	CW212AC	CW212AD	CW212AE	CW212AF	CW212AI	CW212AJ	CW212AK	CW212AL	
Family	Binomial	Common Name																																						
Caryophyllaceae	<i>Petrorhagia nanteuillii</i>	-	*																		1									1							1			
Caryophyllaceae	<i>Scleranthus biflorus</i>	Knawel																																						
Casuarinaceae	<i>Allocasuarina verticillata</i>	Drooping Sheoak						1	2			4	3																											
Casuarinaceae	<i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i>	River Oak																																						
Chenopodiaceae	<i>Chenopodium album</i>	Fat Hen	*			1					1			2		2					2		1	1														2		
Chenopodiaceae	<i>Einadia polygonoides</i>	-												1		1					2							1							2		2			
Clusiaceae	<i>Hypericum perforatum</i>	St. Johns Wort	*	2					1								1			2	1				2	2				2										
Colchicaceae	<i>Wurmbea dioica</i>	Early Nancy																																						
Commelinaceae	<i>Commelina cyanea</i>	Native Wandering Jew																																				1		
Convolvulaceae	<i>Convolvulus angustissimus</i> subsp. <i>angustissimus</i>	-															2	1																						
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed			2			2	2	2		2		2			2	2			2						2	2	2	2						2		1		
Cucurbitaceae	<i>Citrullus lanatus</i> var. <i>lanatus</i>	Wild Melon	*			1																	1					2	2	2	2						2		1	
Cucurbitaceae	<i>Cucumis myriocarpus</i>	Prickly Paddy Melon	*																																					
Cupressaceae	<i>Callitris endlicheri</i>	Black Cypress Pine			5	5	6																																	
Cupressaceae	<i>Callitris glaucophylla</i>	White Cypress Pine								2																														
Cyperaceae	<i>Carex appressa</i>	Tall Sedge														4		2		5																				
Cyperaceae	<i>Cyperus exaltatus</i>	-																																						
Cyperaceae	<i>Cyperus gunnii</i> subsp. <i>gunnii</i>	-																																						
Cyperaceae	<i>Cyperus vaginatus</i>	Stiff Flat-sedge																																						
Cyperaceae	<i>Fimbristylis dichotoma</i>	Common Fringe-sedge																																						
Cyperaceae	<i>Isolepis gaudichaudiana</i>	Benambra Club Sedge					1									1		1					2	2																
Cyperaceae	<i>Lepidosperma laterale</i>	-							1																															
Cyperaceae	<i>Lepidosperma</i> sp.	-																																						
Dilleniaceae	<i>Hibbertia obtusifolia</i>	Hoary Guinea Flower							3																					2										
Droseraceae	<i>Drosera peltata</i>	Pale Sundew																																						
Ericaceae	<i>Acrotriche rigida</i>	-																																						
Ericaceae	<i>Astroloma humifusum</i>	Native Cranberry						2	2	2		2		2																2								2		
Ericaceae	<i>Melichrus urceolatus</i>	Urn-heath							2																															
Euphorbiaceae	<i>Chamasyce drummondii</i>	Caustic Weed			1																																			
Fabaceae	<i>Acacia amblygona</i>	Fan Wattle																																						
Fabaceae	<i>Acacia doratoxylon</i>	Currawang							1			2		1							2																2	1		
Fabaceae	<i>Acacia implexa</i>	Hickory Wattle								1		1	2	2				1			4																			
Fabaceae	<i>Daviesia genistifolia</i>	Broom Bitter Pea																																						
Fabaceae	<i>Daviesia</i> sp.	-																																						
Fabaceae	<i>Desmodium brachypodum</i>	Large Tick-trefoil																																						
Fabaceae	<i>Desmodium varians</i>	Slender Tick-trefoil					2																																	
Fabaceae	<i>Dillwynia sericea</i>	Showy Parrot-pea							2																															
Fabaceae	<i>Glycine clandestina</i>	-				1		2																																
Fabaceae	<i>Glycine tabacina</i>	-		2	2	1	1		1			1	2	2		2	2	2		2	2					2											2			
Fabaceae	<i>Hardenbergia violacea</i>	Purple Coral Pea																																						
Fabaceae	<i>Indigofera australis</i>	Australian Indigo																																						
Fabaceae	<i>Medicago arabica</i>	Spotted Burr Medic	*								1			2		2							1																	
Fabaceae	<i>Medicago minima</i>	Wolly Burr Medic	*																																					
Fabaceae	<i>Medicago sativa</i>	Lucerne	*													1																								
Fabaceae	<i>Medicago</i> sp.	Medic	*							1						2								1																
Fabaceae	<i>Senna aciphylla</i>	Sprawling Cassia																																						
Fabaceae	<i>Senna barclayana</i>	Smooth Senna																																						
Fabaceae	<i>Swainsona galegifolia</i>	Smooth Darling Pea							1												1								1	1							1			
Fabaceae	<i>Trifolium arvense</i>	Haresfoot Clover	*																																					
Fabaceae	<i>Trifolium campestre</i>	Hop Trefoil	*																																					
Fabaceae	<i>Trifolium dubium</i>	Lesser Hop Trefoil	*																																					
Fabaceae	<i>Trifolium repens</i>	White Clover	*																																					
Fabaceae	<i>Trifolium subterraneum</i>	Subterranean Clover	*																																		1			
Fabaceae	<i>Zornia dyctiocarpa</i> var. <i>dyctiocarpa</i>	Zornia					1																																	
Gentianaceae	<i>Centaurum erythraea</i>	Common Centaury	*										1							1																				
Geraniaceae	<i>Erodium crinitum</i>	Blue Storksbill			1									2		2							2																	
Geraniaceae	<i>Erodium</i> sp.	-	*																																					
Geraniaceae	<i>Geranium dissectum</i>	-	*																																			1		
Geraniaceae	<i>Geranium molle</i> var. <i>molle</i>	Cranesbill Geranium	*																																		1			
Geraniaceae	<i>Geranium potentilloides</i>	-						2				2			1	2		2		2			1					1									2	1		
Goodeniaceae	<i>Goodenia hederacea</i> subsp. <i>hederacea</i>	Forest Goodenia					2					2																												
Haloragaceae	<i>Gonocarpus elatus</i>	-				2	3					2																												
Iridaceae	<i>Rolumea rosea</i> var. <i>australis</i>	Onion Grass	*																																					



			Introduced?	CW212AM	CW212AN	CW212AP	CW212AQ	CW212AR	CW212AS	CW212AT	CW212AU	CW212AV	CW212AW	CW212AX	CW212AZ	CW212B	CW212D	CW212E	CW212F	CW212G	CW212H	CW212I	CW212J	CW212K	CW212M	CW212N	CW212O	CW212P	CW212Q	CW212R	CW212S	CW212T	CW212U	CW212V	CW212W	CW212X	CW212Y	CW212Z
Family	Binomial	Common Name																																				
Caryophyllaceae	<i>Petrorhagia nanteuilii</i>	-	*											1					1	1		2		2														
Caryophyllaceae	<i>Scleranthus biflorus</i>	Knawel		2										1																								
Casuarinaceae	<i>Allocasuarina verticillata</i>	Drooping Sheoak																																				
Casuarinaceae	<i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i>	River Oak																																				
Chenopodiaceae	<i>Chenopodium album</i>	Fat Hen	*																																			
Chenopodiaceae	<i>Einadia polygonoides</i>	-		2																																	2	
Clusiaceae	<i>Hypericum perforatum</i>	St. Johns Wort	*				2			1			1	2					2	5									2		1		1		1			
Colchicaceae	<i>Wurmbea dioica</i>	Early Nancy																																				
Commelinaceae	<i>Commelina cyanea</i>	Native Wandering Jew																																				
Convolvulaceae	<i>Convolvulus angustissimus</i> subsp. <i>angustissimus</i>	-																							1													
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed			2	1	2	2	2	2			2	2	1	1	1	1	2		1		2	1		1	2			2			2				2	
Cucurbitaceae	<i>Citrullus lanatus</i> var. <i>lanatus</i>	Wild Melon	*																														1			2		
Cucurbitaceae	<i>Cucumis myriocarpus</i>	Prickly Paddy Melon	*																																			
Cupressaceae	<i>Callitris endlicheri</i>	Black Cypress Pine				1	1																															
Cupressaceae	<i>Callitris glaucophylla</i>	White Cypress Pine																																				
Cyperaceae	<i>Carex appressa</i>	Tall Sedge																																				
Cyperaceae	<i>Cyperus exaltatus</i>	-																																				
Cyperaceae	<i>Cyperus gunnii</i> subsp. <i>gunnii</i>	-																																				
Cyperaceae	<i>Cyperus vaginatus</i>	Stiff Flat-sedge																																				
Cyperaceae	<i>Fimbristylis dichotoma</i>	Common Fringe-sedge								1	2																											
Cyperaceae	<i>Isolepis gaudichaudiana</i>	Benambra Club Sedge							1																													
Cyperaceae	<i>Lepidosperma laterale</i>	-																																				
Cyperaceae	<i>Lepidosperma</i> sp.	-																																				
Dilleniaceae	<i>Hibbertia obtusifolia</i>	Hoary Guinea Flower				1	2			2	1				1						2		1															
Droseraceae	<i>Drosera peltata</i>	Pale Sundew																																				
Ericaceae	<i>Acrotriche rigida</i>	-												1																								
Ericaceae	<i>Astroloma humifusum</i>	Native Cranberry		1			2	1			1																											
Ericaceae	<i>Melichrus urceolatus</i>	Urn-heath																			1																	
Euphorbiaceae	<i>Chamasyce drummondii</i>	Caustic Weed							2																													
Fabaceae	<i>Acacia amblygona</i>	Fan Wattle																																				
Fabaceae	<i>Acacia doratoxylon</i>	Currawang											1	2																								
Fabaceae	<i>Acacia implexa</i>	Hickory Wattle																1																				
Fabaceae	<i>Daviesia genistifolia</i>	Broom Bitter Pea																																				
Fabaceae	<i>Daviesia</i> sp.	-																																				
Fabaceae	<i>Desmodium brachypodum</i>	Large Tick-trefoil											1																									
Fabaceae	<i>Desmodium varians</i>	Slender Tick-trefoil									1										1		1	1														
Fabaceae	<i>Dillwynia sericea</i>	Showy Parrot-pea																																				
Fabaceae	<i>Glycine clandestina</i>	-					1	2			2																											
Fabaceae	<i>Glycine tabacina</i>	-			1			2	2	2	2	1	2	2						1	1			1	1	1			1					2		2		1
Fabaceae	<i>Hardenbergia violacea</i>	Purple Coral Pea																																				
Fabaceae	<i>Indigofera australis</i>	Australian Indigo												1																								
Fabaceae	<i>Medicago arabica</i>	Spotted Burr Medic	*																																			
Fabaceae	<i>Medicago minima</i>	Wolly Burr Medic	*															1																				

[illegible]

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[illegible]

[illegible]

[illegible]



[illegible]

Common Name	Scientific Name	EPBC Act Status	TSC Act Status	Notes
<b>FROGS</b>				
Broad-palmed Frog	<i>Litoria latopalmata</i>			
Common Toadlet	<i>Crinia signifera</i>			
Green Tree Frog	<i>Littoria caerulea</i>			
Pobblebonk	<i>Limnodynastes dumerili</i>			
Spotted Marsh Frog	<i>Limnodynastes tasmaniensis</i>			
<b>REPTILES</b>				
Jacky Lizard	<i>Amphibolurus muricatus</i>			
Southern Rainbow Skink	<i>Carlia tetradactyla</i>			
Eastern Snake-necked Turtle	<i>Chelodina longicollis</i>			
Copper-tailed Skink	<i>Ctenotus taeniolatus</i>			
Yellow-faced Whip Snake	<i>Demansia psammophis</i>			
Tree Skink	<i>Egernia striolata</i>			
Eastern Water Skink	<i>Eulamprus quoyii</i>			
Whites Shink	<i>Liopholis whitii</i>			
Tiger Snake	<i>Notechis scutatus</i>			
Eastern Beaded Dragon	<i>Pogona barbata</i>			
Red-bellied Black Snake	<i>Pseudechis porphyriacus</i>			
Eastern Brown Snake	<i>Pseudonaja textilis</i>			
Eastern Shingleback	<i>Tiliqua rugosa asper</i>			
Eastern Blue-tongue	<i>Tiliqua scincoides scincoides</i>			
Lace Monitor	<i>Varanus varius</i>			
<b>BIRDS</b>				
Spiny-cheeked Honeyeater	<i>Acanthagenys rufogularis</i>			
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>			
Striated Thornbill	<i>Acanthiza lineata</i>			
Buff-rumped Thornbill	<i>Acanthiza reguloides</i>			
Brown Goshawk	<i>Accipiter fasciatus</i>			
Australian Reed-Warbler	<i>Acrocephalus australis</i>			
Australian Owlet-nightjar	<i>Aegotheles cristatus</i>			
Australian King-Parrot	<i>Alisterus scapularis</i>			
Pacific Black Duck	<i>Anas superciliosa</i>			
Red Wattlebird	<i>Anthochaera carunculata</i>			
Australasian Pipit	<i>Anthus novaeseelandiae</i>			
Southern Whiteface	<i>Aphelocephala leucopsis</i>			
Fork-tailed Swift	<i>Apus pacificus</i>	Mi		
Wedge-tailed Eagle	<i>Aquila audax</i>			
White-necked Heron	<i>Ardea pacifica</i>			
Black-faced Woodswallow	<i>Artamus cinereus</i>			
Dusky Woodswallow	<i>Artamus cyanopterus</i>			
White-breasted Woodswallow	<i>Artamus leucorhynchus</i>			
Hardhead	<i>Aythya australis</i>			
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>			
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>		V	
Australian Wood Duck	<i>Chenonetta jubata</i>			
White-backed Swallow	<i>Cheramoeca leucosterna</i>			
Speckled Warbler	<i>Chthonicola sagittata</i>		V	
Spotted Harrier	<i>Circus assimilis</i>		V	
Golden-headed Cisticola	<i>Cisticola exilis</i>			
Grey Shrike-thrush	<i>Colluricincla harmonica</i>			
Ground Cuckoo-shrike	<i>Coracina maxima</i>			
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>			
White-bellied Cuckoo-shrike	<i>Coracina papuensis</i>			
White-winged Chough	<i>Corcorax melanorhamphos</i>			
White-throated Treecreeper	<i>Cormobates leucophaea</i>			
Australian Raven	<i>Corvus coronoides</i>			
Little Raven	<i>Corvus mellori</i>			
Pied Butcherbird	<i>Cracticus nigrogularis</i>			
Australian Magpie	<i>Cracticus tibicen</i>			
Grey Butcherbird	<i>Cracticus torquatus</i>			
Black Swan	<i>Cygnus atratus</i>			
Laughing Kookaburra	<i>Dacelo novaeguineae</i>			
Varied Sittella	<i>Daphoenositta chrysoptera</i>		V	

Common Name	Scientific Name	EPBC Act Status	TSC Act Status	Notes
Mistletoebird	<i>Dicaeum hirundinaceum</i>			
Emu	<i>Dromaius novaehollandiae</i>			
White-faced Heron	<i>Egretta novaehollandiae</i>			
Black-shouldered Kite	<i>Elanus axillaris</i>			
Black-fronted Dotterel	<i>Elsayornis melanops</i>			
Galah	<i>Eolophus roseicapillus</i>			
Eastern Yellow Robin	<i>Eopsaltria australis</i>			
Brown Falcon	<i>Falco berigora</i>			
Nankeen Kestrel	<i>Falco cenchroides</i>			
Australian Hobby	<i>Falco longipennis</i>			
Eurasian Coot	<i>Fulica atra</i>			
Dusky Moorhen	<i>Gallinula tenebrosa</i>			
Peaceful Dove	<i>Geopelia striata</i>			
Musk Lorikeet	<i>Glossopsitta concinna</i>			
Maggie-lark	<i>Grallina cyanoleuca</i>			
Whistling Kite	<i>Haliastur spheurnus</i>			
White-throated Needletail	<i>Hirundapus caudacutus</i>	Mi		
Welcome Swallow	<i>Hirundo neoxena</i>			
Yellow-faced Honeyeater	<i>Lichenostomus chrysops</i>			
White-eared Honeyeater	<i>Lichenostomus leucotis</i>			
White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>			
Superb Fairy-wren	<i>Malurus cyaneus</i>			
Variegated Fairy-wren	<i>Malurus lamberti</i>			
Noisy Miner	<i>Manorina melanocephala</i>			
Hooded Robin	<i>Melanodryas cucullata cucullata</i>		V	
White-throated Honeyeater	<i>Melithreptus albogularis</i>			
Brown-headed Honeyeater	<i>Melithreptus brevirostris</i>			
White-naped Honeyeater	<i>Melithreptus lunatus</i>			
Rainbow Bee-eater	<i>Merops ornatus</i>	Mi		
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>			
Jacky Winter	<i>Microeca fascians</i>			
Restless Flycatcher	<i>Myiagra inquieta</i>			
Leaden Flycatcher	<i>Myiagra rubecula</i>			
Red-browed Finch	<i>Neochmia temporalis</i>			
Southern Boobook	<i>Ninox novaeseelandiae</i>			
Blue Bonnet	<i>Northiella haematogaster</i>			
Crested Pigeon	<i>Ocyphaps lophotes</i>			
Rufous Whistler	<i>Pachycephala rufiventris</i>			
Spotted Pardalote	<i>Pardalotus punctatus</i>			
Striated Pardalote	<i>Pardalotus striatus</i>			
House Sparrow*	<i>Passer domesticus*</i>			
Fairy Martin	<i>Petrochelidon ariel</i>			
Tree Martin	<i>Petrochelidon nigricans</i>			
Scarlet Robin	<i>Petroica boodang</i>		V	
Red-capped Robin	<i>Petroica goodenovii</i>			
Great Cormorant	<i>Phalacrocorax carbo</i>			
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>			
Common Bronzewing	<i>Phaps chalcoptera</i>			
Eastern Rosella	<i>Platycercus eximius</i>			
Striped Honeyeater	<i>Plectorhyncha lanceolata</i>			
Tawny Frogmouth	<i>Podargus strigoides</i>			
Superb Parrot	<i>Polytelis swainsonii</i>	V	V	
Grey-crowned Babbler	<i>Pomatostomus temporalis</i>		V	
Red-rumped Parrot	<i>Psephotus haematotus</i>			
Grey Fantail	<i>Rhipidura albiscapa</i>			
Willie Wagtail	<i>Rhipidura leucophrys</i>			
White-browed Scrubwren	<i>Sericornis frontalis</i>			
Weebill	<i>Smicromis brevirostris</i>			
Diamond Firetail	<i>Stagonopleura guttata</i>		V	
Pied Currawong	<i>Strepera graculina</i>			
Apostlebird	<i>Struthidea cinerea</i>			
Common Starling*	<i>Sturnus vulgaris*</i>			
Common Starling*	<i>Sturnus vulgaris*</i>			



Common Name	Scientific Name	EPBC Act Status	TSC Act Status	Notes
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>			
Double-barred Finch	<i>Taeniopygia bichenovii</i>			
Straw-necked Ibis	<i>Threskiornis spinicollis</i>			
Sacred Kingfisher	<i>Todiramphus sanctus</i>			
Masked Lapwing	<i>Vanellus miles</i>			
Silvereye	<i>Zosterops lateralis</i>			
<b>BATS</b>				
Gould's Wattled Bat	<i>Chalinolobus gouldi</i>			Definite
Chocolate Wattled Bat	<i>Chalinolobus morio</i>			Definite
Little Pied Bat	<i>Chalinolobus picatus</i>		V	Possible
Eastern False-Pipistrelle	<i>Falsistrellus tasmaniensis</i>		V	Possible
Eastern Bentwing Bat	<i>Miniopterus schreibersii oceanensis</i>		V	Definite
an undescribed Free-tailed Bat	<i>Mormopterus species 2</i>			Definite
an undescribed Free-tailed Bat	<i>Mormopterus species 3</i>			Probable
an undescribed Free-tailed Bat	<i>Mormopterus species 4</i>			Definite
Southern Myotis	<i>Myotis macropus</i>		V	Possible
Gould's, Lesser and South-eastern Long-eared Bats	<i>Nyctophilus species (N.gouldi or N. geoffroyi or N. corbeni)</i>	N. corbeni - V	N. corbeni - V	Any of these species could occur.
Grey-headed Flying Fox	<i>Pteropus poliocephalus</i>	V	V	Definite
Yellow-bellied Sheath-tailed Bat	<i>Saccolaimus flaviventris</i>		V	Definite
Inland Broad-nosed Bat	<i>Scotorepens balstoni</i>			Definite
Little Broad-nosed Bat	<i>Scotorepens greyii</i>			Possible
Eastern Broad-nosed Bat	<i>Scotorepens orion</i>			Possible
White-striped Free-tailed Bat	<i>Tadarida australis</i>			Definite
Large Forest Bat	<i>Vespadelus darlingtoni</i>			Definite
Southern Forest Bat	<i>Vespadelus regulus</i>			Definite
Eastern Cave Bat	<i>Vespadelus troughtoni</i>		V	Probable
Little Forest Bat	<i>Vespadelus vulturnus</i>			Definite
<b>MAMMALS</b>				
Goat*	<i>Capra aegagrus hircus*</i>			
Fallow Deer*	<i>Cervus dama*</i>			
Domestic Cat*	<i>Felis catus*</i>			
Water Rat	<i>Hydromys chrysogaster</i>			Tentative
Brown Hare*	<i>Lepus europaeus*</i>			
Eastern Grey Kangaroo	<i>Macropus giganteus</i>			
Eastern Wallaroo	<i>Macropus robustus</i>			
Red Necked Wallaby	<i>Macropus rufogriseus</i>			
House Mouse *	<i>Mus musculus*</i>			
European Rabbit*	<i>Oryctolagus cuniculus*</i>			
Sugar Glider	<i>Petaurus breviceps</i>			
Squirrel Glider	<i>Petaurus norfolcensis</i>		V	
Common Ringtail Possum	<i>Pseudocheirus peregrinus</i>			
Pig*	<i>Sus scrofa*</i>			
Short Beaked Echidna	<i>Tachyglossus aculeatus aculeatus</i>			
Common Brushtail Possum	<i>Trichosurus vulpecula</i>			
Common Wombat	<i>Vombatus ursinus</i>			
European Red Fox*	<i>Vulpes vulpes*</i>			
Swamp Wallaby	<i>Wallabia bicolor</i>			

EPBC Act Status; Mi – Migratory, V – Vulnerable. TSC Act Status; V – Vulnerable

# Appendix D Regent Honeyeater Expert Report

A stylized topographic map with green contour lines is positioned on the left side of the page, extending from the top left towards the bottom left.

## Expert Report for Regent Honeyeater Uungula Wind Farm

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**CWP Renewables Pty Ltd**

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## DOCUMENT TRACKING

<b>Project Name</b>	Expert Report for Regent Honeyeater, Uungula Wind Farm
<b>Project Number</b>	20MUD-16397
<b>Project Manager</b>	Kalya Abbey
<b>Prepared by</b>	Dr Stephen Debus
<b>Reviewed by</b>	Tom Kelly
<b>Approved by</b>	Kalya Abbey
<b>Status</b>	<b>Draft</b>
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This report has been prepared by Dr Stephen Debus, expert for Regent Honeyeater, as approved by DPIE 11 November 2019 (Appendix A).



Dr Stephen Debus

## ACKNOWLEDGEMENTS

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Template 2.8.1

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## Abbreviations

Abbreviation	Description
ALA	Atlas of Living Australia
BC Act	<i>Biodiversity Conservation Act 2016</i>
BVT	BioMetric Vegetation Type
DoE	Department of the Environment
DPIE	Department of Planning, Industry and Environment
ELA	Eco Logical Australia
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
OEH	Office of Environment and Heritage NSW
PCT	Plant Community Type
UWF	Uungula Wind Farm



## Executive Summary

This report considers the likelihood of occurrence of the critically endangered Regent Honeyeater (*Anthochaera phrygia*) within the Uungula Wind Farm (UWF) Study Area. The Study Area for this report includes the Development Footprint, which comprises the extent of predicted ground disturbance required for the Project (645 ha), and a surrounding 100 m Development Corridor. This approach has been taken to allow for flexibility in determining the optimal project layout within the limits of the Development Corridor, following a detailed design process. This expert report by approved Regent Honeyeater expert, Dr Stephen Debus, has been prepared in accordance with Step 3.3 and Appendix H of the Biodiversity Certification Operational Manual (OEH 2015a). The determination made in this report has been based on the results of a desktop assessment, along with field surveys undertaken within the Study Area and surrounds.

The Regent Honeyeater has not been recorded within the Study Area or surrounds following field surveys during 2012-13 and 2018-20 totalling 145 person-days. Additionally, the results of the desktop assessment revealed no historical records of the species within or adjacent to the Study Area. The nearest historical record is approximately 8 km to the south of the southern extent of the Study Area and dates back to 1984. There is a total of two records within 10 km and an additional ten records within 20 km of the Study Area.

Potential foraging habitat occurs within an estimated upper-limit of 22% the Study Area. During times of widespread flowering of key feed species, particularly White Box (*Eucalyptus albens*), the Regent Honeyeater has the potential to occur within the UWF Study Area, as supported by the occurrence and timing of nearby records in similar habitat.

The UWF Study Area does not coincide with any mapped Regent Honeyeater Important Area (DPIE 2020), which is strongly correlated with known breeding records of the species. It is unlikely that the Study Area would support Regent Honeyeater breeding, due to the absence of key breeding habitat features, the fragmented nature of the habitat, the abundance of competitor and predatory species and the minimal overlap between the species potential occurrence within the Study Area and the species breeding period.

Given the above considerations, it is concluded that the Regent Honeyeater has the potential to occur in the UWF Study Area during times of mass flowering events to utilise the available foraging habitat. However, it is considered unlikely to utilise the Study Area for breeding.

# 1. Introduction

## 1.1 Reasons for expert report

Eco Logical Australia (ELA) was commissioned by CWP Renewables Pty Ltd (CWPR) to prepare an expert report stating the likelihood of occurrence of the Regent Honeyeater (*Anthochaera phrygia*) within the Uungula Wind Farm (hereafter referred to as the Project) Study Area.

The Uungula Wind Farm (UWF) is located within the Dubbo Regional Council Local Government Area, approximately 14 km east of Wellington, NSW (**Figure 1**). The Project generally consists of the installation, operation, maintenance and decommissioning of up to 97 Wind Turbine Generators (WTGs), an Energy Storage Facility (ESF), Ancillary Infrastructure and Temporary Facilities. The Project is designed to accommodate a contemporary WTG of up to 250 m in height with a nameplate capacity of approximately 4 megawatts (MW) or greater.

The Study Area for this report includes the Development Footprint, which comprises the extent of predicted ground disturbance required for the Project (645 ha), and a surrounding 100 m Development Corridor (**Figure 2**). This approach has been taken to allow for flexibility in determining the optimal project layout within the limits of the Development Corridor, following a detailed design process.

The Project was originally assessed under the former BioBanking Assessment Methodology (BBAM) (DECC 2009) in 2012 - 2013 by Environmental Resources Management Pty Ltd (ERM), on a study area roughly three times the size of the current Development Footprint (ERM 2013). The ERM assessment included a significant field survey effort, including bird surveys, which was subsequently utilised for the Project Biodiversity Assessment Report (BAR) and Biodiversity Offset Strategy (BOS) (ELA 2020). Supplementary field surveys, including opportunistic records of threatened fauna species, was also undertaken within areas of the final Development Corridor not previously surveyed. To date, the Regent Honeyeater has not been recorded within the Study Area, nor does the Study Area coincide with any mapped Regent Honeyeater Important Area (DPIE 2020) (**Figure 3**).

Despite the above considerations, the BAR and BOS committed to further assessment or the preparation of an expert report for the Regent Honeyeater, given the low national population of this Critically Endangered species, its nomadic and irregular movements (Higgins et al. 2001) and the potential foraging habitat contained within the Study Area. In its response to the UWF Environmental Impact Statement (EIS), the NSW Department of Planning, Industry and Environment (DPIE) requested that an expert report for Regent Honeyeater be prepared, should the species not be assumed to occur in the Study Area.

This expert report outlines the opinion by approved Regent Honeyeater expert, Dr Stephen Debus, as to the likelihood of the species occurring in the UWF Study Area and has been prepared in accordance with Step 3.3 and Appendix H of the Biodiversity Certification Operational Manual (OEI 2015a).

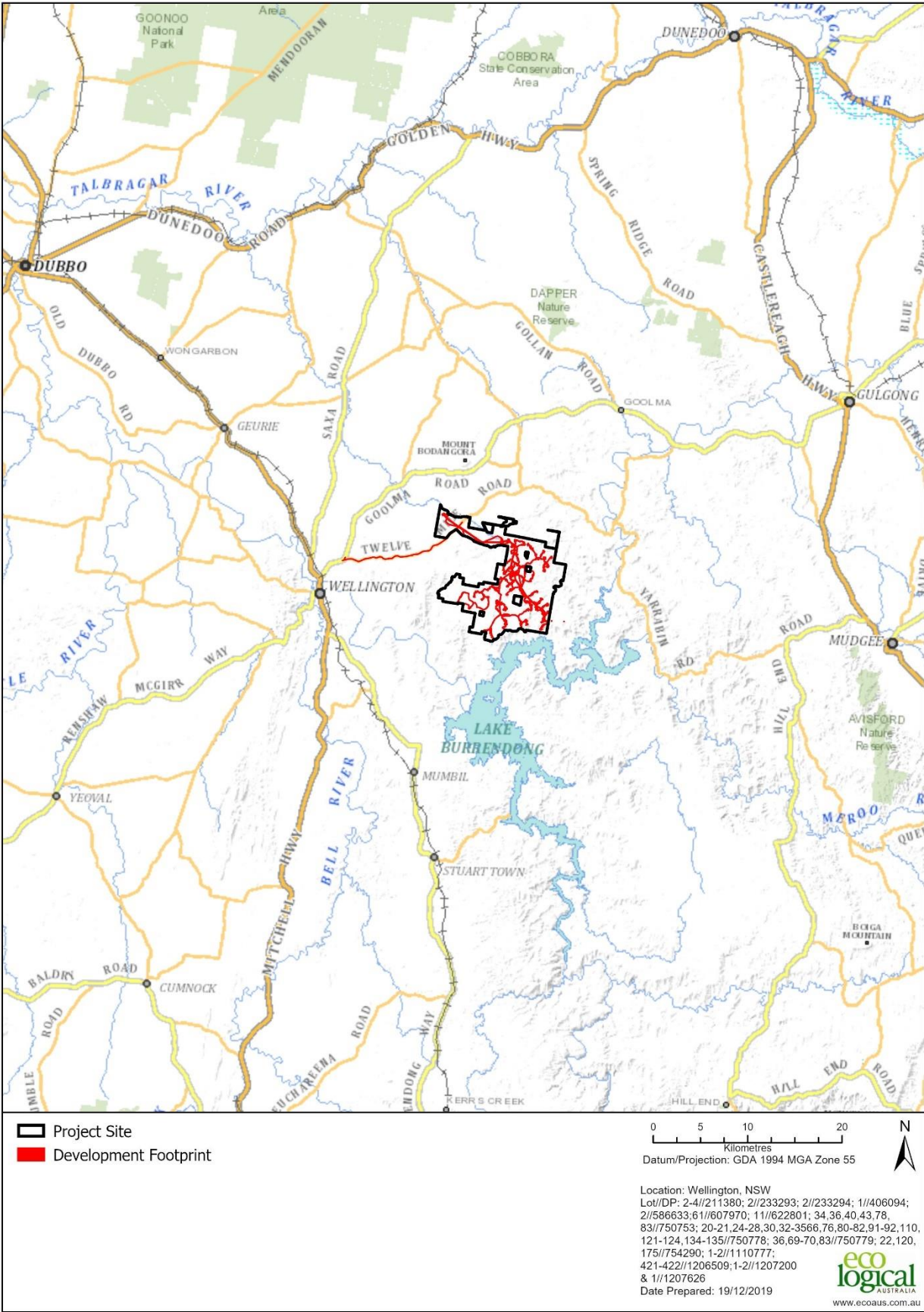


Figure 1: Regional location of the UWF



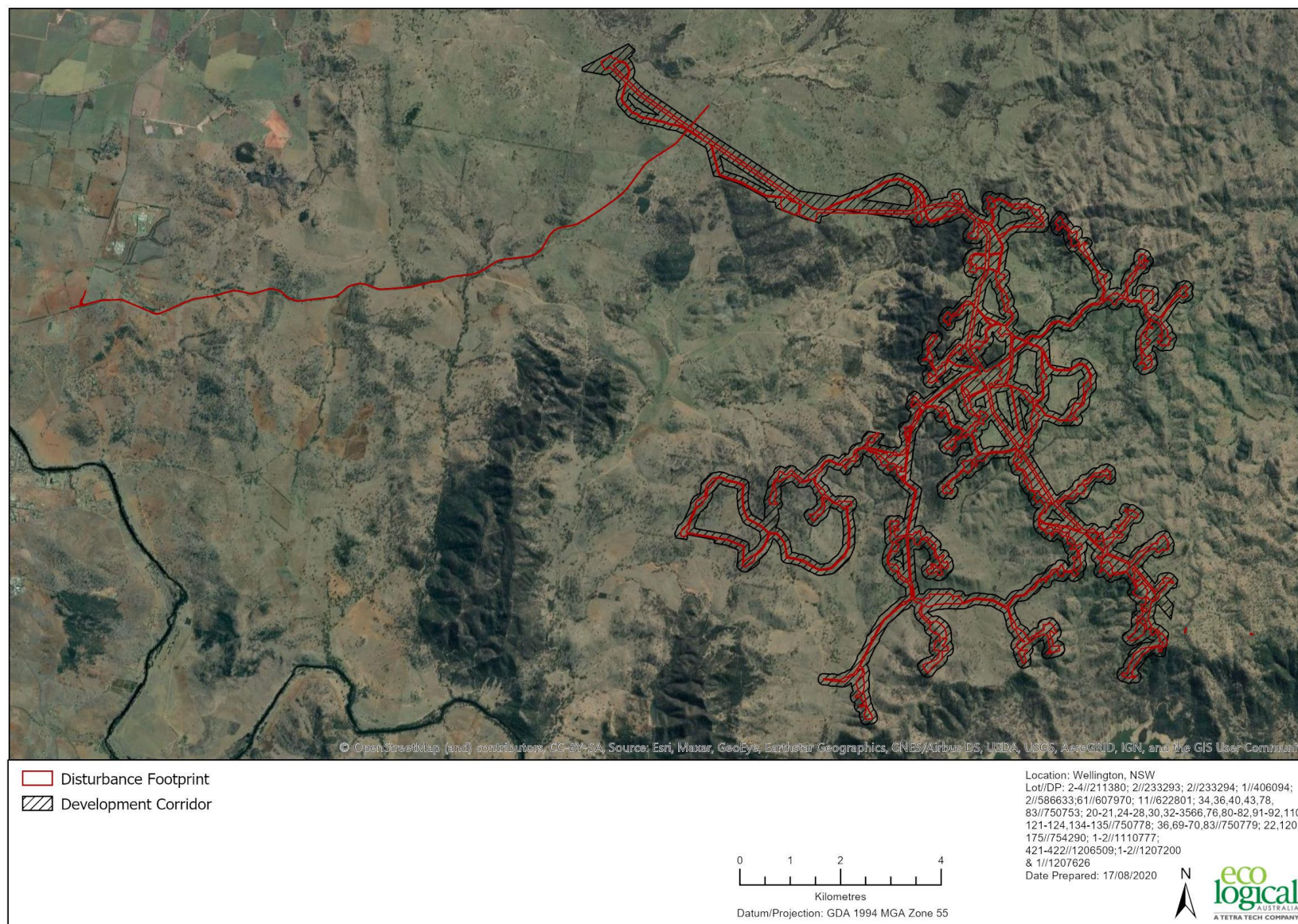


Figure 2: Study Area with both the Development Footprint and surrounding Development Corridor displayed

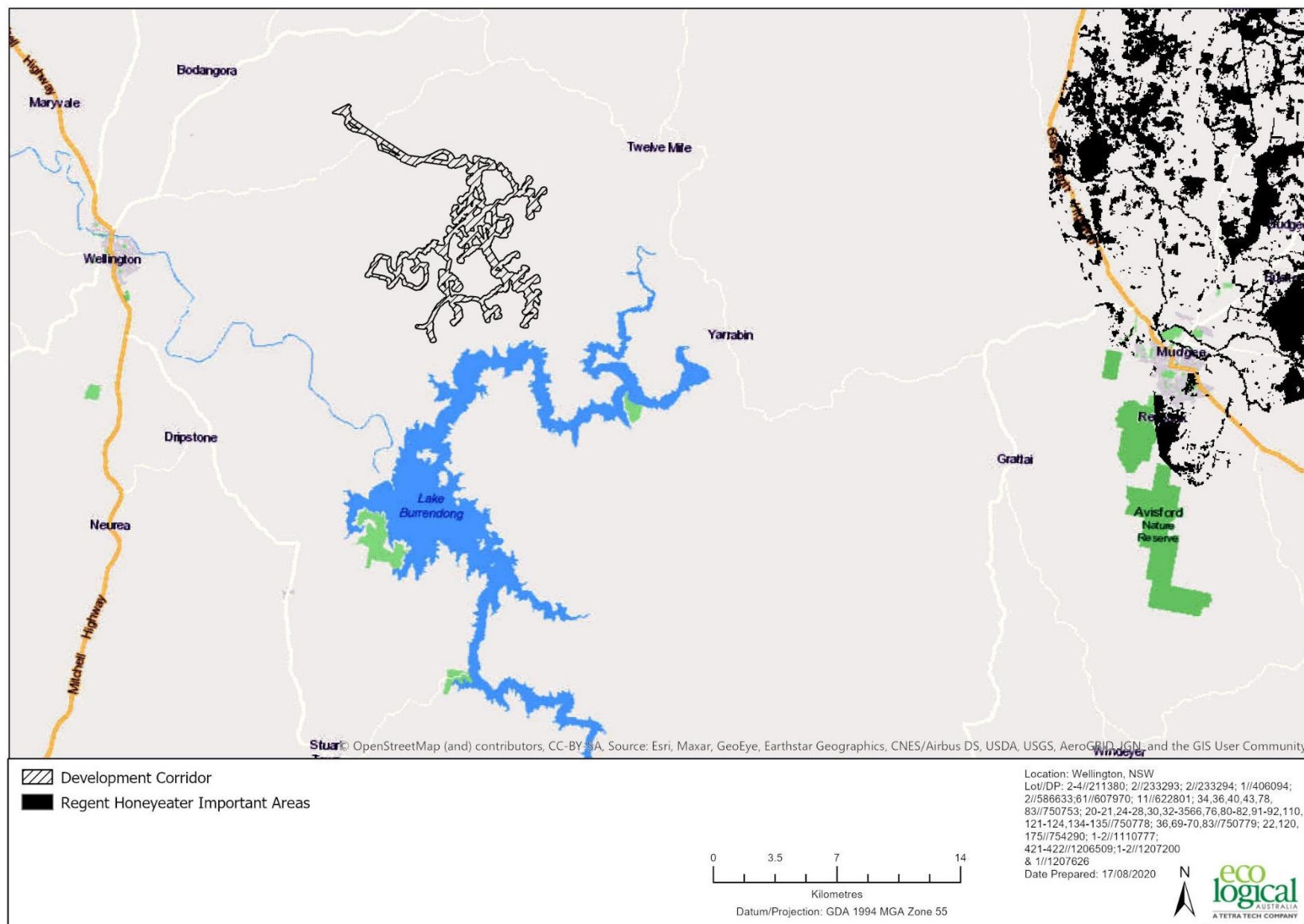


Figure 3: Mapped Regent Honeyeater 'Important Area' (DPIE 2020) relative to the UWF Development Corridor



## 1.2 Qualifications/experience of expert

Dr Stephen Debus is a DPIE approved Regent Honeyeater expert (11 November 2019). He is an ecologist/zoologist with over 35 years' experience in fauna surveys (principally avifauna) and research on the ecology of forest and woodland birds (raptors, owls, and a doctorate and postdoc on threatened and other declining passerines). He is a Senior Ecologist sub-consultant to ELA and a research fellow (formerly) and honorary research associate in Zoology at the University of New England. He has been closely involved in surveys and research on the Regent Honeyeater, principally in the Bundarra-Barraba region of northern NSW but also in the Capertee, Lower Hunter and Chiltern regions, since the early 1990s. Projects or roles associated with Regent Honeyeater populations and threats faced by the species include:

- National Regent Honeyeater Recovery Team (Bundarra-Barraba Operations Group representative) since 2008.
- Prepared the documentation and nomination for listing the Regent Honeyeater as Critically Endangered in NSW (NSW Scientific Committee, NSW OEH).
- Conducting the BirdLife Australia annual Regent Honeyeater systematic surveys in Bundarra-Barraba (2007–present).
- Expert witness in the NSW Land & Environment Court concerning the Regent Honeyeater in the Lower Hunter.
- Conducting the NSW North West Local Land Services Regent Honeyeater and Swift Parrot monitoring program (current).
- Participating in the Australian National University Regent Honeyeater survey program in northern NSW (current).
- Contributing to field work (nest watches and observations) for the studies by Ford et al. (1993) and Ley & Williams (1998).

### Relevant Literature:

Ford, H.A., Davis, W.E., Debus, S., Ley, A., Recher, H. & Williams, B. (1993). Foraging and aggressive behaviour of the Regent Honeyeater *Xanthomyza phrygia* in northern New South Wales. *Emu* 93: 277-281.

Ley, A.J. & Williams, M.B. (1993). Nesting of the Regent Honeyeater *Xanthomyza phrygia* near Armidale, New South Wales. *Australian Bird Watcher* 17: 328-336.



## 2. Species Information

### 2.1 Legal Status

In NSW, the Regent Honeyeater is listed as critically endangered under NSW BC Act and is categorised as a (non-ecosystem) credit species under the BioBanking scheme (and now a dual credit species under the Biodiversity Assessment Method (BAM)). The species is also listed as critically endangered under the Commonwealth EPBC Act.

### 2.2 Abundance and distribution

The Regent Honeyeater's core range extends between north-eastern Victoria and south-eastern Queensland, though is extremely patchy within this range. Within NSW, breeding sub-populations are fragmented and now occur mainly around the Capertee Valley and Goulburn River region in central-west NSW, the Bundarra-Barraba region in northern inland NSW and the Hunter Valley in coastal NSW.

While it appears that the size of the Regent Honeyeater population fluctuates between years and sites, it is estimated that the total population in NSW may have declined to fewer than 350–400 individuals. Population declines have been recorded across NSW breeding sites (DoE 2015; Crates et al. 2019). A captive breeding program has been undertaken for the species since 1995, with captive-bred birds released into the wild in both NSW and Victoria, including 20 recently released birds in the lower Hunter Valley in June 2020 (TCSA 2020).

The nearest record to the UWF Study Area is located approximately 8 km to the south and dates back to 1984 (OEH 2020b) (**Figure 4**). The Study Area is located approximately 27 km from the nearest mapped Regent Honeyeater Important Area (**Figure 3**) and approximately 84 km to the nearest known contemporary breeding area within the Goulburn River. Regent Honeyeaters were recorded within the Goulburn River at 11 sites in 2016 and six sites in 2017 (Crates et al. 2019), with approximately twelve (12) individuals also recorded during 2019, including multiple (mostly unsuccessful) breeding pairs (R. Crates pers. comm. 2019; Birdlife Australia 2020a).

### 2.3 Threatening processes and population declines

The main threat driving the Regent Honeyeater's population decline is the widespread historical and ongoing habitat loss from rural, residential and industrial developments. This has led to the contemporary small population size, which is in itself a key threat to the species. Additional threats including inappropriate agricultural techniques, competition for resources from larger aggressive honeyeaters such as the Noisy Miner (*Manorina melanocephala*) and Noisy Friarbird (*Philemon corniculatus*), and nest predation by other bird species and arboreal mammals exacerbate the species' small and declining population size (Higgins et al. 2001; Commonwealth of Australia 2016).

The UWF Study Area has been subject to widespread historical clearing and contains an abundance of Noisy Miners, with predatory species including Pied Currawong (*Strepera graculina*) and Common Brushtail Possum (*Trichosurus vulpecula*) also prevalent (ERM 2013; T. Kelly pers. obs. 2020).

## 2.4 Ecology and habitat requirements

The Regent Honeyeater is a highly mobile, nomadic species that inhabits dry open forests and woodlands, predominantly box-ironbark woodlands, box-gum and grassy box woodlands and riparian woodlands (Higgins et al. 2001; Commonwealth of Australia 2016). Within these vegetation communities, Regent Honeyeaters appear to favour more fertile sites such as lower slopes, broad river valleys, and along creek flats (Menkhorst et al. 1999; Oliver and Lollback 2010).

Regent Honeyeaters are nectarivorous, with the nectar from flowering eucalypt and mistletoe species forming a dominant component of their diet (NSW Scientific Committee 2011). However, when and where nectar is not readily available, they can supplement their diet with sugary plant or insect exudates such as honeydew and lerps, or invertebrates (Menkhorst et al. 1999). These latter food sources form a major component of juveniles' diets (Oliver 1998). Regent Honeyeaters tend to select the largest trees available for foraging, as larger-diameter mature trees are more likely to provide both flowering and non-flowering food resources.

Key tree and mistletoe feed species known to occur within the UWF Study Area include Mugga Ironbark (*Eucalyptus sideroxylon*), Yellow Box (*E. melliodora*), White Box (*E. albens*) and Box Mistletoe (*Amyema miquelii*).

### 2.4.1 Breeding and nesting habitat

Regent Honeyeaters mostly breed between September and November; however, historically breeding has been recorded between May and March. Regent Honeyeaters preferentially nest in the tree canopies of several eucalypt species and River Sheoak (*Casuarina cunninghamiana*) (Higgins et al. 2001; NSW Scientific Committee 2011). Fertile woodlands and riparian forests dominated by rough-barked trees (e.g. Mugga Ironbarks and River Sheoak) are favoured for nesting sites. Nests are usually placed in tall, mature trees with high canopy cover, towards the end of larger horizontal branches (Higgins et al. 2001).

A study of Regent Honeyeater breeding habits in the Capertee Valley found that all nests were placed in mature trees ranging from 8 to 36 m in height, with a mean height of 22.9 m (Geering 1998). A more recent study across contemporary breeding locations in NSW recorded nests ranging from 3 to 25 m in height, with a mean height of 13 m, and a strong correlation with the presence of flowering Yellow Box, riparian habitats and proximity (<200 m) to water (Crates et al. 2019; R. Crates pers. comm. 2019).

The UWF Study Area does not coincide with any mapped Regent Honeyeater Important Area (DPIE 2020), which is strongly correlated with known breeding records of the species, and contains limited areas of preferred riparian woodland breeding habitat.

### 2.4.2 Habitat patch size and connectivity

Fragmentation of habitat is a significant factor contributing to the species' decline. Habitat fragmentation can inhibit the Regent Honeyeater's ability to move across the landscape and provides an environment that favours species such as Noisy Friarbirds and Noisy Miners, which compete for both foraging and nesting habitat, as well as predatory birds and mammals (e.g. Pied Currawong and Common Brushtail Possum) which disrupt breeding (Geering 1998; Higgins et al. 2001; Commonwealth of Australia 2016; Crates et al. 2019).

Nevertheless, the Regent Honeyeater is a highly mobile species that is capable of widespread dispersal (more than 530 km), and therefore, these birds have the capacity to use isolated remnants as 'stepping stones' (NSW Scientific Committee 2011). Relatively small woodland remnants can provide habitat for the species, especially among modified or partly cleared agricultural land where the species can utilise paddock trees or small isolated patches of woodland for foraging and dispersal.

The UWF Study Area forms part of a modified agricultural landscape in which both woodland and open forest vegetation has been extensively cleared. Remnant woodland and open forest vegetation still occurs across the Study Area, mostly as sparse, partly cleared remnant pockets and paddock trees, however, several large (>500 ha) intact patches remain within and directly adjacent to the Study Area. Despite the patchy nature of remnant vegetation, sufficient habitat connectivity remains to enable movement of a mobile species, such as the Regent Honeyeater, across the majority of the Study Area.



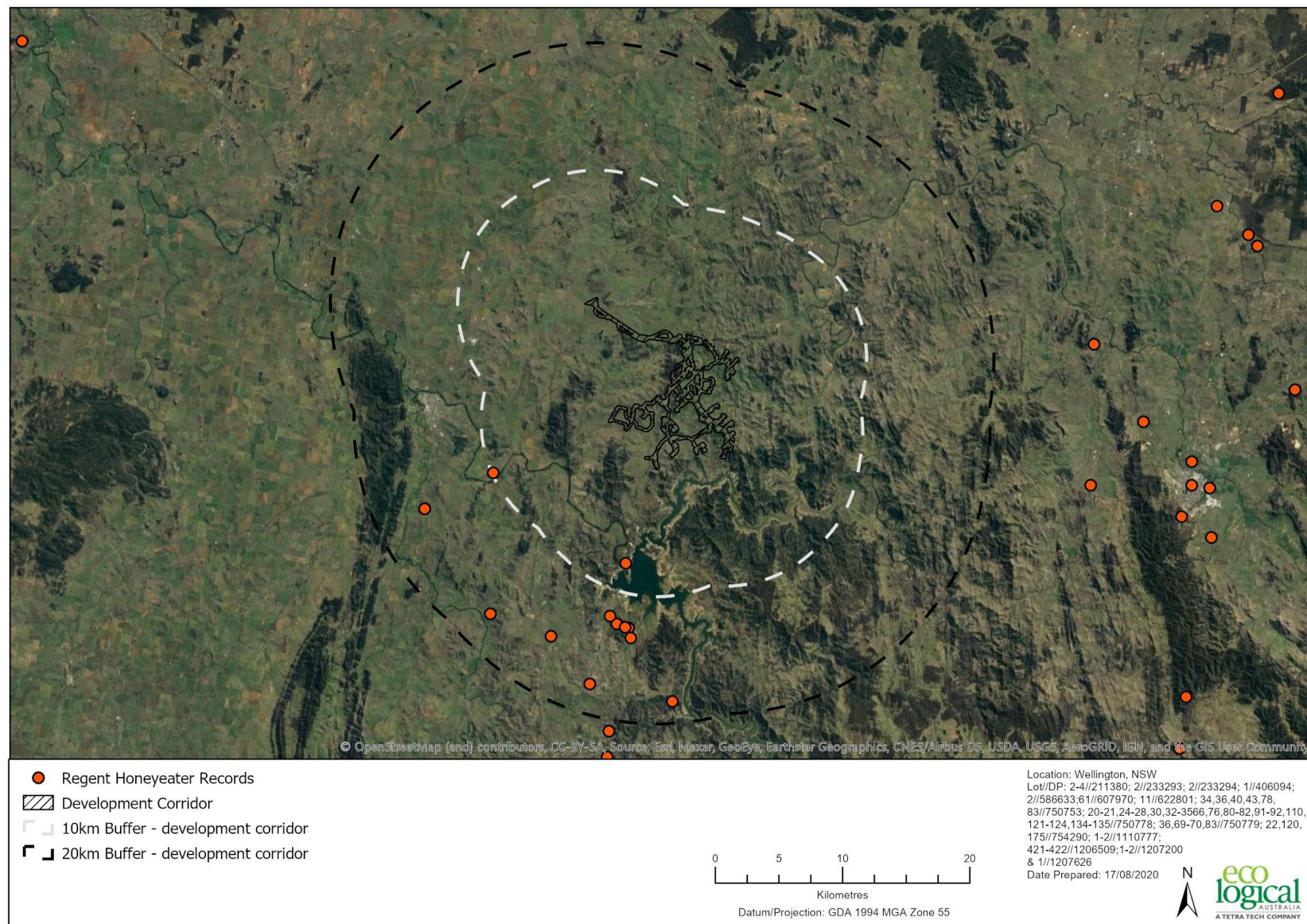


Figure 4: Regent Honeyeater records in context of the UWF Development Corridor

### 3. Assessment methodology

#### 3.1 Desktop assessment

A desktop assessment was undertaken that included accessing databases and assessing known Regent Honeyeater records in NSW (historic for the vicinity of the Study Area). Previous bird surveys undertaken across the Study Area, as well as relevant literature, were also reviewed, including but not limited to the following:

- *Anthochaera phrygia* – Regent Honeyeater SPRAT Profile (DoE 2015)
- NSW Office of Environment and Heritage Regent Honeyeater – profile (OEH 2015b)
- NSW Office of Environment and Heritage BioNet atlas (OEH 2020b)
- Atlas of Living Australia Online (ALA 2020)
- NSW Department of Planning, Industry and Environment Regent Honeyeater Important Area mapping (DPIE 2020)
- Regent Honeyeater Recovery Plan 1999–2003 (Menkhorst et al. 1999)
- National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) (Commonwealth of Australia 2016)
- Regent Honeyeater *Anthochaera phrygia* – critically endangered species listing NSW Scientific Committee – final determination (OEH 2011)
- Contemporary breeding biology of critically endangered Regent Honeyeaters: implications for conservation (Crates et al. 2019)
- Regent Honeyeater bird data online records (Birdlife Australia 2020b)
- Regent Honeyeater – *Anthochaera phrygia* online species sightings records (eBird Australia 2020)
- Uungula Wind Farm Biodiversity Assessment Report and Biodiversity Offset Strategy (ELA 2020)
- Uungula Wind Farm Ecological Impact Assessment (ERM 2013).

#### 3.2 Field Surveys

Bird surveys were undertaken across the Study Area for the UWF ecological impact assessment (ERM 2013) at 24 locations from December 2012 to March 2013 (**Figure 5**). Bird surveys utilised the 2-hectare 20-minute method with all species observed or heard in the area recorded. A total of 28 Bird Utilisation Surveys was also undertaken, which involved two observers stationed at a fixed survey point for 15 minutes and recording the abundance of all large bird species within 800 m and all small bird species within 100 m, along with several covariates. Opportunistic observations of threatened fauna were also recorded within the Study Area and surrounds during the entirety of field surveys for the ecological impact assessment (ERM 2013), totalling approximately 118 person-days of survey effort from September 2012 to March 2013. No Regent Honeyeaters were recorded during the field surveys undertaken for the UWF ecological impact assessment.

Additionally, opportunistic observations of threatened fauna have been recorded during the entirety of field surveys undertaken across the Study Area for the UWF BAR and BOS (ELA 2020), totalling approximately 27 person-days of survey effort during September and October 2018, July 2019 and January and August 2020. No Regent Honeyeaters were recorded during these field surveys.

Vegetation community validation was undertaken as part of the UWF ecological impact assessment (ERM 2013) and UWF BAR (ELA 2020) to determine the BioMetric Vegetation Types (BVTs) present within the Study Area. Each BVT encountered during the field surveys was described and rapid assessments were completed to determine their extent and condition, with BioMetric plot based full floristic surveys also undertaken in accordance with the BioBanking Assessment Methodology (OEH 2014). BVTs present across the Study Area have been assigned to their corresponding Plant Community Type (PCT), in order to determine their association with Regent Honeyeater habitat in accordance with the *Threatened Species Profile Database* (OEH 2020a).



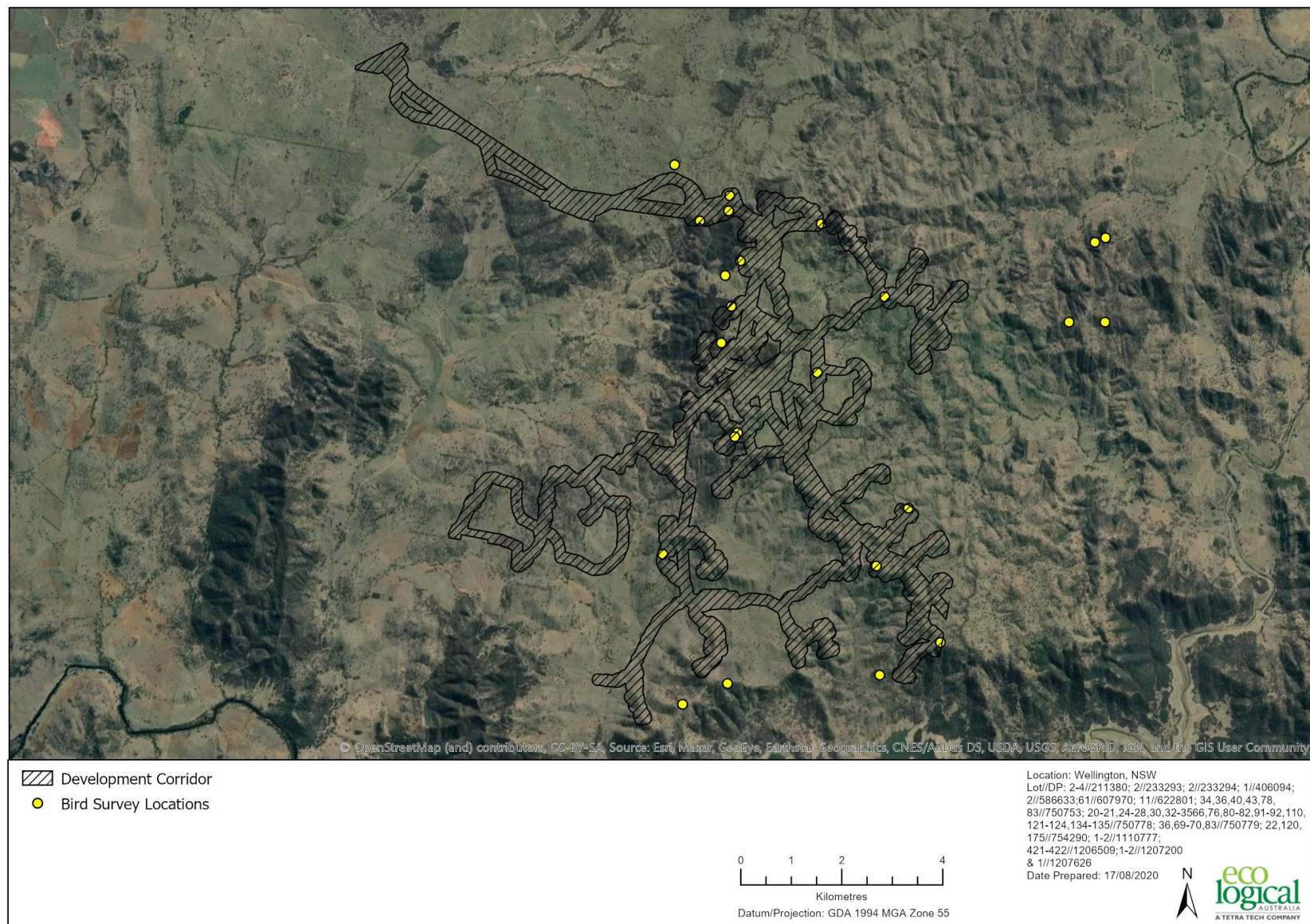


Figure 5: Bird survey effort undertaken across the UWF Study Area and surrounds

## 4. Results

### 4.1 Previous records

The Regent Honeyeater has not been recorded within the UWF Study Area or surrounding areas, with field surveys (inclusive of bird surveys; **Figure 5**) during 2012-13 and 2018-20 totalling 145 person-days failing to locate the species. The nearest historical Regent Honeyeater record to the Study Area is approximately 8 km to the south of the southern extent of the Study Area and dates back to 1984. There is a total of two records within 10 km and an additional ten records within 20 km of the Study Area. Only two of these records within 20 km of the Study Area are from the last 20 years (October 2000 and March 2001), with no records from the last 10 years.

The majority of records within a 20 km radius of the Study Area are located adjacent to Lake Burrendong and the Macquarie River (**Figure 4**). Although these locations support similar vegetation communities and key feed species to that present within the UWF Study Area, the presence and proximity to permanent water bodies is a key point of difference. The absence of nearby recent records in an area which has undergone biodiversity assessment for major projects including the UWF (ELA 2020), Bodangora Wind Farm (Bodangora Wind Farm Pty Ltd 2012) and Wellington Solar Farm (NGH Environmental 2017) and in an area frequented by both amateur and professional ornithologists (including nearby Twelve Mile Rd and Lake Burrendong (Birdlife Australia 2020b; eBird Australia 2020)), indicates that the species is highly uncommon in the Study Area and surrounds. The scarcity of recent NSW records west of the Study Area would further support this conclusion.

### 4.2 Potential habitat

#### 4.2.1.1 Foraging habitat

Vegetation within the Study Area provides potential foraging habitat for the Regent Honeyeater, with key feed tree species, particularly White Box, widespread across the Study Area. The corresponding PCTs for all five of the BVTs present within the Study Area are vegetation communities associated with the Regent Honeyeater (OEH 2020a) (**Table 1** below with examples shown in **Figure 6 - Figure 10**). Approximately 143 ha of these communities occurs within the Disturbance Footprint (645 ha), with cleared forms of these communities excluded from calculations. Extrapolated out to the wider Disturbance Corridor, this area of potential foraging habitat represents approximately 22% of the Study Area.

However, no key feed species (Commonwealth of Australia 2016) were recorded within BVT CW202 (PCT 1279), and key feed species were a rare occurrence within BVT CW177 (PCT 1095) (ERM 2013; T. Kelly pers. obs. 2020). Additionally, only CW112 (PCT 277) and CW211 (PCT 274) occur in preferred alluvial landscape positions most likely to be utilised for foraging (Menkhorst et al. 1999; Oliver and Lollback 2010), with adjacent areas of CW212 (PCT 270) with sufficient landscape connectivity also potentially utilised. As such, the estimation of 22% of the Study Area is likely an overestimation of the total foraging habitat available to the species and this should be considered an 'upper-limit'.

Widespread flowering events of White Box are known to occur in the central west region, typically during late-autumn to early-spring. During such events, nomadic and semi-nomadic nectarivorous birds including honeyeater and parrot species with similar foraging ecologies to the Regent Honeyeater, are



known to migrate to the region to utilise this foraging resource (T. Kelly pers. obs. 2019). There is the potential for Regent Honeyeaters to occur within the UWF Study Area during these events, with previous flowering events likely resulting in the nearby historic records of the species (**Figure 4**) in what is similar foraging habitat. Likewise, influxes or gatherings of nectarivorous parrots (notably lorikeets and Swift Parrots *Lathamus discolor*) and honeyeaters (friarbirds, Noisy Miners, Red Wattlebirds *Anthochaera carunculata*, Spiny-cheeked Honeyeaters *Acanthagenys rufogularis*, Brown Honeyeaters *Lichmera indistincta*, Scarlet Honeyeaters *Myzomela sanguinolenta*, Regent Honeyeaters and others), are attracted to flowering events of Mugga Ironbark, Yellow Box, White Box, Eastern Grey Box (*Eucalyptus moluccana*) and mistletoes in the Bundarra-Barraba region and beyond. However, the number, frequency and geographical extent of Regent Honeyeater records during these events has declined greatly since 2000, with these birds largely contracting to a few core historical breeding localities within the region (S. Debus per. obs., 1990-2020).

#### 4.2.1.2 Breeding habitat

Contemporary Regent Honeyeater breeding habitat is characterised by riparian woodland, particularly River Sheoak woodland, along permanent to semi-permanent drainage lines surrounded by fertile alluvial woodlands, particularly those containing Yellow Box (NSW Scientific Committee 2011; Crates et al. 2019; R. Crates pers. comm. 2019). River Sheoak riparian woodland is absent from the study area, with no permanent drainage lines present in this undulating, hillslope landscape. As such, the Study Area does not contain breeding habitat features present at contemporary key breeding sites in the wider central west region, including Goulburn River and Capertee Valley (T. Kelly pers. obs. 2019).

The widespread fragmentation of potential habitat within the Study Area provides a significant limitation on the viability of Regent Honeyeater breeding. This is further exacerbated by the prevalence of competitor and predatory species across the Study Area including Noisy Miner, Pied Currawong and Common Brushtail Possum (Commonwealth of Australia 2016).

The Study Area does not coincide with any mapped Regent Honeyeater Important Area (DPIE 2020), which is strongly correlated with known breeding records of the species. The Study Area is located approximately 27 km west from the nearest mapped Regent Honeyeater Important Area (**Figure 3**) and approximately 84 km south-west from the nearest known contemporary breeding area within the Goulburn River. Both historical and contemporary breeding records demonstrate strong fidelity to the key breeding areas of the species (Commonwealth of Australia 2016; DPIE 2020).

As detailed in Section 4.2.1.1 above, the Regent Honeyeater has the potential to utilise foraging habitat in the Study Area during widespread flowering events, which typically take place from late-autumn to early-spring, whereas Regent Honeyeater breeding mostly occurs from spring to summer (Commonwealth of Australia 2016). This pattern results in minimal overlap between the species' breeding period and periods in which the species is most likely to occur in the Study Area. This interpretation is supported by the timing of nearby (<20 km radius) historical records, of which only two of nine records (with valid dates) occur during the spring to summer Regent Honeyeater breeding period (ALA 2020; OEH 2020b).



**Table 1: BioMetric Vegetation Types (BVTs) within the UWF Disturbance Footprint and associated Regent Honeyeater PCTs and key feed species**

BVT Code	PCT Name	PCT Code	Regent Honeyeater associated PCT	Key feed species recorded in Study Area	Area (ha)
CW112	Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion	277	Yes	Yellow Box (abundant), Box Mistletoe (abundant)	6.28
CW177	Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion	1095	Yes	Mugga Ironbark (rare), White Box (rare), Box Mistletoe (rare)	26
CW202	Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the South Western Slopes	1279	Yes	None	16.26
CW211	White Box - Rough-barked Apple alluvial woodland on the NSW western slopes	274	Yes	White Box (abundant), Box Mistletoe (rare)	7.87
CW212	White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes	270	Yes	White Box (abundant), Box Mistletoe (rare)	86.71
<b>Total</b>					<b>143.12</b>



**Figure 6: BVT CW112 (PCT 277), featuring Yellow Box located within the Study Area**



**Figure 7: BVT CW177 (PCT 1095), featuring Mugga Ironbark located within the Study Area**





**Figure 8: BVT CW202 (PCT 1279) located within the Study Area**



**Figure 9: BVT CW211 (PCT 274), featuring White Box located within the Study Area**





**Figure 10: BVT CW212 (PCT 270), featuring White Box located within the Study Area**

## 5. Conclusion

This expert report has considered the likelihood of Regent Honeyeater presence within UWF Study Area. The Study Area includes a 667 ha Development Footprint and a surrounding 100 m Development Corridor (**Figure 2**), of which 22% conforms with vegetation communities associated with the Regent Honeyeater (OEH 2020a). The determination made in this report has been based on the results of a desktop assessment, along with field surveys undertaken within the Study Area and surrounds.

General conclusions include the following:

- The species has not been recorded within the UWF Study Area or surrounds following field surveys for the Project, combined with a desktop assessment of historical records. The nearest historical Regent Honeyeater record to the Study Area is approximately 8 km to the south of the southern extent of the Study Area and dates back to 1984. There is a total of two records within 10 km and an additional ten records within 20 km of the Study Area.
- Potential foraging habitat occurs within an estimated upper-limit of 22% the Study Area. During times of widespread flowering of key feed species, particularly White Box, the Regent Honeyeater has the potential to occur within the UWF Study Area.
- The Study Area does not coincide with any mapped Regent Honeyeater Important Area.
- The Study Area is unlikely to support Regent Honeyeater breeding, due to the absence of key breeding habitat features, the fragmented nature of the habitat, the abundance of competitor and predatory species and the minimal overlap between the Regent Honeyeater's potential occurrence within the Study Area and its main breeding period.

Given the above considerations, it is concluded that the Regent Honeyeater has the potential to occur in the UWF Study Area during times of mass flowering events to utilise the available foraging habitat. However, it is considered unlikely to utilise the Study Area for breeding.

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## Appendix A – BAM Expert Nomination – Approval Letter



Our ref: DOC19/974226

Your ref: 14142

Skye Mooney  
Environmental Consultant  
EcoLogical Australia  
skye.mooney@ecoaus.com.au

Dear Skye

**Approval of Dr Stephen Debus as an expert for regent honeyeater (*Anthochaera phrygia*)**

I refer to your correspondence dated 24 October 2019 in which you requested that Dr Stephen Debus be considered as an expert for the regent honeyeater.

The Department of Planning, Industry and Environment, Biodiversity and Conservation Division (BCD), has reviewed the information provided in support of this request. BCD is satisfied that Dr Stephen Debus satisfies the definition of a species expert for regent honeyeater in accordance with Section 6.5.2.3 of the Biodiversity Assessment Method.

Please note that this formal recognition of Dr Stephen Debus as an expert only applies to the North West Region of NSW which comprises the following local government areas; Bathurst, Blayney, Bourke, Brewarrina, Cabonne, Central Darling, Cobar, Coonamble, Cowra, Dubbo Regional, Forbes, Gilgandra, Gunnedah, Gwydir, Lachlan, Lithgow, Liverpool Plains, Mid-Western Regional, Moree Plains, Narrabri, Narromine, Oberon, Orange, Parkes, Tamworth Regional, Unincorporated Far West, Walgett, Warren, Warrumbungle and Weddin.

If you have any further questions in relation to this matter, please contact Liz Mazzer, Conservation Planning Officer on 6883 5325 or via email [liz.mazzer@environment.nsw.gov.au](mailto:liz.mazzer@environment.nsw.gov.au).

Yours sincerely

A handwritten signature in black ink, appearing to be 'S. Cox', with a long horizontal stroke extending to the right.

11 November 2019

**Steven Cox**  
**Acting Director North West Branch**  
**Biodiversity and Conservation Division**





## Appendix E BioBanking Credit Calculator - Credit Report

# BioBanking Credit Calculator

## Ecosystem credits



Proposal ID : 145/2020/5048MP  
 Proposal name : Uungula Wind Farm  
 Assessor name : Lily Gorrell  
 Assessor accreditation number : 145  
 Tool version : v4.0  
 Report created : 15/09/2020 13:55

Assessment circle name	Landsc ape score	Vegetation zone name	Vegetation type name	Condition	Red flag status	Management zone name	Management zone area	Current site value	Future site value	Loss in site value	Credit required for bio diversity	Credit required for TS	TS with highest credit requirement	Average species loss	Species TG Value	Final credit requirement for management zone
One	22.20	CW112_Moderate/Good_Medium	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate/Good_Medium	Yes	1	6.28	74.00	0.00	74.00	383	383	Masked Owl	72.22	3.00	383
One	22.20	CW112_Moderate/Good_Poor	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate/Good_Poor	Yes	2	60.91	65.33	0.00	65.33	3,322	3,322	Masked Owl	61.11	3.00	3,322
One	22.20	CW177_Moderate/Good_Medium	Red Stringybark woodland of the dry slopes of the NSW South Western Slopes Bioregion	Moderate/Good_Medium	Yes	3	18.78	60.42	0.00	60.42	0	955	Masked Owl	55.56	3.00	955
One	22.20	CW177_Moderate/Good_Poor	Red Stringybark woodland of the dry slopes of the NSW South Western Slopes Bioregion	Moderate/Good_Poor	Yes	4	26.00	48.96	0.00	48.96	0	1,099	Masked Owl	55.56	3.00	1,099
One	22.20	CW177_Moderate/Good_Other	Red Stringybark woodland of the dry slopes of the NSW South Western Slopes Bioregion	Moderate/Good_Other	Yes	5	7.21	40.62	0.00	40.62	0	260	Masked Owl	38.89	3.00	260
One	22.20	CW202_Moderate/Good_Medium	Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the NSW South Western Slopes Bioregion	Moderate/Good_Medium	Yes	6	16.27	73.96	0.00	73.96	0	993	Masked Owl	100.00	3.00	993
One	22.20	CW202_Moderate/Good_Poor	Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland of hills of the NSW South Western Slopes Bioregion	Moderate/Good_Poor	Yes	7	11.27	50.17	0.00	50.17	0	487	Masked Owl	61.11	3.00	487
One	22.20	CW211_Moderate/Good_Medium	White Box - Rough-barked Apple alluvial woodland of the NSW central western slopes including in the Mudgee region	Moderate/Good_Medium	Yes	7	7.87	68.67	0.00	68.67	449	449	Masked Owl	77.78	3.00	449

As on 15/09/2020

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Assessment circle name	Landsc ape score	Vegetation zone name	Vegetation type name	Condition	Red flag status	Management zone name	Management zone area	Current site value	Future site value	Loss in site value	Credit required for bio diversity	Credit required for TS	TS with highest credit requirement	Average species loss	Species TG Value	Final credit requirement for management zone
One	22.20	CW211_Moderate/Good_Poor	White Box - Rough-barked Apple alluvial woodland of the NSW central western slopes including in the Mudgee region	Moderate/Good_Poor	Yes	9	45.30	47.33	0.00	47.33	1,859	1,859	Masked Owl	61.11	3.00	1,859
One	22.20	CW212_Moderate/Good_Medium	White Box - Tumbledown Red Gum - Long-leaved Box shrub/grass woodland on fine-grained sediments of the upper Macquarie River gorge, NSW central western slopes	Moderate/Good_Medium	Yes	10	14.56	50.00	0.00	50.00	0	627	Masked Owl	55.56	3.00	627
One	22.20	CW212_Moderate/Good_Poor	White Box - Tumbledown Red Gum - Long-leaved Box shrub/grass woodland on fine-grained sediments of the upper Macquarie River gorge, NSW central western slopes	Moderate/Good_Poor	Yes	11	301.67	49.13	0.00	49.13	0	12,790	Masked Owl	77.78	3.00	12,790
One	22.20	CW212_Moderate/Good_Other	White Box - Tumbledown Red Gum - Long-leaved Box shrub/grass woodland on fine-grained sediments of the upper Macquarie River gorge, NSW central western slopes	Moderate/Good_Other	Yes	12	72.16	44.27	0.00	44.27	0	2,796	Masked Owl	61.11	3.00	2,796
One	22.20	CW212_Low	White Box - Tumbledown Red Gum - Long-leaved Box shrub/grass woodland on fine-grained sediments of the upper Macquarie River gorge, NSW central western slopes	Low	Yes	13	37.11	20.83	0.00	20.83	0	0		0.00	0.00	399

## BioBanking Credit Calculator

### Species credits



Proposal ID : 145/2020/5048MP  
 Proposal name : Uungula Wind Farm  
 Assessor name : Lily Gorrell  
 Assessor accreditation number : 145  
 Tool version : v4.0  
 Report created : 15/09/2020 13:55

Scientific name	Common name	Species TG value	Identified population?	Can Id. popn. be offset?	Area / number of loss	Negligible loss	Red flag status	Number of credits
<i>Anthochaera phrygia</i>	Regent Honeyeater	7.70	No		143.13	0.00	No	11,021
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	2.00	No		11.61	0.00	No	232
<i>Petaurus norfolcensis</i>	Squirrel Glider	2.20	No		143.13	0.00	No	3,149
<i>Phascolarctos cinereus</i>	Koala	2.60	No		143.13	0.00	No	3,721

