

Ten hair sampling tubes sites (H1 to H10 – see **Figure 3**), baited with the same bait as the Elliot traps were deployed. At each site, two traps were deployed, one on the ground and one on a tree at about 6m height with tree trunks in the vicinity sprayed with a honey solution. These traps were left for 10 days. As well as small mammals, hair tubes also sample hairs of large and medium size rare and trap-shy mammals.

Supplementary hair sampling was conducted in the Open Woodland area “A” at 10 other sites marked H11 to H20 (see **Figure 3**).

3.3.2 Microbats

Recordings of bat calls were made from mobile and stationary position (Br) using Anabat-CF ultrasonic recorders (Titley Electronics, Ballina, N.S.W.). Harp traps were deployed for two nights at location Hp1 and one night at Hp2 (see **Figure 3**).

3.3.3 Nocturnal Species and Arboreal Mammals

Two 2-hr spotlight searches were conducted on the evenings of the summer and winter sample in the Survey Area using a 50-watt spotlight on each side of a slow moving vehicle. Each spotlight transect (see **Figure 3**) was traversed at least once per night and the fauna observed noted.

Recorded calls of the threatened species listed in **Table 1** were played at point C1 to C5 (see **Figure 3**) while spotlighting.

Table 1
Threatened Species Recorded Calls

Common Name	Scientific Name
1. Koala	<i>Phascolarctos cinereus</i>
2. Squirrel Glider	<i>Petaurus norfolcensis</i>
3. Powerful Owl	<i>Ninox strenua</i>
4. Barking Owl	<i>Ninox connivens</i>
5. Masked Owl	<i>Tyto novaehollandiae</i> ,
6. Bush Stone-curlew	<i>Burhinus grallarius</i>

3.4 Reptiles

Apart from the pitfall traps (see Section 3.2), searches were made for reptiles in the leaf litter and along the drainage lines, as well as under rocks and logs in the Survey Area.

Particular attention was made to record turtles that may occur along the creek lines that will be dissected by the proposed transport route.

3.5 Invertebrates

There are no invertebrates listed as threatened in this region. Consequently no specific sampling was undertaken.

3.6 Fish

The fish fauna was not targeted for sampling as no listed threatened fish species is likely to occur in the Survey Area or be adversely affected in or near the proposed mine. The natural flow of the creek lines in the Survey Area including along the proposed transport route will not be affected if the recommendations in Section 7.0 are adopted.

4.0 REGIONAL FAUNA

4.1 Threatened Species Conservation Act 1995

A checklist of the regional fauna was compiled from the NPWS Atlas of NSW Wildlife (Boggabri Map Sheet 8936 1:100 000 – October 2004), Strahan (1995), Swan et al (2004), Barette *et al* (2003), Parnaby (1992), Cogger (2000), Churchill (1998), Ayers *et al* (1996-99), NPWS (1999) and other published and unpublished sources.

The fauna checklist for the region defined by the Boggabri (1: 100 000, mapsheet 8936) showed that 18 species of frogs, some 225 birds, 54 mammals and 47 reptiles are on the data base (NPWS 2004). **Figure 4** presents the recorded locations of these species within 5km and 10km of the Survey Area.

4.2 Threatened Terrestrial Vertebrates

Data on the regional fauna have been collated and reviewed in CES (2000) and updated as per NPWS (2004). The data suggest the following:

Amphibians

There are no less than 18 amphibian species that can be expected to occur in the region. None are listed as threatened.

Birds

At least 225 species of birds could occur in the region of which two are listed as endangered (see **Table 2**) and eight are listed as vulnerable (see **Table 3**). Three other listed vulnerable species have also been recorded in this and a previous study (see CES, 2000) and are included in **Table 3**.

Table 2
Endangered Bird Species

Common Name	Scientific Name
1. Regent Honeyeater	<i>Xanthomyza phrygia</i>
2. Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>

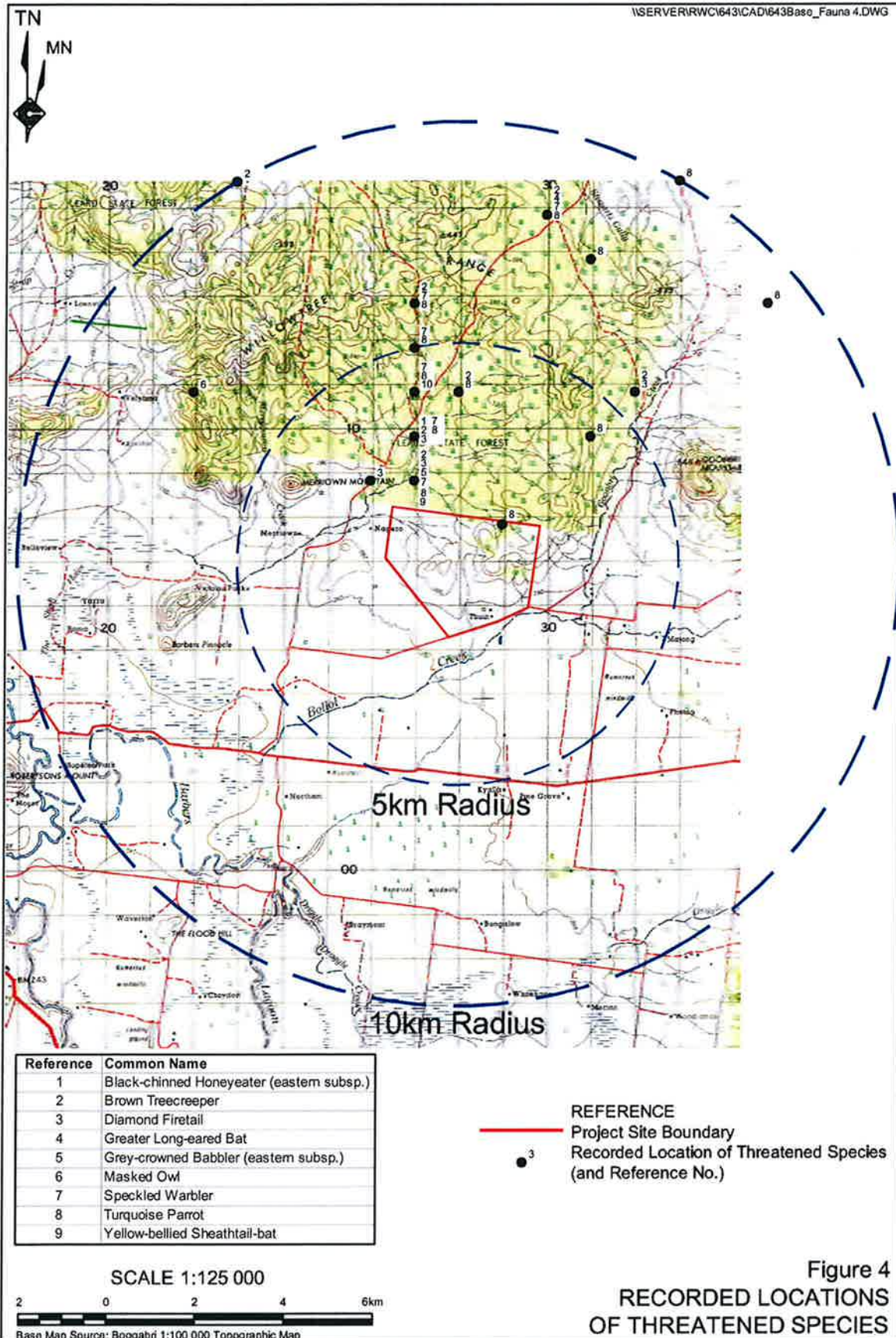


Table 3
Vulnerable Bird Species

Common Name	Scientific Name
1. Speckled Warbler	<i>Pyrrholaemus sagittus</i>
2. Brown Treecreeper	<i>Climacteris picumnus</i>
3. Diamond Firetail	<i>Stagonopleura guttata</i>
4. Blue-billed Duck (W)*	<i>Oxyura australis</i>
5. Black-chinned Honeyeater	<i>Melithreptus gularis</i>
6. Hooded Robin**	<i>Melanodryas cucullata</i>
7. Grey-crowned Babbler**	<i>Pomatostomus temporalis</i>
8. Turquoise Parrot*	<i>Neophema pulchella</i>
9. Masked Owl	<i>Tyto novaehollandiae</i>
10. Grey Falcon*	<i>Falco hypoleucos</i>
11. Glossy Black-Cockatoo**	<i>Calyptorhynchus lathami</i>
W denotes wetland species * denotes species that has been observed by the author in the region. ** denotes recorded during this survey	

There have been at least three exotic birds recorded in the region: the House Sparrow, *Passer domesticus*, the Common Starling, *Sturnus vulgaris* and the Rock Dove, *Columba livia*.

Mammals

At least 54 species of mammals, including 12 introduced species, may occur in the region. Seven species are listed as Endangered (presumed extinct) (see **Table 4**), one species, the Black-striped Wallaby, *Macropus dorsalis*, is listed as endangered and ten species are listed as vulnerable (see **Table 5**).

Table 4
Endangered (Presumed Extinct) Mammal Species

Common Name	Scientific Name
1. White-footed Rabbit-rat	<i>Conilurus albipes</i>
2. Brush-tailed Bettong	<i>Bettongia penicillata</i>
3. Plains Rat	<i>Pseudomys australis</i>
4. Gould's Mouse	<i>Pseudomys gouldii</i>
5. Bridled Naitail Wallaby	<i>Onychogalea fraenata</i>
6. Bilby	<i>Macrotis lagotis</i>
7. Western Barred Bandicoot	<i>Perameles bougainville</i>

Table 5
Vulnerable Mammal Species

Common Name	Scientific Name
1. Long-haired Rat	<i>Rattus villosissimus</i>
2. Rufous Bettong	<i>Aepyprymnus rufescens</i>
3. Brush-tailed Rock Wallaby	<i>Petrogale penicillata</i>
4. Squirrel Glider	<i>Petaurus norfolkensis</i>
5. Spotted Quoll	<i>Dasyurus maculatus</i>
6. Yellow-bellied Sheathtail Bat**	<i>Saccolaimus flaviventris</i>
7. Eastern Freetail Bat	<i>Mormopterus norfolkensis</i>
8. Koala	<i>Phascolarctos cinereus</i>
9. Greater Long-eared Bat	<i>Nyctophilus timoriensis</i>
10. Little Pied Bat	<i>Chalinolobus pictus</i>
** denotes recorded during this study.	

There is a single record of the Brush-tailed Rock Wallaby, *Petrogale penicillata* in the NPWS Wildlife Atlas database (see NPWS 2004) but it is a species of no relevance to this assessment. It is a species that requires topographically complex rocky habitat with rock piles, scree slopes and steep cliffs with benches.

Reptiles

At least 47 species of reptiles may occur in the region but there is only one record of listed as vulnerable species, the Border Thick-tailed Gecko, *Underwoodisaurus sphyrurus*. It is noteworthy that the Survey Area is in the catchment of the Namoi River, where a listed vulnerable turtle, the Namoi River Elseya, *Elseya* sp. also occurs.

4.2.1 Native Fish

The Survey Area is not within the distributional range of any fish listed as threatened under the *Fisheries Management Act 1994*.

4.2.2 Invertebrates

No invertebrate species has been listed as threatened in this region.

4.3 EPBC Act

A search for Commonwealth listed threatened species, international agreement listed species, threatened populations and ecological communities and key threatening processes in the Environment Australia on-line data base centered on Longitude 150.17 E, Latitude -30.75 S in November 2004 revealed the following.

Threatened Communities

The only listed threatened ecological community that may occur in this area is the Grassy White Box Woodlands community that is listed as endangered. (See GCNRC, 2005).

Threatened Species

The listed threatened fauna species that may occur in the Survey Area are presented in **Table 6**.

Table 6
Threatened Fauna Species

Common Name	Scientific Name	Status
Birds		
Swift Parrot	<i>Lathamus discolor</i>	Endangered
Superb Parrot	<i>Polytelis swainsonii</i>	Vulnerable
Australia Painted Snipe	<i>Rostratula australis</i>	Vulnerable
Regent Honeyeater	<i>Xanthomyza phrygia</i>	Endangered
Mammals		
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	Vulnerable
Brush-tailed Rock Wallaby	<i>Dasyurus maculatus</i>	Vulnerable
Greater Long-eared Bat	<i>Nyctophilus timoriensis</i>	Endangered
Reptile		
Namoi River Elseya	<i>Elseya</i> sp. nov. (AMS-R140984)	Vulnerable
Border Thick-tailed Gecko	<i>Underwoodisaurus sphyrurus</i>	Vulnerable
Fish		
Murray Cod	<i>Maccullochella pelli</i>	Vulnerable

Notwithstanding that the Murray Cod occurs in the Murray-Darling Catchment into which the Namoi River drains, this fish has never been recorded in this part of the Namoi River near Boggabri.

Neither the Namoi River Elseya nor the Murray Cod require further consideration as this proposed mine will not affect any river or creek or their water quality beyond the construction of a causeway in Gins Creek. This construction is expected to only have a localised temporary effect during the lying down of the concrete causeway.

Migratory Species

Terrestrial and wetland species (JAMBA and CAMBA) covered by migratory provisions of the EPBC Act, 1999 that may occur on the Survey Area are presented in **Table 7**.

Table 7
Terrestrial and Wetland Species

Common Name	Scientific Name
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>
White-throated Needletail	<i>Hirundapus caudacutus</i>
Regent Honeyeater	<i>Xanthomyza phrygia</i>
Latham's Snipe	<i>Gallinago hardwickii</i>
Painted Snipe	<i>Rostratula benghalensis</i>

Listed Marine Species

Other than those that are already listed as threatened or migratory species which are also marine species, **Table 8** lists the marine species may also occur within the Survey Area.

Table 8
Marine Species

Common Name	Scientific Name
Fork-tailed Swift	<i>Apus pacificus</i>
Great Egret	<i>Ardea alba</i>
Cattle Egret	<i>Ardea ibis</i>
Rainbow Bee-eater	<i>Merops ornatus</i>
Painted Snipe	<i>Rostratula benghalensis</i>

Listed Sites

There are no World Heritage Properties, National Heritage Places, Ramsar Sites or Critical Habitats within 10km of the Project Site. It is however within the Murray-Darling Catchment that has been listed under the National Pollutant Inventory. Considerations on the listed substances are beyond the scope of this report.

5.0 Fauna in the Survey Area

The fauna recorded during the various surveys in the Survey Area are as follows.

5.1 Amphibians

Table 9 lists the frog species that were recorded on or in areas adjoining the Survey Area.

Table 9
Frogs Recorded in and adjoining the Survey Area.

Scientific Name	Common Name	Status
<i>Litoria caerulea</i>	Broad-palmed Frog	P
<i>Litoria peronii</i>	Peron's Tree Frog	P
<i>Litoria rubella</i>	Desert Tree Frog	P
<i>Uperoleia rugosa</i>	Wrinkled Froglet	P
<i>Limnodynastes peronii</i>	Striped Marsh Frog	P
P = Protected Native Species		

All these are common frog species. There are also likely to be other burrowing species that have not been recorded during the survey due to the lateness of the survey (late summer). Many of the burrowing species will also only emerge for limited periods after heavy rain in the warmer months. None of the burrowing species are listed as threatened.

5.2 Birds

Table 10 lists the 57 bird species observed in or near the Survey Area.

Table 10
Birds recorded in and around the East Boggabri Survey Area.

Page 1 of 2

Scientific Name	Common Name	Survey		
		Summer	Winter	Suppl. '04
<i>Tenoned juba</i>	Australian Wood Duck	*	*	
<i>Annas superciliosus</i>	Pacific Black Duck	*	*	
<i>Annas graceless</i>	Grey Teal	*	*	
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe	*	*	
<i>Ardea pacifica</i>	Pacific Heron	*	*	
<i>Plataea flavipes</i>	Yellow-billed Spoonbill		*	
<i>Aquila audax</i>	Wedge-tailed Eagle	*		*
<i>Falco longipennis</i>	Australian Hobby		*	
<i>Falco hypoleucos</i>	Grey Falcon (V)		*	
<i>Falco cenchroides</i>	Nankeen Kestrel	*	*	
<i>Ocyphaps lophotes</i>	Crested Pigeon	*	*	*
<i>Geopelia striata</i>	Peaceful Dove	*		*
<i>Calyptorhynchus lathami</i>	Glossy Black-cockatoo (V)		*	
<i>Cacatua roseicapilla</i>	Galah	*		*
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo		*	
<i>Glossopsitta pusilla</i>	Little Lorikeet		*	
<i>Alisterus scapularis</i>	Australian King-Parrot		*	
<i>Platycercus eximius</i>	Eastern Rosella	*	*	
<i>Platycercus zonarius</i>	Mallee Ringneck		*	
<i>Psephotus haematogaster</i>	Blue-bonnet Parrot	*	*	
<i>Psephotus haematonotus</i>	Red-rumped Parrot	*	*	
<i>Psephotus varius</i>	Mulga Parrot		*	
<i>Neophema chrysostoma</i>	Blue-winged parrot	*	*	
<i>Neophema pulchella</i>	Turquoise Parrot (V)		*	

Table 10 (Cont)
Birds recorded in and around the East Boggabri Survey Area.

Page 2 of 2

Scientific Name	Common Name	Survey		
		Summer	Winter	Suppl. '04
<i>Cuculus flabelliformis</i>	Fan-tailed Cuckoo		*	
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	*		*
<i>Malurus cyaneus</i>	Superb Blue Fairy-Wren	*	*	
<i>Acanthiza nana</i>	Yellow Thornbill	*	*	
<i>Acanthiza lineata</i>	Striated Thornbill	*	*	*
<i>Climacteris leucophaeus</i>	White-Throated Treecreeper	*	*	
<i>Philemon citreogularis</i>	Little Friarbird	*	*	
<i>Manorina melanocephala</i>	Noisy Miner	*	*	*
<i>Meliphaga lewinii</i>	Lewin's Honeyeater			*
<i>Lichenostomus virescens</i>	Singing Honeyeater	*	*	*
<i>Lichenostomus leucotis</i>	White-eared Honeyeater			*
<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater		*	
<i>Lichmera indistincta</i>	Brown Honeyeater		*	
<i>Microeca leucophaea</i>	Jacky Winter	*	*	*
<i>Petroica goodenovii</i>	Red-capped Robin		*	
<i>Melanodryas cucullata</i>	Hooded Robin (V)		*	
<i>Eopsaltria australis</i>	Eastern Yellow Robin	*		*
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler (V)	*	*	
<i>Pachycephala pectoralis</i>	Golden Whistler	*	*	*
<i>Colluricincla harmonica</i>	Grey Shrike Thrush	*	*	
<i>Grallina cyanoleuca</i>	Magpie-Lark	*	*	
<i>Rhipidura fuliginosa</i>	Grey Fantail	*	*	*
<i>Rhipidura leucophrys</i>	Willy Wagtail	*	*	*
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	*	*	
<i>Oriolus sagittatus</i>	Olive-backed Oriole		*	
<i>Cracticus torquatus</i>	Grey Butcherbird	*	*	
<i>Gymnorhina tibicen</i>	Australian Magpie	*	*	*
<i>Strepera graculina</i>	Pied Currawong	*		*
<i>Corvus coronoides</i>	Australian Raven	*	*	*
<i>Struthidea cinerea</i>	Apostlebird	*	*	
<i>Taeniopygia bichenovii</i>	Double-barred Finch	*	*	
<i>Neochmia modesta</i>	Plum-headed Finch	*	*	
<i>Sturus vulgaris</i>	Common Starling #	*	*	

* - Recorded
(V) - Listed vulnerable species.

With the exception of the five listed vulnerable species and the exotic species, all are protected native species.

5.3 Mammals

Table 11 lists the mammals caught in the traps deployed, identified from body tissues (including hair samples) and bones or observed in and around the Survey Area. The microbat species were identified from their ultra-sonic calls during the summer survey and the supplementary survey in Block "A".

Table 11
Mammals Recorded in and Around the Survey Area

Scientific Name	Common Name	Status
<i>Trichosurus vulpecula</i>	Brush-tailed Possum	P
<i>Wallabia bicolor</i>	Swamp Wallaby	P
<i>Macropus giganteus</i>	Eastern Grey Kangaroo	P
<i>Macropus rufogriseus</i>	Red-necked Wallaby	P
<i>Mus domesticus</i>	House Mouse#	U
<i>Oryctolagus cuniculus</i>	European Rabbit #+	U
<i>Vulpes vulpes</i>	European Red Fox#+	U
<i>Canis lupus familiaris</i>	Farm Dog	U
<i>Felis catus</i>	Feral Cat #+	U
<i>Nyctinomus (Tadarida) australis</i>	White-striped Mastiff-bat	P
Undescribed <i>Mormopterus</i>	Little Mastiff-bat (sp4 @ 25 kHz)	P
<i>Mormopterus planiceps</i>	Little Mastiff-bat (sp2 @29/30 kHz)	P
<i>Chalinolobus picatus</i>	Little Pied Bat	V
<i>Chalinolobus morio</i>	Chocolate Wattled Bat	P
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	P
<i>Nyctophilus gouldii</i>	Gould's Long-eared Bat	P
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	P
<i>Vespadelus vulturnus</i>	Little Forest Bat	P
<i>Scotorepens greyii</i>	Little Broad-nosed Bat	P
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail Bat	V
U = introduced P = protected native species V = vulnerable		

All terrestrial and arboreal species caught or observed were either protected native species or exotic (#) species. The exotic species recorded included the European Rabbit, European Red Fox and the Feral Cat which are listed a Key Threatening Processes (+) in NSW (TSC Act) and Federally (EPBC Act).

Of the 11 species of microbats that were recorded during the surveys, two are listed as vulnerable. A third listed vulnerable species, the Greater Long-eared Bat, *Nyctophilus timorensis*, has apparently been recorded in Leard State Forest by Croft (1979). This species was not recorded during this study.

5.4 Reptiles

Table 12 lists the reptiles that were caught in the traps and/or recorded during searches under rocks, logs and leaf litter as well as along creek banks and the edges of farm dams.

Table 12
Reptiles Recorded in the East Boggabri Survey Area

Scientific Name	Common Name	Status
<i>Morethia boulengeri</i>	Boulenger's Morethia	P
<i>Egernia striolata</i>	Tree-crevice Skink	P
<i>Varanus varius</i>	Lace Monitor	P
<i>Menetia greyii</i>	Dwarf Skink	P
<i>Heteronotia binoei</i>	Prickly Gecko	P
<i>Amphibolurus nobbi</i>	Nobbi Dragon	P
<i>Ctenotus robustus</i>	Robust Ctenotus	P
<i>Delma tincta</i>	Excitable Delma	P
<i>Gehyra variegata</i>	Variegated Dtella	P
<i>Tiliqua scincoides</i>	Common (Eastern) Bluetongue	P
<i>Chelodina longicollis</i>	Eastern Snake-necked Turtle	P

P = protected native species

All reptiles recorded during this survey are common protected native species.

6.0 DISCUSSION

The proposed East Boggabri Coal Mine will involve the removal of around 240ha of open cultivated paddocks, 43ha Open Woodland/Forest and 30ha regenerating revegetation dominated by White Cypress Pine (see GCNRC 2005c). In addition, a 20m strip of Flood Plain Community and native/naturalised grassland will be removed where the proposed transport route crosses Bollol Creek.

It is noteworthy that early analysis of the environmental sensitivities of the Survey Area and proposed transport route has identified and allowed a number of environmental safeguards to be incorporated in the mine layout to minimise potential adverse impacts on the fauna. (See **Figure 5** and Section 7.0).

The likely impact this loss of habitat will have on the native fauna, in particular the listed threatened species should be considered with the following factors in mind. Firstly, this area of the state is still overcoming the adverse effect of the recent drought conditions on the local fauna community. Secondly, there will be cumulative impacts from the commencement of the Boggabri Coal Project in the adjoining of native vegetation in Leard State Forest. Thirdly, it is also possible that because of the widespread nationwide drought condition, species like the Large Long-eared Bat and birds, that are usually found in the more arid region farther west may have moved east into areas that will normally be their marginal habitats to escape the dry conditions.

The proposed enhancement of adjoining areas to improve habitat patch quality and the conductivity and connectivity of habitat remnants for the wildlife corridors around the proposed mine area to nearby creek lines and remnant habitat patches will have positive effects on the local ecology and biodiversity (see **Figure 5**). The effect of this ameliorative proposal can be enhanced by early commencement of rehabilitation where possible.

The above notwithstanding, the likely adverse impact on listed threatened species by the proposed East Boggabri Coal Mine is discussed in Sections 6.1 to 6.7.

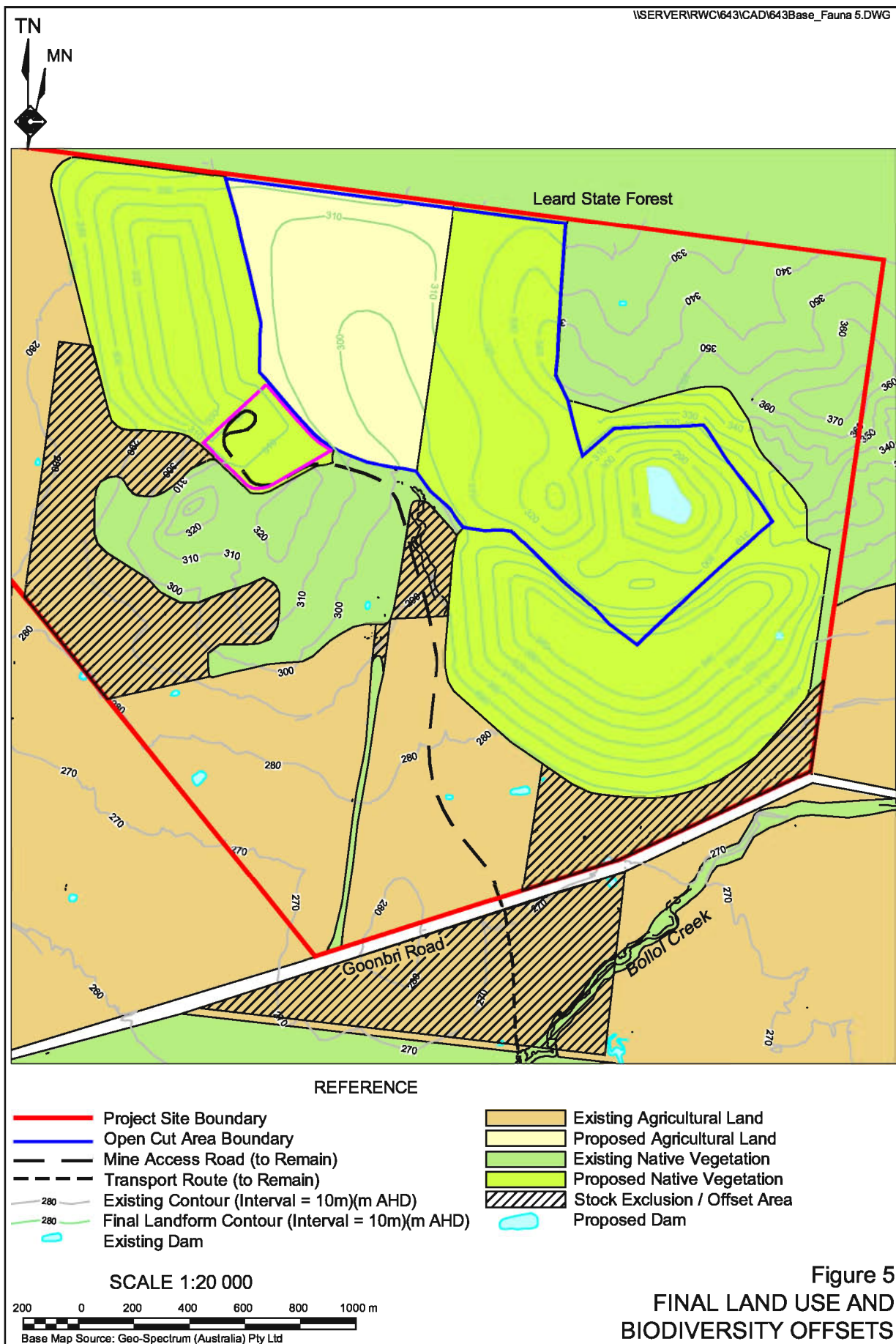


Figure 5
FINAL LAND USE AND
BIODIVERSITY OFFSETS

6.1 Likely Impact on Threatened Species

6.1.1 General Discussion

The regional threatened species checklist NPWS (2005) has no less than 1 frog, 17 bird, 10 mammal and 2 reptile species (see **Appendix 2**).

With regards to listed amphibians, no listed threatened frogs are known from the Boggabri region and none have been recorded from the immediate area to the Study Site. The only listed vulnerable frog, the **Booroolong Frog** is known from a record near Mt Kaputar and is confined to clear high mountain streams. The impact on this frog is thus not relevant to any consideration for this proposal that is located in undulating habitat of a different topographic character.

With regards to listed birds, the area of the proposed mine is neither a permanent wetland area nor is it associated with any extensive wetland. The proposal will thus be unlikely to significantly impact on any listed threatened wetland or wetland dependent species, like the **Freckled Duck**.

None of the listed threatened species that are associated with, or dependent on, wetlands are likely to be affected by this proposal as with the exception of the ephemeral Driggle Draggles Creek and Bollol Creek, albeit the latter still has permanent waterholes in it within sight distance of the proposed transport route, no wetland habitat exist in or adjoining the Survey Area.

Neither the **Malleefowl**, **Bush Thick-knee** nor the **Plains Wanderer** were recorded during the surveys. Due to the presence of foxes and the degraded understorey in the habitat remnants between the extensive areas of cleared cultivated paddocks, it is unlikely that any of these ground dwelling species will occur in the Survey Area, including the area associated with Bollol Creek where some native grassland still persists. The Survey Area is also arguably outside the historical range of the Malleefowl.

It is however noteworthy that the **Blue-billed Duck** was recorded near Gunnedah from a single vagrant (CES, 2002) and the **Black-necked Stork**, a vagrant from the coast has been recorded near Narrabri (NPWS, 2005).

Other than the **Grey Falcon**, which is discussed in detail in Section 6.1.4 of this report, the raptors and owls that are within the distribution range of the Survey Area and have been listed as threatened may use the area from time to time. However, none of these species were recorded during the surveys. All these species also have very large home ranges and are dependent on habitats with large trees, for example the River Red Gums along large rivers, with large tree hollows to roost and high prey density (or as in the case of the Grass Owl, grassland). None of these species are therefore likely to be significantly affected by the proposed mine extension.

The **Turquoise Parrot** was recorded feeding in the cleared paddock near the remnant tree galleries towards the southwestern end of the Project Site during the current surveys. It is known to have occurred nearby in recent years (see **Figure 4**). Notwithstanding that it is a nomadic species, the likely impact the proposed mine may have on this parrot is discussed in Section 6.2.4.

The listed endangered **Swift Parrot**, a species that is also listed in the EPBC Act, is nomadic in this part of its range. It is a winter visitor to the Australian mainland where it feeds on flowering Eucalypts opportunistically from southeastern Australia up to Queensland. There are no records of this species with 20km of the Project Site. In any case, the proposal will be unlikely to affect this parrot due to its opportunistic transient behaviour in this part of its habitat range.

There is a relatively recent (c 1998) record of the **Regent Honeyeater** in the Boggabri region (NPWS 2004) but it was not recorded during the surveys. The Northwestern slopes of NSW are arguably the western limits of this honeyeater's distribution with important breeding areas in the Warrumbungles National Park and Pilliga Nature Reserve to the southwest, and the Barraba District to the east of Gunnedah (see Ayers et al., 1996-99). This species, which is also listed in the EPBC Act, is expected to occur in the Survey Area only as a transient, if at all, and not as a viable local population. Thus, the species is unlikely to be affected significantly by the proposal.

Neither the **Pied Honeyeater** nor **Painted Honeyeater** were recorded during the surveys. The former species is dependent on a reasonable native shrub density with flowering species (eg. *Eremophila*, *Brachysema* and *Grevillea* spp.) The latter species is heavily dependent on Mistletoe. Neither are habitat characteristics that are significant features of the Survey Area and environs. These species are thus unlikely to occur at or near the Survey Area or be affected by the proposal.

Two other listed vulnerable species, the **Diamond Firetail** and **Speckled Warbler** were also not recorded during these surveys, although the former species was recorded in 1999 among the gilgai vegetation east of the existing Whitehaven Coal Mine. The latter species appears to be confined to undisturbed open woodland and adjoining areas. By comparison the former is a seedeater, that frequents woodland and forest with grassy understorey and a good shrub cover, especially near a water source. These habitats occur in the adjoining Leard State Forest and to some extent in Block "A". However, these areas have been selectively logged and the latter been subjected to the removal of fallen timber for firewood which have diminished their habitat patch quality.

As far as the listed mammals are concerned, it is unlikely that any of the listed presumed extinct species, including the **Bilby** and **Bridled Nailtail Wallaby**, will still be found in or near the Survey Area. Despite the long history of farming in the district, there are still persistent and recent unverified reports of Bilbies in the Boggabri region.

The Survey Area is also within range of the listed endangered **Black-striped Wallaby** that has been recorded in the recent surveys in the Bioregion (NPWS, 2002). However, this species was not recorded in the area during the surveys and there has not been any recent record of this species in the area. Given the well-established land use history of the Boggabri area since European settlement and the poor natural habitat quality around the Survey Area, it is most unlikely that this wallaby species and the listed vulnerable **Rufous Bettong**, a species that often occurs with this wallaby, will occur in the area. This notwithstanding, it is unlikely that these two macropods are likely to be significantly affected by this proposal which, with the exception of a small area of habitat in Block "A" and where the proposed transport route crosses Bollol Creek, will mostly only affect cleared land. These species are unlikely to occupy regenerating White Cypress Pine or the narrow roadside habitat corridors in and around the Project Site or the proposed transport route.

The surveys did not record the **Brush-tailed Rock Wallaby** or the **Long-haired Rat**. The former is confined to rocky outcrops and ledges or steep hill slopes. The distribution of the latter is confined to the semi-arid zone although it has been recorded historically in the eastern parts of NSW. It is a rodent that periodically occurs in plague density in the Channel Country of southwest Queensland, South Australia and the Northern Territory. Neither of these species are expected to be found in the Survey Area.

Of the listed vulnerable arboreal species, the **Koala** is subject to consideration under SEPP 44 and is dealt with in detail in Section 6.5 of this report.

It is arguable that Boggabri is too arid and too far west for the **Squirrel Glider** which has a habitat preference for a more mesic habitat with a denser shrub layer, a habitat type which is not present in the Survey Area. Along the proposed transport route the only habitat that could support this glider is along Bollol Creek where other than a 20m creek crossing for the proposed transport route, this habitat will be unaffected. This species was not recorded in the Survey Area and there is only one record of it near the eastern limit of region dating back to 1966. Given the habitat quality of the local environs, it is unlikely that this Squirrel Glider will occur in the area around the proposed mine or along the proposed haul route.

Despite extensive sampling, only 3 of the 4 listed vulnerable microbat species were recorded during the surveys. The likely impact of the proposal on the **Yellow-bellied Sheath-tail Bat**, a species also listed in the EPBC Act, and the **Little Pied Bat** are assessed in detail below in Section 6.2.2 of this report.

Arguably, the Boggabri region is probably on the eastern distributional limit of the Little Pied Bat and the Greater Long-eared Bat which are semi-arid zone species.

The Little Pied Bat has been recorded at the Whitehaven Coal Mine in 1999 (CES 2000). The likely impact of the proposal on the latter species is further discussed in Section 6.2.2 below. These species may therefore occur from time to time this far east of their normal range but it is unlikely to be significantly affected by the proposal in this marginal part of its range. It is probable that it has been driven farther east than it normally prefers by the recent drought.

There has also been an unverified recent record of the **Eastern Freetail-bat**¹ in the region (NPWS, 2002) but, despite extensive sampling, this species was not recorded during these surveys. The Survey Area will be at the western limit of the Greater Long-eared Bat, but as it is a mesic habitat species and is normally associated with coastal habitat, it is not expected to occur in the area of proposed mine site.

The listed vulnerable **Spotted Quoll** was identified as occurring in the region only from a single record in 1997 near Carroll Gap. There is no more recent record of this species in the Boggabri Region on the NSW database (NPWS, 2004). This species, although robust in its ability to use a variety of habitats, requires a reasonably dense ground cover and is thus not expected to occur in the Survey Area for lack of suitable habitat.

With regards to reptiles, there are early records of the Pale headed snake, *Hoplocephalus bitorquatus*, from around both Boggabri and Gunnedah (Swan pers. comm.) although the database has only one record in the region (NPWS, 2004). The Surveyed Areas is within its known range. This listed vulnerable snake is nocturnal and arboreal, using hollow limbs and lifting bark on mature standing trees. As it is largely a frog eater and it usually occurs along watercourses, both permanent and ephemeral. Given the lack of permanent watercourses

¹ Also called the Eastern Little Mastiff-bat (Parnaby 1992) or the East-coast Freetail bat (Churchill 1998)

around the Survey Area and a lack of any recent records of this species in the region, it is extremely unlikely this snake occurs on the Survey Area. The Survey Area itself did not provide any suitable habitat for this species which prefers a habitat of mature trees along watercourses with a thick understorey.

The listed endangered burrowing Five-clawed Worm Skink, *Anomalopus mackayi*, is reported in Hoser (1989) as occurring within the Boggabri region. The animal featured in his book is actually *Lerista punctatovittata*. *Anomalopus mackayi* has never been found in this region although it is known to occur around Narrabri. It is an inhabitant of open woodland with moist black soil and grass cover. This cracking self-mulching soil type habitat is not present in this region.

The Survey Area is also close to the range of another listed vulnerable reptile, the **Border Thick-tailed Gecko**, *Underwoodisaurus sphyrurus*. There are two recent records of this gecko in the region. However, this species essentially inhabits rocky wooded areas with large boulders, a habitat which is not present within the Survey Area.

Although there is no recent record of it in the region, as the proposed mine is within the Namoi River catchment, it is noteworthy to consider the likely impact of the proposal on the **Namoi River Elseya** or Bell's Turtle, *Elseya bellii* (Gray 1884). It is a listed vulnerable species, found between 700m and 800m AHD in the headwaters of the Namoi, Macdonald and Gwydir Rivers (Cann 1998 cf Ayers *et al* 1996-99). Cann (1998) discusses the *Elseya* species from mid-eastern Australia. He describes populations in the Namoi, Gwydir and MacDonald Rivers in NSW and in Bald Rock Creek in Queensland. He has put them together under *Elseya bellii* while recognising that there may be several species or sub-species involved. He noted further that:

"Their general habitats are narrow runs of river approximately 30m to 40m wide, adjoined by sheep and cattle grazing land. The terrain is granite country. The riverbed is sandy and rocky, with small beds of weed with many willow trees and gums along the banks. Rarely are the holes deeper than 3m." (at p212)

The Namoi River Elseya is unlikely to be found within the Survey Area. No further consideration of listed threatened reptiles is thus warranted for this proposed mine.

The above notwithstanding, Section 5A assessments have been conducted on the vulnerable species that were recorded during the surveys or have a potential of occurring in the Survey Area given the habitat patch quality and the habitat types present. The following detailed assessments of the relevant species that have been recorded or likely to occur, and are not vagrant or transient species, are presented below as Sections 6.2.2 to 6.2.9.

6.1.2 Yellow-bellied Sheathtail Bat, *Saccolaimus flaviventris*

Saccolaimus flaviventris appears to be generally quite rare throughout its pan continental distribution, especially in southern latitudes. It is also apparently patchily distributed and in some areas, restricted to denser habitats (see Richards 1992 and 1993).

Breeding

Saccolaimus flaviventris breeds in summer, with a single young being weaned by the following early autumn (Chimimba and Kitchener 1987).

Foraging

This species forages primarily upon insects that are hunted by aerial intercept, as indicated by this species' long tapered wings (high aspect ratio) and a high wing loading. This fast flight with little manoeuvrability suggests that it uses its loud, long-range echolocation call, to capture insects by aerial interception.

Roosting

Saccolaimus flaviventris roosts only in large high tree hollows which are situated such that there is enough clear space beyond the entrance to allow an unencumbered drop until the bat attains normal flight speed during launching. It usually roosts in tree hollows or abandoned Sugar Glider nests as solitary individuals or in number less than 10 individuals (Richards 1995). Recently it has been found to sometimes roost in larger colonies, around 40 individuals (L.S. Hall, *pers. comm.*).

Movement / Migration

There is no information available in relation to movement or migration patterns on this species. Richards (1983c, 1995c) concluded that because some *S. flaviventris* were caught during the 1980s in situations where they appeared to be exhausted they might have been undertaking pre-winter migrations. This hypothesis has been repeated in other publications, including, for example, Ayers *et al.* (1996-99) but this was probably due to Lyssavirus infection that rendered them too exhausted to fly (Richards *pers comm*).

Dickman (1994, Table 2) considers that the status of this species is "stable" in western NSW, as does Stephens (1992) for the Murray Mallee area. By contrast, Ayers *et al.* (1996-99) identified the threats undermining the status of this species as being:

- clearing of old trees with hollows which eliminates roosting sites;
- grazing at severe levels which may reduce regeneration of roost trees; and
- predation by feral cats at roost sites may have localised impacts.

The bat call recordings indicate that this species forages and ranges extensively over the Project Area but roosting site emergence call patterns were recorded only in Block "A".

a) Whether the life cycle of a threatened species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

Considering that this species apparently forages over a wide range (Richards, unpublished) the temporary net effect of a loss of a small patch or patches of habitat may not be great.

It is unlikely that the removal of the Open Woodland/Forest habitat in the Survey Area will affect this species' life history in a manner that will cause its local extinction if the recommended safeguards in Section 7.0 are adopted. This proposed area of disturbance represents only a small portion of its normal extensive home range and the proposal will not preclude it from hunting and foraging over the surrounding area, notwithstanding the adjoining Boggabri Coal Project.

b) Whether the life cycle of an endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No threatened fauna population has been listed in this region under the TSC Act.

c) Whether a significant area of known habitat of a threatened species, population or ecological community in the region is to be modified or removed.

No threatened fauna population or community has been listed for this region thus no known habitat of a threatened fauna population or ecological community in the region will be affected by the proposed mine.

Some large trees will be lost, however, it is unlikely that the proposal will affect this species as only a few hollow-bearing trees will be lost.

d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The proposal will be unlikely to isolate the local population of yellow-bellied Sheath-tail Bat from any currently interconnecting or proximate areas of habitat of this species because of its mobility and large foraging ranges.

e) Whether critical habitat will be affected.

No critical fauna habitat has been listed in this region of NSW.

f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.

Given the broad distribution of this species, it will be expected to occur in all the reserves this region, as well as those in coastal areas of the State.

g) Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.

Mining has been identified an activity that forms part of a listed Threatening Process that has been listed under the TSC Act – the Clearing of Native Vegetation as defined in the final determination of the scientific committee.

With this in mind, the amount of native vegetation of high habitat value to fauna that needed to be cleared has been kept to a minimum and extensive safeguards have been proposed for this mine proposal (see Section 7.0).

h) Whether any threatened species, population or ecological community is at the limit of its known distribution.

The Survey Area is not at the limit of this listed vulnerable bat which has an extensive distribution ranging over the Eastern and Northern half of the Australian Continent.

In summary, the proposed mine is unlikely to significantly adversely affect the Yellow-bellied Sheath-tail Bat, especially in the long-term and with the implementation of the recommended safeguards of Section 7.

6.1.3 Turquoise Parrot *Neophema pulchella*

The Turquoise Parrot is small grass parrot that has been listed as a vulnerable species. A small flock of this bird was observed feeding in the late afternoons on the ground in the paddocks near the gate to Goonbri Road in the southwestern corner of the Project Site. There are no less than 33 recorded locations for this parrot in the region.

Higgins *et al.* (1999) noted that this species can be found mainly in the western foothills of the Great Dividing Range and sometimes the nearby plains.

Chaffer and Miller (1946) traced the history of this species' abundance last century and the recognition from late 1890s into the 1920s that the species had already suffered a major decline in numbers and distribution. However, Frith (1952) reported that since Chaffer and Miller (1946) the species has been reported from other localities and appears to be increasing in numbers and distribution. This continued increase in numbers was also recorded by McGill (1960) who noted that in some parts of New South Wales the Turquoise Parrot even outnumbered the well-known Red-rumped Parrot. The species is considered to be partly-nomadic, locally common and with numbers consolidating (Pizzey and Knight 1998).

Breeding

The Turquoise Parrot breeds in August-December and may also breed in the April-May period (Pizzey and Knight 1998).

The nest is usually in a stump or hollow tree spout usually within 2m of the ground but it may even nest in logs lying on the ground (Quin and Baker-Gabb 1993, cited in Smith *et al.* 1995). Clutch size is 4 to 5 white rounded eggs (Pizzey and Knight 1998).

Foraging

Observations of feeding indicate that seeds of grasses and small herbs are the main component in the diet. Grass species include; Wire Grass, *Aristida sp.*, Wallaby Grass, *Danthonia semiannularis*, Barley Grass, *Hordeum murinum**. Also near Sydney birds were seen eating spore cases of a moss. Herbs include Variable Grousel, *Senecio lautus*, Blue Heliotrope, *Heliotropium amplexicaule**, Chick-weed, *Stellaria media**, Wild Mustard, *Sisymbrium sp.**, Stinging Nettle, *Urtica urens**, Saffron Thistle, *Carthamus lanatus**, and the shrubs *Dillwynia sp.* and Bearded Heath, *Leucopogon microphyllus* (Chaffer and Miller 1946, Frith 1952, Morris 1980). [Asterisks indicate introduced species.] In addition to seed and vegetable matter, Turquoise Parrots also include pollen, nectar, fruits, insects, and insect larvae in their diet (Frith 1977).

Nesting

Nesting habitat requirements appear to be woodland with open grassy areas and close proximity to permanent water. The apparent preferred habitat is woodland, typically with numerous dead trees with vertical hollows, adjacent to permanent water and adjoining forested hills (see Higgins *et al.* 1999). Generally, the birds forage in open forest and grassy glades in woodland close to creeks with permanent water. The open forests of Yellow Box, White Box and Blakeley's Redgum appear to be favoured (Morris 1980). It also frequents habitats of open grassy woodland, coastal heaths, pastures with exotic grasses, roadsides and orchards (Pizzey and Knight 1998).

Movement / Migration

This species is generally sedentary (Higgins *et al.* 1999). The inland limit to its distribution in New South Wales is described as Moree-Nymagee-Hillston-Deniliquin (Pizzey and Knight 1998). Morris (1980) did not record any sightings west of a line from the Narrabri district to Gilgandra, Dubbo, Trundle, Condobolin and Mount Hope Nature Reserve, except for two breeding records, near Nymagee in 1970 and Broken Hill in 1969.

Threatening processes that affect this species are unclear but in the region of western NSW, the major threat is arguably dryland cropping. Threats also include grazing through reduction in seed supply, timber cutting and frequent fires which reduce nest site abundance, and predation by foxes and cats (Smith *et al.* 1995, Ayres *et al.* 1996-99).

a) Whether the life cycle of a threatened species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

The area where this parrot was recorded will not be affected by proposal, albeit it is an area that is subjected to cropping. Only a small area of native grassland (4ha) - that is not subjected to cropping - will be impacted upon by the transport route crossing at Bollol Creek. With the enhancement of the habitat corridors and removal in the designated area of the grassland from stock grazing it is unlikely that the proposed activity will significantly impact the local population of this grass parrot.

b) Whether the life cycle of an endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No threatened fauna population has been listed in this region under the TSC Act.

c) Whether a significant area of known habitat of a threatened species, population or ecological community in the region is to be modified or removed.

The proposal will remove or modify some feeding habitat on the edge of the woodland/forest area of this bird. cursory inspections of mature trees with hollows that have been proposed for removal did not locate any nesting site of this parrot in the proposed mine.

No threatened fauna population or community has been listed for this region.

d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The proposal will be unlikely to isolate the local population of Turquoise Parrot from any currently interconnecting or proximate areas of habitat of this semi-nomadic bird.

e) Whether critical habitat will be affected.

No critical fauna habitat has been listed in this region of NSW.

f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.

The Cocoparra National Park is located within the range of the Turquoise Parrot and birds are known from that area and from Round Hill Nature Reserve. Turquoise Parrots are also present in the Mt. Kaputar, Goobang and Warrumbungle National Parks as well as Curembenya Nature Reserve (Morris 1980 and Ayers *et al* 1966-99).

g) Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.

Mining has been identified as an activity that forms part of a listed Threatening Process that has been listed under the TSC Act – the Clearing of Native Vegetation as defined in the final determination of the scientific committee.

With this in mind, the amount of native vegetation of high habitat value to fauna that needed to be cleared has been kept to a minimum and extensive safeguards have been proposed for this mine proposal (see Section 7.0).

Except for the removal of some mature trees (see further discussion below in Section 6.3), the proposed activity will not constitute any listed key threatening processes directly, or contribute to them significantly.

h) Whether any threatened species, population or ecological community is at the limit of its known distribution.

The Survey Area is not at the distribution limit of this species which extends over much of the eastern half of NSW (see Morris 1980, Ayers *et al* 1996-99 and Higgins *et al* 1999).

In summary, the proposed mine is unlikely to significantly adversely affect the Turquoise Parrot especially in the long-term and with the implementation of the recommended safeguards of Section 7.

6.1.4 Grey Falcon, *Falco hypoleucos*

Falco hypoleucos was observed within sight distance of the Project Site. It has also been recorded locally in this valley (see CES 2000 and pers. obs.). This species has a widespread distribution that extends throughout NSW and in recent times, been recorded as breeding only along major inland waterways (see Ayers *et al.* 1996-99).

Despite extensive searches, no nest of this falcon was located in, or within sight distance of, the Survey Area.

Breeding

It breeds in summer and sometimes, even during a drought. Adult pairs appear to be mostly sedentary.

Foraging

It forages mainly over open shrubland and feeds mainly on grassland birds, some rodents and lizards.

Nesting

It usually nests in large Eucalypt trees along major watercourse in the inland of the State.

Movements

Outside nesting seasons, this species occurs along major inland waterways and over the semi-arid shrublands, except in areas of "waterless deserts". The Survey Area is probably near the eastern limit of its distributional range where it is known only as a vagrant.

The threats to this species were identified in Ayers *et al.* (1996-99) to include:

- Clearing of mature trees close to watercourses or floodplains and in drought refugia (eg. Murray-Darling confluence).
- Cultivation that results in fragmentation of habitat, which in turn affects the abundance and variety of prey species.
- DDT – related eggshell thinning. Since this pesticide is now completely banned in Australia, this threat is no longer relevant.

- Egg collecting. This is, however, a law enforcement issue and has no relevance in any consideration of this mining proposal.
- Competition from other Falcon species which is problematic (J Brickhill *per comm.* in Ayers et al 1996-99)

a) Whether the life cycle of a threatened species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

Except for the removal of some mature trees (see discussion in Section 6.3), the proposal will not directly or indirectly significantly contribute to any of these threatening processes identified above.

The viable local population of *Falco hypoleucos* in the region, if any, will only be found along the Namoi River. At best, the Survey Area will represent a minute part of its foraging habitat during its breeding season.

It is therefore unlikely that the proposal will significantly impact upon this falcon adversely.

b) Whether the life cycle of an endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No threatened fauna population has been listed in this region under the TSC Act.

c) Whether a significant area of known habitat of a threatened species, population or ecological community in the region is to be modified or removed.

No threatened fauna population or community has been listed for this region.

No shrubland or large trees in a riparian zone will be significantly affected. Some large trees will be lost in the Open Woodland/Forest habitat on the proposed mine (see Section 6.3). It is unlikely that the proposed clearing of 77ha of native vegetation, including some native grassland, will adversely affect this species in this part of its distribution range where it is most probably a vagrant.

d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The proposal is unlikely to isolate the habitat of the Grey Falcon from any currently interconnecting or proximate areas of habitat of this species due to its wide ranging habitats in this part of its distribution range and its semi-nomadic and vagrant behaviour.

e) Whether critical habitat will be affected.

No critical fauna habitat has been listed in this region of NSW.

f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.

This species is expected to be represented in Sturt NP, Kinchega NP, Nocolleche NR, Wanarring NR, Mallee Cliffs NR and Wallandra NP in the semi-arid zone of NSW.

g) Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.

Mining has been identified an activity that forms part of a listed Threatening Process that has been listed under the TSC Act – the Clearing of Native Vegetation as defined in the final determination of the scientific committee.

With this in mind, the amount of native vegetation of high habitat value to fauna that needed to be cleared has been kept to a minimum and extensive safeguards have been proposed (see Section 7.0).

h) Whether any threatened species, population or ecological community is at the limit of its known distribution.

The Survey Area is not at the distributional limit of this species which ranges over most of semi-arid NSW, especially in areas where suitable riparian habitat are available for nesting.

In summary, the proposed mine is unlikely to significantly adversely affect the Grey Falcon.

6.1.5 Grey-crowned Babbler, *Pomatostomus temporalis*

Pomatostomus temporalis was recorded on the Survey Area and in the habitat nearby. It has also been recorded elsewhere in the region (NPWS 2004) and will be affected by the proposed mine.

“Grey-crowned Babblers occupy open woodland dominated by mature eucalypts, with tall shrubs, and intact ground cover of grass and forbes...” (Scientific Committee Final Determination 26 October 2001).

Breeding

This babbler is a communal breeder and breeds co-operatively most times of the year, except in autumn, in sedentary family groups of 2 to 13 birds.

Foraging

This babbler is insectivorous and forages in leaf litter and on bark of trees. Home ranges vary from less than 2ha in high rainfall areas to over 50ha in semi-arid woodland habitats.

Nesting

This Babbler builds conspicuous dome-shaped nests in dead or partly living trees in Eucalypt woodlands.

Movements

No seasonal movement is apparent in this species and family groups seem to occupy an area permanently.

The threats to this species has been identified as “habitat degeneration due to weed invasion” and “grazing by stock and clearance and fragmentation of habitat, including removal of dead timber” (NSW 2001). These threats have lead to a reduction in family group (viz family) size and increasing isolation of populations (viz genetic isolation and inbreeding).

a) *Whether the life cycle of a threatened species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.*

The areas of Open Woodland in which the *P. temporalis* has been observed to occur will be preserved (see Section 7.0 and **Figure 5**).

Notwithstanding that the areas where Grey-crowned Babblers have been observed will be preserved, an area of Open Woodland/Forest of 43ha will be removed along with a 30ha patch of regenerating White Cypress Pine. However, it will probably alter the behaviour of the family group in the remaining habitat but this will be ameliorated by the improvement in the habitat patch quality in the surrounding remaining Open Woodland from the on-going rehabilitation and proposed ameliorative planting (see **Figure 5**).

It is thus unlikely that the proposed mine will affect this species significantly as there is probably sufficient Open Woodland/Forest habitat in the surrounding remnants to support this local babbler family.

b) *Whether the life cycle of an endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.*

No threatened fauna population has been listed in this region under the TSC Act.

c) *Whether a significant area of known habitat of a threatened species, population or ecological community in the region is to be modified or removed.*

This proposal does not involve the removal or modification of a significant area of this Babbler's known habitat on the Project Site (see **Figure 5**).

No threatened fauna population or community has been listed for this region.

d) *Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.*

The proposed disturbance will be unlikely to isolate any local population of this babbler from any currently interconnecting or proximate areas of habitat of this species because of its mobility through its ability to fly between patches of habitat.

e) *Whether critical habitat will be affected.*

No critical fauna habitat has been listed in this region of NSW.

f) *Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.*

This species is poorly represented in conservation reserves as it occurs in the woodland habitat on richer soils on plains and undulating terrain that are favoured for agriculture.

g) *Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.*

Mining has been identified an activity that forms part of a listed Threatening Process that has been listed under the TSC Act – the Clearing of Native Vegetation as defined in the final determination of the scientific committee.

With this in mind, the amount of native vegetation of high habitat value to fauna that needed to be cleared has been kept to a minimum and extensive safeguards have been proposed for this mine proposal (see Section 7.0 below).

h) Whether any threatened species, population or ecological community is at the limit of its known distribution.

The Survey Area is near the southern edge of the Brigalow South Bioregion and is not at the distributional limit of this vulnerable Babbler species which is known to occur in suitable habitat over most of eastern half of NSW.

In summary, the proposed activities are unlikely to significantly impact adversely upon a local population of the Grey-crowned Babbler, especially in the long-term.

6.1.6 Hooded Robin, *Melanodryas cucullata*

A single record was made of *Melanodryas cucullata* to the northeast end of the Project Site during the winter survey in an area White Cypress Pine regeneration adjoining Block "A". This habitat patch will be affected by the proposed open cut area. This robin was not observed again on any of the subsequent visits to the Survey Area.

This robin is known to inhabit *Acacia* shrubs, woodland and mallee (Blakers *et al* 1981). It appears to only make local moves between the hills in summer to the adjacent lowland in winter. It often breeds communally, sometimes forms mixed flocks with other robins, has a home range of about 2.0ha and only persists in larger woodland remnants.

(a) Whether the life cycle of a threatened species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

There is no evidence to suggest that there is a viable local population of this robin in the Survey Area as evident by its absence on subsequent visits in spite of targeted searches for it in the areas along Leard State Forest especially the adjoining area known as Block "A" and the regenerating White Cypress Pine stand where it was last sighted.

The area of Open Woodland to the east where this robin was observed and the adjoining area in Leard State Forest will be unaffected by this proposal or the Boggabri Coal Project (see **Figure 2**). The proposed disturbance may alter the movement of this robin in the Project Site itself. It is unlikely that this proposed mine will adversely impact upon the long term viability of a local population of this robin given that the Project Site is only a wintering habitat and the biodiversity offset and rehabilitation that has been proposed will in the long term improve the habitat quality in the areas designated for this purpose (see **Figure 5**).

(b) Whether the life cycle of an endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No listed endangered fauna population is listed around region.

(c) Whether a significant area of known habitat of a threatened species, population or ecological community in the region is to be modified or removed.

Given the limited extent and poor patch quality of open woodland/forest remnants around Project Site due to heavy grazing of its understorey, it is unlikely that the clearing of open woodland/forest will amount to a significant area of habitat for this bird. There is a relatively large amount of open woodland/forest still remaining in the adjoining Leard State Forest (see **Figure 2**).

No threatened fauna population or ecological community has been listed in the Gunnedah/Boggabri area.

(d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

Notwithstanding the cumulative clearing of native vegetation and increasing fragmentation from progressive changes in the land use around the Survey Area, it is unlikely to isolate any woodland remnants around the Survey Area with the preservation and enhancement of existing habitat corridors (See **Figure 5**).

(e) Whether critical habitat will be affected.

No critical habitat has yet been listed in the Act in the region.

(f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas in the region).

Threatened fauna habitats are poorly represented in areas of richer soil types in the region.

(g) Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.

“Mining operation” is included in the range of activities that contribute to the listed key threatening process, the Clearing of Native Vegetation.

The proposal is, however, unlikely to contribute or further augment the adverse impact of exotic predators that have been listed as Key Threatening Processes on the native fauna, such as the impact of the Red Fox and Feral Cat given the long history of land use in the region.

(h) Whether any threatened species, population or ecological community is at the limit of its known distribution.

The area around Boggabri is not at the limit of the known distribution of this robin whose range extends over most of NSW except the north coast.

In summary, the proposed activities are unlikely to significantly impact adversely upon a local population of this robin, especially in the long-term.

6.1.7 Black Cockatoo, *Calyptorhynchus lathami*

Calyptorhynchus lathami was recorded feeding in the remnant patch of *Casuarina cristata* in the Survey Area during the winter survey. The local population of this bird appears to forage over most of this undulating valley between Goonbri and Kelvin Range where Leard and Vickery State Forest are located. Although there are few records of this bird in the region, it is common in the Pilliga forest less than 40km to the west of the Project Site.

Calyptorhynchus lathami is a tree hollow nester and apparently feeds almost exclusively on *Casuarina* and *Allocasuarina* (see NPWS, 1999). It is often observed to seek out and feed on the larger stands of these trees on hill sides and valley slopes.

(a) Whether the life cycle of a threatened species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

As the area of the proposed mine does not have any large hollow bearing trees and the only stand of mature *Casuarina* will be preserved, the proposed mine is thus unlikely to significantly affect *Calyptorhynchus lathami*.

(b) Whether the life cycle of an endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No Endangered or Vulnerable fauna population has been listed in this region under the TSC Act.

(c) Whether a significant area of known habitat of a threatened species, population or ecological community in the region is to be modified or removed.

The area of proposed disturbance does not contain any significant area of habitat suitable for *Calyptorhynchus lathami* as it contains only one stand of *Casuarina* and no potential nesting trees.

No threatened fauna population and or fauna ecological community is listed for this region.

(d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The Survey Area does not constitute a significant wildlife corridor for the habitats on either side of the ridgeline in this valley. The proposed mine is unlikely to affect the conductivity and connectivity between habitat patches in the undulating valley between the Goonbi and Kelvin Range.

(e) Whether critical habitat will be affected.

No critical fauna habitat has been listed under the TSC Act in this region.

(f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas in the region).

The original native fauna habitat type on the area of proposed mine is not well represented in reserve in the region (see Cox 2002 and NPWS 2002).

(g) Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.

Mining has been identified an activity that forms part of a listed Threatening Process that has been listed under the TSC Act – the Clearing of Native Vegetation as defined in the final determination of the scientific committee.

With this in mind, the amount of native vegetation of high habitat value to fauna that needed to be cleared has been kept to a minimum and extensive safeguards have been proposed (see Section 7.0).

(h) Whether any threatened species, population or ecological community is at the limit of its known distribution.

The Survey Area is not at the limit of the known distribution of *Calyptorhynchus lathami* (see NPWS (1999)).

In summary, the proposed mine is unlikely to significantly adversely affect *Calyptorhynchus lathami* with the proposed safeguards suggested in Section 7.0.

6.1.8 Greater Long-eared Bat, *Nyctophilus timoriensis*

There is little known of the biology of this species (see NPWS 1996-99). The taxonomic evidence however showed that, although in earlier publications showed it to be distributed over southern Australia, this taxon is in fact a complex of three or four species. One of these is basically restricted to the Murray-Darling Basin (Richards pers comm.).

Nyctophilus timoriensis was not recorded in the project area from any capture. Due to the impossibility of separating the calls of *Nyctophilus* species and as a precaution it has been considered to occur locally. The species is known to be quite rare, though this in part may be related to the difficulty of capture and detection in the relatively open vegetation that it inhabits. There are probably only about 20 verifiable localities in NSW where it occurs. Croft (1979) apparently recorded in Leard State Forest. It is a large *Nyctophilus* and should not have been confused with other sympatric long-eared bats in the region.

In a general discussion of conservation status, Dickman (1994, Table 2) considers this species to be stable in western New South Wales. Lumsden *et al* (1995) proposed that "... the ability of bats to fly, their spatial scale of movement and their social organisation (e.g. their overlapping foraging areas, colonial roosting habits, interspecific tolerance) are key factors that enable these species to live successfully within the farmland environment and that have prevented regional extinctions ...". The Murray-Darling Basin form of *N. timoriensis* has been listed as Vulnerable in the draft national Bat Action Plan (Richards and Hall 1996).

Breeding

This species probably bears twin young like other *Nyctophilus* spp in summer (see Richards 1995).

Foraging

This bat with long ears and a low wing aspect ratio, providing slow but highly manoeuvrable flight primarily gleans insects from the ground. It is highly probable that if this species is present in the Project Area it occurs along the habitat corridors and remnant patches of Open Woodland/Forest, especially in Block "A".

Roosting

Long-eared bats appear to be quite flexible in their roost selection, but have a predilection for tree hollows, exfoliating bark, or dense foliage (Richards pers comm.).

Movement / Migration

There is no knowledge of any movement or migration patterns that this species may exhibit. However, given its flight morphology characteristics, it is unlikely to undertake the long distance migrations noted for high wing aspect ratio species.

(a) Whether the life cycle of a threatened species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

It is unlikely that the removal of the Open Woodland/Forest habitat on the Project Site will affect this species' life history in a manner that will cause its local extinction if the recommended safeguards in Section 7.0 are adopted. This proposed mine represents only a small portion of its normal extensive home range and the proposed disturbance will not preclude it from hunting and foraging over the surrounding area, notwithstanding the adjoining Boggabri Coal Project.

b) Whether the life cycle of an endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No threatened fauna population has been listed in this region under the TSC Act.

c) Whether a significant area of known habitat of a threatened species, population or ecological community in the region is to be modified or removed.

No threatened fauna population or community has been listed for this region thus no known habitat of a threatened fauna population or ecological community in the region will be affected by the proposal.

Some large trees will be lost, however, it is unlikely that the proposed disturbance over 73ha will affect this species as only few hollow-bearing trees will be lost.

d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The proposed activity will be unlikely to isolate any local population of *N. timoriensis* from any currently interconnecting or proximate areas of habitat of this species because of its mobility and large foraging ranges.

e) Whether critical habitat will be affected.

No critical fauna habitat has been listed in this region of NSW.

f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.

Given the broad distribution of this species, it will be expected to occur in all the reserves this region, as well as those in coastal areas of the State.

g) Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.

Mining has been identified an activity that forms part of a listed Threatening Process that has been listed under the TSC Act – the Clearing of Native Vegetation as defined in the final determination of the scientific committee. With this in mind, the amount of native vegetation of high habitat value to fauna that needed to be cleared has been kept to a minimum and extensive safeguards have been proposed (see Section 7.0).

h) Whether any threatened species, population or ecological community is at the limit of its known distribution.

The Survey Area is not at the limit of this listed vulnerable bat which has an extensive distribution ranging over the eastern and northern half of the Australian Continent.

In summary, the proposed mine is unlikely to significantly adversely affect the Greater Long-eared Bat with the proposed safeguards suggested in Section 7.0.

6.1.9 Little Pied Bat, *Chalinolobus picatus*

Chalinolobus picatus was recorded only in Block "A" and only from 2 discrete call sequences from an over-night recording session.

This bat is very patchily distributed and quite rare. Dickman (1994, **Table 2**) considers that the status of this species is "stable" in western NSW, and Stephens (1992) likewise for the Murray Mallee area (cf. Ayers *et al* (1996-99).

Breeding

Very little else is known about the breeding biology of this species other than it is a summer breeder and most probably bears 2 young in a litter like other *Chalinolobus* species. (Richards 1983a, 1995a).

Foraging

This species can be assumed to forage primarily upon insects that hunted by aerial pursuit, which is indicated by morphological characters that reflect this type of hunting, such as its wing aspect ratio and wing loading.

Roosting

Chalinolobus picatus was once thought to be an obligate cave-dweller and require caves or their substitutes for roosting, but has also been found in buildings (Hall and Richards 1979) including a report of about 40 in breeding colony behind an open sliding door in an old building at Yathong Nature Reserve (Richards pers comm.).

Movement / Migration

There is no information available on its movement or migration patterns. Dwyer (1966) concluded that like the females of a sibling species, *C. dwyeri*, it will separate from most of the males in a regional population during the summer breeding season and by the following autumn the breeding colony would have dispersed.

(a) Whether the life cycle of a threatened species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

It is unlikely that the removal of the Open Woodland/Forest habitat from the Survey Area will affect this species' life history in a manner that will cause its local extinction if the recommended safeguards in Section 7.0 are adopted. This proposed mine represents only a small portion of its normal extensive home range and the proposed disturbance will not preclude it from hunting and foraging over the surrounding area, notwithstanding the adjoining Boggabri Coal Project.

b) Whether the life cycle of an endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No threatened fauna population has been listed in this region under the TSC Act.

c) Whether a significant area of known habitat of a threatened species, population or ecological community in the region is to be modified or removed.

No threatened fauna population or community has been listed for this region thus no known habitat of a threatened fauna population or ecological community in the region will be affected by the proposal.

Some large trees will be lost, however, it is unlikely that the disturbance will affect this species as only few hollow-bearing trees will be lost.

d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

The proposed disturbance is unlikely to isolate the local population of the Little Pied Bat from any currently interconnecting or proximate areas of habitat of this species because of its mobility and large foraging ranges.

e) Whether critical habitat will be affected.

No critical fauna habitat has been listed in this region of NSW.

f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.

Given the broad distribution of this species, it will be expected to occur in all the reserves this region, as well as those in coastal areas of the State.

g) Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.

Mining has been identified an activity that forms part of a listed Threatening Process that has been listed under the TSC Act – the Clearing of Native Vegetation as defined in the final determination of the scientific committee.

With this in mind, the amount of native vegetation of high habitat value to fauna that needed to be cleared has been kept to a minimum and extensive safeguards have been proposed (see Section 7.0).

h) Whether any threatened species, population or ecological community is at the limit of its known distribution.

The Survey Area is not at the limit of this listed vulnerable bat which has an extensive distribution ranging over the Eastern and Northern half of the Australian Continent.

In summary, the proposed mine is unlikely to significantly adversely affect the Little Pied Bat with the proposed safeguards suggested in Section 7.0.

6.1.10 Summary

As detailed in the assessments above, the proposal will be unlikely to significantly affect the listed threatened species found or likely to occur in or around the proposed mine. Therefore no SIS should be warranted.

6.2 EPBC Act - Considerations

6.2.1 Introduction

It is noteworthy that in the EPBC Act, the considerations of Commonwealth listed threatened species apply to all land, including Commonwealth land and Territories, and to Commonwealth related activities. Thus, these matters are considered below as to whether the proposed activity will constitute a controlled action.

6.2.2 Listed Threatened Species

The species listed in the EPBC Act for the Survey Area are included in Section 6.1 above and bear no need for repetition here.

6.2.3 Listed Migratory Species

The White-breasted Sea Eagle, *Haliaeetus leucogaster*, is predominantly a coastal and estuarine species but also occurs in inland waterways where there are sufficient fish in the lakes and rivers for it to persist. The proposed mine does not involve or have any direct or indirect impact on any wetland thus it will have no impact on the White-breasted Sea Eagle.

The White-throated Needletail, *Hirundapus caudacutus*, is a migratory species that spends almost all of its time in the air over the Australian Continent. However, it opportunistically roosts in tall trees from time to time. The removal of native vegetation comprising Open Box Woodland/Forest and a small area of native grassland will be unlikely to have any direct or indirect impact on this mostly aerial species.

The Regent Honeyeater is also listed as a threatened species under the TSC Act (see Section 6.1.1).

The Satin Flycatcher, *Myiagra cyanoleuca*, is a species that inhabits Eucalypt Woodland and migrates north in winter. It breeds in the wetter areas with dense vegetation and moves to drier habitats once the young are out of the nest. There is some Open Box Woodland/Forest that will be affected by the proposed mine. This species was not observed in Block "A" or any where else on the Survey Area.

Any likely adverse impact on this species will be minimised through minimising the removal of Open Woodland/Forest remnants (see Section 7.0 and **Figure 5**). In this part of its range where *M. cyanoleuca* is nomadic and the removal of limited areas of Open Box Woodland/Forest is unlikely to cause a significant impact on the Satin Flycatcher.

6.2.4 Listed Wetland Species

The proposal is also unlikely to affect the listed migratory wetland species for the following reasons.

The Painted Snipe, *Rostratula benghalensis* and its congeneric, the listed Vulnerable Australian Painted Snipe, *R. australis*, are species that forage in mudflats and nest among the vegetation in shallow water. This type of wetland habitat does not occur on or near the Project Site. The proposal will therefore be unlikely to affect this species.

Latham's Snipe, *Gallinago hardwickii*, is a species that usually forages in muddy edges of freshwater swamps and pools, and occupies wet grass and heath. This species is unlikely to use the areas in the Survey Area as the low-lying area has been contoured and cropped.

6.2.5 Listed Marine Species

These species have already been included in the discussions in Section 6.3.3 and Section 6.3.4 and bear no need for repetition here.

6.2.6 Listed Key Threatening Processes

The European Red Fox, Feral Cat and the European Rabbit are listed as key threatening processes listed under the EPBC and TSC Acts.

The proposal is likely to have an adverse impact on the Feral Cat, European Red Fox and European Rabbit populations in the area by denying them the free foraging range of the open pastures. This will assist in reversing some of the effects of the adverse impact these exotic species have on local native fauna.

The implications of Key Threatening Processes that are listed under the TSC Act have been addressed in Section 6.1.1(g) to 6.1.8(g).

6.2.7 Summary

From the considerations above, the proposal will be unlikely to have any significant impact on matters that will constitute or could be construed to be a controlled action under the EPBC Act.

6.3 Native Vegetation Conservation

Some 43ha of the Open Box Woodland/Forest (**Habitat 1**), 30ha of regenerating *Callitris* (**Habitat 4**) and a small area of native grassland near Bollol Creek (part **Habitat 3**) will be removed for the proposed East Boggabri Mine and its loss is a relevant consideration under the NVC Act in relation to its impact on the local fauna habitat.

6.4 Cumulative Impact

The development and operation of the Boggabri Coal Project in Leard State Forest to the immediate north of the Project Site will require the removal of up to 1 200ha of native vegetation over the life of the project. During the proposed life of the proposed East Boggabri Coal Mine proposal (8 to 10 years), this will be restricted to approximately 350ha, roughly equivalent to the area that will be disturbed by the proposed East Boggabri Coal Mine. Given the location of the Boggabri Coal Project in Leard State Forest, the majority of the native vegetation that will be removed would be White Cypress Pine (*Callitris glaucophylla*) - Narrow-leaf Ironbark (*Eucalyptus crebra*) Forest Community, equivalent to Habitat 1 on the Project Site (Open Woodland/Forest habitat).

It is anticipated that this disturbance will include the initial setting up of the approved Boggabri Coal Project involving the proposed activity to establish the first years workings of the pit, establishment of their coal processing facilities, administrative areas and transport routes. This area of approximately 100ha, will represent a pulse impact from the development of the proposed East Boggabri Coal Mine and adjoining the Boggabri Coal Project.

The removal of the Open Woodland/Forest habitat over the subsequent 8 to 10 years with the two mines operating in tandem will contribute to the cumulative loss of woodland remnants in the areas on and surrounding the Project Site of up to 420ha (approximately 70ha on the Project Site and an additional 350ha in Leard State Forest). This loss will represent a press impact for the duration of the life of these mines and beyond.

If the recommended safeguards are adopted (see Section 7.0 below), including the removal of stock from those areas of the Project Site on the "Thuin" and "Forest View" properties, it will allow the regeneration of the habitat structure over these areas. This will improve the wildlife corridor connectivity and conductivity of the fauna habitat throughout the Project Site and in a north-south direction between the extensive woodland remnants in the remainder of Leard State Forest and the Flood Plain Vegetation Community in Bollol Creek.

Adverse impacts on the native fauna of the local area will therefore be ameliorated by the biodiversity offset strategy proposed (see **Figure 5**) including the minimisation of disturbance to existing native vegetation, the revegetation of disturbed areas with native tree shrub and grass species and the increase in habitat patch quality resulting from exclusion of stock grazing pressure in the designated areas.

6.5 SEPP 44 Koala Habitat Protection

Narrabri Local Government Area is listed under Schedule 1 of SEPP 44 and requires that any development application include an investigation to determine the presence of core Koala habitat within the areas of proposed disturbance. The vegetation community in the Survey Area contained two feed tree species, the Bimble Box, *Eucalyptus populnea*, and White Box, *Eucalyptus albens*, that are listed in Schedule 2 above 15% cover (see GCNRC 2005) but no Koala or sign of Koala was encountered during the current surveys.

Given the above and the proposed enhancement planting to be carried out, it is concluded that no significant area of potential or core Koala habitat is likely to be lost in the long term as a result of this proposed development. Hence, no further consideration of a Koala management plan pursuant to SEPP 44 is warranted.

6.6 ESD Principles

From the analysis in the preceding sections, it will appear unlikely that the proposal will adversely affect the biodiversity locally or otherwise. Therefore no issue of either intergenerational equity or value-added consideration relating to fauna or their habitats arises. The proposed development is thus consistent with ESD principles with respect to these matters.

The precautionary principle dictates that we should not ignore any factors that are well established and accepted in general principles, for lack of adequate data in a particular instance, and should act upon them.

The proposed East Boggabri Coal Mine will necessitate some clearing of native vegetation and it will have some short term cumulative effect on the diminishing habitat remnants that form a network of habitat patches between the surrounding properties and Leard State Forest.

In accordance with precautionary principles the adverse impact of this proposal on the native vegetation will be minimised by compensatory and ameliorative measures on the native vegetation and fauna habitat which are detailed in the Section 7.0 and as shown in **Figure 5**.

6.7 Biodiversity Hotspots

The Southern Brigalow Belt (SBB) has been nominated as one of the biodiversity hotspots on the Australian Continent. It is unclear as to how this nomination will impact upon state and federal planning instruments and legislation, other than facilitating more funding for relevant research in the nominated area.

In any case, as it is unlikely that this proposed mine will adversely impact on the biodiversity of the local fauna community, no further consideration with regards to the SBB as a nominal biodiversity hotspot is warranted.

7.0 RECOMMENDED SAFEGUARDS

7.1 Introduction

A number of safeguards can be put in place to minimise or ameliorate any adverse impact on the fauna in general and, in particular, on the listed threatened species that may occur in the area of proposed mine and the adjoining fauna habitats. These are as follows.

7.2 Project Site

- i) Removal of native vegetation, including regenerating White Cypress Pine patches, should be kept to a minimum.
- ii) The existing remnant stand of Belah, *Casuarina cristata*, should be preserved and fenced off to allow the patch to regenerate as a food resource for the Glossy Black Cockatoo.
- iii) The entire Project Site should be de-stocked to allow the grassy understorey to regenerate to improve the habitat patch quality for Grey-crowned Babblers in the remainder of the Survey Area that is in directly affected by the proposed mining activity.

- iv) Mining should progress from the least sensitive to the more sensitive areas where native vegetation and/or where listed species have been recorded.
- v) Where possible, tree removal, especially the larger mature trees, should be carried out in late spring and early autumn to avoid spring nesting birds and overwintering bats.
- vi) Pre-start inspections of mature trees for nesting birds and roosting bats where mature trees with hollows are to be removed should be conducted.
- vii) When located, nesting and roosting hollows, as well as nests, used by listed threatened species, should be relocated to appropriate locations nearby where possible.
- viii) Where possible live and dead felled and fallen timber should be left on the ground as fauna habitat.
- ix) No felled or fallen live or dead timber or vegetation debris of native vegetation should be buried or burned on site as a means of dispersal.
- x) Areas identified for biodiversity offsets in the final land use should be fenced off as soon as practicable to allowed the local native vegetation community with a grassy understorey to regenerate.
- xi) Post-mining rehabilitation of the open cut area should commence as soon as possible to allow re-establishment of the connectivity of habitat corridor from Leard State Forest to adjoining vegetation remnants
- xii) Where practicable, the northern and southern emplacements should be rehabilitated to a native vegetation community that is consistent with the adjoining Leard State Forest.
- xiii) An appropriate vertebrate pest control program should be included as part of this proposed mining operation and management plan in order to minimise the impact of species that have been listed as key threatening processes.

7.3 Proposed Transport Route

- i) The proposed transport route, where possible, should be located on an alignment through cleared cultivated paddocks to minimise further removal of native vegetation.
- ii) Creek crossings should use a causeway construction design that will not interfere with the natural flow of the creek.
- iii) Where the proposed transport route runs along existing roads, the clearing of native vegetation along the road shoulders should be kept to a minimum, where practical branches should be looped to preserve trees with overhanging branches.

- iv) Where the proposed transport route cuts across an existing road, and where possible it should be located in an alignment that does not necessitate the removal of any additional native trees.
- v) Any existing vermin-proof fence along the proposed transport route should be preserved to discourage native fauna from running on to the proposed transport route from areas of habitat cover.

8.0 CONCLUSION

Having given consideration to the above and the operation of the proposed open cut mine, we are of the opinion that the proposed activity is:

- i) unlikely to significantly affect any of the listed threatened species, fauna populations or communities;
- ii) unlikely to augment or significantly contribute to any of the Commonwealth or State listed key threatening processes in the long term;
- iii) unlikely to significantly affect any Ramsar wetland or any CAMBA or JAMBA internationally listed species;
- iv) unlikely to affect any core or potential Koala habitat; and
- v) consistent with ESD principles with regards to fauna and will not adversely affect the local biodiversity irreversibly.

Thus, the proposed mining activity should not be considered to constitute a controlled action and no SIS is warranted.

Some parts of the proposed transport route pass through potential Koala habitat (see GCNRC 2005). However, there is no evidence to suggest that it is core Koala habitat and only few listed feed trees will be removed for the construction of the road, hence no Koala Habitat Management Plan pursuant to SEPP 44 should be required.

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APPENDIX 1

EXTENDED FAUNA CHECKLIST FOR THE BOGGABRI/GUNNEDAH REGION

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Compiled from the NPWS Atlas of NSW Wildlife (Map Sheet 8936 1:100 000 – October 2004), Strahan (1995), Barrett (2003), Swan et al (2004), Robinson (1995), Parnaby (1992), Cogger (2000), Ayes *et al* (1996-99) and NPWS (1999).

FAUNA STATUS KEY (AFTER THREATENED SPECIES CONSERVATION ACT 1995 AND NATIONAL PARKS AND WILDLIFE ACT 1974):

E4- – PRESUMED EXTINCT
E1 – ENDANGERED
V – VULNERABLE
P – PROTECTED
U – UNPROTECTED (EXOTIC)
+ – NPWS BIOCLIMATIC PREDICTIONS
NCN – No Common Name

AMPHIBIAN

Common Name	Scientific Name	Status
Family HYLIDAE		
1. Water-holding Frog	<i>Cyclorana platycephala</i>	P
2. Rough Frog	<i>Cyclorana verrucosa</i>	P
3. Green Tree Frog	<i>Litoria caerulea</i>	P
4. Gunther's Frog	<i>Litoria latopalmata</i>	P
5. Peron's Tree Frog	<i>Litoria peronii</i>	P
6. Booroolong Frog	<i>Litoria booroolongensis</i>	V
7. Desert Tree Frog	<i>Litoria rubella</i>	P
Family LEPTODACTYLIDAE		
8. Trilling Frog	<i>Neobatrachus centralis</i>	P
9. Common Spadefoot Toad	<i>Neobatrachus sudelli</i>	P
Family MYOBATRACHIDAE		
10. Plains Froglet	<i>Crinia parinsignifera</i>	P
11. Common Eastern Froglet	<i>Crinia signifera</i>	P
12. Eastern Banjo Frog	<i>Limnodynastes dumerilii</i>	P
13. Long-thumbed Frog	<i>Limnodynastes fletcheri</i>	P
14. Ornate Burrowing Frog	<i>Limnodynastes ornatus</i>	P
15. Salmon-striped Frog	<i>Limnodynastes salmini</i>	P
16. Spotted Grass Frog	<i>Limnodynastes tasmaniensis</i>	P
17. Northern Banjo Frog	<i>Limnodynastes terraereginae</i>	P
18. Crucifix Frog	<i>Notaden bennettii</i>	P

Total Number of Amphibian Species = 18
Total Number of Endangered Amphibian = 1
Total Number of Vulnerable Amphibians = Nil
Total Number of Introduced Amphibians = Nil

BIRDS

Common Name	Scientific Name	Status
Family MEGAPODIIDAE		
1. Malleefowl	<i>Leipoa ocellata</i>	E1
Family ARDEIDAE		
2. Australasian Bitten	<i>Botaurus poiciloptilus</i>	V+
3. Black Bitten	<i>Ixobrychus flavicollis</i>	V+
Family ANATIDAE		
4. Magpie Goose	<i>Aneranas semipalmata</i>	V+
5. Pacific Black Duck	<i>Anas superciliosa</i>	P
6. Australian Wood Duck	<i>Chenonetta jubata</i>	P
7. Cotton-Pygmy Goose	<i>Nettaptus coiromandelianus</i>	E1+
8. Blue-billed Duck	<i>Oxyura australis</i>	V+
9. Freckled Duck	<i>Stictonetta naevosa</i>	V+
Family PHALACROCORACIDAE		
10. Great Cormorant	<i>Phalacrocorax carbo</i>	P
Family THRESKIORNITHIDAE		
11. Straw-necked Ibis	<i>Theskiornis sinicollis</i>	P
12. Sacred (or Australian White) Ibis	<i>Theskiornis aethiopica molucca</i>	(= P)
13. Yellow-billed Spoonbill	<i>Platalea flavipes</i>	P
Family ARDEIDAE		
14. Pacific (White-necked) Heron	<i>Ardea pacifica</i>	P
15. White-faced Heron	<i>Egretta novaehollandiae</i>	P
Family CICONIIDAE		
16. Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	V+
Family PANDIONIDAE		
17. Osprey	<i>Pandion haliaetus</i>	V+
Family ACCIPITRIDAE		
18. Black-breasted Buzzard	<i>Hamirostra melanostrmon</i>	V+
19. Square-tailed Kite	<i>Lophoictinia isura</i>	V+
20. Wedge-tailed Eagle	<i>Aquila audax</i>	P
21. Black-shouldered Kite	<i>Elanus axillaris</i>	P
22. Whistling Kite	<i>Haliastur sphenurus</i>	P
Family FALCONIDAE		
23. Red Goshawk	<i>Erythrotriochis radiatus</i>	V+
24. Brown Falcon	<i>Falco berigora</i>	P
25. Australian (Nankeen) Kestrel	<i>Falco cenchroides</i>	P+
26. Peregrine Falcon	<i>Falco peregrinus</i>	P
27. Grey Falcon	<i>Falco hypoleucos</i>	V+
28. Black Falcon	<i>Falco subniger</i>	P
Family GRUIDAE		
29. Brolga	<i>Grus rubicundus</i>	V+
Family OTIDIDAE		
30. Australian Bustard	<i>Ardeotis australis</i>	E1+
Family PEDIONOMIDAE		
31. Plains-wanderer	<i>Pedionomus torquatus</i>	V+
Family RALLIDAE		
32. Black-tailed Native-hen	<i>Gallinula ventralis</i>	P

Common Name	Scientific Name	Status
Family SCOLOPACIDAE		
33. Sanderling	<i>Calidris alba</i>	V+
34. Long-toed Stint	<i>Calidris subminuta</i>	P
Family CHARADRIIDAE		
35. Masked Lapwing	<i>Vanellus miles</i>	P
Family BURHINIDAE		
36. Bush Thick-knee (Curlew)	<i>Burhinus magnirostris</i>	E1+
Family ROSTRATULIDAE		
37. Painted Snipe	<i>Rostratula benghalensis</i>	V+
Family CHARADRIIDAE		
38. Mongolian Plover	<i>Charadrius mongolus</i>	V+
Family SCOLOPACIDAE		
39. Black-tailed Godwit	<i>Limosa limosa</i>	V+
Family COLUMBIDAE		
40. Bar-shouldered Dove	<i>Geopelia humralis</i>	P
41. Peaceful Dove	<i>Geopelia strpata</i>	P
42. Rock Dove	<i>Columba livia</i>	U
43. Diamond Dove	<i>Geopelia cuneata</i>	P
44. Crested Pigeon	<i>Ocyphaps lophotes</i>	P
Family CACATUIDAE		
45. Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	P
46. Galah	<i>Cacatua roseicapilla</i>	P
47. Little Corella	<i>Cacatua sanguinea</i>	P
48. Red-tailed Black Cockatoo	<i>Calyptorhynchus magnificus</i>	V+
49. Cockatiel	<i>Nymphicus hollandicus</i>	P
50. Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	V+
Family PSITTACIDAE		
51. Little Corella	<i>Cacatua sanguinea</i>	P
52. Superb Parrot	<i>Polytelis swainsonii</i>	V+
53. Swift Parrot	<i>Lathamus discolor</i>	E1+
54. Turquoise Parrot	<i>Neophema pulchella</i>	V+
55. Blue Bonnet	<i>Northiella haematogaster</i>	P
56. Red-rumped Parrot	<i>Psephotus haematonotus</i>	P
57. Australian Ringneck	<i>Barnardius zonarius</i>	P
58. Mulga Parrot	<i>Psephotus varius</i>	P
Family TYTONIDAE		
59. Barn Owl	<i>Tyto alba</i>	P
60. Eastern Grass Owl	<i>Tyto longimembris</i>	V+
61. Masked Owl	<i>Tyto novaehollandiae</i>	V+
Family STRIGIDAE		
62. Barking Owl	<i>Ninox connivens</i>	V+
63. Powerful Owl	<i>Ninox strenus</i>	V+
Family PODAGIDAE		
64. Tawny Frogmouth	<i>Podargus strigoides</i>	P
Family CAPRIMULGIDAE		
65. Spotted Nightjar	<i>Caprimulgus guttatus</i>	P

Common Name	Scientific Name	Status
Family AEGORIMULGIDAE		
66. Australian Owlet Nightjar	<i>Podargus strigoides</i>	P
Family ALCEDINIDAE		
67. Azure Kingfisher	<i>Caprimulgus guttata</i>	P
Family HALCYONIDAE		
68. Red-backed Kingfisher	<i>Todiramphus pyrrophygia</i>	P
69. Sacred Kingfisher	<i>Todiramphus sanctus</i>	P
Family MEROPIIDAE		
70. Rainbow Bee-eater	<i>Merops ornatus</i>	P
Family CORACIIDAE		
71. Dollarbird	<i>Eurystomus orientalis</i>	P
Family MALURIDAE		
72. White-winged Fairy-wren	<i>Malurus leucopterus</i>	P
Family PARDALOTIDAE		
73. Chestnut-rumped Thornbill	<i>Acanthiza uropygialis</i>	P
74. Banded Whiteface	<i>Aphelocephala nigricincta</i>	P
75. Speckled Warbler	<i>Pyrholaemus saggittus</i>	V
76. Rufous Fieldwren	<i>Calamanthus campestris</i>	P
Family ACANTHIZIDAE		
77. Calamanthus	<i>Secriornis fuliginosus</i>	V+
Family POMATOSTOMIDAE		
78. Grey-crowned Babbler	<i>Pomatostomus temporalis</i>	V
79. Chestnut-crowned Babbler	<i>Pomatostomus ruficeps</i>	P
Family CINCLOSOMATIDAE		
80. Chirruping Wedgebill	<i>Psophodes cristatus</i>	P
Family MELIPHAGIDAE		
81. Spiny-cheeked Honeyeater	<i>Acanthagenys rufogularis</i>	P
82. Fuscous Honeyeater	<i>Lichenostomus fuscus</i>	P
83. Noisy Miner	<i>Manorina melanocephala</i>	P
84. Yellow-throated Miner	<i>Manorina flavigula</i>	P
85. Little Friarbird	<i>Philemon citreogularis</i>	P
86. White-fronted Honeyeater	<i>Phylidonyris albifrons</i>	P
87. Pied Honeyeater	<i>Certhionyx variegatus</i>	V+
88. Painted Honey-eater	<i>Grantiella picta</i>	V+
89. Regent Honeyeater	<i>Xanthomyza phrygia</i>	E1+
Family DICRURIDAE		
90. Willy Wagtail	<i>Rhipidura leucophrys</i>	P
91. Magpie-lark (Pee Wee)	<i>Myiagra inquieta</i>	P
Family CAMPHEPHAGIDAE		
92. Black-faced Cuckoo-strike	<i>Coracina novaehollandiae</i>	P
93. Ground Cuckoo-shrike	<i>Coracina maxima</i>	P
Family PETROICIDAE		
94. Jacky winter	<i>Microeca leucophaea</i>	P
95. Hooded Robin	<i>Melanodryas cucullata</i>	P
Family DICRURIDAE		
96. Willie Wagtail	<i>Rhipidura leucophrys</i>	P

Common Name	Scientific Name	Status
Family ARTAMIDAE		
97. Black-faced Woodswallow	<i>Artamus cinereus</i>	P
98. White-breasted Woodswallow	<i>Artamus leucorhynchus</i>	P
99. Pied Butcherbird	<i>Cracticus nigrogularis</i>	P
100. Grey Butcherbird	<i>Cracticus torquatus</i>	P
101. Australian Magpie	<i>Gymnorhina tibicen</i>	P
Family ZOSTEROPIDAE		
102. Silvereye	<i>Zosterops lateralis</i>	P
Family CORVIDAE		
103. Australian Raven	<i>Corvus coronoides</i>	P
104. Little Crow	<i>Corvus bennetti</i>	P
Family MOTACILLIDAE		
105. Richard's Pipit	<i>Anthus novaeseelandiae</i>	P
Family PASSERIDAE		
106. Plum-headed Finch	<i>Neochmia modesta</i>	P
107. Diamond Firetail	<i>Steganopleura guttatum</i>	V
108. Common Starling	<i>Sturinus vulgaris</i>	U
109. House Sparrow	<i>Passer domesticus</i>	U

Total Number of Bird Species = 109

Number of Endangered Species = 6

Number of Vulnerable Species = 31

Number of Introduced Species = 3

MAMMAL

Common Name	Scientific Name	Status
Family TACHYGLOSSIDAE		
8. Short-beaked Echidna	<i>Tachyglossus aculeatus</i>	P
Family DASYURIDAE		
9. Yellow-footed Antechinus	<i>Antechinus flavipes</i>	P
10. Stripe-faced Dunnart	<i>Sminthopsis marcoura</i>	V+
11. Common Dunnart	<i>Sminthopsis murina</i>	P
Family PERAMELIDAE		
12. Bilby	<i>Macrotis lagotis</i>	E4
13. Western Barred Bandicoot	<i>Perameles bougainville</i>	E4
Family PHASCOLARCTIDAE		
14. Koala	<i>Phascolarctos cinereus</i>	V+
Family PTRROPODIDAE		
15. Little Red Flying Fox	<i>Pteropus scapulatus</i>	P
Family PHALANGERIDAE		
16. Common Brushtail Possum	<i>Trichosurus vulpecula</i>	P
Family PETAURIDAE		
17. Sugar Glider	<i>Petaurus breviceps</i>	P
18. Squirrel Glider	<i>Petaurus norfolcensis</i>	V+
Family MACROPODIDAE		
19. Black-striped Wallaby	<i>Macropus dorsalis</i>	E1+
20. Red Kangaroo	<i>Macropus rufus</i>	P
21. Eastern Grey Kangaroo	<i>Macropus giganteus</i>	P
22. Common Wallaroo	<i>Macropus robustus</i>	P

23. Red-necked Wallaby	<i>Macropus rufogriseus</i>	P
24. Bridled Nailtail Wallaby	<i>Onychogalea fraenata</i>	E4
25. Brush-tailed Rock-wallaby	<i>Petrogale penicillata</i>	V
26. Swamp Wallaby	<i>Wallabia bicolor</i>	P
Family POTOROIDAE		
27. Brush-tailed Bettong	<i>Bettongia penicillata</i>	E4+
28. Rufous Bettong	<i>Aepyprymnus rufescens</i>	V+
Family MOLOSSIDAE		
29. Little Mastiff-bat	<i>Mormopterus planiceps</i>	P
30. White-striped Freetail-bat	<i>Tadarida australis</i>	P
Family VESPERTILIONIDAE		
31. Gould's Wattled Bat	<i>Chalinolobus gouldii</i>	P
32. Chocolate Wattle Bat	<i>Chalinolobus morio</i>	P
33. Little Pied Bat	<i>Chalinolobus pictus</i>	V +
34. Lesser Long-eared Bat	<i>Nyctophilus Geoffrey</i>	P
35. Gould's Long-eared Bat	<i>Nyctophilus gouldii</i>	P
36. Greater Long-eared Bat	<i>Nyctophilus timoriensis</i>	V
37. Western Broad-nosed Bat	<i>Scotorepens balstoni</i>	P
38. Little Forest Eptesicus	<i>Vespadelus vulturnus</i>	P
39. Yellow-bellied Sheathtail	<i>Saccolaimus flaviventris</i>	V +
40. Western Broad-nosed Bat	<i>Scotorepens balstoni</i>	P
41. Little Broad-nosed Bat	<i>Scotorepens greyii</i>	P
Family MURIDAE		
42. White-footed Rabbit-rat	<i>Conilurus albipes</i>	E4
43. House Mouse	<i>Mus domesticus</i>	U
44. Plains Rat	<i>Pseudomys australis</i>	E4
45. Gould's Mouse	<i>Pseudomys gouldii</i>	E4
46. Black Rat	<i>Rattus rattus</i>	U
47. Long-haired Rat	<i>Rattus villiossimus</i>	V
Family LEPORIDAE		
48. Brown Hare	<i>Lepus capensis</i>	U
49. European Rabbit	<i>Oryctolagus cuniculus</i>	U
Family CANIDAE		
50. Wild Dog	<i>Canis familiaris</i>	U
51. European Red Fox	<i>Vulpes vulpes</i>	U
Family FELIDAE		
52. Feral Cat	<i>Felis catus</i>	U
Family BOVIDAE		
53. Wild Cattle	<i>Bos taurus</i>	U
54. Sheep	<i>Ovis ovis</i>	U
55. Feral Goat	<i>Capra hircus</i>	U
Family SUIDAE		
56. Feral Pig	<i>Sus scrofa</i>	U
Family EQUIDAE		
57. Horse	<i>Equus caballus</i>	U

Total Number of Mammal Species = 50

Number of Presumed Extinct Species = 7

Number of Endangered Mammals = 1

Number of Vulnerable Species = 9

Number of Introduced Species = 12

REPTILES

Common Name	Scientific Name	Status
Family CHELIDAE		
1. Namoi River Elseya	<i>Elseya sp (belli ?)</i>	V
2. Long-neck Turtle	<i>Chelodina longicollis</i>	P
Family AGAMIDAE		
3. Nobbi	<i>Amphibolurus nobbi</i>	P
4. Bearded Dragon	<i>Pogona barbata</i>	P
Family GEKKONIDAE		
5. Eastern Spiny-tailed Gecko	<i>Diplodactylus intermedius</i>	P
6. Stone Gecko	<i>Diplodactylus vittatus</i>	P
7. Soft-tailed Gecko	<i>Diplodactylus williamsi</i>	P
8. Native Gecko (NCN)	<i>Gehyra dubia</i>	P
9. Bynoe's Gecko	<i>Heteronotia binoei</i>	P
10. Border Thick tailed Gecko	<i>Underwoodisaurus sphyrurus</i>	V
11. Thick-tailed Gecko	<i>Underwoodisaurus milii</i>	P
Family PYGOPODIDAE		
12. Olive Legless Lizard	<i>Delma inornata</i>	P
13. Burton's Legless Lizard	<i>Lialis burtonis</i>	P
14. Common Scaly-foot	<i>Pygopus lepidopodus</i>	P
15. Hooded Scaly-foot	<i>Pygopus nigriceps</i>	P
Family VARANIDAE		
16. Lace Monitor	<i>Varanus varius</i>	P
Family SCINCIDAE		
17. Red-throated Skink	<i>Bassiana platynota</i>	P
18. Wall Lizard	<i>Cryptoblepharus virgatus</i>	P
19. Striped Skink	<i>Ctenotus robustus</i>	P
20. Native Skink (NCN)	<i>Cryptoblepharus carnabyi</i>	P
21. Tree Skink	<i>Egernia striolata</i>	P
22. Garden Skink	<i>Lampropholis guichenoti</i>	P
23. Native Skink (NCN)	<i>Lerista muelleri</i>	P
24. Native Skink (NCN)	<i>Lerista punctatovittata</i>	P
25. Native Skink (NCN)	<i>Lygisaurus foliorum</i>	P
26. Three-clawed Worm Skink	<i>Anomalopus mackyi</i>	E1
27. Boulenger's Skink	<i>Morethia boulengeri</i>	P
Family TYPHLOPIDAE		
28. Blind or Worm Snake (NCN)	<i>Ramphotyphlops proximus</i>	P
29. Blind or Worm Snake (NCN)	<i>Ramphotyphlops wiedii</i>	P
Family BOIDAE		
30. Carpet or Diamond Python	<i>Morelia spilota</i>	P
Family COLUBRIDAE		
31. Green Tree Snake	<i>Dendrelaphis punctulata</i>	P
Family ELAPIDAE		
32. Red-naped Snake	<i>Furina diadema</i>	P
33. Spotted Black Snake	<i>Pseudechis guttatus</i>	P
34. Eastern Brown Snake	<i>Pseudonaja textilis</i>	P
35. Coral Snake	<i>Simoselaps australis</i>	P
36. Bandy Bandy	<i>Vermicella annulata</i>	P
37. Pale-headed snake	<i>Hoplocephalus bitorquatus</i>	V+

Total Number of Reptile Species = 37

Total Number of Reptiles Endangered = 1

Total Number of Vulnerable Reptile = 3

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