

Kristy Bennetts
Barnson Pty Ltd
Unit 2, 108-110 Market Street
Mudgee, NSW 2850

Job No: 09SYDECO-0031

1 September 2009

Dear Kristy,

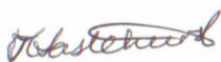
RE: Ulan Rezoning Ecological Assessment

Eco Logical Australia Pty Ltd was commissioned by Barnson Pty Ltd to undertake an ecological assessment of a site proposed for rezoning at Ulan in western NSW. The aim of the assessment was to identify potential opportunities and constraints to rezoning and development of the site for industrial purposes.

The findings of the site inspection, together with an assessment of the likely constraints and opportunities to the proposed rezoning, are outlined in the attached.

If you have questions about any aspect of this letter report, please contact me on (02) 9993 0566 or 0400 494 233.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Tammy Haslehurst'.

Tammy Haslehurst
Ecologist

Introduction

Eco Logical Australia Pty Ltd was commissioned by Barnson Pty Ltd to undertake an ecological assessment of Lots 271 and Part Lot 276 Toole Road, Ulan in the central west slopes of NSW. The site proposed for rezoning requires an assessment to determine the likely constraints and opportunities to development of the site for industrial purposes. The site is located within the Mudgee Local Government Area and the Hunter-Central Rivers Catchment Management Authority (CMA).

The Sandy Hollow Gulgong Railway runs south west – north east through the site and Sportsman's Hollow Creek runs parallel to this forming the north-western boundary of the site. To the north is also a parcel of land supporting relatively intact woodland and Ulan Road forms the eastern boundary. To the south and south west is Toole Road, a small allotment, a section of the rail line and part of Sportsman's Hollow Creek (Figure 1). A small drainage line also passes from the north-west to the south-east of the site passing under the rail line and Ulan road through a series of box culverts.

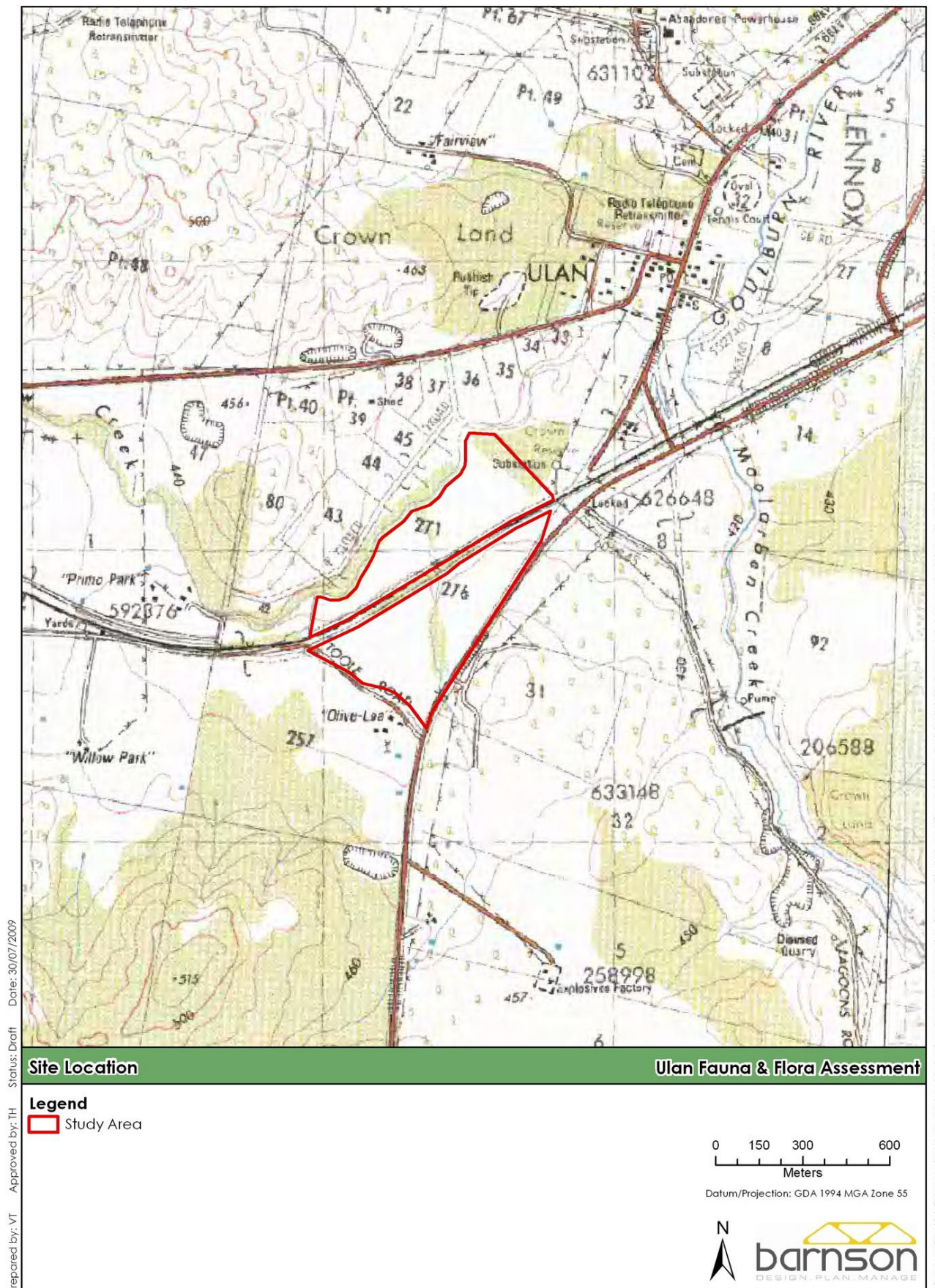
The site has been cleared and grazed in the past and, therefore, only scattered tree cover remains over much of the site with the exception of the riparian zones of Sportsman's Hollow Creek and the adjoining drainage. These riparian zones are dominated by *Angophora floribunda* (Rough-barked Apple) with regenerating *Eucalyptus blakelyi* (Blakely's Red Gum) also present along the north-eastern portion of Sportsman's Hollow Creek. The understorey is grassy and comprises a mixture of native and exotic species. Cattle continue to graze the site.

Soils

The study site is located on the Home Rule soil landscape group. This soil type is characterised by fragile, light textured surface soils with a low fertility. The topsoils are normally loose brown to dark brown loamy sand. This soil type generally supports Grey Gum - Narrow-leaved Red Ironbark Woodland with *Casuarina cunninghamiana* (River She-oak) and Rough-barked Apple common along perennial streams and main drainage lines (Murphy & Lawrie 1998).

The Ulan soil landscape group is present along the eastern boundary of the site and is also characterised by fragile, light textured surface soils with a low fertility. The topsoils are a hard-setting brownish-black fine sandy loam. Dry sclerophyll forest dominated by associations of Slaty Gum, Scribbly Gum, *E. fibrosa* (Broad-leaved Ironbark) and *E. dwyeri* (Dwyer's Red Gum) commonly occur on this soil landscape group. In addition, Rough-barked Apple is common along drainage lines (Murphy & Lawrie 1998).

Figure 1 Site Location



Methods

Literature Review

A review of all readily available literature and database records pertaining to the ecology of the study area and surrounding locality were reviewed to provide important background information. Information reviewed included:

- Department of Environment and Climate Change (DECCa) Threatened Species Database records (15 km radius);
- Department of Environment, Water, Heritage and the Arts (DEWHA) Online search for Matters of National Environmental Significance (Accessed June 2009);
- Aerial photography (2007);
- Ulan Underground Mine Extensions – Terrestrial and Aquatic Fauna Monitoring Survey Programme to Satisfy Conditions of Consent for ML 1341 and ML 1468 (Mount King Ecological Surveys 2006);
- Ulan Coal – Continued Operations, Preliminary Environmental Assessment (Umwelt 2008).

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database searches. Five terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposal study area, results of the field survey and professional judgement. The terms for likelihood of occurrence are defined below:

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

Site Inspection

A one day site inspection was conducted by Kristy Bennetts (Barnson), Alison Hamilton (Barnson) and Tammy Haslehurst (Eco Logical Australia) on 2 June 2009. Surveys included vegetation mapping and targeted searches for threatened flora and fauna habitat features. Rain was experienced in the days leading up to the survey period and periodic light rain was experienced during the surveys. Therefore, it is possible that fauna activity, in particular bird activity, across the site was lower than normal at the time of the site inspection. Further detail of the methodology used for the project has been provided below.

Vegetation mapping

Vegetation mapping was undertaken using aerial photography and ground-truthing. The site was traversed and a list of species recorded. Vegetation boundaries were marked on aerial photography using Geographic Information Systems (GIS) and where delineation of boundaries in the field was not obvious from the aerial photography, boundaries were marked using a Global Positioning System (GPS).

Vegetation communities were labelled in the field based on the dominant canopy species.

Flora surveys

Given the small and disturbed nature of the site, vegetation quadrats were not undertaken. Instead, the study area was traversed and an inventory of the dominant species within each of the strata collected. The presence of any endangered ecological communities was then verified using the community descriptions and diagnostic species listed in the Scientific Committee Final Determinations for the community and the results of the field surveys.

Any specimens unidentifiable in the field were retained and later identified. Furthermore, any specimens thought to be threatened species or for which identification was problematic were sent to the Herbarium at the Royal Botanic Gardens for verification.

Weed invasion and other disturbance were noted.

Targeted surveys for threatened flora were conducted using the random meander technique (Cropper 1993) through areas of suitable habitat.

Given the cryptic nature of some species and that some species such as orchids can only be detected during the flowering season, it may not have been possible to detect all threatened species during the survey period. For these species an assessment of the presence of potential habitat was made. Figure 2 illustrates the locations in which traverses/random meander surveys were conducted.

Fauna habitat mapping

The presence of important habitat features for fauna such as hollow-bearing trees, potential nesting or roosting sites, rocky outcrops, waterbodies and winter flowering eucalypts were recorded. The location of any important habitat features were marked using a Global Positioning System (GPS) so that they could be relocated and avoided during future management activities. It is important to note that due to the inaccessibility of some areas there is the potential that the distribution and number of features such as hollow-bearing trees at the site would be greater than indicated by this survey. Furthermore, in areas where a number of hollow-bearing trees were present in one location and therefore individual GPS points were likely to overlap in the mapping, one GPS point was taken and notes taken on the approximate number of hollow-bearing trees present in the area.

AUSRIVAS Aquatic Habitat Assessment

An aquatic habitat assessment was undertaken for Sportsman's Hollow Creek in accordance with the Australian River Assessment System (AUSRIVAS) habitat assessment method. This involved the collection of a number of stream and riparian zone attributes in order to get a broad indication of aquatic habitat conditions.

Limitations

General

This assessment was not intended to provide an inventory of all species present across the site but instead an overall assessment of the ecological values of the site with particular emphasis on threatened species, endangered ecological communities and key fauna habitat features. It is important to note that some species may not have been detected on the site during the inspection as they may be cryptic or seasonal and only detectable during flowering or during breeding. In this case the likelihood of their occurrence on site has been assessed based on the presence of potential habitat.

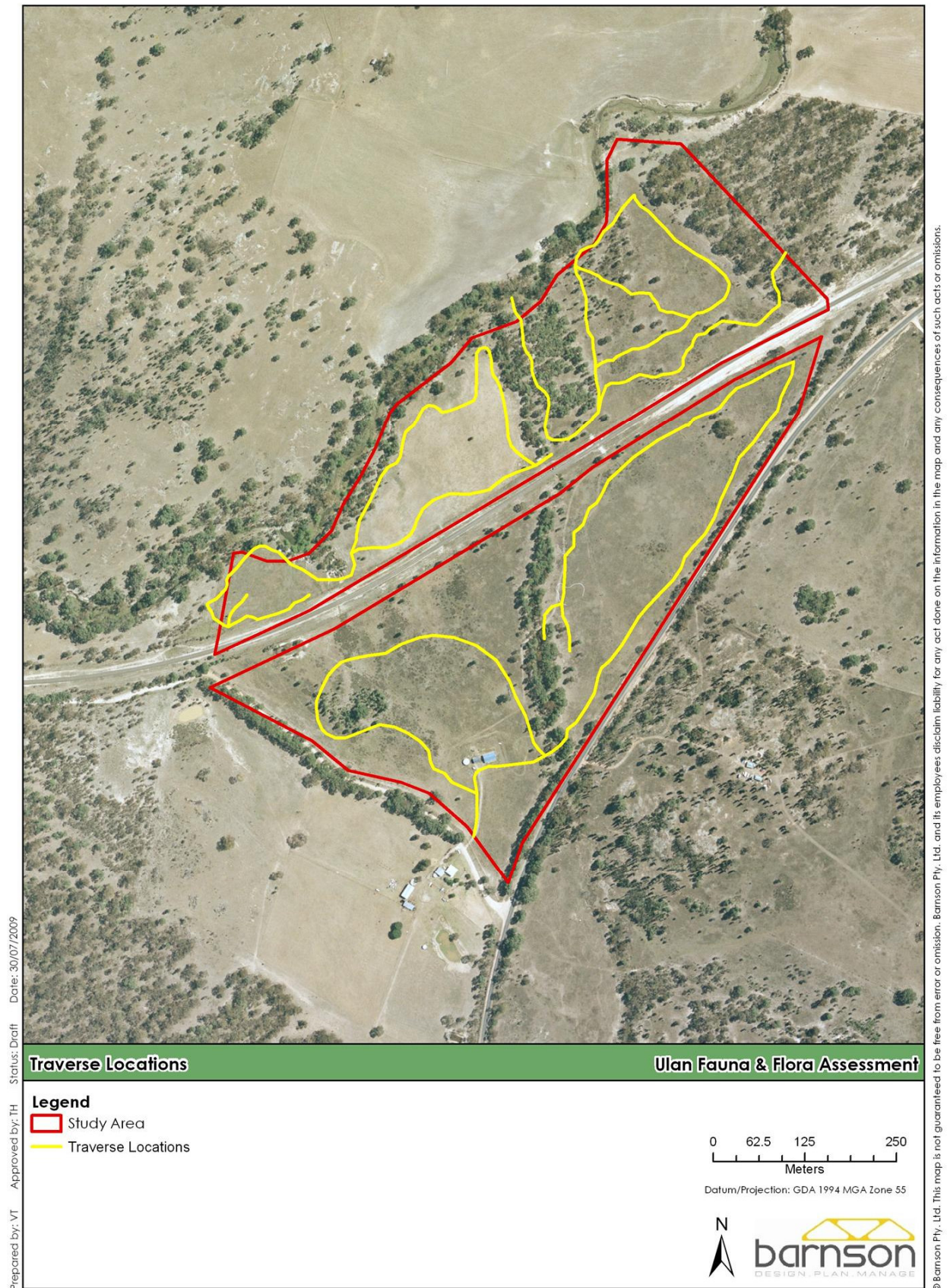
Furthermore, given surveys were undertaken during winter, many species were not in flower and, therefore, identification was difficult or detection not possible (eg. lilies, orchids). Where possible, flora species have been identified to species level. However, due to seasonal constraints this was not possible for all species.

Vegetation community boundaries

Vegetation mapping of an area seeks to describe the distribution of the plant species in that area at that time by defining a number of vegetation units (assemblages or communities), which are relatively internally homogeneous. This generalised approach can over simplify the real situation as plants rarely occur in well-defined communities with distinct boundaries. Accordingly, vegetation units used for mapping should be viewed as indicative of their extent

Furthermore, predicting historical vegetation boundaries within in cleared landscape is extremely difficult and therefore vegetation boundaries shown on the mapping are indicative only and based on a best estimate using the information available.

Figure 2 **Traverse Locations**



Results

Literature Review

Database searches indicated that a number of threatened species and endangered ecological communities had been recorded, or have the potential to occur, within the locality (DECC 2009a, DEWHA 2009). An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database searches and is included in Appendix D.

Vegetation mapping was not available for the study area although the following endangered ecological communities have been listed as occurring within the Kerrabee CMA sub-region (Hunter-Central West CMA region (DECC 2009b):

- Hunter Valley Weeping Myall Woodland of the Sydney Basin Bioregion
- Swamp oak floodplain forest of the NSW North Coast; Sydney Basin and South East Corner bioregions
- White Box Yellow Box Blakely's Red Gum Woodland

Vegetation Communities and Flora

A total of 65 flora species were recorded across the four vegetation communities present throughout the study area. Of these, 10 were exotic species.

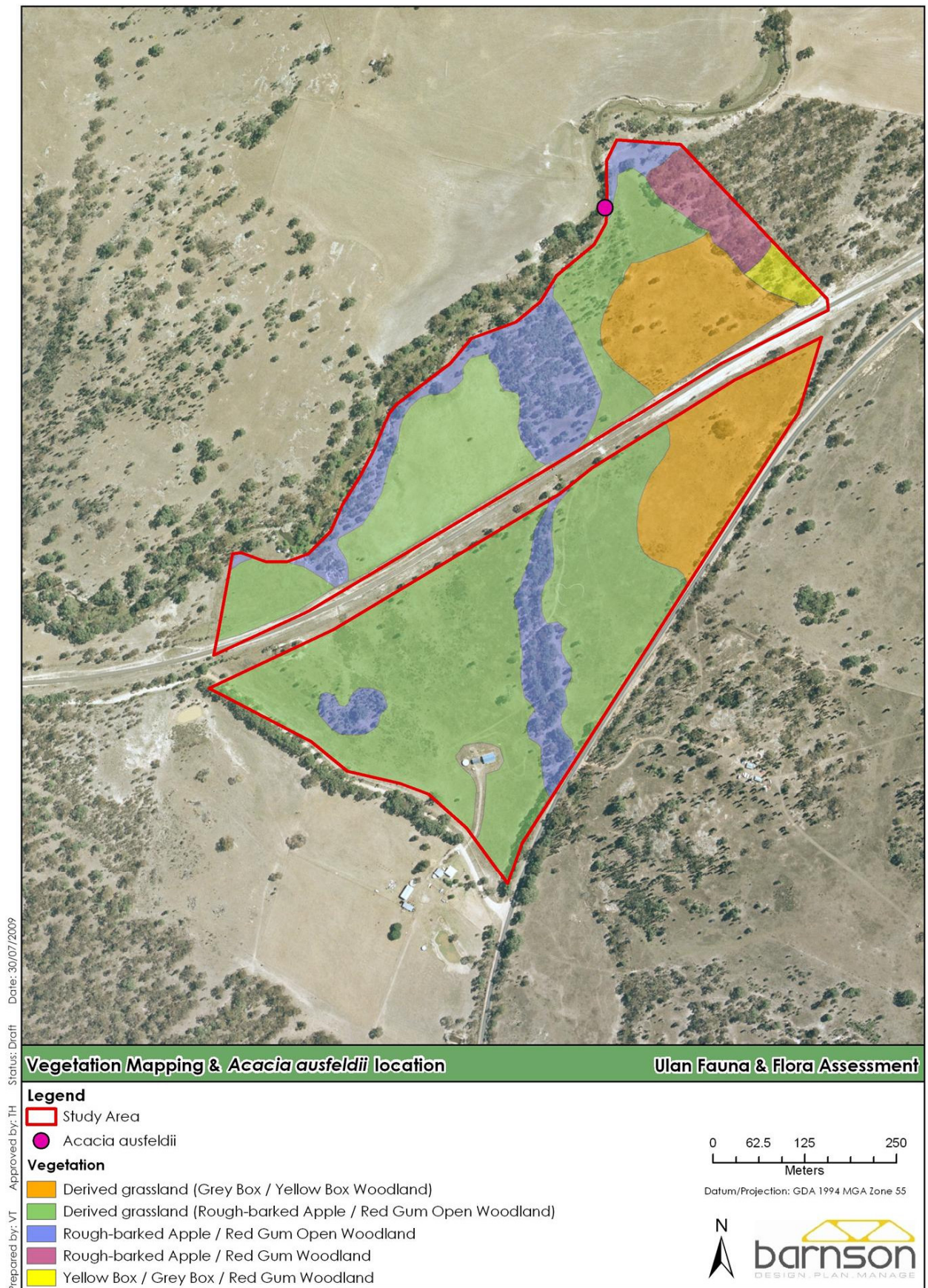
The site has undergone past vegetation clearance and is currently grazed by cattle. As such scattered tree cover and a grassy ground layer covers much of the site (i.e. derived grassland), with the exception of the riparian areas where relatively dense stands of Rough-barked Apple and Blakely's Red Gum occur. Tree cover across the site is regrowth with the exception of one large *Eucalyptus melliodora* (Yellow Box) in the east of the site, south of the railway. Five vegetation types, comprising of three vegetation communities have been mapped at the site. The ground layer was similar across much of the site with minor variation evident in areas of more dense woodland in the centre of the site (primarily in the shrub layer), the immediate creek bank and in moist depressions. A description of each of the vegetation communities has been included below and their distribution across the site is shown in Figure 3.

Table 1 Vegetation communities present across the site

Vegetation Community	Description	Endangered Ecological Community
Rough-barked Apple / Blakely's Red Gum Open Woodland	• Dominated by regenerating <i>Angophora floribunda</i> • <i>Eucalyptus blakelyi</i> scattered throughout • Restricted primarily to riparian areas • Heavily grazed • Shrub layer on immediate creek bank (eg. <i>Acacia</i> spp., <i>Callitris glaucophylla</i>, <i>Brachychiton populneus</i>) but absent / minimal in other areas (<i>Melaleuca thymifolia</i>) • Groundcover dominated by native species including;	No

Vegetation Community	Description	Endangered Ecological Community
	<i>Arundinella nepalensis</i>, <i>Aristida</i> spp., <i>Microlaena stipoides</i>, <i>Echinopogon</i> sp., <i>Lomandra</i> sp., <i>Melichrus urceolatus</i>, <i>Themeda australis</i>, <i>Panicum effusum</i> and <i>Carex appressa</i> in moist areas Abundant leaf litter and bare earth	
Derived Grassland – (Rough-barked Apple / Blakely's Red Gum Open Woodland)	- Regenerating <i>Angophora floribunda</i> and <i>Eucalyptus blakelyi</i> scattered throughout - Heavily grazed - Shrub layer primarily absent - Groundcover dominated by native species including; <i>Arundinella nepalensis</i>, <i>Aristida</i> spp., <i>Themeda australis</i>, <i>Panicum effusum</i> and <i>Carex appressa</i> in moist areas	No
Grey Box / Yellow Box / Red Gum Woodland	- Dominated by <i>Eucalyptus microcarpa</i> and <i>Eucalyptus melliodora</i> with scattered <i>Eucalyptus blakelyi</i> - Restricted to eastern part of site - Understorey comprised of <i>Cassinia arcuata</i> and <i>Allocasuarina luehmannii</i> - Groundcover dominated by native species including <i>Themeda australis</i>, <i>Cheilanthes sieberi</i>, <i>Arundinella nepalensis</i>, <i>Austrodanthonia tenuior</i>, <i>Austrodanthonia bipartita</i>, and <i>Sporobolus creber</i>. - This area is less grazed	Yes
Derived Grassland – (Grey Box ± Yellow Box Woodland)	- Dominated by <i>Eucalyptus microcarpa</i> - Restricted to eastern part of site - Understorey primarily restricted to grazed, regenerating <i>Allocasuarina luehmannii</i> - Heavily grazed - Groundcover dominated by native species including <i>Themeda australis</i>, <i>Cheilanthes sieberi</i>, <i>Arundinella nepalensis</i>, <i>Austrodanthonia tenuior</i>, <i>Austrodanthonia bipartita</i>, <i>Plantago</i> sp. and <i>Sporobolus creber</i>.	Yes
Exotic grassland	Area within rail corridor dominated by <i>Chloris gayana</i>	No

Figure 3 **Vegetation mapping & Ausfeld's Wattle record**



Fauna Habitat

Fauna habitat was limited across the site due to past disturbance and fauna activity at the time of the surveys was limited. A summary of the fauna habitat features present at the site and the species for which they are likely to provide habitat are summarised below in Table 2 and more details regarding fauna habitat present across the site is provided below.

Table 2 Summary of fauna habitat features at the site

Habitat Feature	Species
Woodland and scattered trees	Birds, microchiropteran bats (microbats), arboreal mammals, reptiles
Hollow-bearing tree	Birds, microbats, arboreal mammals, reptiles
Stag	Birds, particularly birds of prey, reptiles, bats?
Watercourse	Amphibians, microbats, birds.
Leaf litter	Reptiles, some amphibians
Trees with defoliating bark	Microbats, reptiles
Grass tussocks	Reptiles, amphibians, ground dwelling mammals

Birds

The regenerating vegetation particularly along riparian areas at the site provides potential nesting and foraging habitat for woodland bird species. The scattered trees across the site would also provide foraging and nesting opportunities particularly for birds common to disturbed environments. The riparian vegetation along Sportsman's Hollow Creek would provide potential habitat for some waterbirds such as ducks.

One hollow-bearing tree was recorded at the site and would provide potential nesting habitat for hollow-dependant species. A stag was recorded along the western portion of Sportsman's Hollow Creek and would provide a potential perching site for birds and in particular birds of prey that may forage across the site.

Mammals

There is the potential for microchiropteran bats to forage at the site particularly along Sportsman's Hollow Creek. The hollow-bearing tree present along the creek and defoliating bark on the Rough-barked Apple would also provide potential roosting habitat. Culverts are also present beneath the railway and surrounding roads. There is the potential for these areas to provide roosting habitat for microchiropteran bat species known to inhabit man-made structures.

Habitat for arboreal mammals is limited and no evidence of drays or arboreal mammal activity was noted during the surveys. The ground layer is also limited in habitat value for ground dwelling mammals as the grasses across most areas are heavily grazed by cows and there is little to no fallen logs and woody debris for shelter. Nonetheless, there is the potential for some mammals common to disturbed environments such as the Yellow-footed Antechinus (*Antechinus flavipes*), rats (*Rattus* spp.), House Mouse (*Mus musculus*) to utilise the site.

Amphibians

One species of frog, the Common Eastern Froglet (*Crinia signifera*) was recorded calling along Sportsman's Hollow Creek although it is likely that more amphibian species would utilise the creek. Sportsman's Hollow Creek, the ephemeral drainage lines at the site and the dense leaf litter in the riparian zone would all provide potential habitat for amphibians. Furthermore, the macrophytes present within Sportsman's Hollow Creek would also provide basking, foraging and breeding habitat for amphibians.

Reptiles

No reptiles were recorded at the site during the inspection although potential habitat in the form of grass tussocks, stream edge vegetation and dense leaf litter is present. Grazing across the site reduces the quality of habitat for reptile species although it is likely that they would still utilise the site. Furthermore, an area of dense tall grass (*Chloris gayana*) within the rail corridor which passes through the site would provide refuge opportunities for reptiles utilising the site.

Endangered Ecological Communities and Threatened Species

Endangered Ecological Communities

Although the site has undergone past disturbance and clearing, vegetation consistent with the characteristics described for the endangered EEC *White Box Yellow Box Blakely's Red Gum Woodland* (Box-Gum Woodland) is present on site. The presence of a large *Eucalyptus melliodora* in the east of the site suggests that this species was once present in greater abundance across the site. Furthermore, discussions with the landowner revealed that removal of Box trees had occurred on site and it was likely that they were historically more widespread. Whilst it is difficult to determine the likely boundaries of this community across the site and the likely abundance of *Eucalyptus melliodora* prior to any clearing, the following characteristics have been used to determine the likely boundary:

- The current extent of Yellow Box and / or Grey Box;
- Absence or very low numbers of Rough-barked Apple;
- Characteristics of vegetation in immediately adjacent areas;
- Apparent Bulk Electrical Conductivity Mapping (note: used with caution as changes in electrical conductivity can indicate salinity or changes in soil) ; and
- Soil mapping (note: eastern part of the site is close to the boundary of the Home Rule and Ulan soil landscape groups).

Listings for this community differ under both state and Commonwealth legislation with state legislation generally incorporating vegetation in a wider range of conditions than the Commonwealth. A set of criteria for determining the presence of the EEC at a site has been prepared for the TSC Act and is listed below. This criterion has been addressed with reference to the study site in support of the inference that vegetation in the eastern part of the site, although in a degraded condition, is characteristic of the EEC Box Gum Woodland. A more detailed assessment combining all attributes identified for this community has been included in Appendix C.

The Final Determination defines Box-Gum Woodland broadly. There are five main features in the Determination that govern whether the EEC exists at a site:

1. Whether the site is within the area defined in the Determination.

Yes

2. Whether the characteristic trees of the site are (or are likely to have been) White Box, Yellow Box or Blakely's Red Gum.

Yellow Box and Blakely's Red Gum

Blakely's Red Gum present in riparian and ecotone areas on site and on adjacent land in areas also supporting Yellow Box)

3. Whether the site is mainly grassy.

Yes – grassy understorey present

4. Whether any of the listed characteristic species occur (including as part of the seedbank in the soil).

13 of the potential 94 characteristic species (14 %) were present at the site.

5. If the site is degraded, whether there is potential for assisted natural regeneration of the overstorey or understorey.

Given the presence of a number of native grass species including Themeda australis and no evidence of soil ploughing, it is considered likely that the site has the potential to respond to assisted natural regeneration.

A large mature Yellow Box was recorded in the east of the site and vegetation the north-east of the site appears to support two vegetation types; Rough-barked Apple / Blakely's Red Gum along the riparian zone and grassland derived from a Yellow Box / Grey Box ± Blakely's Red Gum woodland community further south. It is likely that prior to clearing, the site would have supported vegetation similar to that of the adjacent area. Therefore, it has been assumed that prior to clearing; Yellow Box would have been more prevalent across the site and co-dominated with Grey Box. For this reason, and based on the criteria above, it is considered likely that sections of the eastern part of the site would meet the criteria for consideration as Box Gum Woodland under the TSC Act (Figure 3).

It is important to note that the surveys for this community have been undertaken during winter and, therefore, this may not reflect the true condition of this vegetation community.

The vegetation at the site is also considered likely to meet the criteria for categorisation as White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland under the EPBC Act for the following reasons:

- Although Grey Box now dominates part of the site, it is considered that Yellow Box would have been a co-dominant prior to clearing. Assumed prior dominance of Yellow Box given mature Yellow Box present on site.
- The patch is greater than 0.1 ha and the perennial vegetation of the ground layer is dominated by native species, which contains at least 12 native, non-grass understorey species (such as forbs, shrubs, ferns, grasses and sedges);
- *Themeda australis* is present and a number of other 'important' species were recorded.

A more detailed assessment addressing each of the EPBC criteria has been included in Appendix C.

Threatened Flora

Fifteen threatened flora species have previously been recorded within the locality (i.e. 15 km radius) or are considered to have the potential to occur (DECC 2009a, DEWHA 2008, Umwelt 2008). An assessment of the potential for threatened flora species to occur at the site and list of species previously recorded within the locality or considered to have the potential to occur has been included in Appendix D. One threatened species, *Acacia ausfeldii* (Ausfeld's Wattle) was recorded on the boundary of the site, in the north-eastern corner within the riparian zone of Sportsman's Hollow Creek (Figure 3). Given the highly disturbed nature of the site and heavy weed invasion, it is unlikely that many of these species would occur.

No threatened flora species were recorded during the site inspection. The modified nature of the site would limit the likelihood that many threatened flora species would be found at the site. A number of Ausfeld's Wattle (*Acacia ausfeldii*) records exist around the site to the north, south and east site. Whilst every effort has been made to examine representative areas on the site, the nature of the random meander means there are areas of the site that have not been closely examined. Therefore there is potential for Ausfeld's Wattle to occur in other parts of the site. However, given the site disturbance, absence of shrubs and grazing pressure it is considered unlikely.

Species for which the site is likely to provide potential habitat are listed below. Although *Swainsona sericea* (Silky Swainson-pea) has been listed below, depending on the grazing regime implemented at the site this species may be precluded from occurring.

- *Bothriochloa biloba* (Lobed Blue-grass)
- *Philothea ericifolia*
- *Swainsona sericea* (Silky Swainson-pea)
- *Acacia ausfeldii* (Ausfeld's Wattle)

Threatened Fauna

A large number of threatened fauna species have previously been recorded within the locality or are considered to have the potential to occur. An assessment of the potential for threatened species to occur at the site and a list of species previously recorded within the locality or considered to have the potential to occur has been included in Appendix D.

No threatened fauna species were recorded at the site although potential habitat was also present for the following species:

Birds

- *Anseranas semipalmata* (Magpie Goose)
- *Botaurus poiciloptilus* (Australasian Bittern)
- *Burhinus grallarius* (Bush Stone-curlew)
- *Callocephalon fimbriatum* (Gang-gang Cockatoo)
- *Certhionyx variegates* (Pied Honeyeater)
- *Climacteris picumnus victoriae* (Brown Treecreeper)
- *Grantiella picta* (Painted Honeyeater)

- *Hamirostra melanosternon* (Black-breasted Buzzard)
- *Lathamus discolor* (Swift Parrot)
- *Melanodryas cucullata cucullata* (Hooded Robin)
- *Melithreptus gularis gularis* (Black-chinned Honeyeater (eastern sub-species))
- *Neophema pulchella* (Turquoise Parrot)
- *Ninox connivens* (Barking Owl)
- *Ninox strenua* (Powerful Owl)
- *Oxyura australis* (Blue-billed Duck)
- *Pomatostomus temporalis temporalis* (Grey-crowned Babbler (eastern sub-species))
- *Polytelis swainsonii* (Superb Parrot)
- *Pyrrholaemus saggitatus* (Speckled Warbler)
- *Stagonopleura guttata* (Diamond Firetail)
- *Tyto novaehollandiae* (Masked Owl)
- *Xanthomyza phrygia* (Regent Honeyeater)

Mammals

- *Chalinolobus dwyeri* (Large-eared Pied Bat, Large Pied Bat)
- *Chalinolobus picatus* (Little Pied Bat)
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat)
- *Myotis macropus* (Large-footed Myotis)
- *Nyctophilus timoriensis* (Greater Long-eared Bat)
- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat)

For waterbirds such as the Blue-billed Duck, Australasian Bittern and Magpie Goose, potential habitat is present adjacent to the site along Sportsman's Hollow Creek. The boundary of the study site falls within the riparian zone on the southern bank of the creek and, therefore, does not include the creek.

For most of the aforementioned species the site would provide only potential foraging habitat and it is likely that species utilising the site would rely on a wider range of primary resources throughout the locality for habitat with the site providing a supplement to these key resources.

The culverts passing beneath the railway and road have the potential to be utilised as roost site by some bat species including the Eastern Bentwing-bat and Large-footed Myotis. Whilst it is unlikely that the removal of any

culverts would result as a consequence of rezoning, should future development be proposed on site, surveys to verify the potential presence of bats using the culverts should be undertaken.

SEPP 44 Koala Habitat

State Environmental Planning Policy 44 – Koala Habitat (SEPP 44) applies to the Mudgee LGA. However, none of the species recorded on the site are listed as Koala feed trees under schedule to of the SEPP and, therefore, the site would not be considered potential koala habitat under the provisions of SEPP 44.

Corridors

The site is largely cleared and supports primarily scattered tree cover with the exception of the riparian areas along the creek and drainage line where woodland dominated by Rough-barked Apple remains. As is the case in many rural landscapes, the fragmentation means riparian areas often provide the only remaining links to adjacent areas of vegetation. This is the case onsite where the riparian vegetation maintains a narrow link to areas to the east, west and south of the site and these links should be maintained.

Scattered paddock trees often play an important role in providing 'stepping stone' habitat for mobile species through highly cleared landscapes. Although the scattered trees at the site would function as 'stepping stone' habitat, the presence of stands of woodland to the west, south-west and east increases the likelihood that if some scattered tree clearance was to occur on site, areas of potential 'stepping stone' habitat would remain.

Aquatic Habitat

Sportsman's Hollow Creek

Sportsman's Hollow Creek is located on the edge of the northern site boundary. At the site of the aquatic habitat assessment (north-eastern corner) the southern bank is steep and has undergone heavy erosion. The northern bank is lower and sits in line with the adjoining land which supports pasture. The riparian zone on the southern bank is dominated by native species and includes a small number of mature trees.

Instream features include extensive macrophyte cover. Macrophytes provide important habitat for a variety of aquatic species and birds. Water at the time of the survey was turbid. This is likely to be attributable to both the surrounding agricultural land use and the rainfall experienced in the days preceding the survey.

The gradient of the southern bank decrease upon approach to the confluence of Sportsman's Hollow Creek and the associated drainage line that runs north-south through the centre of the site.

A water hole is also present along Sportman's Hollow Creek. This area supports a large amount of aquatic vegetation and a stag on the northern bank. The water hole and associated vegetation are likely to provide habitat for a variety of aquatic species. However, based on visual observations the water quality appears to be degraded.

Drainage line

The drainage line through the centre of the site is ephemeral and was dry at the time of the survey. The riparian vegetation is narrow for the most part. Whilst the understorey is primarily native, the shrub layer is limited but increases in the area north of the railway. Bank erosion and trampling by cattle is also evident.

Constraints and Opportunities

The site has undergone extensive past disturbance including tree clearance and grazing by cattle. Despite such disturbance a relatively native groundlayer remains and some vegetation regrowth is evident. Whilst the majority of the site does not present a high constraint to development, a list of likely constraints to development based on the ecological values of the site has been outlined below and an ecological constraints map is included in Figure 4.

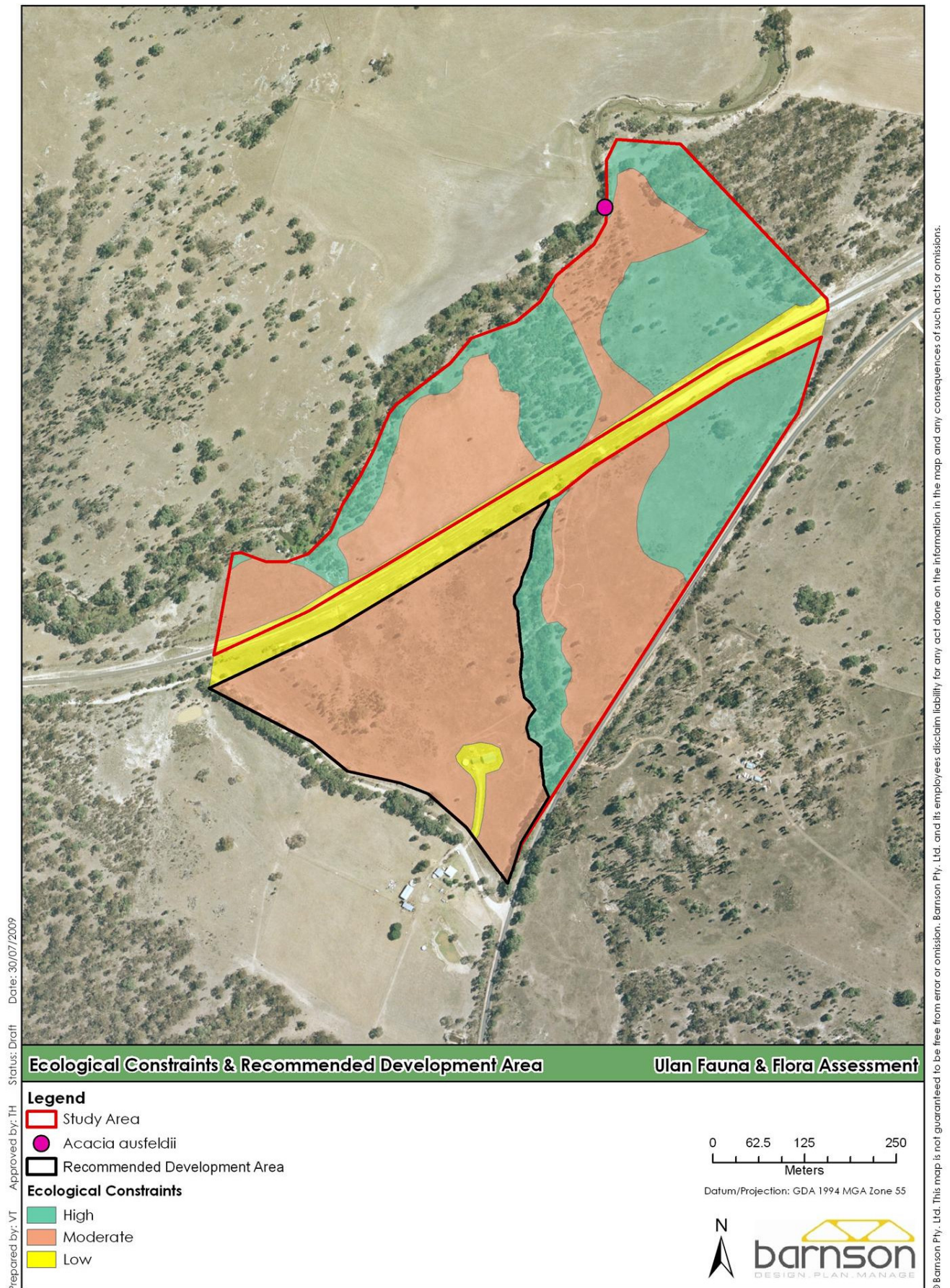
Each of the constraints have been ranked as either high, moderate or low based largely on the legislative requirements associated with the matter and likely ecological value. The criteria for the ranking are as follows:

- High = EEC or threatened species known to occur, provide connectivity to adjacent areas
- Moderate = supports potential habitat for a threatened species, native vegetation
- Low = of limited value for threatened species or exotic vegetation

Table 3 Likely site constraints

Matter	Constraint	Recommendation / Comments
Derived Grassland – (Grey Box ± Yellow Box Woodland)	High – endangered ecological community	Surveys undertaken during spring to more accurately verify BGW condition across the site
<i>Acacia ausfeldii</i>	High – threatened species	Riparian area supporting this species be avoided and a buffer between any development and this area, provided.
Riparian areas - connectivity	High	Development within 40 m of the creek would require approval under the <i>Water Management Act 2000</i> .
Culvert – potential microchiropteran bat roost site	Moderate	Survey during appropriate season to verify potential use as roosting habitat. Should suitable habitat be found constraints to development would apply.
Sportsman's Hollow Creek	High	Buffers to all watercourses should be provided as part of any future master plans.
Hollow-bearing tree	High	Hollow-bearing tree clearance avoided in all future master plan designs
Mature Yellow Box	High	Supports hollows and is the only mature tree remaining on the site therefore its conservation is important.
Derived Grassland – (Rough-barked Apple / Blakely's Red Gum Open Woodland)	Moderate	Areas supporting this vegetation type be considered for development before areas of Grey Box / Yellow Box Derived Grassland or riparian vegetation.

Figure 4 Ecological constraints and recommended development area



Recommendations / Conclusions

In general, the area to the south west of the railway is less constrained than the north and east of the site. The northern area supports an endangered ecological community, a watercourse and associated vegetation and a threatened species. In addition, vegetation to the south east of the railway is also considered part of an endangered ecological community. Therefore it is recommended that if possible, riparian areas and the vegetation in the east of the site be conserved and excluded from future development plans. Furthermore the riparian vegetation at the site forms part of an important corridor through a fragmented landscape and therefore this connectivity should not be fragmented by future development at the site.

Should development occur on the site, the following matters should be considered and recommendations addressed. Any likely legislative requirements as they relate to the recommendations below have also been outlined below. Figure 4 illustrates the recommended developable area based on the ecological constraints.

- Development should be avoided within the area mapped as Derived Grassland (formerly Grey Box / Yellow Box Woodland) as this area supports an endangered ecological community;
 - Should development be proposed in this area, a more detailed ecological assessment of the Derived Grassland (formerly Grey Box / Yellow Box Woodland) during Spring is recommended to provide a better indication of the true condition of this community; and
 - A formal impact assessment under both the NSW EP&A Act and EPBC Act for Box Gum Woodland would be required.
- Development of riparian areas and current woodland vegetation should be avoided;
 - Any vegetation clearance within riparian areas would require approval under the *Water Management Act 2000*
- A buffer is provided between any areas of development and the *Acacia ausfeldii* record. It is recommended that the riparian area where this species is located, which is currently fenced, remains fenced.
- Cattle grazing be excluded from riparian areas and the area of Derived Grassland (formerly Grey Box / Yellow Box Woodland)
- In areas where development is proposed, a more detailed ecological assessment is undertaken in Spring when the majority of flora species will be in flower to provide a more accurate assessment of the condition of the vegetation across the site.
- The mature Yellow Box in the east of the site be conserved and protected from any future development impacts.
- Current vegetation corridors (eg. riparian vegetation) be maintained.

References

- DECC (2005) **Box-Gum Woodland – profile**. DECC, Hurstville. Online
<http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10837>. Accessed 3 June 2009
- DECC(2008) **White box yellow box Blakely's red gum woodland - endangered ecological community listing – NSW Scientific Determination**. DECC, Hurstville. Online
<http://www.environment.nsw.gov.au/determinations/BoxgumWoodlandEndComListing.htm>. Accessed 3 June 2009
- Department of Environment, Conservation and Climate Change (2009a) **DECC Threatened Species Database Records**.
- DECC (2009b) DECC **Kerrabee CMA sub-region Endangered Ecological Communities**. Online
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/cma_subregion_list.aspx?id=754. Accessed 3 June 2009.
- DECC (2009c) **Identification Guidelines for Endangered Ecological Communities - White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland)**. Online
<http://www.environment.nsw.gov.au/resources/nature/box-gumIdGuidelines.pdf>. Accessed 3 June 2009
- Department of Environment, Water, Heritage and the Arts (DEWHA) (2009). **Protected Matters Search Tool – Matters of National Environmental Significance**. Department of Environment, Water, Heritage and the Arts, Canberra. Online <http://www.environment.gov.au/erin/ert/epbc/index.html>
- Department of Environment and Heritage (2006a) **White Box – Yellow Box – Blakely's Red Gum grassy woodland and derived grassland – EPBC Act Policy Statement**. Online
<http://www.environment.gov.au/epbc/publications/pubs/box-gum.pdf>. Accessed 3 June 2009
- Department of Environment and Heritage (2006b) **White Box – Yellow Box – Blakely's Red Gum grassy woodland and derived grassland ecological community species list**. Online
<http://www.environment.gov.au/epbc/publications/pubs/box-gum-species.pdf>. Accessed 3 June 2009
- Mount King Ecological Surveys (2006) **Ulan Underground Mine Extensions – Terrestrial and Aquatic Fauna Monitoring Survey Programme to Satisfy Conditions of Consent for ML 1341 and ML 1468**. Prepared for Ulan Coal Mine Pty Ltd.
- Murphy B.W. and Lawrie J.W. (1998) **Soil Landscapes of the Dubbo 1:250000 Sheet Map**. Department of Land and Water Conservation of NSW, Sydney
- Murphy B.W. and Lawrie J.W. (1998) **Soil Landscapes of the Dubbo 1:250000 Sheet Report**. Department of Land and Water Conservation of NSW, Sydney
- Umwelt (2008) **Ulan Coal – Continued Operations, Preliminary Environmental Assessment**. Prepared for United Coal Mines Limited.

Appendix A: Flora Species List

Table 4 Flora species recorded across site

Family	Scientific Name	Common Name
Adiantaceae	<i>Cheilanthes sieberi</i>	Mulga Fern
Apiaceae	<i>Hydrocotyle</i> sp.	
Asteraceae	<i>Aster subulatus</i> *	Wild Aster
Asteraceae	<i>Calocephalus citreus</i>	Lemon Beauty-heads
Asteraceae	<i>Cassinia arcuata</i>	Sifton Bush
Asteraceae	<i>Euchiton sphaericus</i>	
Asteraceae	<i>Hypochaeris radicata</i> *	Catsear
Asteraceae	<i>Onopordum acanthium</i> *	Scotch Thistle
Asteraceae	<i>Picris</i> sp.	
Asteraceae	<i>Vittadinia muelleri</i>	
Brassicaceae	<i>Lepidium</i> sp. *	
Cactaceae	<i>Opuntia stricta</i> *	Common Prickly Pear
Campanulaceae	<i>Wahlenbergia communis</i>	Tufted Bluebell
Casuarinaceae	<i>Allocasuarina luehmannii</i>	Bulloak
Casuarinaceae	<i>Allocasuarina luehmannii</i>	Bulloak
Chenopodiaceae	<i>Einadia nutans</i>	Climbing Saltbush
Cupressaceae	<i>Callitris glaucophylla</i>	White Cypress Pine
Cyperaceae	<i>Carex appressa</i>	Tall Sedge
Cyperaceae	<i>Fimbristylis dichotoma</i>	Common Fringe-sedge
Dilleniaceae	<i>Hibbertia obtusifolia</i>	Hoary Guinea Flower
Ericaceae - Styphelioideae	<i>Astroloma humifusum</i>	Native Cranberry

Family	Scientific Name	Common Name
Ericaceae - Styphelioideae	<i>Melichrus urceolatus</i>	Urn-heath
Fabaceae - Faboideae	<i>Daviesia genistifolia</i>	Broom Bitter Pea
Fabaceae - Faboideae	<i>Glycine tabacina</i>	
Fabaceae - Mimosoideae	<i>Acacia ausfeldii</i>	Ausfeld's Wattle
Fabaceae - Mimosoideae	<i>Acacia decora</i>	Western Silver Wattle
Fabaceae - Mimosoideae	<i>Acacia implexa</i>	Hickory Wattle
Haloragaceae	<i>Haloragis heterophylla</i>	Rough Raspswort
Juncaceae	<i>Juncus psammophilus</i>	
Juncaceae	<i>Juncus subsecundus</i>	
Lamiaceae	<i>Mentha satureioides</i>	Creeping Mint
Lomandraceae	<i>Lomandra</i> sp.	
Loranthaceae	<i>Amyema</i> sp.	
Malvaceae	<i>Modiola caroliniana*</i>	Red-flowered Mallow
Myrtaceae	<i>Angophora floribunda</i>	Rough-barked Apple
Myrtaceae	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum
Myrtaceae	<i>Eucalyptus melliodora</i>	Yellow Box
Myrtaceae	<i>Eucalyptus microcarpa</i>	Grey Box
Myrtaceae	<i>Melaleuca thymifolia</i>	Thyme Honey-myrtle
Oxalidaceae	<i>Oxalis perennans</i>	
Plantaginaceae	<i>Plantago</i> sp.	
Poaceae	<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	Jericho Wire-grass
Poaceae	<i>Aristida ramosa</i>	Purple Wiregrass
Poaceae	<i>Aristida vagans</i>	Threeawn Speargrass
Poaceae	<i>Arundinella nepalensis</i>	Reedgrass
Poaceae	<i>Austrodanthonia bipartita</i>	Wallaby Grass

Family	Scientific Name	Common Name
Poaceae	<i>Austrodanthonia tenuior</i>	
Poaceae	<i>Austrostipa nitida / nodosa</i>	
Poaceae	<i>Chloris gayana</i>	Rhodes Grass
Poaceae	<i>Chloris truncata</i>	Windmill Grass
Poaceae	<i>Echinopogon</i> sp.	
Poaceae	<i>Eragrostis brownii</i>	Brown's Lovegrass
Poaceae	<i>Eragrostis elongata</i>	Clustered Lovegrass
Poaceae	<i>Eragrostis leptostachya</i>	Paddock Lovegrass
Poaceae	<i>Eulalia aurea</i>	Silky Browntop
Poaceae	<i>Imperata cylindrica</i>	Blady Grass
Poaceae	<i>Microlaena stipoides</i>	Weeping Grass
Poaceae	<i>Panicum effusum</i>	Hairy Panic
Poaceae	<i>Paspalum dilatatum</i> *	Paspalum
Poaceae	<i>Setaria</i> sp.	
Poaceae	<i>Sporobolus creber</i>	Western Rat-tail Grass
Poaceae	<i>Themeda australis</i>	Kangaroo Grass
Rosaceae	<i>Rubus ulmifolius</i> *	Blackberry
Scrophulariaceae	<i>Verbascum thapsus</i> *	Aarons Rod
Sterculiaceae	<i>Brachychiton populneus</i>	Kurrajong
* = exotic species Bold = threatened species		

Appendix B: Bird List

Scientific Name	Common Name
<i>Aquila audax</i>	Wedge-tailed Eagle
<i>Cacatua galerita</i>	Sulfur-crested Cockatoo
<i>Cacatua roseicapilla</i>	Galah
<i>Corcorax melanorhamphos</i>	White-winged Chough
<i>Corvus coronoides</i>	Australian Raven
<i>Gymnorhina tibicen</i>	Australian Magpie
<i>Malurus</i> sp.	Supurb Fairy-wren
<i>Manorina melanocephala</i>	Noisy Minor
<i>Ocyphaps lophotes</i>	Crested Pigeon
<i>Platycercus adscitus eximius</i>	Eastern Rosella
<i>Strepera graculina</i>	Pied Currawong

Appendix C: Box Gum Woodland Criteria

White Box Yellow Box Blakely's Red Gum Woodland is found on relatively fertile soils on the tablelands and western slopes of NSW and generally occurs between the 400 and 800 mm isohyets extending from the western slopes, at an altitude of c. 170m to c. 1200 m, on the northern tablelands (Beadle 1981). The community occurs within the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands and NSW South Western Slopes Bioregions.

White Box Yellow Box Blakely's Red Gum Woodland includes those **woodlands where the characteristic tree species include one or more of the following species** in varying proportions and combinations - *Eucalyptus albens* (White Box), ***Eucalyptus melliodora* (Yellow Box) or *Eucalyptus blakelyi* (Blakely's Red Gum)**. Grass and herbaceous species generally characterise the ground layer. In some locations, **the tree overstorey may be absent** as a result of past clearing or thinning and at these locations only an understorey may be present. Shrubs are generally sparse or absent, though they may be locally common.

The **trees may occur as pure stands**, mixtures of the three species or in mixtures with other trees, including wattles.

Commonly co-occurring eucalypts include Apple Box (*E. bridgesiana*), Red Box (*E. polyanthemos*), Candlebark (*E. rubida*), Snow Gum (*E. pauciflora*), Argyle Apple (*E. cinerea*), Brittle Gum (*E. mannifera*), Red Stringybark (*E. macrorhyncha*), **Grey Box (*E. microcarpa*)**, Cabbage Gum (*E. amplifolia*) and others.

Woodlands with *Eucalyptus albens* are most common on the undulating country of the slopes region while *Eucalyptus blakelyi* and *Eucalyptus melliodora* predominate in grassy woodlands on the tablelands. Drier woodland areas dominated by *Eucalyptus albens* often form mosaics with areas dominated by ***Eucalyptus blakelyi* and *Eucalyptus melliodora* occurring in more moist situations, while areas subject to waterlogging may be treeless**. *E. microcarpa* is often found in association with *E. melliodora* and *E. albens* on the south western slopes. Woodlands including *Eucalyptus crebra*, *Eucalyptus dawsonii* and *Eucalyptus moluccana* (and intergrades with *Eucalyptus albens*), for example in the Merriwa plateau, Goulburn River National Park and western Wollemi National Park, are also included. Intergrades between *Eucalyptus blakelyi* and *Eucalyptus tereticornis* may also occur here.

Within White Box Yellow Box Blakely's Red Gum Woodland, species such as *Rostellularia adscendens*, *Chloris ventricosa*, *Austrodanthonia racemosa*, *Brunoniella australis*, *Cymbopogon refractus*, *Swainsona galegifolia*, *Notelaea microcarpa*, *Stackhousia viminea*, *Olearia elliptica*,

Jasminum suavissimum, *Plantago gaudichaudii*, *Dichanthium sericeum*, *Plantago debilis* and *Wahlenbergia communis* are generally more restricted to more northern areas (eg. Prober 1996). Some other species in White Box Yellow Box Blakely's Red Gum Woodland were generally restricted to southern areas. These include *Gonocarpus elatus*, *Austrostipa blackii*, *Aristida behriana*, *Bracteantha viscosa*, *Austrodanthonia auriculata* and *Austrostipa nodosa* (Prober 1996).

The understorey in intact sites is characterised by native grasses and a high diversity of herbs; the most commonly encountered include Kangaroo Grass (*Themeda australis*) Poa Tussock (*Poa sieberiana*), wallaby grasses (*Austrodanthonia* spp.), spear-grasses (*Austrostipa* spp.), Common Everlasting (*Chrysocephalum apiculatum*), Scrambled Eggs (*Goodenia pinnatifida*), Small St John's Wort (*Hypericum gramineum*), Narrow-leafed New Holland Daisy (*Vittadinia muelleri*) and blue-bells (*Wahlenbergia* spp.).

Shrubs are generally sparse or absent, though they may be locally common.

Remnants generally occur on fertile lower parts of the landscape where resources such as water and nutrients are abundant.

Disturbed remnants are considered to form part of the community, including where the vegetation would respond to assisted natural regeneration.

White Box Yellow Box Blakely's Red Gum Woodland includes vegetation described as *Eucalyptus albens* alliance and *E. melliodora* / *E. blakelyi* alliance in Beadle (1981), the *Eucalyptus albens* alliance in Moore (1953a, b), the grassy white box woodlands of Prober and Thiele (1993, 1995) and Prober (1996) and the Grassy white box woodland of the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*. In the southern tablelands and parts of the southwest slopes, White Box Yellow Box Blakely's Red Gum Woodland are described in Thomas *et al.* (2000).

Related communities are the *Eucalyptus microcarpa*, *Eucalyptus pilligaensis* Grey Box/*Eucalyptus populnea* Poplar Box communities of the western slopes and plains and the *Eucalyptus moluccana*, Grey Box, communities of the Clarence, lower Hunter Valley and Western Sydney. These are not covered by this Determination. Similarly the natural temperate grasslands and the *Eucalyptus pauciflora* grassy woodlands of the cooler parts of the southern tablelands are not covered by this Determination.

The understorey may be highly modified by grazing history and disturbance. A number of native species appear not to tolerate grazing by domestic stock and are confined to the least disturbed remnants (*Dianella revoluta*, *Diuris dendrobioides*, *Microseris lanceolata*, *Pimelea curviflora*, *Templetonia stenophylla* (Prober & Thiele 1995). Dominant pasture species typically change from *Themeda australis*, *Austrostipa aristiglumis* and *Poa* spp. to *Austrostipa falcata*, *Austrodanthonia* spp. and *Bothriochla macra* as grazing intensity increases (Moore 1953a). This may reflect differences in palatability of these species and their ability to tolerate grazing pressure. **Light grazing and burning may also be a problem and lead to *Aristida ramosa* dominance (Lodge & Whalley 1989).**

Disturbed remnants are still considered to form part of the community including remnants where the vegetation, either understorey, overstorey or both, would, under appropriate management, respond to assisted natural regeneration, such as where the natural soil and associated seed bank is still at least partially intact.

Remnant Box-Gum Woodland can occur in a range of conditions, from almost pristine to highly modified. The importance of a particular Box-Gum Woodland remnant to the maintenance and recovery of this EEC in a local region needs to be considered in the context of the extent and condition of Box-Gum Woodland in the local region.

Where the Box-Gum Woodland remnant is in less than pristine condition it is still considered part of the EEC as long as the site has at least part of its natural soil and seedbank intact, so that under appropriate management it would respond to assisted natural regeneration. Therefore the Box-Gum Woodland EEC can include the following conditions,

- Trees present as a canopy with a non-native ground-layer;
- **Characteristic tree species absent as a result of past clearing or thinning and only other tree species and groundlayer present; and**
- Overstorey absent as a result of past clearing or thinning and only a ground-layer present.

For isolated Box-Gum Woodland trees to be considered part of the EEC, it must be considered that the site, under appropriate management, would respond to assisted natural regeneration.

The community is poorly represented in conservation reserves. There are small occurrences of White Box Yellow Box Blakely's Red Gum Woodland in Border Ranges National Park, Goobang National Park, Goulburn River National Park, Manobalai Nature Reserve, Mt Kaputar National Park, Oxley Wild Rivers National Park, Queanbeyan Nature Reserve, Towari National Park, Warrumbungle National Park, Wingen Maid Nature Reserve and Wollemi National Park. The community also occurs in the following State Conservation Areas, Copeton State Conservation Area, Lake Glenbawn State Conservation Area and Lake Keepit State Conservation Area.

The community is characterised by the following assemblage of species:

Characteristic Species	
<i>Acacia buxifolia</i>	<i>Eucalyptus nortonii</i>
<i>Acacia implexa</i>	<i>Eulalia aurea</i>
<i>Acacia paradoxa</i>	<i>Eucalyptus goniocalyx</i>
<i>Allocasuarina verticillata</i>	<i>Eucalyptus melliodora</i>
<i>Alectryon oleifolius</i>	<i>Eucalyptus microcarpa</i>
<i>Aristida behriana</i>	<i>Exocarpos cupressiformis</i>
<i>Aristida ramosa</i>	<i>Geijera parviflora</i>
<i>Asperula conferta</i>	<i>Geranium solanderi</i>
<i>Atalaya hemiglauca</i>	<i>Glycine clandestina</i>
<i>Austrodanthonia auriculata</i>	<i>Glycine tabacina</i>
<i>Austrodanthonia bipartita</i>	<i>Glycine tomentella</i>
<i>Austrodanthonia racemosa</i>	<i>Gonocarpus elatus</i>
<i>Austrodanthonia richardsonii</i>	<i>Goodenia pinnatifida</i>
<i>Austrostipa aristiglumis</i>	<i>Hibbertia linearis</i>
<i>Austrostipa blackii</i>	<i>Hibbertia obtusifolia</i>
<i>Austrostipa nodosa</i>	<i>Hypericum gramineum</i>
<i>Austrostipa scabra</i>	<i>Jacksonia scoparia</i>
<i>Bothriochla macra</i>	<i>Jasminum lineare</i>
<i>Brachychiton populneus</i>	<i>Jasminum suavisimum</i>

Characteristic Species	
<i>Brachyloma daphnoides</i>	<i>Leptorhynchus squamatus</i>
<i>Bracteantha viscosa</i>	<i>Lissanthe strigosa</i>
<i>Brunoniella australis</i>	<i>Lomandra filiformis</i>
<i>Bulbine bulbosa</i>	<i>Melichrus urceolatus</i>
<i>Bursaria spinosa</i>	<i>Microseris lanceolata</i>
<i>Callitris endlicheri</i>	<i>Notelaea microcarpa</i>
<i>Callitris glaucophylla</i>	<i>Olearia elliptica</i>
<i>Capparis mitchellii</i>	<i>Olearia viscidula</i>
<i>Cassinia longifolia</i>	<i>Oxalis perennans</i>
<i>Cassinia quinquefaria</i>	<i>Pandorea pandorana</i>
<i>Cheilanthes sieberi</i>	<i>Panicum queenslandicum</i>
<i>Chloris truncata</i>	<i>Parsonsia eucalyptophylla</i>
<i>Chrysocephalum apiculatum</i>	<i>Pimelea curviflora</i>
<i>Cymbopogon refractus</i>	<i>Plantago debilis</i>
<i>Dianella longifolia</i>	<i>Plantago gaudichaudii</i>
<i>Dianella revolute</i>	<i>Poa labillardieri</i>
<i>Dichanthium sericeum</i>	<i>Poa sieberiana</i>
<i>Dichelachne micrantha</i>	<i>Rostellularia adscendens</i>
<i>Dichelachne sciurea</i>	<i>Rumex brownii</i>
<i>Diuris dendrobioides</i>	<i>Sida corrugata</i>

Characteristic Species	
<i>Dodonaea viscosa</i>	<i>Sorghum leiocladum</i>
<i>Echinopogon caespitosus</i>	<i>Stackhousia monogyna</i>
<i>Ehretia membranifolia</i>	<i>Stackhousia viminea</i>
<i>Elymus scaber</i>	<i>Swainsona galegifolia</i>
<i>Eremophila mitchellii</i>	<i>Templetonia stenophylla</i>
<i>Eucalyptus blakelyi</i>	<i>Themeda australis</i>
<i>Eucalyptus albens</i>	<i>Wahlenbergia communis</i>
<i>Eucalyptus bridgesiana</i>	
<i>Eucalyptus conica</i>	
Note: Highlight = recorded on site	

Identifying Box-Gum Woodland

Following is a key for use in determining whether Box-Gum Woodland exists on a site. Where doubt exists over an appropriate category (e.g. whether the site is mainly grassy or is shrubby), use a precautionary approach that assumes that the community is present.

- 1** The site is in the NSW North coast, New England Tableland, Nandewar, Brigalow Belt south, Sydney Basin, south Eastern Highlands or NSW South Western Slopes Bioregions **2.**

1*	The site is outside the above bioregions	The site is not Box-Gum woodland
2	There are no native species in the understorey, and the site is unlikely to respond to assisted natural regeneration	The site is not Box-Gum woodland
2*	The understorey is otherwise	3
3	The site has trees	3
3*	The site is treeless, but is likely to have supported White Box, Yellow Box or Blakely's Red Gum prior to clearing:	5
4	White Box, Yellow Box or Blakely's Red Gum, or a combination of these species, are or were present	5
4*	White Box, Yellow Box or Blakely's Red Gum, have never been present	The site is not Box-Gum woodland
5	The site is predominantly grassy	The site is Box-Gum woodland
5*	The understorey of the site is dominated by shrubs excluding pioneers species	The site is not Box-Gum woodland

The condition of remnants of this EEC varies. Examples of the various conditions the community may occur in include:

1. Multi-aged overstorey with a grassy, herb-rich understorey:

- Remnants in this condition are very scarce and are generally confined to travelling stock reserves, roadside vegetation, cemeteries, some national parks and the occasional private property.

2. Partially cleared/thinned stands with a mixture of native and exotic understorey species:

- This condition is far more common than the above, however its long term future is often insecure due to inadequate regeneration of overstorey species. Often current management (e.g. set-stocking) is inconsistent with tree regeneration.

3. Stands where White Box, Yellow Box or Blakely's Red Gum have been killed and other species dominate the canopy:

- This condition occurs in woodlands where the characteristic trees occur in conjunction with White Cypress Pine. The understorey is often in reasonable to very good condition.

4. Grasslands (secondary or derived grasslands), where the tree overstorey has been removed and only the Box-Gum Woodland understorey is present:

- This condition is likely to be reasonably common in some areas and is likely to be relatively easy to rehabilitate if appropriate management strategies are implemented.

5. Degraded remnants that have few, if any, native species in the understorey:

This condition is typical of Box-Gum Woodland where agricultural practices have been more intensive (e.g. pasture improvement over long periods).

The Final Determination defines Box-Gum Woodland broadly. There are five main features in the Determination that govern whether the EEC exists at a site:

1. Whether the site is within the area defined in the Determination.

Yes

2. Whether the characteristic trees of the site are (or are likely to have been) White Box, Yellow Box or Blakely's Red Gum.

Yellow Box and Blakely's Red Gum (Blakely's Red Gum present in riparian and ecotone areas on site and on adjacent land in areas also supporting Yellow Box)

3. Whether the site is mainly grassy.

Yes – grassy understorey present

4. Whether any of the listed characteristic species occur (including as part of the seedbank in the soil).
<i>13 of the potential 94 characteristic species (14 %) were present at the site.</i>
5. If the site is degraded, whether there is potential for assisted natural regeneration of the overstorey or understorey.
<i>Given the presence of a number of native grass species including Themeda australis and that there is no evidence of soil ploughing, it is considered likely that the site has the potential to respond to assisted natural regeneration.</i>

Attribute	Present at Site
TSC Act Criteria	
White Box Yellow Box Blakely's Red Gum Woodland is found on relatively fertile soils on the tablelands and western slopes of NSW.	Soils of low fertility – sandy loam
Generally occurs between the 400 and 800 mm isohyets extending from the western slopes, at an altitude of c. 170m to c. 1200 m, on the northern tablelands.	Altitude approximately 430 ASL
Includes those woodlands where the characteristic tree species include one or more of the following species in varying proportions and combinations - <i>Eucalyptus albens</i> (White Box), <i>Eucalyptus melliodora</i> (Yellow Box) or <i>Eucalyptus blakelyi</i> (Blakely's Red Gum).	Yellow Box present in east of site. Blakely's Red Gum present in north of site within riparian and ecotone zones.
Grass and herbaceous species generally characterise the ground layer. In some locations, the tree overstorey may be absent as a result of past clearing or thinning and at these locations only an understorey may be present. Shrubs are generally sparse or absent, though they may be locally common.	Native grasses dominate the groundlayer. The canopy is comprised of scattered trees. Shrubs are sparse.
The trees may occur as pure stands, mixtures of the three species or in mixtures with other trees, including wattles. Commonly co-occurring eucalypts include Apple Box (<i>E. bridgesiana</i>), Red Box (<i>E. polyanthemos</i>), Candlebark (<i>E. rubida</i>), Snow Gum (<i>E. pauciflora</i>), Argyle Apple (<i>E. cinerea</i>), Brittle Gum (<i>E. mannifera</i>), Red Stringybark (<i>E. macrorhyncha</i>), Grey Box (<i>E. microcarpa</i>), Cabbage Gum (<i>E. amplifolia</i>) and others.	Grey Box also present across site.
Characteristic tree species present	Yellow Box, Blakely's Red Gum
Characterised by the assemblage of species as outlined in the Final Determination	13 of the 94 characteristic species present (14%). 13 of the total 65 species (20 %) recorded at the site

Attribute	Present at Site
	were characteristic of BGW.
Disturbed remnants are still considered to form part of the community including remnants where the vegetation, either understorey, overstorey or both, would, under appropriate management, respond to assisted natural regeneration, such as where the natural soil and associated seed bank are still at least partially intact.	Disturbed remnant present at the site. It is considered likely that this community would respond to assisted natural regeneration. Soils do not appear to have been ploughed, native grasses remain within the understorey. Grazing occurs onsite and therefore will have impacted upon species composition.
The importance of a particular Box-Gum Woodland remnant to the maintenance and recovery of this EEC in a local region needs to be considered in the context of the extent and condition of Box-Gum Woodland in the local region.	The extent of BGW within the LGA is unknown due to the absence of vegetation mapping although it is known from other parts of the LGA (eg. Ulan Mine Site).
Therefore the Box-Gum Woodland EEC can include the following conditions, • Trees present as a canopy with a non-native ground-layer, • Characteristic tree species absent as a result of past clearing or thinning and only other tree species and groundlayer present and • Overstorey absent as a result of past clearing or thinning and only a ground-layer present.	The description that would best fit the current site conditions is: Characteristic tree species primarily absent as a result of past clearing or thinning and only other tree species and groundlayer present.
EPBC Act Criteria	
Can occur as either a woodland or a derived grassland.	Occurs as open woodland in the north of the site.
Characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, and the dominance, or prior dominance, of White Box, Yellow Box or Blakely's Red Gum trees.	Understorey supports native species but is not highly diverse. Assumed prior dominance of Yellow Box given mature Yellow Box present on site.
In the Nandewar Bioregion, Grey Box (<i>Eucalyptus microcarpa</i> or <i>E. moluccana</i>) may also be dominant or codominant.	The site is not in the Nandewar Bioregion.
Associated, and occasionally co-dominant, trees include, but are not restricted to: Grey Box (<i>Eucalyptus microcarpa</i>), Fuzzy Box (<i>E. conica</i>), Apple Box (<i>E. bridgesiana</i>), Red Box (<i>E. polyanthemos</i>), Red Stringybark (<i>E. macrorhyncha</i>), White Cypress Pine (<i>Callitris glaucophylla</i>), Black Cypress Pine (<i>C. enderlicheri</i>), Long-leaved Box (<i>E. gonicalyx</i>), New	Grey Box present in the north and White Cypress and Kurrajong present in the north eastern within the riparian corridor.

Attribute	Present at Site
England Stringybark (<i>E. calignosa</i>), Brittle Gum (<i>E. mannifera</i>), Candlebark (<i>E. rubida</i>), Argyle Apple (<i>E. cinerea</i>), Kurrajong (<i>Brachychiton populneus</i>) and Drooping She-oak (<i>Allocasuarina verticillata</i>)	
Sites dominated by other tree species that do not have Yellow Box, White Box or Blakely's Red Gum as co-dominants are not considered to be part of the EEC (except in the Nandewar Bioregion)	Grey Box now dominates parts of the site although it is considered that Yellow Box would have been a co-dominant prior to clearing.
This ecological community occurs in areas where rainfall is between 400 and 1200 mm per annum, on moderate to highly fertile soils at altitudes of 170 metres to 1200 metres	Annual rainfall 600 mm to 800 mm per annum Altitude approximately 430 ASL
Sites dominated by Western Grey Box (<i>E. microcarpa</i>) or Coastal Grey Box (<i>E. moluccana</i>) without Yellow Box, White Box or Blakely's Red Gum as co-dominants are not considered to be part of the ecological community, except in the Nandewar Bioregion.	Grey Box now dominates part of the site although it is considered that Yellow Box would have been a co-dominant prior to clearing.
Shrub cover in this ecological community is naturally patchy, and shrubs may be dominant only over a very localised area. Shrub cover should therefore be assessed over the entire remnant, not just in a localised area. A remnant with a significant ground layer of tussock grasses, and where the distribution of shrubs is scattered or patchy, is part of the ecological community.	Shrubs are limited across the site.
It occurs in the Brigalow Belt South, Nandewar, New England Tableland, South Eastern Queensland, Sydney Basin, NSW North Coast, South Eastern Highlands, South East Corner, NSW South Western Slopes, Victorian Midlands and Riverina Bioregions	NSW South Western Slopes
Areas in which an overstorey exists without a substantially native understorey are degraded and are no longer a viable part of the ecological community. Although some native species may remain, in most of these areas the native understorey is effectively irretrievable.	N/A
In order to be the listed ecological community, an understorey patch, in the absence of overstorey trees, must have a high level of native floral species diversity, but only needs to be 0.1 hectares or greater in size.	Patch is greater than 0.1 ha in size Floral diversity limited.
A patch in which the perennial vegetation of the ground layer is dominated by native species, and which contains at least 12 native, non-grass understorey species (such as forbs,	12 native non-grass understorey species were recorded across the site.

Attribute	Present at Site
shrubs, ferns, grasses and sedges) is considered to have a sufficiently high level of native diversity to be the listed ecological community.	
At least one of the understorey species should be an important species (e.g. grazing-sensitive, regionally significant or uncommon species; such as Kangaroo Grass or orchids) in order to indicate a reasonable condition.	<i>Themeda australis</i> present and a number of other important species present.
Areas with both an overstorey and understorey present are also considered of sufficiently good condition to be part of the listed ecological community if: - the understorey meets any of the conditions above; or - if they have a predominantly native understorey, are two hectares or above in size, and have either natural regeneration of the overstorey species or 20 or more mature trees per hectare.	Natural regeneration of the overstorey was evident in the east of the site (Blakely's Red Gum) although regeneration was not evident in other parts of the site.

Appendix D: Threatened Species Likelihood of Occurrence

Table 5 Threatened flora likelihood of occurrence

Scientific Name	Common Name	Source	TSC Act Status	EPBC Act Status	Habitat	Likelihood of occurring within the study area
<i>Acacia ausfeldii</i>	Ausfeld's Wattle	UCML report	V	-	It is mostly found on flat sandy soils often in remnant roadside patches of eucalypt woodland.	Recorded on site within riparian zone.
<i>Acacia flocktoniae</i>	Flockton Wattle	UCML list	V	V	It grows in dry sclerophyll forest on sandstone.	Unlikely – sandstone not present.
<i>Bothriochloa biloba</i>	Lobed Blue-grass	UCML list	De-listed	V	Lobed Blue-grass grows in cleared eucalypt forests and relict grassland, often dominated by Purple Wiregrass (<i>Aristida ramosa</i>), Red-leg Grass (<i>Bothriochloa macra</i>), Red Grass (<i>B. decipiens</i>), Queensland Bluegrass (<i>Dicanthium sericeum</i>) or <i>Austrostipa aristiglumis</i> . Usually grows on poorer soils.	Potential – relict grassland present.
<i>Digitaria porrecta</i>	Finger Panic Grass	EPBC PMST	E	E	Is found in native grassland, woodlands or open forest with a grassy understorey, on richer soils. Often found along roadsides and traveling stock routes where there is light grazing and occasional fire.	No – rich soils not present.
<i>Diuris tricolor</i> (formally <i>sheaffiana</i>)	Pink Donkey Orchid	EPBC PMST	V	V	It is found in sclerophyll forest among grass, often with native Cypress Pine (<i>Callitris spp.</i>). It is found in sandy soils, either on flats or small rises. Has also been recorded from a red earth soil within a Bimble	Unlikely - site likely to be too disturbed.

Scientific Name	Common Name	Source	TSC Act Status	EPBC Act Status	Habitat	Likelihood of occurring within the study area
					Box community in western NSW.	
<i>Eucalyptus cannonii</i>	Cannon's Stringybark	EPBC PMST UCML report	V	V	It is found within the altitude range of about 460 m to 1040 m. Within the range, the species appears to tolerate most situations except the valley floors. Recorded from Tablelands Grassy Woodland Complex communities and Talus Slope Woodland, and in Winburndale Nature Reserve within woodland dominated by Red Stringybark (<i>Eucalyptus macrorhyncha</i>) and Long-leaved Box .	Unlikely – not recorded on site during inspection.
<i>Homoranthus darwinioides</i>		UCML Report	V	V	It grows in a variety of woodland habitats with shrubby understoreys, usually in gravely sandy soils. The species has been recorded growing on flat sunny ridge tops with scrubby woodland, sloping ridges, gentle south-facing slopes, and a slight depression on a roadside with loamy sand.	Unlikely –grassy woodland present.

Note:

TSC Act = *Threatened Species Conservation Act 1995*; EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*.

V = Vulnerable, E = Endangered,

PMST = Protected Matters Search Tool

UCML = United Coal Mine Limited List

Table 6 Threatened flora likelihood of occurrence

Scientific Name	Common Name	Source	TSC Act Status	EPBC Act Status	Habitat	Likelihood of occurring within the study area
Birds						
<i>Anseranas semipalmata</i>	Magpie Goose	UCML Report UCML list	V	-	It is mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges.	Potential
<i>Botaurus poiciloptilus</i>	Australasian Bittern	UCML list	V	-	It favors permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.).	Potential
<i>Burhinus grallarius</i>	Bush Stone-curlew	UCML list	E	-	It is known to inhabit open forests and woodlands with a sparse grassy groundlayer and fallen timber.	Potential – although fallen timber scarce.
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	DECC UCML Report UCML list	V	-	In winter, it may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas and particularly in box-ironbark assemblages, or in dry forest in coastal areas. It favours old growth attributes for nesting and roosting.	Likely
<i>Calyptorhynchus lathami</i>	Glossy Black-cockatoo	DECC UCML Report UCML list	V	E	It inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak (<i>Allocasuarina littoralis</i>), Forest She-oak (<i>A. torulosa</i>) or Drooping She-oak (<i>A. verticillata</i>) occur.	Unlikely
<i>Certhionyx variegatus</i>	Pied Honeyeater	DECC	V	-	It inhabits wattle shrub (primarily Mulga, <i>Acacia aneura</i>), mallee, spinifex and eucalypt woodlands, usually when shrubs are flowering. It feeds on nectar, predominantly from various species of emu-bushes (<i>Eremophila</i> spp.); also from mistletoes and various other shrubs (e.g. <i>Brachysema</i> spp. and <i>Grevillea</i> spp.).	Potential – Mistletoe present at site
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper	DECC UCML Report UCML list	V	-	It is found in drier forests, woodlands, scrubs with fallen branches.	Potential
<i>Falco hypoleucos</i>	Grey Falcon	UCML list	V	-	It is usually restricted to shrubland, grassland and	Unlikely

					wooded watercourses of arid and semi-arid regions.	
<i>Grantiella picta</i>	Painted Honeyeater	DECC UCML Report UCML list	V	-	It inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. It feeds on the fruits of mistletoes growing on woodland eucalypts and acacias.	Potential
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	UCML Report UCML list	V	-	It lives in a range of inland habitats, especially along timbered watercourses which is the preferred breeding habitat. It also hunts over grasslands and sparsely timbered woodlands.	Potential
<i>Hylacola cauta</i>	Shy Heathwren	UCML list	V	-	It inhabits mallee woodlands with a relatively dense understorey of shrubs and heath plants	No
<i>Lathamus discolor</i>	Swift Parrot	EPBC PMST UCML Report UCML list	E	E	It is found in dry sclerophyll eucalypt forests and woodlands and occasionally in wet sclerophyll forests.	Potential
<i>Leipoa ocellata</i>	Malleefowl	EPBC PMST	E	V, Mig JAMBA	It inhabits mallee communities, preferring the tall, dense and floristically-rich mallee found in higher rainfall (300-450 mm mean annual rainfall) areas. It prefers areas of light sandy to sandy loam soils and habitats with a dense but discontinuous canopy, dense and variable shrub and herb layers.	No
<i>Melanodryas cucullata</i>	Hooded Robin	DECC UCML Report UCML list	V	-	It prefers wooded country such as eucalypt woodland, acacia scrub and mallee. It is also found in or near clearing and it requires a structurally diverse habitat.	Potential
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern sub-species)	DECC UCML Report UCML list	V	-	It is mostly found in the upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (<i>Eucalyptus sideroxylon</i>), White Box (<i>Eucalyptus albens</i>), Grey Box (<i>Eucalyptus microcarpa</i>), Yellow Box (<i>Eucalyptus melliodora</i>) and Forest Red Gum (<i>Eucalyptus tereticornis</i>). It also inhabits open forests of smooth-barked gums, stringybarks, ironbarks and tea-trees.	Potential
<i>Neophema pulchella</i>	Turquoise	DECC	V	-	It lives on the edges of eucalypt woodland	Potential

	Parrot	UCML Report UCML list			adjoining clearings, timbered ridges and creeks in farmland.	
<i>Ninox connivens</i>	Barking Owl	DECC UCML list	V	-	It inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting. During the day they roost along creek lines, usually in tall understorey trees with dense foliage such as <i>Acacia</i> and <i>Casuarina</i> species, or the canopy leaves in large Eucalypts.	Potential - foraging
<i>Ninox strenua</i>	Powerful Owl	DECC UCML Report UCML list	V	-	It inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest.	Potential - foraging
<i>Oxyura australis</i>	Blue-billed Duck	DECC UCML Report UCML list	V	-	It prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover. It will fly if disturbed, but prefers to dive if approached.	Unlikely
<i>Petroica rodinogaster</i>	Pink Robin	DECC	V	-	It inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies.	Unlikely
<i>Lophoictinia isura</i>	Square-tailed kite	DECC UCML list	V	-	It is found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.	Unlikely
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern sub-species)	DECC UCML Report UCML list	V	-	It inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains.	Potential
<i>Polytelis swainsonii</i>	Superb Parrot	EPBC PMST UCML list	V	V	It occurs in forests dominated by eucalyptus, especially River Red Gums (<i>Eucalyptus camaldulensis</i>) and box eucalyptus e.g. <i>Eucalyptus melliodora</i>	Potential
<i>Pyrrholaemus sagittatus</i>	Speckled Warbler	DECC	V		It lives in a wide range of Eucalyptus dominated communities that have a grassy understorey,	Potential

					often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area.	
<i>Rostratula australis</i>	Australian Painted Snipe	EPBC PMST	V	V, Mar, Mig CAMBA	It lives in well-vegetated shallows and margins of wetlands, dams, sewerage ponds, wet pastures, marshy areas, open timber.	Unlikely
<i>Stagonopleura guttata</i>	Diamond Firetail	DECC UCML Report UCML list	V	-	It is found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland	Potential
<i>Tyto novaehollandiae</i>	Masked Owl	DECC UCML list	V	-	It lives in dry eucalypt forests and woodlands from sea level to 1100 m. It is a forest owl, but often hunts along the edges of forests, including roadsides.	Potential
<i>Xanthomyza phrygia</i>	Regent Honeyeater	EPBC PMST DECC UCML list	E	E, Mig JAMBA	It mainly inhabits temperate woodlands and open forests that have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak.	Limited potential
Mammals						
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat, Large Pied Bat	EPBC PMST DECC UCML Report UCML List	V	V	It roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin frequenting low to mid-elevation dry open forest and woodland close to these features. It is also found in well-timbered areas containing gullies.	Potential
<i>Chalinolobus picatus</i>	Little Pied Bat	UCML Report	V		It occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress-pine forest, mallee, Bimbil box. Roosts in caves, rock outcrops, mine shafts,	Potential

					tunnels, tree hollows and buildings.	
<i>Dasyurus maculatus maculatus</i> (SE mainland population)	Spot-tailed Quoll,	EPBC PMST	V	E	It is recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites	Unlikely
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	UCML list	V	-	It prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	Unlikely.
<i>Miniopterus australis</i>	Little Bentwing-bat	UCML List	V	-	It is found in moist eucalypt forest, rainforest or dense coastal banksia scrub. It roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	No
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	DECC UCML Report UCML List	V	-	It is usually found in caves, which are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures	Potential
<i>Myotis macropus</i>	Large-footed Myotis	UCML Report UCML List	V	-	It generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. In may forage over streams and pools catching insects and small fish by raking their feet across the water surface.	Potential
<i>Nyctophilus timoriensis</i>	Greater Long-eared Bat	UCML List DECC EPBC PMST	V	-	It inhabits a variety of vegetation types, including mallee, bulloak <i>Allocasuarina leuhmanni</i> and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains. It roosts in tree hollows, crevices, and under loose bark.	Potential
<i>Petaurus norfolcensis</i>	Squirrel Gliders	DECC UCML Report UCML List	V	-	It inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or	Unlikely

					Acacia midstorey.	
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	EPBC PMST DECC UCML Report UCML List	E	V	It prefers rocky habitats, including loose boulder-piles, rocky outcrops, steep rocky slopes, cliffs, gorges and isolated rock stacks. It occupies rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north. It browses on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees.	No
<i>Phascolarctos cinereus</i>	Koala	DECC UCML Report UCML List	V	-	It inhabit eucalypt woodlands and forests	Unlikely
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	UCML Report UCML list	V	-	It roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows	Potential
<i>Vespadelus troughtoni</i>	Eastern Cave Bat	UCML Report UCML list	V	-	It is a cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. Occasionally found along cliff-lines in wet eucalypt forest and rainforest.	No
Amphibians						
<i>Litoria booroolongensis</i>	Booroolong Frog	EPBC PMST	E	E	It live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins. Shelter under rocks or amongst vegetation near the ground on the stream edge.	Unlikely – not rocky
<i>Mixophyes iteratus</i>	Giant Barred Frogs	DECC UCML List	E	E	They forage and live amongst deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest, at elevations below 1000 m. They breed around shallow, flowing rocky streams from late spring to summer.	No
Reptiles						
<i>Aprasia parapulchella</i>	Pink-tailed	UCML List	V	V	It inhabits sloping, open woodland areas with	Unlikely

	Worm-lizard				predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass. The sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks.	
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	EPBC PMST	E	V	They shelter in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. They move from the sandstone rocks to shelters in hollows in large trees within 200 m of escarpments in summer	No.
<i>Suta flagellum</i>	Little Whip Snake	DECC UCML List	V	-	It occurs in Natural Temperate Grasslands and grassy woodlands, including those dominated by Snow Gum <i>Eucalyptus pauciflora</i> or Yellow Box <i>E. melliodora</i> . They also occur in secondary grasslands derived from clearing of woodlands. Found on well drained hillsides, mostly associated with scattered loose rocks. Most specimens have been found under rocks or logs lying on, or partially embedded in the soil.	Unlikely

Fish

<i>Maccullochella peelii peelii</i>	Murray Cod, Cod, Goodoo	EPBC PMST		V	They are adaptability and the diversity of habitats they occupy. They inhabit a variety of habitats from quite small clear, rocky, upland streams with riffle and pool structure on the upper western slopes of the Great Dividing Range to large, meandering, slow-flowing, often silty rivers in the alluvial lowland reaches of the Murray-Darling Basin. Murray cod prefer deep holes with cover in the form of large rocks, fallen trees, stumps, clay banks and overhanging vegetation.	Unlikely
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Note:

TSC Act = *Threatened Species Conservation Act 1995*; EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*.

V = Vulnerable, E = Endangered, CE = Critically Endangered, M = Migratory, Mar = Marine; JAMBA = Japan-Australia Migratory Bird Agreement, CAMBA = China-Australia Migratory Bird Agreement

PMST = Protected Matters Search Tool

UCML = United Coal Mine Limited List