WHITEHAVEN COAL MINING PTY LTD

ABN: 65 086 426 253

Belmont Coal Project

via Gunnedah

Fauna Assessment

Prepared by

Countrywide Ecological Service

August, 2007

Specialist Consultant Studies Compendium
Part 3

Fauna Assessment

of the

Belmont Coal Project

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EXECUTIVE SUMMARY

This report presents the outcomes of a fauna study and assessment undertaken on behalf of Whitehaven Coal Mining Pty Ltd ("the Proponent"). The Project Site comprises an area centered on the "Belmont" property located approximately 25 km north of Gunnedah on the Wean Road. The Proponent proposes to establish and extract coal from a proposed Belmont Open Cut mine for about 10 years.

The fauna Survey Area comprised a total area of some 600 hectares including all or parts of the 'Belmont', 'Glenroc', 'Roseberry' and 'Stratford' properties. Development of the proposed mine will require the disturbance of approximately 243ha, including a haul road and the diversion of Wean Road to the east of its current alignment through cleared paddocks.

The Survey Area, other than the route of proposed road diversion and haul road, is bounded by Vickery State Forest to the west, the road access into the forest to the south, the limit of the open woodland community to the north and includes the area where the ephemeral creek line from 'Yarrari' meets Wean Road.

Five habitat types can be distinguished; see GCNRC (2007):

i) Open Woodland Habitat of Narrow-leaf Ironbark – Pilliga Grey Box;
ii) Open Woodland Corridor Habitat of Pilliga Grey Gum – White Cypress Pine;
iii) Creek line Gallery Habitat of Boxes with scattered White Cypress Pine;
iv) Regenerating Remnant Habitat of White Cypress Pine; and
v) Cleared paddocks (cultivated, grazed and contoured).

This report details the methods used and the results obtained from fauna surveys conducted within the Survey Area. It discusses and assesses the likely impact the Project may have on all protected fauna and, in particular, on any threatened species, populations and communities that were recorded or that may occur in the area and immediate environs. Pursuant to s5A of the EP&A Act, the report provides information for the determining authority to assess whether there is a need for a SIS according to the TSC Act (and the FM Act), and makes recommendations in this regard. This report also assesses the need for a Koala Habitat Management Plan under SEPP 44. In addition, the report discusses the proposed development with regard to all the listed Key Threatening Ecological Processes, ESD Principles and the relevant fauna habitat matters under the NV Act. The report also considers whether this proposal should be considered as a controlled action under the EPBC Act.

The fauna checklist for the Gunnedah/Boggabri Region recorded 18 species of frogs, at least 181 birds, some 50 mammals and 40 reptiles in the region.

The surveys recorded 5 amphibians, 9 reptiles, 58 birds, including 2 listed vulnerable species and an exotic species, 22 mammals, including a listed vulnerable bat and 8 exotic species, 3 of which are listed as Key Threatening Ecological Processes.

The 7-part test was conducted on the Yellow-bellied Sheathtail Bat, *Saccolaimus flaviventris,* and the Turquoise Parrot, *Neophema pulchella*, were recorded in the Survey Area, the Grey Falcon, *Falco hypoleucos,* which was recorded nearby and the Grey-crowned Babbler, *Pomatstomus temporalis,* a species that has been found in some parts of the area the Project Site and the Beccari's Bat, *Mormopterus beccarii,* along this section of the proposed Transport Route between the Project Site and Hoad Lane.

The record of a Gilbert's Whistler, *Pachycephala inornata,* on the Project Site and another species the Hooded Robin, *Melanodryas cucullata,* that is likely to occur on the Project Site and along the section of the Transport Route through Shannon Harbour Road Reserve, were also assessed persuant to Section 5A of the EP&A Act.

This report makes 19 recommendations to ameliorate and minimise any adverse impact the proposed development may have on the fauna community.

Having given consideration to the above and that all possible practical alternatives have been canvassed and adopted to avoid, minimise and ameliorate the impact of proposed open cut mine on the local fauna, it is my 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 listed species;

iv) unlikely to affect any core or potential Koala habitat;

v) consistent with ESD principles with regards to fauna and will not adversely affect the local biodiversity; and

vi) unlikely to cause any perceivable or significant changes to habitat that would directly affect the local fauna community as a consequence of climate change.

Thus, the proposed mining activity should not be considered to constitute a controlled action. The proposal is also outside the scope of SEPP 44 and hence no Koala Habitat Management Plan should be required.

1 INTRODUCTION

This report presents the outcomes of a fauna study and assessment undertaken on behalf of Whitehaven Coal Mining Pty Ltd in the Gunnedah area between December 2001 and April 2007. The area of land on which mining and mining-related activities are proposed is referred to throughout this document as the "Project Site". The Project Site is located approximately 25km north of Gunnedah to the immediate east of Vickery State Forest (see **Figure 1**). The Project Site covers an area of approximately 366ha within Exploration Licence (EL) 5831 and Consolidated Lease (CL) 316, incorporates parts of the "Belmont", "Glenroc" and "Roseberry" properties within the Parish of Tulcumba and incorporates all or part of:

- Lots 1 and 2, DP 787417;
- Lot 30, DP 754950; and
- Various Council roads and road reserves.

The fauna Survey Area comprised a total area of some 600 hectares including all or parts of the 'Belmont', 'Glenroc', 'Roseberry' and 'Stratford' properties and the western portion of Shannon Harbour Road Reserve (see **Figure 1**).

Development of the Project will require the disturbance of approximately 196ha for the open cut mine and overburden emplacement areas, a further 37ha for soil stockpiling and 5.2ha for Project Site infrastructure (see **Figure 2**). Between the Project Site and an established coal haul route of the Whitehaven and Tarrawonga Coal Mines (Hoads Lane, Braymont Road and Kamilaroi Highway), it is proposed to construct a purpose-built haul road over properties owned by the Proponent and within the road reserve of Shannon Harbour Road, requiring disturbance to 6.1ha of land (see **Figure 3**). Wean Road, which currently traverses the eastern side of the Project Site will be diverted east through the cleared paddocks in a gentle arc as a detour around the Project Site.

The proposed mine according to the details provided by the Proponent will include *inter alia:*

- Coal mining by open cut mining methods over the area defined by the "limit of mining" (114.1ha);
- open cut mining would be by the conventional haulback method involving the sequential removal of soil and overburden / interburden materials above and within the coal seams, coal removal, and progressive backfilling and rehabilitation of the mined-out areas. Open cut mining may be supplemented by auger mining, to a distance of 200m beyond the western limit of the open cut;
- annual ROM coal production would increase from an initial level of approximately 0.75Mtpa to a maximum annual rate of 1.5Mtpa;
- programmed placement of overburden and interburden materials from the open cut area to a combination of out-of-pit and in-pit overburden emplacements;

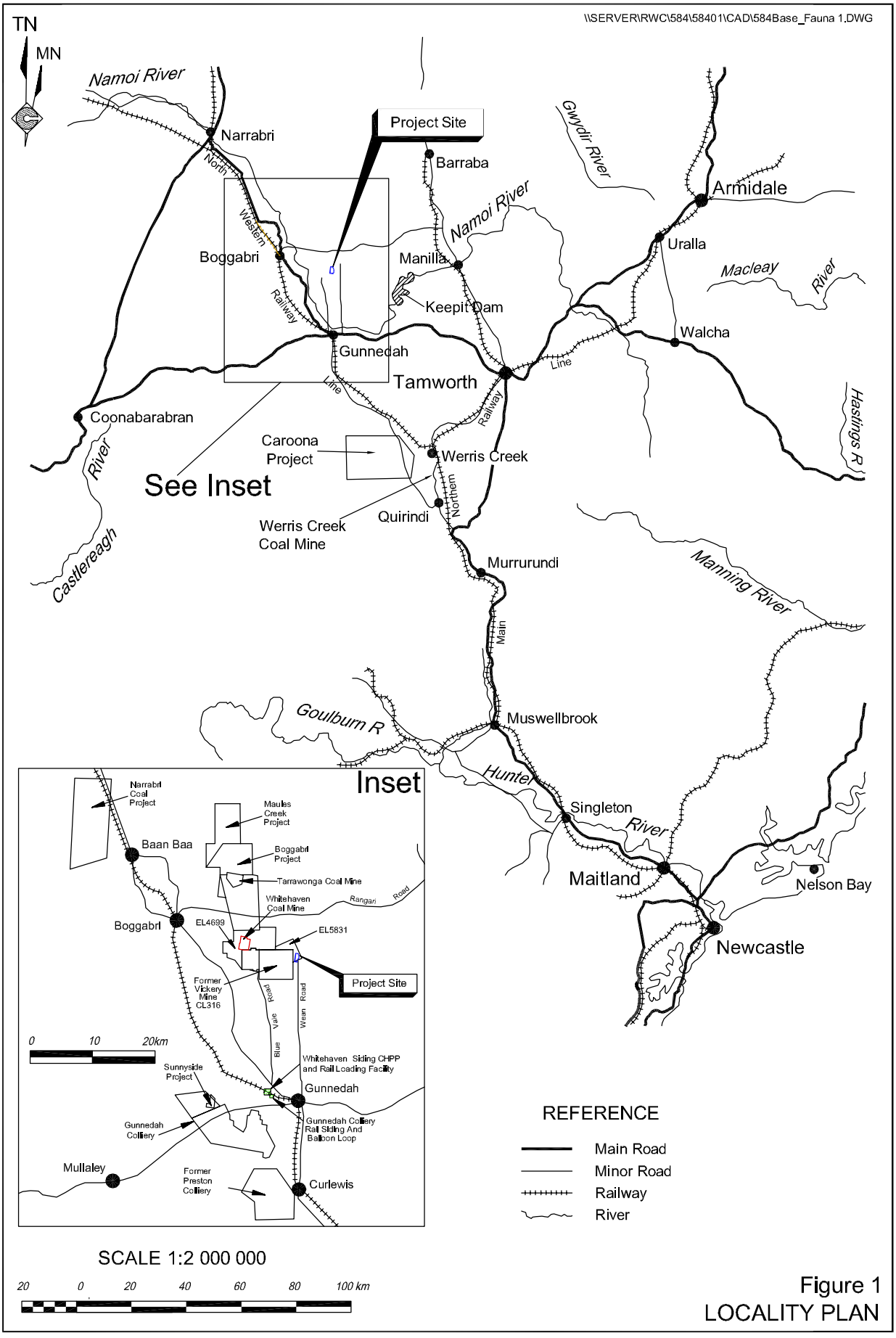


Figure 1
LOCALITY PLAN

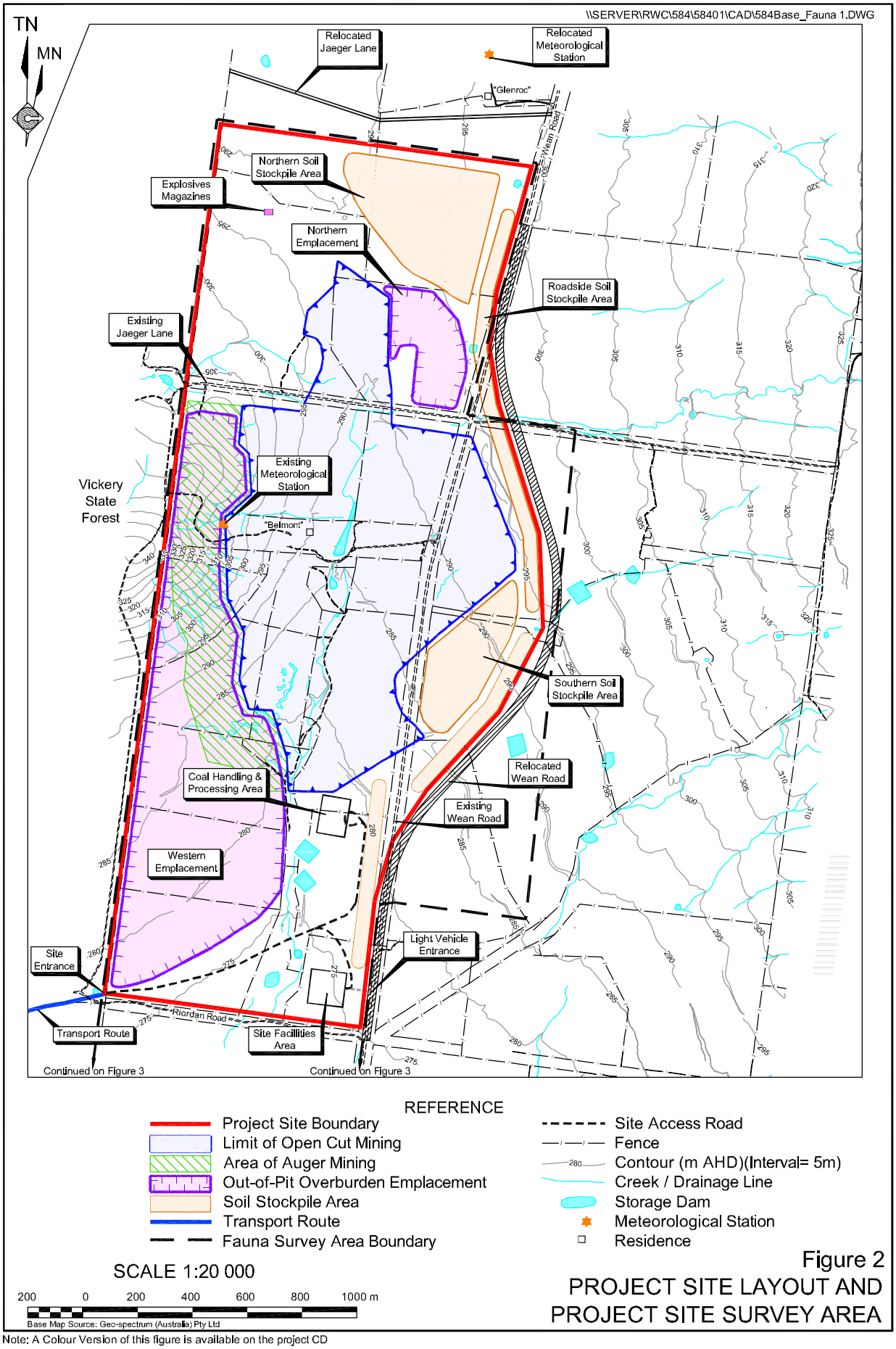
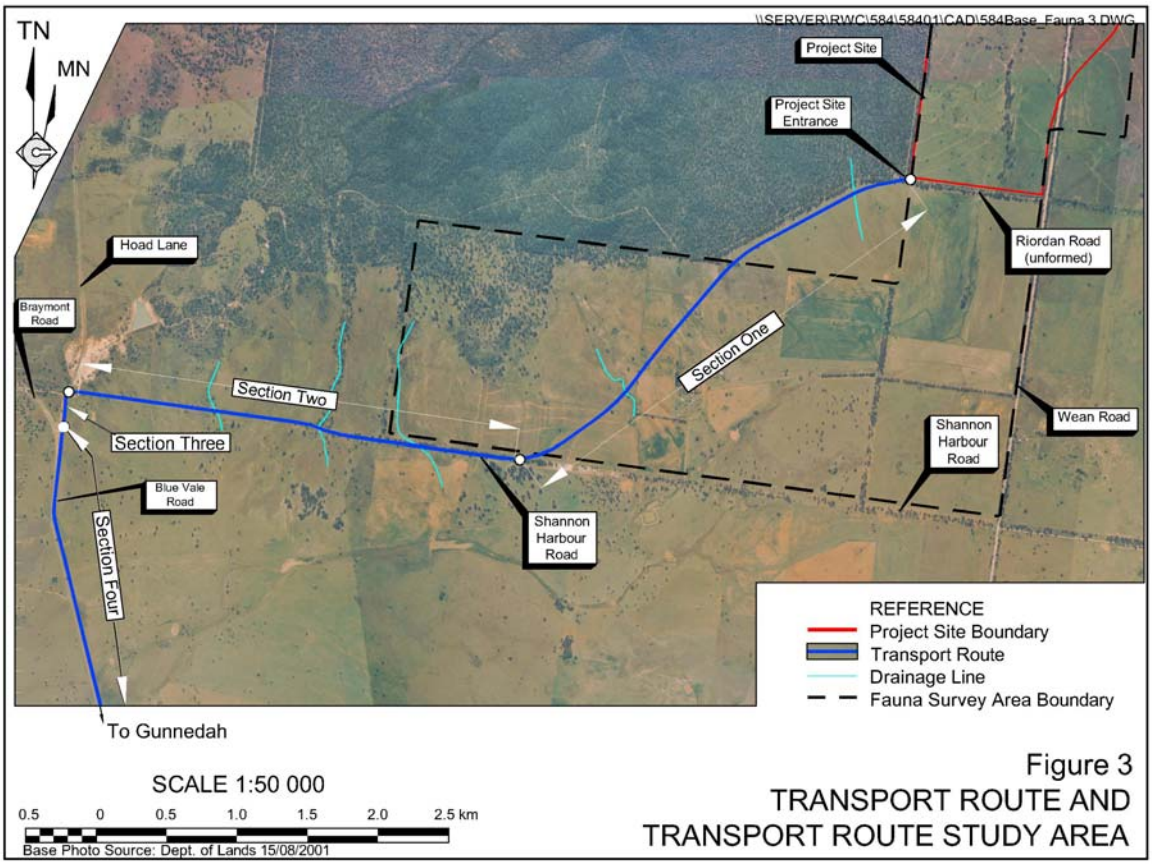


Figure 2
PROJECT SITE LAYOUT AND PROJECT SITE SURVEY AREA

Note: A Colour Version of this figure is available on the project CD



Note: A Colour Version of this figure is available on the project CD

- on-site size reduction of the ROM coal using a crushing plant positioned within the Coal Handling and Processing Area;
- relocation of a section of Wean Road;
- upgrading sections of the Shannon Harbour Road and intersection onto Hoad Lane to be incorporated into the proposed transport route;
- transportation of coal from the Project Site to the Whitehaven CHPP for washing and/or despatch to export markets via rail to Port Newcastle. At least 85% of the Project ROM coal would require washing;
- backloading of coarse and fine reject material from the Whitehaven CHPP for placement in the mined-out areas within the limit of mining;
- installation of a range of services, structures and transportable buildings; and
- progressive shaping and rehabilitation of the areas of disturbance within the Project Site.

This report details the methods used and the results obtained from fauna surveys conducted in December 2001, July 2002, September 2002 and September/October 2006 within the Survey Area and now includes the survey conducted in April 2007 in western portion of Shannon Harbour Road where the proposed Haul road will be constructed. It discusses and assesses the likely impact the proposed development may have on all protected fauna and, in particular, on any threatened species, populations and communities that were recorded or that may occur

in the area and immediate environs. It makes recommendations to ameliorate and minimise any adverse impact the proposed activity may have on the fauna community. Pursuant to s5A of the *Environmental Planning and Assessment Act 1979* (hence EP&A Act), the report provides information for the determining authority to assess whether there is a need for a Species Impact Statement (SIS) according to the *Threatened Species Conservation Act 1995* (hence TSC Act) and the *Fisheries Management Act 1994* (hence FM Act), and makes recommendations in this regard.

This report also assesses the need for a Koala Habitat Management Plan pursuant to *State Environmental Planning Policy No. 44, Koala Habitat Protection* (SEPP 44), given the Gunnedah Local Government Area (LGA) is listed in Schedule 1 of this planning instrument. In addition, the report discusses the proposed development with regard to both the State and Federally listed Key Threatening Ecological Processes, Ecological Sustainable Development (ESD) Principles and the clearing of native vegetation under the *Native Vegetation Act 2003* (hence NV Act). Matters are considered in the spirit of the NV Act only, ie. relating to the loss and fragmentation of fauna habitat and wildlife corridor in this fauna report.

The report also considers whether this proposal should be considered to be a controlled action under the *Environmental Protection and Biodiversity Conservation Act 1999 (C'th)* (hence EPBC Act).

2 SURVEY AREA

The Survey Area (**Figure 2**) is bounded by Vickery State Forest (VSF) to the west, the road access into the VSF to the south (Riordan Road), the limit of the open woodland community to the north and includes the area where the ephemeral creek line from 'Yarrari' meets Wean Road (see **Figure 2**). The Survey Area therefore extends beyond the Project Site of the proposed Belmont Coal Mine.

An additional survey was carried out to assess the likely impact of the construction of the haul road. This haul road provides access from Hoad Lane, and the existing sealed road to the west, to the Project Site (see **Figure 3**).

This Project Site lies in the Brigalow South Bioregion (BSB Region; see (Thackway and Cresswell 1995) and is within the Namoi River Catchment in the Murray-Darling Basin.

Five habitat types can be distinguished in the Project Site (see **Figure 4** and GCNRC (2007)).

i) Open Woodland Habitat of Narrow-leaf Ironbark – Pilliga Grey Box (**Photo 1**);

ii) Open Woodland Corridor Habitat of Pilliga Grey Gum – White Cypress Pine (**Photo 2**);

iii) Creek line Gallery Habitat of Boxes with scattered White Cypress Pine (**Photo 3**);

iv) Regenerating Remnant Habitat of White Cypress Pine (**Photo 4**); and

v) Cleared paddocks (cultivated, grazed and contoured – see **Photo 3**).

Fauna sampling with traps was confined to the first 4 habitat types.

In the vicinity of the Project Site, the roadside tree corridors form a number of connections between the Kelvin Range to the east and the VSF to the west (see **Photo 5**).

Photo 1 Open Woodland Habitat of Narrow-leaf Ironbark – Pilliga Grey Box

Photo 2 Corridor Habitat of Pilliga Grey Gum – White Cypress Pine

Note: A colour version of these plates are available on the Project CD

Photo 3 Creek line Gallery Habitat of Boxes with scattered White Cypress Pine and Cleared paddocks (cultivated, grazed and contoured fields)

Photo 4 Regenerating Remnant Habitat of White Cypress Pine

Note: A colour version of these plates are available on the Project CD

Photo 5 Proposed Haul Road Tree Gallery, Shannon Harbour Road

Note: A colour version of this plate is available on the Project CD

3 METHODS AND MATERIAL

3.1 Introduction

A variety of methods were used to sample the fauna according to guidelines suggested in DEC (2006) and modified for this Survey Area. Some of the methods used targeted more than one fauna group. Trap and recording sites are shown on **Figure 4**. Field identifications of fauna observed were made using Antis (2002), Cogger (2000), Slater et. al. (1990), Strahan (1995), and Swan (1990). Sampling was conducted according to approved animal welfare protocol of the author.

The weather conditions were as follows.

- Summer Sampling (2001)

December 10 to 14 – fine calm days with dry weather and maximum temperatures in the high 20s and low 30s°C and night temperature minimums about 12 °C for the sampling period.

- Winter Sampling (2002)

July 11 – fine calm day, maximum temperature 18°C and a night minimum 1°C.
July 24 – fine calm day, maximum temperature 20°C and a night minimum 2°C.

- Supplementary Sampling (2002)

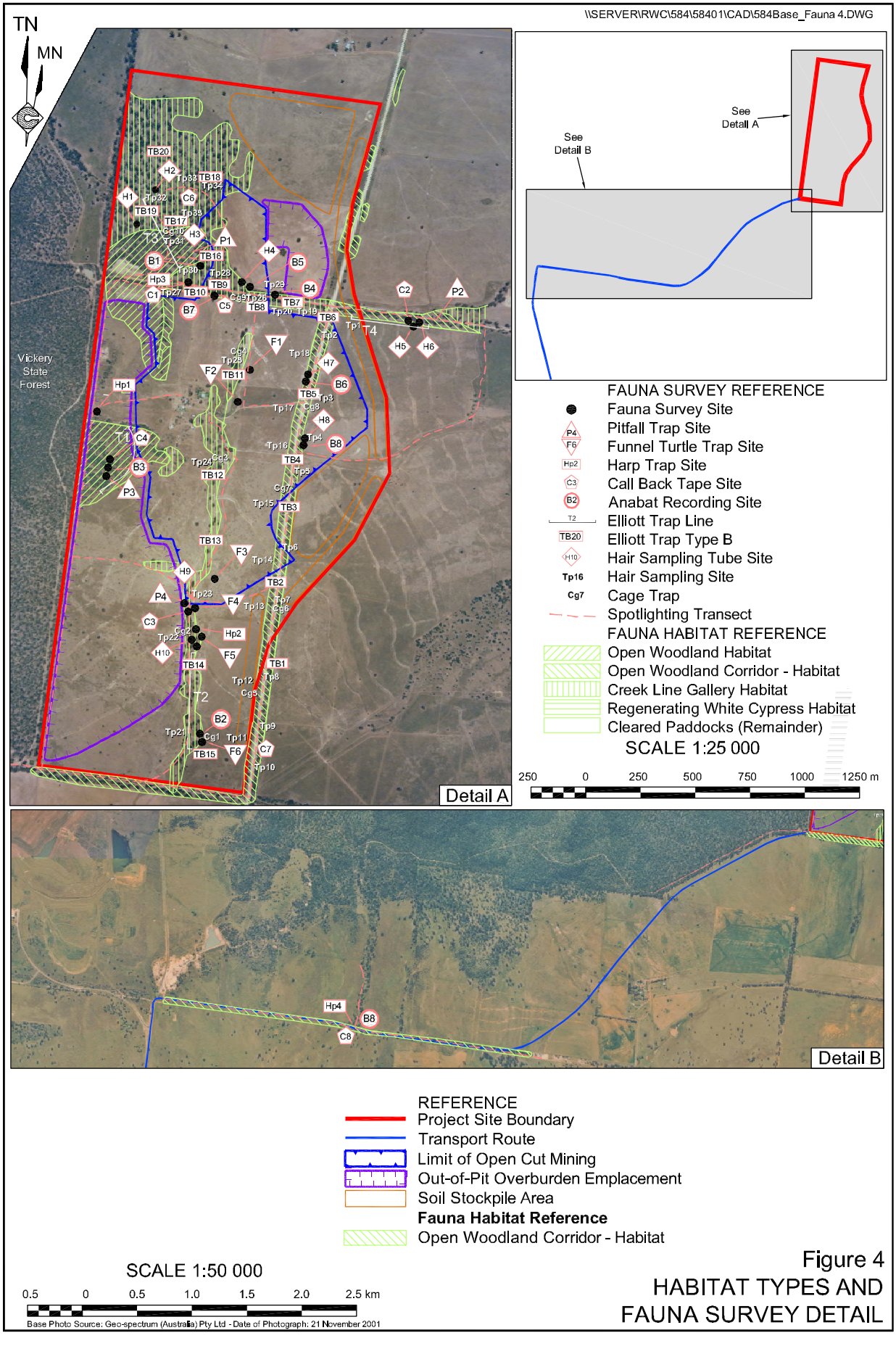


Figure 4
HABITAT TYPES AND
FAUNA SURVEY DETAIL

September 19 – fine and calm, temperature 20°C at 7.00pm and a night minimum of 11°C.

September 20 – strong northerly winds and a severe thunderstorm in the evening and night. Day maximum temperature 28°C at 11.00am and a night minimum of 10°C. No night sampling.

September 21 – cloudy and windy with a day maximum temperature of 22°C and night minimum of 8°C.

September 22 – clear and windy day with a maximum temperature of 24°C.

- Additional Sampling (2006)

October 28 - clear day, dry with light winds, maximum temperature 36°C minimum temperature 20°C.

October 29 - clear day, dry with increasing clouds and light north-easterly winds 10-15km/hr, maximum temperature 34°C minimum temperature 20°C.

October 30 - Cloudy and windy, maximum temperature 35°C, minimum 19°C with northerly winds.

November 1 - Overcast with increasing winds from the north-west, evening thunderstorms with squally winds. Maximum temperature 34°C and minimum temperature 21°C.

November 2 - Cloudy with late morning showers ambient temperature at 11.00am was 32 °C with winds veering to the south-west.

- Haul Road Supplementary Sampling (2007)

March 21 - Dry clear day with light winds. Maximum temperature 30°C with recent heavy rain from previous week.

March 22 - Cool night with minimum temperature down to 10°C, calm morning with late morning temperature at 11.00am reaching 28°C.

3.2 Amphibians

Pitfall trap lines comprising 2 PVC pipes 150mm x 600mm deep with a 30.0cm high, 10.0m drift fence extending 2.0m each side of the pitfall traps were located in the various habitat types at sites P1-P4 (see **Figure 4**). Two tube traps were also installed between the pitfall traps, one each side of the drift fence.

The Survey Area has been subjected to high intensity agricultural land use and pitfall trap lines were limited to areas away from the open paddocks. As an alternative to pro forma multiple duplication of trap effort per 100ha according to survey area size**,** (see eg. NPWS 2005) searches for frogs were made during the early evenings along the creek line and all the dams within and near the Survey Area.

Though targeting amphibians, both pitfall and tube traps will also catch small mammals and reptiles.

3.3 Birds

The birds were identified from calls and direct observation each morning and opportunistically throughout the day on and around the Survey Area. The calls of the relevant listed threatened owl species were broadcast from positions C1- C7 (**Figure 4**) to determine the presence of these species in the area.

3.4 Mammals

A variety of methods were used to sample mammals as discussed below (**Figure 4** for trap deployment positions.) Additionally, each day, ground searches for signs and body remains were carried out throughout the Survey Area.

Targeted mammal sampling methods included the following.

3.4.1 Small Mammals

Elliott live mammal traps (Type A, Elliott Scientific Equipment, Upwey, Victoria) were set along four areas of remnant vegetation as indicated in **Figure 4**. At each site, (identified as T1 to T4 on **Figure 4**), 25 traps were set for 4 nights. Each trap was placed about 10m apart in a line and baited with a mix of rolled oats, peanut butter and sesame oil.

Ten hair sampling tubes (H1 to H10 – **Figure 4**), baited with the same bait, were deployed on the ground and on trees at about 6m height and the 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.

3.4.2 Microbats

Recordings of bat calls were made at positions B1 to B4 (**Figure 4**) using ANABAT V ultrasonic recorders with a time delay module (Titley Electronics, Ballina, N.S.W.). Harp traps were deployed for two nights at locations Hp1 and Hp2 (**Figure 4**).

More focused recording of microbat calls was also undertaken in winter in the Survey Area to locate any bat activity around major roosting tree hollows. A follow-up call sampling was carried out in September 2002 in the Open Woodland Corridor Habitat of Pilliga Grey Gum – White Cypress Pine and in the Creek line Gallery Habitat of Boxes with scattered White Cypress Pine (**Figure 4)**, in order to locate roosting hollows.

3.4.3 Nocturnal Species and Arboreal Mammals

Two 2-hr spotlight searches were conducted on the evenings of the 10, 11 and 15 December 2001 (early summer) and the 11 and 23 July 2002 (winter) along Wean road, Shannon Harbour Road which extends from Wean Road to Hoad Lane and various access tracks within and adjacent to the Survey Area using a 50-watt spotlight on each side of a slow moving vehicle. Each spotlight transect (**Figure 4**) was traversed at least once per night and the fauna observed noted.

Supplementary spotlighting efforts were made along the tree galleries along Wean Road, Jaeger Lane, Riordan Road and part of Shannon Harbour Road where the proposed haul road is located.

Recorded calls of the following listed threatened species were played at point C1-C5 (**Figure 4**) while spotlighting.

Common Name	***Scientific Name***
1. Koala	*Phascolarctos cinereus*
2. Yellow-bellied Glider	*Petaurus australis*
3. Squirrel Glider	*Petaurus norfolcensis*
4. Powerful Owl	*Ninox strenua*
5. Barking Owl	*N. connivens*
6. Sooty Owl*	*Tyto tenebricosa*
7. Masked Owl	*T. novaehollandiae*,
8. Bush Stone-curlew	*Burhinus grallarius*

Note: * - the Survey Area is probably out of this species' normal distributional range.

3.4.4 Arboreal Mammals

Thirty-five supplementary hair sampling tubes baited with crushed oats, peanut butter and honey mix were deployed on trees. They were located 6m above ground in trees along the roadside corridors on Wean Road and Jaeger Lane (**Figure 4**, Tp 1 to Tp 35). At each location, the tree trunks on which the traps were attached and the surrounding adjacent tree trunks were sprayed with a diluted honey solution to attract any arboreal animal present. These sampling tubes were left out between 28 October and 2 November 2006 on the Project Site.

In addition, 20 Elliott Trap Type B attached 2.0m above ground with right-angle brackets on the trunks of the larger trees along the roadside corridors on Wean Road and Jaeger Lane (**Figure 4**, Tb 1 to Tb 20). These traps were baited in a similar fashion to the hair sampling tubes. These live traps were checked daily and were deployed between 29 October and 2 November 2006 on the Project Site.

3.4.5 Medium Size Mammals

Ten cage traps baited with similar bait described in Section 3.3.4 were deployed on the ground in shaded and sheltered areas, often at the bottom of a large mature tree, along the creek line, remnant vegetation patch and the roadside corridors on the Project Site (**Figure 4**, Cg 1 to Cg 10).

3.5 Reptiles

Apart from the pitfall traps (see Section 3.1), searches were made for reptiles in the leaf litter and along the creeks, as well as under rocks and logs in the Survey Area.

Six Funnel traps were also deployed in the deeper waterholes in the Project Site Survey Area to sample the turtles. These traps also catch yabbies, frogs and fish.

Additional targeted reptile search were conducted in Spring 2006 along the entire length of the roadside corridors along Wean Road (between Riordan Road and Jaeger Lane), along Riordan Road (between Vickery State Forest and Wean Road and along Jaeger Lane between Vickery State Forest and 200m beyond Wean Road across the road junction. A supplementary search was also conducted in April 2007 along the tree corridor along the entire length of Shannon Harbour Road where the Haul road will be located.

3.6 Invertebrates

There are no invertebrates listed as threatened in this region. Consequently, no specific sampling was undertaken to target this fauna group.

3.7 Fish

The fish fauna was not targeted for sampling as no listed threatened fish species is likely to be adversely affected in or near the Project Site. However, funnel traps which target reptiles and amphibians in the waterholes also trap fish that are present.

3.8 Sampling of the Transport Route

The sampling over the various transport route alternatives involved a daytime inspection for signs and spotlighting at night for presence of fauna species likely to be affected by the construction of the road along the entire length of the two most likely options. This was carried out on afternoon and early evening of the 11 July 2002 and the morning of the 12 July 2002 and concentrated on the areas where a road has yet to be constructed through the tree corridors in the road reserves.

A similar supplementary sample was conducted in between the afternoon and evening of 21 April 2007 and the following morning 22 April 2007 to sample the more environmentally sensitive section of Haul Road along the current transport route option. It also included an all-night bat call recording and the deployment of a Harp trap at a strategic point marked B 8 and Hp 4 in **Figure 4**. This location is the junction of a remnant corridor joining Vickery State Forest and the tree corridor along this western portion of Shannon Harbour Road. It also has proximity to a dam which was filled from a recent down pour and good rain over the last few months over summer 2006/2007.

3.9 Estimating Impact on Fauna Habitat

Counts of the number of potential hollow bearing trees were made from the area representing the full extent of the proposed mine. These trees were partitioned into a class structure according to their trunk diameter at Standard Breast Height (DBH) which roughly corresponds to their age and maturity.

The number of hollows was counted in each tree. Three hollows were allocated into three classes – small, medium and large (see Section 6.3 for details). The number of stags and other non-hollow bearing trees (>3.0m in height) were also recorded.

After a visual inspection, similar tree counts were considered unnecessary along the proposed Haul road as the construction would not have to involve the removal of any large hollow-bearing trees or stags and the minimum removal of other native vegetation (see **Figure 3** and GCNRC 2007).

3.10 Locating Microbat Roost Sites

In late September 2002, supplementary samplings of the roadside vegetation corridors, the open woodland area (Box Cut area) along Wean Road and Jaeger Lane and the tree gallery along the creekline were undertaken with Anabat recorders placed in strategic positions facing the most prominent bat flyways. A mobile Anabat unit mounted on a vehicle was also used to detect any roost emergence call sequences in these areas.

4 REGIONAL FAUNA

A species[1] checklist of the Gunnedah / Boggabri regional fauna was compiled from the NPWS Atlas of NSW Wildlife (Boggabri Map Sheet 8936 1:100 000 – April 2007), Strahan (1995), Swan (1990), Barker *et al* (1995), Parnaby (1992), Cogger (2000), Churchill (1998), Ayers *et al* (1996-99), NPWS (1999), CES (2005) and other published and unpublished data sources, including over a user defined area (-149.84, -31.16, 150.77, -30.52) from the Bionet database (April 2007). See Appendix 1.

[1] Notwithstanding that in some cases the sub-species status have been included in the final determination in the listing process (see **Appendix 1**), the subject species will only be referred in this report at the species level as no taxonomic confusion or distribution anomaly will flow from this approach. Any confused reader should contact the author of this report directly.

The fauna checklist for the Gunnedah/Boggabri Region recorded 18 species of frogs, at least 181 birds, some 53 mammals and 40 reptiles in the region.

4.1 Threatened Terrestrial Vertebrates

The data on this regional fauna was collated and reviewed in CES (2000), CES (2005) and CES (2002) and the last checklist updated as per data from NPWS (2007). The data suggest the following.

i) Amphibians

There are no less than 18 amphibian species that can be expected to occur in the region. Only the Booroolong Frog, *Litoria booroolongensis*, is listed as endangered[2].

ii) Birds

At least 181 species of birds could occur in the region of which seven are listed as endangered (see **Table 1**) and 35are listed as vulnerable (see **Table 2**).

Table 1
Endangered Species of the Gunnedah / Boggabri Region

Common Name	Scientific Name
1. Bush Thick-knee (Stone-curlew)	*Burhinus magnirostris*
2. Black-necked Stork (W)	*Ephippiorhynchus asiaticus*
3. Malleefowl	*Leipoa ocellata*
4. Cotton-Pygmy Goose (W)	*Nettaptus coromandelianus*
5. Swift Parrot	*Lathamus discolor*
6. Australian Bustard (WD)	*Ardeotis australis*
7. Squatter Pigeon	*Geophas scripta*

Table 2
Vulnerable Species[3] of the Gunnedah / Boggabri Region

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Common Name	Scientific Name
1. Australasian Bitten (W)	*Botaurus poiciloptilus*
2. Black Bitten (W)	*Ixobrychus flavicollis*
3. Magpie Goose (W)	*Aneranas semipalmata*
4. Freckled Duck (W)	*Stictonetta naevosa*
5. Blue-billed Duck (W)	*Oxyura australis*
6. Black-necked Stork (W)	*Ephippiorhynchus asiaticus*
7. Osprey (WD)	*Pandion haliaetus*

[2] The NPWS Atlas of NSW Wildlife predicted list included another listed endangered amphibian, the New England Bell Frog, *Litoria castanea,* a species that has been determined to be a species that was described as *L. flavipunctata* and separate from the southern population of Green and Golden Bell frog, *L. aurea*. *Litoria castanea (flavipunctata)* is not known to occur outside its limited distribution in the New England Tableland, notwithstanding its distribution on the region described as the North Western Slopes.

[3] The NPWS Atlas of NSW Wildlife predictive list included the Pink Robin, *Petroica rodinogaster*. As it is species whose range does not extend beyond the NSW South Coast, it has been excluded from the list above.

Table 2 (Cont'd)
Vulnerable Species of the Gunnedah / Boggabri Region

Common Name	Scientific Name
8. Black-breasted Buzzard	*Hamirostra melanostrnon*
9. Square-tailed Kite	*Lophoictinia isura*
10. Red Goshawk	*Erythrotriochis radiatus*
11. Grey Falcon**	*Falco hypoleucos*
12. Brolga (W)	*Grus rubicundus*
13. Plains-wanderer	*Pedionomus torquatus*
14. Sanderling (W)	*Calidris alba*
15. Painted Snipe (WD)	*Rostratula benghalensis*
16. Lesser Sand (Mongolian) Plover (W)	*Charadrius mongolus*
17. Black-tailed Godwit (W)	*Limosa limosa*
18. Superb Parrot	*Polytelis swainsinii*
19. Glossy Black-Cockatoo	*Calyptorhynchus lathami*
20. Red-tailed Black Cockatoo	*Calyptorhynchus magnificus*
21. Powerful Owl	*Ninox strenus*
22. Barking Owl	*Ninox connivens*
23. (Eastern) Grass Owl	*Tyto capensis (longimembris)*
24. Masked Owl	*Tyto novaehollandiae*
25. Turquoise Parrot	*Neophema pulchella*
26. Diamond Firetail	*Steganopleura guttatum*
27. Striated Fieldwren (Calamanthus)	*Calamanthus (Secriornis) fuliginosus*
28. Grey-crowned Babbler**	*Pomatstomus temporalis*
29. Pied Honeyeater	*Certhionyx variegatus*
30. Speckled Warbler	*Pyrrholaemus saggittus*
31. Painted Honeyeater	*Grantiella picta*
32. Regent Honeyeater	*Xanthomyza phrygia*
33. Pink (Major Mitchell's) Cockatoo	*Cacatua leadbeateri*
34. Hooded Robin	*Melanodryas cucullata*
35. Brown Treecreeper	*Climacteris picumnus*

W - wetland species
WD - wetland dependent; species associated with river channels
** denotes recorded during this study

There have been at least 3 exotic birds recorded in the region: the House Sparrow, *Passer domesticus,* the Common Starling, *Sturunus vulgaris* and the Rock Dove, *Columba livia. Sturunus vulgaris* is a particularly aggressive species that out compete native tree hollow dependent birds for limited roosting and nesting sites.

iii) Mammals

At least 53 species of mammals including 12 introduced species may occur in the region. Nine species are listed as Endangered (presumed extinct) (see **Table 3**), two species are listed as endangered (see **Table 4**) and 13 species are listed as vulnerable (see **Table 5**).

Table 3
Endangered Species (presumed extinct) of the Gunnedah / Boggabri Region

Common Name	Scientific Name
1. White-footed Rabbit-rat	*Conilurus albipes*
2. Brush-tailed Bettong	*Bettongia penicillata*
3. Plains Rat	*Pseudomys australis*
4. Gould's Mouse	*Pseudomys gouldii*
5. Bridled Nailtail Wallaby	*Onychogalea fraenata*
6. Bilby	*Macrotis lagotis*
7. Western Barred Bandicoot	*Perameles bougainville*
8. Eastern Hare Wallaby	*Bettongia penicillata*
9. Eastern Quoll	*Dasyurus viverrinus*

Table 4
Endangered (extant) Species of the Gunnedah / Boggabri Region

Common Name	Scientific Name
1. Black-striped Wallaby	*Marcropus dorsalis*
2. Brush-tailed Rock-wallaby	*Petrogale penicillata*

Table 5
Vulnerable Mammal Species[4] of the Gunnedah / Boggabri Region

Common Name	Scientific Name
1. Koala	*Phascolarctos cinereus*
2. Squirrel Glider	*Petaurus norfolcensis*
3. Little Pied Bat	*Chalinolobus picatus*
4. Large Pied Bat	*Chalinolobus dwyeri*
5. Greater Long-eared Bat	*Nyctophilus timoriensis*
6. Yellow-bellied Sheathtail Bat**	*Saccolaimus flaviventris*
7. Long-haired Rat	*Rattus villiossimus*
8. Stripe-faced Dunnart	*Sminthopsis macroura*
9. Rufous Bettong	*Aepyprymnus rufescens*
10. Brush-tailed Phascogale	*Phascogale tapaotafa*
11. Little Bent-wing Bat	*Miniopterus australis*
12. Common Bent-wing Bat	*Miniopterus schreibersii*
13. Tiger Quoll	*Dasyurus maculatus*
** denotes recorded during this study	

[4] There is a single record of Eastern Little Mastiff-bat, *Mormopterus norfolkensis,* around Gunnedah in the Bionet database. This species has not been included in the regional fauna list as the data submitted to the NPWS Atlas of NSW Wildlife database could not be verified to have been an accurate record, notwithstanding the distinctive character of the call characteristics of this species.

There is also a record of a Pilliga Mouse, *Pseudomys pilligaensis,* within the Gunnedah LGA (see Appendix 1). This species has so far exhibited an uncharacteristically limited distribution for a *Pseudomys* but appears to be dependent on ground cover dominated by native vegetation, but strives on disturbed habitats, such as after a wildfire and immediately after initial native vegetation clearing. It appears to be confined to poorer soils further west and has not been included as a species that is likely to occur in the Survey Area for this Project.

iv) Reptiles

At least 6 species of reptiles may occur in the region of which 3 have been listed as vulnerable: the Pale-headed Snake, *Hoplocephalus bitorquatus,* Border Thick-tailed Gecko, *Underwoodisaurus sphyrurus* and the Namoi River, Elseya, *Elseya* sp.

v) Endangered Population

The Australian Brush-turkey, *Alectura lathami*, is listed as an endangered population in the Brigalow Belt South Bioregion.

Figure 5 presents the recorded locations of threatened fauna species within a 5km and 10km radius of the Project Site.

4.2 Native Fish

Notwithstanding that there are two records of the Sliver Perch, *Bidyamus bidyanus*, in the Namoi River system and that the Survey Area are within the distributional range of this species, the creek are ephemeral and do not have suitable habitat for any native fish listed as threatened under the FM Act, including the Silver Perch.

4.3 Invertebrates

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

4.4 EPBC Act Considerations

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 150.27 E, Latitude -30.85 S in October 2002 and updated on April 2007 revealed the following (DEH 2007).

i) Threatened Communities

The only listed threatened ecological community that may occur in area is the Grassy White Box Woodlands community which is listed as Endangered - see GCNRC (2007).

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TN
MN

REFERENCE
Project Site Boundary
Threatened Species Record

1: Brown Treecreeper
2: Koala
3: Grey-Crowned Babbler
4: Turquoise Parrot
5: Turquoise Parrot
6: Speckled Warbler, Brown Treecreeper, Yellow-Bellied Sheathtail-Bat
7: Brown Treecreeper
8: Brown Treecreeper
9: Turquoise Parrot
10: Yellow-Bellied Sheathtail-Bat, Eastern Free-tail Bat
11: Speckled Warbler, Brown Treecreeper, Hooded Robin, Grey-Crowned Babbler, Little Pied Bat
12: Grey-Crowned Babbler
13: Grey-Crowned Babbler
14: Regent Honeyeater
15: Turquoise Parrot
16: Large-eared Pied Bat
17: Turquoise Parrot
18: Masked Owl
19: Border Thick-tailed Gecko
20: Brown Treecreeper, Turquoise Parrot
21: Koala

Source: Atlas of NSW Wildlife (April 2007)

SCALE 1:150 000

2.5 0 2.5 5.0 7.5 km

Base Map Source: Boggabri 1:50 000 Topographic Maps

Figure 5
REGIONAL THREATENED SPECIES RECORDS

ii) Threatened Species

The following threatened fauna species may occur in the search area.

Common Name	Scientific Name	Status
Birds		
1. Swift Parrot	*Lathamus discolor*	Endangered
2. Regent Honeyeater	*Xanthomyza phrygia*	Endangered
Mammals		
3. Large-eared Pied Bat	*Chalinolobus dwyeri*	Vulnerable
4. Spotted-tail Quoll	*Dasyurus maculatus*	Vulnerable
5. Greater Long-eared Bat	*Nyctophilus timoriensis*	Endangered
Reptile		
6. Namoi River Elseya	*Elseya* sp. nov. (AMS-R140984)	Vulnerable

iii) Migratory Species

Terrestrial and wetland species (JAMBA and CAMBA) covered by migratory provisions of the EPBC Act are presented in **Table 6**.

Table 6
Terrestrial and Wetland Species (JAMBA and CAMBA)

Common Name	Scientific Name
1. White-bellied Sea-Eagle	*Haliaeetus leucogaster*
2. White-throated Needletail	*Hirundapus caudacutus*
3. Regent Honeyeater	*Xanthomyza phrygia*
4. Latham's Snipe	*Gallinago hardwickii*
5. Painted Snipe	*Rostratula benghalensis*

iv) International Agreement Sites

There are no World Heritage Areas and no Ramsar sites in the search area defined in **Figure 4**.

5 FAUNA IN THE SURVEY AREA

5.1 Amphibians

Table 7 lists the frog species that were recorded on or in areas adjoining the Survey Area.

Table 7
Recorded Frog Species

Common Name	Scientific Name	Status
1. Gunther's Frog	*Litoria latopalmata*	P
2. Peron's Tree-frog	*Litoria peronii*	P
3. Green Tree-frog	*Litoria caerulea*	P
4. Spotted Marsh Frog	*Limnodynastes tasmaniensis*	P
5. Wrinkled Toadlet	*Uperoleia rugosa*	P
6. Rough Frog	*Cyclorana verrucosus*	P

All these are common frog species. *Cyclorana verrucosus* tadpoles were recorded in one of the dams in the Shannon Harbour Road reserve after the last heavy rain in February 2007. This is a species that has apparently not been recorded in the region. While there are also likely to be other burrowing frogs that will not be recorded except when they emerge, and then only for very limited periods immediately after heavy soaking rain, none of these species are listed as threatened.

5.2 Birds

Table 8 lists the bird species observed in the Survey Area.

Table 8
Observed Bird Species

Page 1 of 2

Common Name	Scientific Name	Status
1. Australian Wood Duck	*Chenonetta jubata*	P
2. Pacific Black Duck	*Anas superciliosa*	P
3. Grey Teal	*Anas gracilis*	P
4. Little Pied Cormorant	*Phalacrocorax melanoleucos*	P
5. Pied Cormorant	*Phalacrocorax varius*	P
6. Little Black Cormorant	*Phalacrocorax sulcirostris*	P
7. Australian Pelican	*Pelecanus conspicillatus*	P
8. White-faced Heron	*Egretta novaehollandiae*	P
9. Nankeen Night Heron	*Nycticorax caledonicus*	P
10. Wedge-tailed Eagle	*Aquila audax*	P
11. Australian Hobby	*Falco longipennis*	P
12. Grey Falcon	*Falco hypoleucos*	V
13. Peregrine Falcon	*Falco peregrinus*	P
14. Nankeen Kestrel	*Falco cenchroides*	P
15. Masked Lapwing	*Vanellus miles*	P
16. Common Bronzewing	*Phaps chalcoptera*	P
17. Crested Pigeon	*Ocyphaps lophotes*	P
18. Peaceful Dove	*Geopelia striata*	P
19. Galah	*Cacatua roseicapilla*	P
20. Sulphur-crested Cockatoo	*Cacatua galerita*	P
21. Cockatiel	*Nymphicus hollandicus*	P
* Introduced exotic species P = Protected V = Vulnerable E = Endangered U = Unprotected		

Table 8 (Cont'd)
Observed Bird Species

Common Name	Scientific Name	Status
22. Australian King-Parrot	*Alisterus scapularis*	P
23. Crimson Rosella	*Platycercus elegans*	P
24. Eastern Rosella	*Platycercus eximius*	P
25. Blue-bonnet Parrot	*Psephotus haematogaster*	P
26. Red-rumped Parrot	*Psephotus haematonotus*	P
27. Mulga Parrot	*Psephotus varius*	P
28. Turquoise Parrot	*Neophema pulchella*	V
29. Channel-billed Cuckoo	*Scythrops novaehollandiae*	P
30. Southern Boobook	*Ninox novaeseelandiae*	P
31. Barn Owl	*Tyto alba*	P
32. Tawny Frogmouth	*Podargus strigoides*	P
33. Australian Owlet-Nightjar	*Aegotheles cristatus*	P
34. Laughing Kookaburra	*Dacelo novaeguineae*	P
35. Superb Fairy-wren	*Malurus cyaneus*	P
36. Western Gerygone	*Gerygone fusca*	P
37. Yellow Thornbill	*Acanthiza nana*	P
38. Noisy Miner	*Manorina melanocehrla*	P
39. Lewin's Honeyeater	*Meliphaga lewinii*	P
40. Flame Robin	*Petroica phoenicea*	P
41. Eastern Yellow Robin	*Eopsaltria australis*	P
42. White-browed Babbler	*Pomatstomus supercilious*	P
43. Grey-crowned Babbler	*Pomatstomus temporalis*	V
44. Gilbert's Whistler	*Pachycephala inornata*	V
45. Rufous Whistler	*Pachycephala rufiventris*	P
46. Willy Wagtail	*Rhipidura lecophrys*	P
47. Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	P
48. Black-faced Woodswallow	*Artamus cinereus*	P
49. Pied Butcherbird	*Cracaticus nigrogulsris*	P
50. Australian Magpie	*Gymnorhina tibicen*	P
51. White-winged Chough	*Corcorax melanorhamphos*	P
52. Apostlebird	*Struthidea cinerea*	P
53. Australian Raven	*Corvus coronoides*	P
54. Double-barred Finch	*Taeniopygia bichenovii*	P
55. Golden-headed Cisticola	*Cisticola exilis*	P
56. Silvereye	*Zosterops lateralis*	P
57. White-winged Triller	*Lalage sueurii*	P
58. Welcome Swallow	*Hirundo neoxena*	P
59. Common Starling*	*Sturunus vulgaris*	U

* Introduced exotic species
P = Protected V = Vulnerable E = Endangered U = Unprotected

Other than the exotic species indicated above, all are protected native species.

5.3 Mammals

The following terrestrial mammals listed in **Table 9** were either caught in the traps deployed, identified from body tissues (including hair samples) and bones or observed in and around the Survey Area.

All species caught were either common native species or exotic (*) species. The exotic species recorded included the European Red Fox and the Feral Cat which are listed a Key Threatening Processes (+) in NSW (TSC Act) and Federally (EPBC Act).

The following bat species listed in **Table 10** were detected from analysis of taped calls.

Table 9
Recorded Terrestrial Mammal Species

Common Name	Scientific Name	Status	Method of Detection
1. Short-beak Echidna		P	Os
2. Common Dunnart	*Smithopsis murina*	P	Pt, Ea
3. Yellow-footed Antechinus	*Antechinus flavipes*	P	Ea, Eb, H
4. Sugar Glider	*Petaurus breviceps*	P	S, H
5. Brush-tailed Possum	*Trichosurus vulpecula*	P	S, H, C
6. Ring-tailed Possum	*Pseudochrinus peregrinus*	P	S,H
7. House Mouse*	*Mus domesticus*	U	P, Ea
8. Cattle*	*Bos taurus*	U	S, H, O, Os
9. Sheep*	*Ovis ovis*	U	S, O, Os
10. European Red Fox*+	*Vulpes vulpes*	U	S, H, O
11. Domestic Dog*	*Canis familairis*	U	O
12. Eastern Grey Kangaroo	*Macropus giganteus*	P	S, O, H, Os
13. Red-necked Wallaby	*Macropus rufogriseus*	P	S, O, H, Os
14. Swamp Wallaby	*Wallabia bicolour*	P	S, O, H, Os
15. European Rabbit *+	*Oryctolagus cuniculus*	U	S, O, H, Os
16. Feral Cat *+	*Felis cattus*	U	S, O, H
17. Brown Hare	*Lepus capensis*	U	S, O, H

Methods of detection:
Pt - Pitfall traps
Ea - Elliot trap type A on ground.
Eb - Elliot Trap type B 2.0m above ground.
S - Spotlight searches
O - Observations by sight, sound and/or smell.
T - hard and soft tissue remains
Os - Other signs, including foot-prints, scratch marks, diggings, scats, etc.
H - Hair traps (on ground and 6.0m on trees).
C - Cage trap
P = Protected V = Vulnerable E = Endangered U = Unprotected

* Introduced Exotic Species
+ Key Threatening Process

Table 10
Recorded Bat Species

Common Name	Scientific Name	Status
Family Molossidae		
1. White-striped Mastiff-bat	*Nyctinomus (Tadarida) australis*	P
2. Little Mastiff-bat (sp1 24 kHz)	*Mormopterus sp 3* (short penis)	P
3. Little Mastiff-bat (sp1 29/30 kHz)	*Mormopterus sp 4* (long penis)	P
4. Beccaris Mastiff-bat	*Mormopterus beccarii*	V
Family Vespertilionidae		
5. Chocolate Wattled Bat	*Chalinolobus morio*	P
6. Lesser Long-eared Bat	*Nyctophilus geoffroyi*	P
7. Gould's Long-eared Bat	*Nyctophilus gouldii*	P
8. Gould's Wattled Bat	*Chalinolobus gouldii*	P
9. Little Forest Bat	*Vespadelus vulturnus*	P
10. Western Broad-nosed Bat	*Scotorepens balstoni*	P
Family Emballonuridae		
11. Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	V
P = Protected V = Vulnerable		

Follow-up sampling to target roosts of microbat, in particular if there was any roost of the Yellow-bellied Sheathtail present in the Survey Area, resulted in the detection of the following bat species listed in **Table 11**.

Table 11
Recorded Bat Species (Follow-up Targeted Sampling)

Species\Site	Wean Rd	Jaeger Lane	Belmont Creek	Box Cut Area	Vehicle Mobile	Haul Road@
Recording duration ->	2.4hrs	10.0hrs	3.0hrs	7.0hrs	3.5 hrs	9.5hrs
1. *Nyctophilus* spp	+	+	+	+	+	+
2. C. mario	+	+	+	+	++	?
3. *Vespadelus.* spp	+	+	+	+	+	++
4. Sco. balstoni					+	+
5. C. gouldii	++	+	++	+	++	+
6. *Mormopterus* spp	+	+	+++	+	++	+++
7. Sac. flaviventris		+	+		+	+
8. Tadarida australis		+	?		+	+

+++ - denotes possible roosting site from high frequency of calls
++ - denotes that the calls of the species were recorded commonly
+ - denotes presence of species
? – denotes call too faint to make a positive identification
@ Western portion of Shannon Harbour Road along the Transport Route.

At least 2 species of *Nyctophilus* and two to three species of *Mormopterus* are included in these recordings. Most of the calls *Nyctophilus* spp were too weak to make distinction between species easily achievable. A fourth species of Beccari's Free-tail Bat, *Mormopterus beccarii,* was evident in the most recent (April 2007) recording along the reserve corridor vegetation remnant in this section of Shannon Harbour Road along the Transport Route.

5.4 Reptiles

The reptiles listed in **Table 12** were caught in the traps and or recorded during searches under rocks, logs and leaf litter.

Table 12
Recorded Reptile Species

Common Name	Scientific Name	Status
1. Eastern Snake-necked Turtle	*Chelodina longicollis*	P
2. Blue-bellied Black Snake	*Pseudechis guttatus*	P
3. Common Dwarf Skink	*Menetia greyii*	P
4. Nobbi	*Amphibolours nobbi*	P
5. South-eastern Morethia Skink	*Morethia boulengeri*	P
6. Robust Skink	*Ctenotus robustus*	P
7. Dubious Dtella	*Gehyra dubia*	P
8. Eastern Blue-tongued	*Tiliqua scincoides*	P
9. Tree Crevice-skink	*Egernia striolata*	P
10. Eastern Brown Snake	*Pseudonaja textilis*	P
P = Protected		

All reptiles recorded are common protected species.

6 DISCUSSION

The Belmont Coal Project will require disturbance to approximately 243ha of land on the Project Site and along the constructed section of the transport route. Of this, 24.9ha is classified by GCNRC (2007) as Narrow-leaf Ironbark - Pilliga Grey Box Community, 51.5ha Pilliga Grey Box - White Cypress Pine Community, 13.4ha Pilliga Grey Box - White Box - Yellow Box - White Cypress Pine Community, with the remaining 42.3ha considered remnant vegetation of higher habitat value proposed to be set aside as part of the offset strategy. It is noteworthy that the haul road along the section of Shannon Harbour Road on the proposed transport route has been aligned such that disturbance to mature native trees within the 6.1ha area would be limited to the removal of seven trees (some of these are exotic species) and a patch of regenerating Callitris (see GCNRC, 2007).

In an attempt to minimise, ameliorate or avoid any adverse impact on the fauna biodiversity, a number of changes to Project design have been made since the initial survey when the environmental sensitivities of the Project Area was mooted with the company. As a consequence, the clearing of the roadside corridors along Wean Road and Jaeger Lane has been minimised to preserve as much of the mature hollow bearing trees as practicable. In addition, the Project Site has largely been destocked and remaining woodland remnants in the balance of the Project Site that is not affected by the proposed activity has been offered as part of a biodiversity offset strategy (see GCNRC, 2007). The regeneration of these areas will increase the patch quality of these former grazing areas which will allow the conservation of the local biodiversity and contribute to the connectivity and conductivity of the fragmented habitat remnants between Vickery State Forest and the Kelvin Range.

Over the life of the Project, the fauna community in the Survey Area can be expected to experience pulse (short duration) impacts from the modification and removal of habitat arising

from the progressive removal of vegetation as mining progresses. In addition, longer term pressed (sustained) impacts will be experienced by the fauna community as a consequence of the removal of mature habitat trees with hollows within the areas of proposed disturbance for the operational life of the Project and beyond.

Safeguards to minimise and ameliorate the short duration and sustained impacts and adoption of post-mining rehabilitation and biodiversity offsets are detailed in Section 7.0. However, some of the trees with large hollows will take between 50 (maturing of existing standing crop) to over 100 years (from seedling reestablishment) for their replacement.

As a preferred option for best practice in minimising possible environmental impact on fauna, mining from the least to the most environmentally sensitive areas, was canvassed with the Proponent. However, for technical reasons and economic imperatives the proposed mining activities will commence with a box cut across Jaeger Lane before progressing southward (see Figure 2.9 in *Environmental Assessment*). Establishment and mining of the box cut will be completed within three years, with backfilling and rehabilitation of the box cut and the adjacent northern out-of-pit dump, and the re-establishment of the Jaeger Lane roadside corridor is planned to be completed within 5 years from the commencement of mining. This pulse impact of clearing and alienation on is small section of the habitat corridor on Jaeger Lane is expected to extend over the best part of 10 years before and regrowth shrub layer can be established.

Most mining activities will occur from 7.00am to 10.00pm and blasting about once a week (between 10.00am and 5.00pm). Haulage along the haul road however will occur throughout the day and night.

6.1 Likely Impact on Threatened Species

6.1.1 General Discussion

The likely impact on listed threatened species listed under the TSC Act (and the EPBC Act, also see Section 6.2.) found or likely to occur in the Project Site include the amphibians, birds, mammals and reptiles as follows.

6.1.2 Amphibians

The Project Site is not within the range of the only listed endangered frog species in the region, the **Booroolong Frog,** *Litoria booroolongensis*. None were found on the site during the 2002, 2006 or 2007 field surveys and, given its habitat preference for fast flowing rocky mountain streams farther east, it would not occur in this area. The distribution of this species is not expected to extend beyond the fast flowing creeks on the upper reaches of the western flowing rivers on the Northern Tablelands.

6.1.3 Birds

The area of the Project Site and environs are not part of a permanent wetland area, or is it associated with any extensive wetland area. The proposal will thus be unlikely to significantly impact on any listed threatened wetland or wetland dependent bird species. None of the listed threatened species that are associated with, or dependent on wetlands are likely to affected by this proposed mine as no extensive wetland habitat exists in the Survey Area except ephemeral creeks.

Neither the **Malleefowl**, **Bush Thick-knee** nor the **Plains Wanderer** was recorded during the surveys. These are highly susceptible ground dwelling birds and due to the presence of foxes and the degraded understorey in the habitat remnants between the extensive areas of cleared, cultivated and grazed paddocks, it is unlikely that any of these species will occur in the Survey Area. This location is, in any case, arguably outside the historical range of the Malleefowl.

Other than the **Grey Falcon**, which is discussed in detail in Section 6.1.8 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 woodland habitat with high prey density (or as in the case of the **Grass Owl**, over extensive grassland). None of these species are therefore expected to be significantly affected by the proposed activity.

With one exception, none of the listed threatened parrots, including the **Glossy Black Cockatoo** that has recently been recorded in the region (see CES 2005), were recorded during the surveys. The **Turquoise Parrot**, a parrot that feeds essentially on grass seeds (from both native and exotic grasses), was recorded feeding at the edge of the Ironbark patch north of Jaeger Lane (see Section 6.1.7). Despite extensive inspections of all tree hollows in and within sight distance of the Survey Area, no nesting hollows of any of these listed threatened parrots were located. The listed endangered **Swift Parrot**, a species that is also listed in the EPBC Act, is nomadic in this part of its winter range. Notwithstanding the substantial number of tree hollows that will be lost, no listed threatened parrots are likely to be significantly affected by the proposed activity.

There is a relatively recent (c 1998) record of the Regent Honeyeater in the Boggabri region (NPWS 2007 – see **Figure 5**) but it was not recorded during the 2002, 2006 or 2007 surveys. The North Western Slopes of NSW are arguably the western limits of this species' distribution with important breeding areas in the Warrumbungles NP and Pilliga Nature Reserve to the south-west, and the Barraba District to the east of Gunnedah (see Ayers *et al* 1996-99). The only patch of Ironbark-Box Woodland Vegetation Community in the Survey Area which could potentially have constituted habitat for this species is only marginally disturbed by the Project. 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** was 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 Project Site and environs. These species are thus unlikely to occur at or near the Project Site and be affected by the proposed activity.

Two other recently listed vulnerable species, the **Diamond Firetail** and **Speckled Warbler** were not recorded during the field surveys, although the former species was recorded in 1999 among the gilgai habitat approximately 10km to the west at the Whitehaven Coal Mine. These species are not expected to occur in the Survey Area because of the lack of understorey that has resulted from grazing by sheep and cattle under the habitat remnants in the ploughed and contoured paddocks.

The inclusion of Calamanthus species in the regional checklist is an aberration in the initial listing that has yet to be corrected. It is in reality a 2-species complex: an eastern species distributed only along the coast and a western species which occurs in the arid zone. There is no continuous population cline between these two populations. No Calamanthus species was recorded during the surveys and none is expected.

The **Brown Treecreeper** forages mostly on the understorey and lower trunks of woodland trees. There are several records of this bird within 10km of the Project Site, one adjoining the Project Site (see **Figure 5**). Its local distribution is, however, confined to relatively large intact woodland patches, viz Vickery State Forest and the uncleared slopes of the Kelvin Range. Despite targeted searches along the tree line of Belmont Creek and the roadside habitat corridors in the Survey Area, this listed vulnerable species was not recorded during the surveys. Similarly, this species is not expected to occur in the ploughed and contoured paddocks on the Project Site due to the sparseness of the woodland remnant and the lack of understorey that has resulted from grazing by sheep and cattle under these limited habitat remnants.

Of note is the record of a juvenile **Gilbert's Whistler**, a listed vulnerable species that has not previously been recorded in the region. This species is considered further in Section 6.1.12.

The **Hooded Robin** was not recorded in or within sight distance of the Project Site or the Transport Route however it has been recorded near the south-western edge of the Project Site in the adjoining Vickery State Forest (see **Figure 5**). This robin appears to only make local moves between the hills in summer to the adjacent lowland in winter. As the Transport Route passes through habitat in which this species is likely to occur a detail assessment of the likely impact the proposed activity may have on this small bird has been carried out in Section 6.1.13.

6.1.4 Mammals

As far as the listed mammals are concerned, it is unlikely that any of the listed presumed extinct species, including the **Plain's Rat**, **Eastern Quoll**, **Bilby** and **Bridled Nailtail Wallaby,** are likely to be found in or near the Survey Area. There are, however, persistent and recent unverified reports of bilbies in the region although no extant population is now likely to occur in NSW.

The Project Site also is within current distribution range of the listed endangered **Black-striped Wallaby**. 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 North Western Slopes of NSW[5]. Given the well-established land use history of the Gunnedah area since European settlement and the poor natural habitat quality around proposed mine, it is most unlikely that this wallaby species or the listed vulnerable **Rufous Bettong** will occur in the area.

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 more eastern parts of NSW in the Liverpool Plains. It periodically occurs in plague density in the Channel Country in SE Queensland, northern South Australia and parts of the Northern Territory. Neither of these species is expected to ever be found on the Project Site.

Of the listed vulnerable arboreal species, the Koala is a subject for SEPP 44 and is dealt with in detail in Section 6.4 of this report.

It is arguable that the Gunnedah region is too far east for the **Pilliga Mouse** 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. Neither of these species was identified in the Survey Area and there is no recent record of these species locally. Given the habitat quality of the local environs, it is unlikely that this **Squirrel Glider** will occur in the area. There is only one record of the **Pilliga Mouse** west of Gunnedah near the boundary limit of the Gunnedah LGA. Due to the disturbed and highly modified nature of the ground in the Survey Area this native mouse is unlikely to occur on the Project Site

Despite extensive sampling, only one of the four listed vulnerable microbat species was recorded during the surveys. The likely impact of the proposal on the **Yellow-bellied Sheathtail Bat**, a species also listed in the EPBC Act, is assessed in detail below in Section 6.1.2 of this report.

Arguably, the Gunnedah area is probably on or closed to the eastern distributional limits of the **Little Pied Bat** and the **Greater Long-eared Bat**. These bats have predominantly semi-arid zone distributions.

Notwithstanding that the **Little Pied Bat** was recorded at the Whitehaven Coal Mine approximately 10km to the west in 1999 (CES 2000) and it has also been recorded approximately 800m west of the Project Site within Vickery State Forest (see **Figure 5**), the majority of the known locations of this species in NSW have been in the Western Division - in more open and arid habitats (see Ayers *et al* 1996-99). Breeding in summer, it can apparently tolerate high roost temperatures and its preference for dry roosting sites limits it to occupying subterranean caves, mine shafts, tree hollows, as well as abandoned buildings that has this specific characteristic (Richards 1995). Although this species may occur from time to time in woodland this far east, this local (probably episodic) population is unlikely to be significantly affected by the Project in this marginal part of its range. It has not been recorded during any of the surveys around the Project Site and Transport Route despite extensive sampling efforts.

[5] Refer page 300, Cunninghamia 6(2): 1999. Botanical Divisions and Sub-divisions of NSW.

There are four records of **Greater Long-eared Bat** in the defined search area centred on the Project Site. None of these are within 10km of the Project Site. The Study Areas on the lower slopes of the Northern Tablelands has to be considered the eastern limits for this, an essentially semi-arid zone bat. It is a species had has a preferred habitat that is open and sparse, and thus is not expected to be significantly adversely affected by the loss of the woodland areas of the Project Site.

Of the two microbats that are at their western limits, the first species, the **Large-eared Pied Bat**, is known from a single record, near the southeastern foothills of the Kelvin Range within 10km of the Project Site (NPWS 2007 - see **Figure 5**). This bat generally occurs in drier forest and woodland habitats east and west of the Great Dividing Range. Its western range in NSW includes the Central West and North Western Slopes. The Project Site is near the western limit of the North West Slopes but the species can be expected to foray occasionally into nearby hills on the North Western Plains. There has also been an unverified recent record of the **Eastern Freetail-bat**[6] in the region (NPWS 2007 – see **Figure 5**) but, despite extensive sampling, neither this species nor the **Large-eared Pied Bat** was recorded during the field surveys. The Survey Area would be at the western limits of these microbat species. In particular, the **Eastern Freetail-bat** is a mesic habitat species and is normally associated with coastal habitat. It is not expected to occur in the area of proposed Project.

The TSC Act listed vulnerable **Spotted** or **Tiger Quoll**, is a species also listed in the EPBC Act, and has been recorded in the search area defined in the Bionet data base from an old record. There is no recent record of this species in the Boggabri Map Sheet in the NSW data base (NPWS 2007) within 10km of the Project Site. This species, although robust in its ability to use a variety of habitat, requires a reasonably dense ground cover and access to reasonably high prey densities and is thus not expected to occur on or surrounding the Project Site for lack of suitable habitat and food source.

No record of the **Stripe-faced Dunnart** currently exists with 10km of the Project Site or the defined search on the Bionet data base. It is however a species that has occurred in the more productive soils like those on the Liverpool Plains and in the Murray-Darling Basin on the floodplains.

6.1.5 Reptiles

The Survey Area are within the range of the **Pale-headed Snake**, *Hoplocephalus bitorquatus*, a reptile that is listed as vulnerable. However, none was located during the field surveys and none has been recorded from the immediate area. The Project Site itself did not provide any suitable habitat for this species which prefers a habitat of mature trees along watercourses with a thick understorey. The creek line on the Project Site is very degraded and over grazed with only scattered trees and a bare understorey along its course.

The Survey Area are also close to the range of another Schedule 2 reptile, the **Border Thick-tailed Gecko**, *Underwoodisaurus sphyrurus*. However, this species essentially inhabits rocky wooded areas with large boulders, a habitat which is not present within the Project Site.

[6] Also called the Eastern Little Mastiff-bat (Parnaby 1992) or the East-coast Freetail bat (Churchill 1998). A single specimen record of this species exist in the Bionet database. Its correct location (and/or identity) has yet to be verified.

The **Namoi River Elseya**[7], another listed vulnerable species, is found between 700m and 800m AHD in the headwaters of the Namoi, Macdonald and Gwydir Rivers (Cann 1998 cf Ayers *et al* 1996-99). There are, however, unconfirmed reports of this species also occurring in the Macquarie Marshes. It was not found in the Survey Area and would not occur on the Project Site as the watercourse is far too ephemeral, small and degraded. Cann (1998) also noted that it had never been found in habitats used by *Chelodina longicollis,* a species which was found in Belmont Creek, the main ephemeral creek on the Project Site.

Section 5A assessments have been conducted only on the listed vulnerable species that were recorded during the surveys or those that have the potential of occurring on the Project Site given the habitat patch quality and the habitat types present. In accordance with the DEC guidelines (DEC, 2005), the following detailed assessments of relevant the species are presented below at to determine the following.

- *"Whether or not the 'proposal' is likely to reduce the long-term viability of a local population of the species, population or community.*
- *Whether or not the 'proposal' is likely to accelerate the extinction of the species, population or ecological community".*

6.1.6 Assessment of Impact

The following seven part test of significance has been completed for the following species, in accordance with s5A of the EP&A Act.

6.1.6.1 Yellow-bellied Sheathtail Bat, *Saccolaimus flaviventris*

The bat call recordings indicate that this species forages and ranges extensively over the Survey Area and appears to occur more frequently in or near more densely wooded areas. Although no roosting site emergence call patterns was recorded, the most frequent calls occurred along Jaeger Lane and along the habitat edge of Vickery State Forest on the western boundary of the Project Site Survey Area, including over the regenerating White Cypress Pine community. Less frequent calls of this species were recorded along the Belmont Creek gallery habitat and along Wean Road and Shannon Harbour Road.

Further recordings in the Project Site to find roost sites in areas likely to be affected by the proposed activities **did** not record the presence of any roost sites.

[7] Formerly known as Bell's Turtle, *Elseya bellii* (Gray 1884) the species found in this part of the Namoi River catchment is apparently an undescribed distinct species - *Elseya* sp. nov. (AMS-R140984).

The following is extracted from Richards (1998):

"Very little is known about the biology of this species, though breeding has been analysed from museum specimens by Chimimba and Kitchener (1987). The general ecology has been reviewed by Richards (1983, 1995a).

It has never been recorded in caves, and large colonies (around 40 individuals) have been found in some roosts (L.S. Hall, pers. comm. in Ibid). It has been hypothesed, based on flight characteristics, that this species may be restricted to roosts in emergent trees because it needs a clear space below the roost to gain flight speed (Richards and Hall 1997).

Saccolaimus flaviventris appears to be quite rare, especially in southern latitudes. Field surveys by the consultant in the Murwillumbah-Lismore area indicated that a large foraging range may be required, because detector passes were low and it appeared from these data that just a few individuals were making large circuits (Richards, unpublished). During an intensive survey in the Shoalwater Bay Military Training Area in central Queensland, that comprised 9 weeks of field work using 55 sites across two seasons, *S. flaviventris* was patchily distributed and restricted to denser habitats (Richards 1992 and 1993)."

Ayers *et al* (1996-99) at page 144 identified the following threats to 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.
- Predation by feral cats at roost sites may have localised impacts. (However, I consider this to be nothing more that a speculative comment).

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Richards (1998) suggests that as follows, *ad idem*:

"In order to assess potential impacts on the life cycle of *S. flaviventris* it is necessary to address the primary components of its ecology, such as breeding, foraging, roosting and movement/migration accordingly.

i) Breeding

Females of this species have the typical pattern of breeding in summer, with a single young being weaned by the following early autumn (Chimimba and Kitchener 1987).

ii) Foraging

This species can be assumed to forage primarily upon insects that are hunted by aerial intercept, which is typical of species with long tapered wings (high aspect ratio) and a high wing loading. This indicates (supported by field observations) that flight is fast, with little manoeuvrability, and given the loud, long-range echolocation call, insects would be captured by interception rather than being pursued.

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

iii) Roosting

S. flaviventris roosts only in tree hollows, and as mentioned above, these are predicted to be large, located high in a tree, and situated such that there is enough clear space at the exit to allow an unencumbered drop until the bat attains normal flight speed.

iv) Movement and Migration

There is no information available in relation to movement or migration patterns that this species may exhibit. Richards (1983, 1995) concluded that because some *S. flaviventris* has been caught during the 1980's in situations where they appeared to be exhausted, and in open view of the public, that they may have been undertaking pre-winter migrations. This hypothesis has been repeated in other publications, including, for example, Ayers *et al* (1996). Because several individuals of this species have been recorded over the last year or so to have been infected with Lyssavirus (similar to rabies) the individuals observed may not have been exhausted but instead may have been diseased and unable to fly. The "migration" hypothesis therefore needs to be revised. “

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

The area of partially cleared woodland within the northern section of the proposed limit of open cut mining area, the tree gallery along the ephemeral creek and on either sides of Jaeger Lane and Wean Road, and along Belmont Creek that will be removed contain some trees with hollows that may be used by this species. It is unlikely, however, that the modification of this habitat will affect this species’ life history in a manner that will cause its local extinction. This proposed mine area represents only a small portion of its normal extensive home range (Richards *pers comm*) and the proposed activity will not preclude it from hunting and foraging over the surrounding area.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

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

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:
(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

No endangered ecological community has been listed in this region under the TSC Act.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

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 Project.

A number of large trees will be lost along the roadside corridor Jaeger Lane and Wean Road and creekline gallery habitat along Belmont Creek (see Section 6.3). However, it is unlikely that the proposed disturbance of 243ha on the Project Site and area disturbed for the construction of the haul road in the Shannon Harbour Road Reserve along the proposed transport route will affect this species in this part of its distribution.

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

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical[8] fauna habitat has been listed in this region of NSW.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan[9] or threat abatement plan,

This species is listed as vulnerable in the NSW TSC Act, but is not listed in the national Bat Action Plan (Richards and Hall 1997) because of its widespread distribution. 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.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Mining has been identified an activity that forms part of a listed Threatening Process, the Clearing of Native Vegetation (as defined in the final determination of the NSW Scientific Committee) has been listed under the TSC Act.

[8] The EPBC Act has an additional category of Critically Endangered Habitat, none has been declared in the Gunnedah area of NSW. See Section 6.2.

[9] No further recovery plans will be prepared in its place Priority Action Statements (PAS) for the respective species are now being prepared.

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 formulated for this mine proposal (see Section 7 below).

6.1.6.2 Turquoise Parrot, *Neophema pulchella*

The Turquoise Parrot is small grass parrot that has been listed as a vulnerable species. A pair of this bird was observed feeding in the late afternoons on the ground in the paddocks north of Jaeger Lane on both sides of Wean Road in December 2001 but not on subsequent trips in July and September 2002, nor October 2006 and April 2007.

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 out-numbers the well-known Red-rumped Parrot. The species is considered to be partly-nomadic, locally common and with numbers consolidating (Pizzey and Knight 1998).

The Turquoise Parrot has been recorded to occur in a number of conservation reserves including Cocoparra, Mt. Kaptutar, Goobang and Warrumbungle National Parks as well as Round Hill and Curembenya Nature Reserves (Morris 1980 and Ayers *et al* 1966-99).

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

In order to assess potential impacts on the life cycle of the Turquoise Parrot it is necessary to address the primary components of its ecology, such as breeding, foraging, nesting and movement/migration accordingly.

i) 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 2 m 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 4-5 white rounded eggs (Pizzey and Knight 1998).

ii) Foraging

Observations of feeding indicate that seeds of grasses and small herbs are the main component in the diet. Grass[10] 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 Grounsel, *Senecio lautus*, Blue Heliotrope, *Heliotreopium 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).

iii) 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).

iv) Movement and 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.

The Project Site is not at the distribution limit of this species (see Morris 1980, Ayers *et al* 1996-99 and Higgins *et al* 1999).

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).

The Project will remove or modify some feeding habitat on the edge of the woodland area affected by the initial Year 1 Box Cut and across the road side gallery along Jaeger Lane (approximately 12.9ha). Detailed inspections of mature trees with hollows that have been proposed for removal did not located any nesting site of this parrot. Except for the removal of some mature trees (see discussion below in Section 6.3), the proposed activities would not constitute any threatening processes directly, or contribute to them significantly. It is therefore unlikely that the proposal will adversely effect on the life cycle of this grass parrot such that a viable local population of the species is likely to be placed at risk of extinction.

[10] Species indicated with an asterisk are exotic grasses.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

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

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

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

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

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 Project.

A number of large trees will be lost along the roadside corridor along Wean Road and Jaeger Lane and creekline gallery habitat (see Section 6.3). However, it is unlikely that the proposed disturbance of 12.9ha of suitable habitat will affect this species in this part of its distribution.

The proposed activities associated with the Project are unlikely to isolate the local population of Turquoise Parrot from any currently interconnecting or proximate areas of habitat of this flight mobile bird.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical[11] fauna habitat has been listed in this region of NSW.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

There is no recovery or threat abatement plan for this Turquoise Parrot.

[11] The EPBC Act has an additional category of Critically Endangered Habitat, none has been declared in the Gunnedah area of NSW. See Section 6.2.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Mining has been identified an activity that forms part of a listed Threatening Process, the Clearing of Native Vegetation (as defined in the final determination of the NSW Scientific Committee) has been listed under the TSC Act.

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).

6.1.6.3 Grey Falcon, *Falco hypoleucos*

This listed vulnerable raptor which has been recorded locally (see CES 2000). It is a small falcon that has been recorded to breed only along major inland waterways in recent times (see Ayers *et al* 1996-99). The Project Site is not at the distributional limit of this species which ranges over most of semi-arid NSW where it nests in suitable riparian habitat with tall Eucalypts that are fringed by shrubland.

In July 2002, this falcon was observed to forage along Wean Road in the section of roadside corridor 2.0 km to 5.0 km south of the Project Site. In September 2002, it was observed foraging in the paddock around a dam on the Project Site, east of Wean Road and was using a tall isolated White Cypress Pine located in the northern end of the paddock as a perch tree. This tree will be unaffected by the proposed mine.

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

The following is the results of a seven part test of significance completed for the Grey Falcon.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

In order to assess potential impacts on the life cycle of the Grey Falcon, *Falco hypoleucos,* it is necessary to address the primary components of its ecology, such as breeding, foraging, nesting and movement/migration accordingly.

i) Breeding

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

ii) Foraging

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

iii) Nesting

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

iv) Movement and Migration

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

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

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[12] – related eggshell thinning;
- egg collecting[13]; and
- competition from other falcon[14] species which is problematic (J Brickhill *per comm.* in Ayers et al 1996-99).

Except for the removal of some mature trees (see discussion below in Section 6.3), the proposed activity would not constitute any of these threatening processes directly or contribute to them significantly. No shrubland or large trees in a riparian zone will be affected. Some large trees will be lost along the roadside corridor and creekline gallery habitat (see Section 6.3 below). It is unlikely that the proposed activity over 243 ha will adversely affect this species' population viability in this part of its distribution range.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

[12] Since this pesticide is now completely banned in Australia, this threat is no longer relevant.
[13] This is a law enforcement issue and is not a relevant consideration for this mining proposal.
[14] As all falcons are native to Australia, I find this opinion in a conservation authority's publication rather curious.

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

No endangered ecological community has been listed in this region under the TSC Act.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

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.

A number of large trees will be lost along a 2.0 km roadside corridor and 2.0 km creekline gallery habitat (see Section 6.3). The trees that will be removed are not from along any major watercourses and the Project Site has also been cleared, heavily grazed, contoured and cultivated for over 100 years. Thus no significant nesting or foraging habitat of this falcon is expected to be modified or removed, notwithstanding that in this part of its range it is only a vagrant. It is therefore unlikely that this proposed activity over 243 ha will affect this species in this part of its distribution.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical[15] fauna habitat has been listed in this region of NSW.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

There is no recovery or threat abatement has been formulated for this falcon.

[15] The EPBC Act has an additional category of Critically Endangered Habitat, none has been declared in the Gunnedah area of NSW. See Section 6.2.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Mining has been identified an activity that forms part of a listed Threatening Process, the Clearing of Native Vegetation (as defined in the final determination of the NSW Scientific Committee) has been listed under the TSC Act.

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).

6.1.6.4 Grey-crowned Babbler, *Pomatstomus temporalis*

The Grey-crowned Babbler was not recorded within the Survey Area or in any of the habitat nearby in the initial survey and the two subsequent surveys in 2001 and 2002. It has, however, been recorded in the region (NPWS 2002) and thus was considered to potentially also occur on the Project Site.

"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).

In the last two most recent surveys, however, in 2006 and 2007, this babbler was recorded on the Project Site between Vickery State Forest and the road side habitat corridor along Wean Road, along the section between the main gate into Belmont Property and Riordan Road leading into Vickery State Forest. A family of up to 11 individuals were recorded in October 2006 and two groups of 9 and 12 birds were recorded on and adjacent to Shannon Harbour Road reserve respectively in March 2007. In addition, a number of nests were recorded on the road reserve. Over 13 nests were recorded, all were non-active breeding nests and a number have been inactive for some time, suggesting multi-generational use of this habitat patch.

The threats to this species have 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).

The Project Site is at the edge of the Brigalow South Bioregion near the western boundary of Nandewar Bioregion and is not at the distributional limit of this listed vulnerable babbler species. Although it is patchier in distribution in recent times, it is known to occur over most of NSW where suitable open woodland habitat exist, that is, except in the most arid regions. Recent recovery actions in Victoria where its numbers had significantly decline has met with some encouraging successes (Robinson *et al* 2007).

At the Whitehaven Coal Mine nearby, two families of this babbler have been monitored since the commencement of operations of that open cut mine. Notwithstanding several severe drought periods the region has experienced, retaining the removed timber, destocking to improve the remaining patch quality and sequencing the mining operation from least environmentally sensitive to most environmentally sensitive areas has allowed this babbler to continue to survive on the Whitehaven mining lease (Lim in prep.).

It has also been observed to use a rehabilitated areas of mine sites where appropriate tree planting has been effectively implemented (see HHVC 2003). Here the babbler has been recorded to use area of regrowth that are more than 5 years old.

In order to assess potential impacts on the life cycle of the Grey-crowned Babbler, it is necessary to address the primary components of its ecology, such as breeding, foraging, roosting and movement/migration accordingly.

i) Breeding

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

ii) Foraging

The Grey-crowned Babbler is an insectivorous bird and forages in leaf litter, logs and on bark of trees. Home ranges vary from less than 2ha in high rainfall areas to over 50ha in semi-arid woodland habitats.

iii) Nesting

This babbler builds conspicuous dome-shaped nests apparently in dead or partly living trees in Eucalypt woodlands. In the Gunnedah area it often built its nests 3m - 5m above ground regenerating Eucalypt - Callitris woodland.

iv) Movements

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

This species is poorly represented in conservation reserves as it generally occurs in the woodland habitat on richer soils on plains and undulating terrain that are favoured for agriculture. Its family group sizes reduction is now more apparent as is the increase in its patchiness in areas of older and more intensive settlement (especially rural residential subdivisions) and where recent agricultural activities on rural land have occurred, such as the conversions of grazing land to extensive monoculture to form olive groves and vineyards.

The following seven part test of significance was completed for the Grey-crowned Babbler.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Since the partial destocking of the Project Site, the Survey Area has been colonised by more than one family group. The patch quality of the habitat has improved from the changes in the previous agricultural land use practices.

Notwithstanding the initial loss of approximately 237ha of foraging habitat from the Project Site between Vickery State Forest and Wean Road, the Project could have a positive long term impact on the overall babbler habitat through improving the habitat patch quality for this species between the Kelvin Range and Vickery State Forest if the proposed safeguards in Section 7 are adopted and effectively implemented, especially the destocking that has been recommended.

It is thus unlikely that this local viable babbler population would be put at risk of extinction especially if its breeding cycle is not disrupted and tree removal is conducted in late summer and early autumn.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

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

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

> **(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
> **(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

No endangered ecological community has been listed in this region under the TSC Act.

(d) in relation to the habitat of a threatened species, population or ecological community:

> **(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
>
> **(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
>
> **(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,**

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 Project.

A number of large trees will be lost along the approximately 2.0km roadside corridor and about 2.0km of creekline gallery habitat (see Section 6.3). However, the proposed activities are 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. Notwithstanding the removal or modification of a significant area of this babbler's known habitat as a consequence of a series of existing and proposed mines in the Gunnedah - Boggabri region, this proposal is not expected to result in the nett loss of habitat available to this babbler if the safeguards in Section 7 are adopted and effectively implemented.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

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

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

There is no recovery plan or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Mining has been identified an activity that forms part of a listed Threatening Process, the Clearing of Native Vegetation (as defined in the final determination of the NSW Scientific Committee) has been listed under the TSC Act.

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).

6.1.6.5 Beccaris Mastiff-bat, *Mormopterus beccarii*

Notwithstanding its listed vulnerable status, Beccaris Mastiff-bat is a common and widespread species outside NSW and ranges over the entire northern half of the Australian Continent spreading from all of Queensland to the northern half of Western Australia, including most of the Northern Territory. Its distribution also extends into New Guinea and parts of the Indonesia and the Pacific Islands (see Churchill 1998).

Calls from an apparently isolated population have been recorded from around Gunnedah (Reihold, *et a*l 2001). Although often morphologically difficult to distinguish from the Inland Freetail Bat, *Mormopterus sp 3,* and no published regional reference call is yet available for this species, its relative flat call characteristics at a lower range than the other *Mormopterus* species (see Table 5.3) made its identification from the recent recorded calls from the vegetation remnants along Shannon Harbour Road and its presence in the Survey Area compelling.

It is apparently largely an above canopy forager. With a fast wing beat and short narrow pointed wings it has a flight that is fast but not very manoeuvrable. It prefers relatively sparse habitat free from obstructions and is commonly caught along watercourses line with large widely spaced mature trees, especially in the more arid areas.

Notwithstanding the difficulty in verifying its presence in the Survey Area, the following seven part test of significance assessment has been carried out as a precaution.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

To assess the impact of the proposal on the life cycle of *Mormopterus beccarii,* the following aspects of its biology have to be considered.

i) Breeding

Mormopterus beccarii is a spring/summer breeder and advanced pregnancies have been recorded from early October. Lactating females have been recorded up into January with all males having descended scrotum[16] by November each year. It bears a single young.

ii) Foraging

This *Mormopterus* is believed to forage largely aerially although it agility and scurrying ability on the ground has been noted (Churchill 1998). It occurs over a wide range of habitat where it forages mostly over the canopy for a wide range of flying insects - beetles, bugs and moths.

iii) Nesting

This bat common roost in tree hollows and up to 50 individuals have been found in roofs in Queensland houses and caves in New Guinea.

iv) Movement and Migration

No seasonal or colonial roosting or breeding is evident in this species.

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

The area of partially cleared woodland in the area of the initial Box Cut development, the tree gallery along the ephemeral creek and on either sides of the road Wean Road and Jaeger Lane that will be disturbed contain some trees with hollows in them that may be used by this species. It is unlikely, however, that the modification of this habitat will affect this species' life history in a manner that will cause its local extinction. This proposed area of disturbance represents only a small portion of its normal home range and the proposed mining activities will not preclude it from, roosting, breeding hunting and foraging over the surrounding area.

The viability of this isolated population of this spring/summer breeding bat should not be affected if the recommended safeguards in Section 7 are adopted and effectively implemented.

[16] A reliable indicator of breeding condition and sexual activity in male mammals that also a sign that mating is occurring in the population (This is for the benefit of those who venture to read this report with no biological training).

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

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

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

No endangered ecological community has been listed in this region under the TSC Act.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

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.

A number of large trees will be lost along the Wean Road and Jaeger Lane roadside corridors and creekline gallery habitat (see Section 6.3). However, if the recommended safeguards in Section 7 are adopted and effectively implemented, especially in relation to having an adequate biodiversity offset strategy it is unlikely that the proposed activity over 243 ha will affect this species in this part of its distribution.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

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

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

There is no recovery or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Mining has been identified an activity that forms part of a listed Threatening Process, the Clearing of Native Vegetation that has been listed under the TSC Act (as defined in the final determination of the NSW 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).

6.1.6.6 Gilbert's Whistler, *Pachycephala inornata*

A single juvenile whistler was observed in the Ironbark Woodland north of Jaeger Lane. This species has not been predicted to occur in the region. The NPWS (2007) has no record of this species on the Boggabri 8936 1:100 000 map sheet and the Bionet database has no record of this species in the Gunnedah area defined by co-ordinates 149.84, -31.16, 150.77, -30.52.

Bioclim predicted potential range of this whistler in Ayers *et. al.* (1996-99) did not extend this far north to include the areas around Gunnedah and the nearest record of this species in the NPWS Wildlife Atlas is farther west just south of Wee Waa. Blakers *et al* (1995) documented no record east of longitude 148.00 but Barrett *et. al.* (2003) reported documented records of this whistler further east beyond longitude 151.00 but not any farther north than latitude -27.00, well short of encompassing the area around Gunnedah. Of note is that there was no report of breeding activity beyond the proximity of the Murray River along the southern boundary of NSW in the latest census and in the earlier one report of breeding did not extend farther north than latitude -28.00.

In order to assess potential impacts on the life cycle of Gilbert's Whistler, it is necessary to address the primary components of its ecology, such as breeding, foraging, roosting and movement/migration accordingly.

i) Breeding

Gilbert's Whistler breeds annually and breeding has been recorded from September through to January.

ii) Foraging

Usually found in Mallee, and it is sometimes found in taller eucalypt woodland and partly cleared country. This whistler feeds on large insect, especially caterpillars, beetles and weevils which it takes from the ground and sometime from trees.

iii) Nesting

It nests in pairs and lays two to three eggs in simple cup-shape nests in forks in small trees near shrubs usually no more that two or three metres above ground. Blakers *et al* (1985) noted that three pairs that were recorded in a 25ha vegetation remnant had considerable distance between each others' nests.

iv) Movement and Migration

No large scale seasonal movement has been recorded for this whistler although some birds are sedentary, part of the population is a nomadic.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Barring that this is not a simple case of misidentification from a single sighting of a juvenile bird, it is plausible that this may be a natural continuum of the range extension that was evident between the two censuses reported by Blakers et al (1995) and Barrett et al (2003). Be that as it may, the Project Site is not within the breeding range of this species and arguable, if a viable local population exist at all around the Project Site. When taking into consideration the unusually prolonged extensive drought conditions through most of the continent, extra-limital foray by dispersing young individuals may not be that unusual.

It would be safe to assume that the Project Site is at best probably only a habitat for the nomadic population. Under these circumstances, given what is known of its ecology, the habitat on the Project Site and its environs would at best constitute only an advancing front for non-breeding nomadic birds at the extremities of its extending range. It is thus unlikely that the proposed activity will impact upon any viable local population placing it at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

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

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

No endangered ecological community has been listed in this region under the TSC Act.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

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.

A number of large trees will be lost along the Wean Road and Jaeger Lane roadside corridors and creekline gallery habitat (see Section 6.3). This should not unduly affect this whistler that is nomadic in this part of its range and is known to occupy partly cleared country. Nevertheless, if the recommended safeguards in Section 7 are adopted and effectively implemented, especially in relation to having an adequate biodiversity offset strategy it is unlikely that the proposed activity over 243 ha will affect this species in this part of its distribution.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

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

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

There is no recovery or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Mining has been identified an activity that forms part of a listed Threatening Process, the Clearing of Native Vegetation that has been listed under the TSC Act (as defined in the final determination of the NSW 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).

6.1.6.7 Hooded Robin, *Melanodryas cucullata*

Although the Hooded Robin has not been recorded on or within sight distance of the Project Site or the Transport Route it has, however, been recorded near the south-western edge of the Project Site in the adjoining Vickery State Forest (NPWS 2007 - see Figure 5). There are no less than nine records of this species in the region including one at the edge of Leard State Forest (CES 2005). As reporting rates by bird atlassers for this is species generally higher in winter than other times of the year the fact that it has not been observed during these surveys has to be viewed with some caution. Notwithstanding the fauna sampling effort afforded this proposal (see Appendix 2) only a limited amount of time has been put to targeting this species.

This robin is known to inhabit *Acacia* shrubs, woodland and mallee (Blakers *et al* 1981) and can apparently only persist in larger woodland remnants. This species is thus not expected to occur along the roadside corridors and in the ploughed and contoured paddocks on the Project Site due to the sparseness of the woodland remnant and the lack of understorey that has resulted from grazing by sheep and cattle under these limited habitat remnants. It is however likely to make local seasonal movements from the hills in Vickery State Forest to the surrounding lowlands including across the haul road between the Project Site and Hoads Lane along the proposed Transport Route.

In order to assess potential impacts on the life cycle of the Hooded Robin, it is necessary to address the primary components of its ecology, such as breeding, foraging, roosting and movement/migration accordingly.

i) Breeding

This robin lays two eggs once or twice a year and often breeds communally, sometimes forms mixed flocks with other robins in the process. It breeds between July and November. In more arid parts of its distribution, it can also breeds opportunistically after good rain.

ii) Foraging

It forages in clearings and at the edge of stands of vegetation remnants where it darts from bare branches and tree stumps on the larger insects on the ground. It has been recorded to occupy a home range that varies from 9.0ha to 15ha increasing in winter reflecting the higher nutritional intake it requires during its breeding period. It can apparently only exist in relatively large vegetation remnants, presumable in response to predation pressure from other native birds (like Butcherbirds and Currawongs) in the more open country.

iii) Nesting

It builds its neat small cup-shape nest of soft dry grass, strips of bark and other dry vegetation held together by spiders' webs. Nests are located in the crevices of trees and stumps (Beruldsen 2003).

iv) Movement and Migration

It is bird that is essentially sedentary or resident in its habit and makes only local movements between the hills in summer to the adjacent lowland in winter. No migratory or nomadic movements have been observed in this robin.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The construction of the haul road along the proposed Transport Route between the Project Site and Blue Point Road will only involved minimum clearing of trees along Shannon Harbour Road reserve. It itself it should not impact on this robin in any significant way. The proposed activity will however introduce truck haulage traffic through this corridor throughout daylight hours that could impact on this robin's movements from Vickery State Forest on to the surrounding lowland in winter.

Provided the potential collision risks between the bird and the motor traffic can be minimised along this length of the proposed Transport Route that will be constructed, or eliminated, the proposed activity should be little or no risk to the local Hooded Robin population.

The most significant deterministic factor to avoid roadkills from collisions with motor vehicles is speed. If the vehicular traffic speed can be limited to, say, 60km/hr, it would significantly reduce if not eliminate the likelihood of collision with this bird during its movements to and from the surrounding lowlands from Vickery State Forest. This recommendation has been include in Section 7.

Whether this proposed ameliorating measure[17] is sufficient to reduce or eliminate the risk to the Hooded Robin to the extent that the haulage traffic would not put at risk of extinction this local population is a moot point at the moment. Given that this species has not been observed during any of the surveys and an unknown number of pairs may currently be inhabiting Vickery State Forest one can only speculate as to the effectiveness of the recommend vehicular speed reduction on the local population of Hooded Robin.

Nevertheless the recommended road speed reduction of the motor traffic along this stretch of the proposed Transport Route will also benefit the other wildlife in general by lowering the risks of roadkills. Thus this proposed measure will be consistent with the conservation of the local biodiversity.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

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

[17] Particularly if it can be included in the post-approval mine management plan provisions for adequate signage of the speed restriction and to heightened awareness for avoiding collision with wildlife in this section of the Transport Route as well as mandatory induction for truck drivers and consultants operation at this proposed mine.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

> **(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
> **(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

No endangered ecological community has been listed in this region under the TSC Act.

(d) in relation to the habitat of a threatened species, population or ecological community:

> **(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
>
> **(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
>
> **(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,**

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.

A number of large trees will be lost along the Wean Road and Jaeger Lane roadside corridors and creekline gallery habitat (see Section 6.3). This may affect the Hooded Robin pattern of movement from the hills to the surrounding lowlands and is probably of small consequence to it. However, if the recommended safeguards in Section 7 are adopted and effectively implemented, it is probably unlikely that the proposed activity over this section of the Transport Route will affect the local population of the Hooded Robin in Vickery State Forest.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

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

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

There is no recovery or threat abatement plan for this species.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Mining has been identified an activity that forms part of a listed Threatening Process, the Clearing of Native Vegetation that has been listed under the TSC Act (as defined in the final determination of the NSW 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).

6.1.7 Summary

As detailed in the assessments above, the proposed Belmont Coal Project, an open cut mine that will affect approximately 243ha of mostly highly modified agricultural land and the construction of a haul road between the Project Site and Hoad Lane along the Transport Route, is unlikely to significantly affect the Yellow-bellied Sheathtail Bat, Beccaris Mastiff-bat, Turquoise Parrot, Grey Falcon, Grey-crowned Babbler or Gilbert's Whistler. It is probably also unlikely to significantly affect the Hooded Robin with the adoption and implementation of the recommendations in Section 7.

6.2 EPBC Act

The EPBC Act now applies to Commonwealth land and Territories, Commonwealth activities as well as activities on other lands relating to EPBC Act matters[18]. These are considered below for the proposed Belmont Coal Project:

6.2.1 International Agreement Listings

Given the small size of the proposed open cut mine and that no tailings or discharged dam that can be potentially hazardous to waterbirds will be constructed and no Ramsar wetlands will be affected, the migratory species listed under CAMBA and JAMBA are unlikely to be significantly adversely affected by this proposed mining activity.

Thus, no further consideration of any of the international agreement listed species is warranted for this proposal.

6.2.2 Listed Threatening Ecological Processes

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

[18] The relevant EPBC Act listed threatened species are similar to those of the TSC Act and are dealt with in Section 6.1.

The proposed activity and the proposed vertebrate pest control plan for the proposed mine are likely to have an adverse impact on the Feral Cat, European Red Fox and European Rabbit populations in the area by denying them the current free ranging and foraging habitat of the existing open pastures. This will assist in reversing some of the effects of the adverse impact these exotic species have on local native fauna.

Other threatening processes from the clearing of native vegetation are addressed in Section 6.3.

Analysis of CO_2 emissions from the on-site activities and ultimate use of coal from the Belmont Coal Project and its consequence to Climate Change are presented in Heggies (2007)[19]. Other than the obvious consequences of the current extensive and on-going nationwide drought, the actual mechanisms of the anthropogenic changes directly responsible for the impact on the fauna and their habitats on the Project Site and further a field from the effects Greenhouse gasses are compelling but currently unattainable.

6.2.3 Summary

From the considerations above, including the listed threatened species in Section 6.1, the proposed development of the Belmont Coal Project is thus unlikely to have any significant impact on matters that would constitute or could be construed to be a controlled action under the EPBC Act with regards to the fauna community and their habitats.

6.3 Native Vegetation Conservation and Cumulative Impact

The NPWS, in a letter to *PlanningNSW* (now part of DECC) dated 13 August 2002*,* sent in response to an invitation to a Planning Focus meeting regarding the Belmont Coal Mine proposal in which they identified the proposed mine site as being within the Brigalow South Bioregion. The letter stated that, according to Pressey *et al* (2000), this is a region where over 60% of the native vegetation, thus original extent of the original fauna habitat, has been cleared since European settlement and only 6% of the region is held in conservation reserve.

NPWS also concluded that all vegetation remnants in the Gunnedah region are of high conservation value based on the above and the precautionary principle from the rationale surmised from Smith *et al* (2000). The Service maintains that *"*Due to the high level of clearing and fragmentation of the native vegetation in the Gunnedah region, all native remnants (sic – presumably referring to vegetation or habitat remnants) have very high conservation value (irrespective of their condition) simply due to their current scarcity within the region," (cf GCNRC 2007 viz regenerating White Cypress Pine).

[19] This study, however, has not included the collateral effects of the blending and use of lower grade coal that would otherwise be unusable with the high grade coal from this Project.

The Project will involve the clearing of some remnant vegetation along Jaeger Lane and Wean Road, the northern half of the creekline gallery trees along the drainage line on 'Belmont' and 'Roseberry' properties between Jaeger Lane and Riordan Road, as well as some vegetation remnant in the area of the initial box cut development and the regenerating White Cypress Pine patch on the hill slope next to the western boundary adjoining Vickery State Forest.

The route of the private haulroad/access road to Hoad Lane along the proposed transport route has been selected to pass through cleared paddocks and then within an existing road reserve with established tracks and cleared corridors. There will be no significant further loss of mature trees as a result of the construction of these roads if the road is aligned in a sensitive way to avoid unnecessary removal of native vegetation. Within the Project Site, the extension of the Haul road along the proposed transport route to form the site access road will be positioned in cleared paddocks and will not necessitate any clearing of native vegetation other than that essentially required for other mining related purposes.

Having canvassed the alternatives to minimise clearing of native vegetation, the proposed activity will necessitate the removal of some 700 mature trees, including over 500 Box and Ironbark hollow bearing trees along the Wean Road and Jaeger Lane corridors, the gallery along the creekline and the habitat remnant along the western edge of the box cut area.

Some of the stags (standing dead trees) also have hollows in them that were occupied by hollow-nesting birds (Cockatiels, Cockatoos and Galahs) and exhibiting nesting behaviour at the time of sampling despite the drought conditions. Non-hollow bearing tree species included *Callitris* and *Casuarina* spp over 3.0m in height.

Table 13 assesses the tree class structure of the Box and Ironbark to be cleared as indicated by trunk diameters at Standard Breast Height (SBH).

Table 13
Tree Size Classes

Tree Size **Box and Ironbark**	**<30cm**	**31-59cm**	**>60cm**	**Total**	**Stags**	**Callitris**
1. Wean Road (East)	32	36	37	115	10	73
2. Wean Road (West)	16	43	35	94	31	35
3. Belmont Creek	7	36	91	134	6	34
4. Jaeger Lane (North)	19	18	22	59	1	6
5. Jaeger Lane (South)	0	14	25	39	1	0
6. Box Cut Area	31	19	10	60	14	73
Total	**105**	**166**	**270**	**502**	**52**	**221**

Estimates of the number of hollows in each of the small, medium and large classes are summarised below in **Table 14**.

Table 14
Tree Hollow Classes

Hollow Size	Small	Medium	Large	Total
1. Wean Road (East)	117	118	28	263
2. Wean Road (West)	158	90	59	307
3. Belmont Creek	106	65	37	208
4. Jaeger Lane (North)	5	4	11	20
5. Jaeger Lane (South)	27	38	12	77
6. Box Cut Area	15	42	20	77
Total	**428**	**377**	**167**	**972**

Finally **Table 15** summarises the fauna species that could potentially use each hollow size class.

Table 15
Tree Hollow Size and Users

Tree Hollow Class Size	Expected Fauna Usage
Small (cracks to < 5cm)	Microbats and Small Arboreal Mammals
Medium (5cm-10cm)	Possums, Parrots and Other birds
Large Hollows (+ 10cm)	Owls and Ducks

Ameliorative actions in response to this loss of native vegetation and fauna habitat include post-mining rehabilitation and the establishment of a biodiversity offset strategy whereby significant areas of native vegetation on and external to the Project Site would be excluded from agricultural or other disturbance and maintained solely for its vegetation conservation value. Additional and extensive fauna habitat safeguards are recommended for this Project in Section 7.0.

The principle of avoidance of clearing native vegetation has been applied to the extent applicable in this instance, and has thus been habitat loss has been minimised, and the post-mining rehabilitated areas will exceed the habitat loss by a factor of two.

Notwithstanding the above, there is no systematic study of the cumulative loss of native vegetation in this part of the Brigalow South Bioregion around Gunnedah. The Proponents proposed Biodiversity Offset includes proposals to improve connectivity and conductivity of habitat corridors linking Vickery State Forest with the Kelvin Range.

6.4 SEPP 44 Koala Habitat Protection

Gunnedah 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 contains less than 15% cover of Bimble Box, *Eucalyptus populnea*, and White Box, *Eucalyptus albens,* feed tree species listed in Schedule 2 (see GCNRC 2007) and no Koala

nor sign of Koala was encountered during the surveys. There was also no historical evidence of any Koala colony in the area other than a record on the northern edge of Vickery State Forest and one on the eastern foothill of the Kelvin Range. It is thus appears that this species occurs in very low densities locally. These were most likely records of dispersing individual from colonies that are occurring on the richer soils around Gunnedah.

Given the above, it can be concluded that no potential or core Koala habitat will be lost as a result of this Project and thus the proposed activity is outside the application of SEPP 44. Hence no further consideration of Koala habitat protection is warranted.

6.5 ESD Principles

The proposed activity is not likely to adversely affect the biodiversity locally or otherwise. It therefore does not raise any issue of either intergenerational equity or value-added considerations relating to fauna or their habitats. It is thus consistent with ESD principles in this respect.

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 open cut mine will necessitate some clearing of native vegetation and will affect the existing wildlife corridors along Wean Road and Jaeger Lane which are part of the habitat remnants that forms a network of wildlife corridors between the Kelvin Range and Vickery State Forest.

The adverse impact of this proposed mine on the native vegetation has been minimised by:

i) the reduction of the area of clearing along Jaeger Lane through refinements to the mine plan and out-of-pit overburden dump positioning (See Figure 2.15 of the *Environmental Assessment*);

ii) the sitting of the constructed section of the transport route and detours of Wean Road and Jaeger Lane in cleared paddocks to avoid any further removal of native vegetation; and

iii) the location of the out-of-pit–dumps within areas of limited conservation value, ie. regenerating White Cypress Pine and cleared paddocks (see GCNRC 2007).

Compensatory and ameliorative measures to address any adverse impact on the native vegetation and fauna habitat are detailed in the Section 7.0 below.

7 RECOMMENDED SAFEGUARDS

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. These are as follows.

i) Where possible, tree removal, especially the mature trees, should be carried out in late spring and early autumn to avoid spring nesting birds and over-wintering bats.

ii) Pre-start inspections of mature trees for nesting birds and roosting bats should be conducted when mature trees are removed in any clearing campaign.

iii) Nesting and roosting hollows, as well as nests used by listed threatened species, should be relocated to appropriate locations nearby.

iv) No less than 50% in volume of fallen timber and logs suitable for farm use and firewood should be left on the ground.

v) No fallen timber, stags, logs or vegetation debris from any vegetation clearing for the proposed mining activity should be buried or burned.

vi) The constructed section of the proposed transport route should be located on an alignment through cleared paddocks to minimize further removal of native vegetation.

vii) Detours for Wean Road and Jaeger Lane should be located in cleared paddocks to minimize further removal of native vegetation.

viii) Post-mining rehabilitation of the open cut area should commence as soon as possible with the re-establishment of the connectivity of corridor along Wean Road and Jaeger Lane being the main priority.

ix) Consideration should be given to ameliorative revegetation to commence as soon as possible in the southwest corner of Wean Road and Jaeger Lane as well as the entire length of Shannon Harbour Road by fencing off the area and seeding with seeds from local trees to enhance the remaining connectivity of the wildlife corridor along the sides of those roads.

x) Consideration should be given to ameliorative revegetation should commence as soon as possible at the western end of Jaeger Lane by fencing off a 20m strip within ‘Belmont’ and seeding with seeds from local trees to enhance the remaining connectivity of the wildlife corridor between the proposed mining area and Vickery State Forest.

xi) Ameliorative revegetation by fencing off the road reserve between Lot 28 DP 754929 and Lot 32 DP 754950 and seeding with seeds from local trees should commence as soon as possible to allow the corridor to regenerate.

xii) Ameliorative revegetation by fencing off a 20m strip along the northern side of Riordan Road and seeding with seeds from local stocks. Fencing/seeding should commence as soon as possible to enhance the connectivity and conductivity of the existing corridor.

xiii) Where practicable, the Western Emplacement area should be rehabilitated to a community that is consistent with the adjoining Vickery State Forest.

xiv) Appropriately designed post-mining wetland areas should be created within the final void and around long-term water management structures to replace the loss of the creek gallery habitat.

xv) A suitable vertebrate pest control program should be included as part of the mining operation and management plan in order to minimise the impact of species that have been listed as key threatening processes.

xvi) The constructed section of the proposed transport route should be aligned to minimised, as much as possible, the need to remove any more native vegetation than necessary, especially large trees and hollow-bearing trees.

xvii) As part of the biodiversity offset for the Project, the patch quality, connectivity and conductivity of habitat remnants between the Kelvin Range and Vickery State Forest should be enhanced by fencing off and destocking whatever tree corridors and remnant native vegetation that currently still exist and that are within the control of the company.

xviii) Reduce speed limits to 60km/hr along the Haul road along Shannon Harbour Road along the transport route that are lined with mature trees should be considered to reduced native fauna mortality from roadkills and the necessity to clear trees for the construction of road shoulders wider than necessary.

8 CONCLUSION

Having given consideration to the above and that all possible alternatives that have been canvassed and all practical measures adopted to avoid, minimise and ameliorate the impact of proposed open cut mine on the local fauna, it is my 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 listed species;

iv) unlikely to affect any core or potential Koala habitat;

v) consistent with ESD principles with regards to fauna and will not adversely affect the local biodiversity; and

vi) unlikely to cause any perceivable or significant changes to habitat that would directly affect the local fauna community as a consequence of climate change.

Thus, the Belmont Coal Project should not be considered to constitute a controlled action. The proposal is also outside the scope of SEPP 44 and hence no Koala Habitat Management Plan should be required.

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Appendix 1

Fauna Checklist for the Gunnedah/Boggabri Region

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Fauna Checklist for the Gunnedah / Boggabri Region

Amphibia [20]	Scientific Name	Common Name	Legal Status	Count
Hylidae				
	Cyclorana platycephala	Water-holding Frog	P	1
	Cyclorana verrucosa	Rough Frog	P	1
	Litoria caerulea	Green Tree Frog	P	7
	Litoria latopalmata	Broad-palmed Frog	P	7
	Litoria peronii	Peron's Tree Frog	P	10
	Litoria rubella	Desert Tree Frog	P	8
Myobatrachidae				
	Crinia parinsignifera	Eastern Sign-bearing Froglet	P	1
	Limnodynastes dumerilii	Bullfrog	P	6
	Limnodynastes fletcheri	Long-thumbed Frog	P	4
	Limnodynastes ornatus	Ornate Burrowing Frog	P	5
	Limnodynastes salmini	Salmon-striped Frog	P	4
	Limnodynastes tasmaniensis	Spotted Marsh Frog	P	5
	Neobatrachus sudelli	Painted Burrowing Frog	P	7
	Notaden bennettii	Holy Cross Toad	P	1
	Pseudophryne bibronii	Bibron's Toadlet	P	1
	Uperoleia rugosa	Wrinkled Toadlet	P	2

Aves (Birds)	Scientific Name	Common Name	Legal Status	Count
Acanthizidae				
	Acanthiza apicalis	Inland Thornbill	P	15
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill	P	15
	Acanthiza lineata	Striated Thornbill	P	1
	Acanthiza nana	Yellow Thornbill	P	33
	Acanthiza pusilla	Brown Thornbill	P	1
	Acanthiza reguloides	Buff-rumped Thornbill	P	10
	Acanthiza uropygialis	Chestnut-rumped Thornbill	P	2
	Aphelocephala leucopsis	Southern Whiteface	P	2
	Gerygone fusca	Western Gerygone	P	10
	Gerygone olivacea	White-throated Gerygone	P	9
	Pyrrholaemus sagittatus	Speckled Warbler	V	21
	Smicrornis brevirostris	Weebill	P	33
Accipitridae				
	Accipiter fasciatus	Brown Goshawk	P	2
	Aquila audax	Wedge-tailed Eagle	P	15
	Circus approximans	Swamp Harrier	P	1
	Circus assimilis	Spotted Harrier	P	3
	Elanus axillaris	Black-shouldered Kite	P	9
	Haliaeetus leucogaster	White-bellied Sea-Eagle	P	2
	Haliastur sphenurus	Whistling Kite	P	2
	Hamirostra melanosternon	Black-breasted Buzzard	V	1
	Hieraaetus morphnoides	Little Eagle	P	6
	Lophoictinia isura	Square-tailed Kite	V	5
	Milvus migrans	Black Kite	P	1

[20] Two other frogs, listed endangered are also found in the North West Slopes, the Booroolong Frog, *Litoria booroolongensis* and the New England Bell Frog, *Litoria castanea*.

Fauna Checklist for the Gunnedah / Boggabri Region

Aves (Birds)	Scientific Name	Common Name	Legal Status	Count
Aegothelidae				
	Aegotheles cristatus	Australian Owlet-nightjar	P	38
Alaudidae				
	Mirafra javanica	Horsfield's Bushlark	P	6
Anatidae				
	Anas gracilis	Grey Teal	P	5
	Anas superciliosa	Pacific Black Duck	P	9
	Chenonetta jubata	Australian Wood Duck	P	8
	Cygnus atratus	Black Swan	P	1
	Malacorhynchus membranaceus	Pink-eared Duck	P	1
	Stictonetta naevosa	Freckled Duck	V	1
Anhingidae				
	Anhinga melanogaster	Darter	P	1
Apodidae				
	Apus pacificus	Fork-tailed Swift	P	1
	Hirundapus caudacutus	White-throated Needletail	P	3
Ardeidae				
	Ardea pacifica	White-necked Heron	P	4
	Egretta novaehollandiae	White-faced Heron	P	7
Artamidae				
	Artamus cinereus	Black-faced Woodswallow	P	2
	Artamus cyanopterus	Dusky Woodswallow	P	10
	Artamus personatus	Masked Woodswallow	P	3
	Artamus superciliosus	White-browed Woodswallow	P	16
	Cracticus nigrogularis	Pied Butcherbird	P	24
	Cracticus torquatus	Grey Butcherbird	P	36
	Gymnorhina tibicen	Australian Magpie	P	50
	Strepera graculina	Pied Currawong	P	31
Burhinidae				
	Burhinus grallarius	Bush Stone-curlew	E1	1
Cacatuidae				
	Cacatua galerita	Sulphur-crested Cockatoo	P	40
	Cacatua sanguinea	Little Corella	P	4
	Calyptorhynchus lathami	Glossy Black-Cockatoo	V	4
	Eolophus roseicapillus	Galah	P	57
	Nymphicus hollandicus	Cockatiel	P	12
Campephagidae				
	Coracina maxima	Ground Cuckoo-shrike	P	2
	Coracina novaehollandiae	Black-faced Cuckoo-shrike	P	21
	Coracina papuensis	White-bellied Cuckoo-shrike	P	3
	Coracina tenuirostris	Cicadabird	P	4
	Lalage tricolor	White-winged Triller	P	11
Caprimulgidae				
	Eurostopodus mystacalis	White-throated Nightjar	P	1
Casuariidae				
	Dromaius novaehollandiae	Emu	P	3
Charadriidae				
	Vanellus miles	Masked Lapwing	P	4

Fauna Checklist for the Gunnedah / Boggabri Region

Aves (Birds)	Scientific Name	Common Name	Legal Status	Count
Climacteridae				
	Climacteris picumnus	Brown Treecreeper	V	25
	Cormobates leucophaeus	White-throated Treecreeper	P	39
Columbidae				
	*Columba livia**	Rock Dove	U	3
	Geopelia cuneata	Diamond Dove	P	1
	Geopelia humeralis	Bar-shouldered Dove	P	12
	Geopelia placida	Peaceful Dove	P	28
	Ocyphaps lophotes	Crested Pigeon	P	27
	Phaps chalcoptera	Common Bronzewing	P	21
Coraciidae				
	Eurystomus orientalis	Dollarbird	P	1
Corcoracidae				
	Corcorax melanorhamphos	White-winged Chough	P	17
	Struthidea cinerea	Apostlebird	P	12
Corvidae				
	Corvus coronoides	Australian Raven	P	39
	Corvus mellori	Little Raven	P	1
Cuculidae				
	Cacomantis flabelliformis	Fan-tailed Cuckoo	P	1
	Chalcites basalis	Horsfield's Bronze-Cuckoo	P	5
	Chalcites lucidus	Shining Bronze-Cuckoo	P	3
	Chalcites osculans	Black-eared Cuckoo	P	1
	Cuculus pallidus	Pallid Cuckoo	P	3
	Scythrops novaehollandiae	Channel-billed Cuckoo	P	3
Dicaeidae				
	Dicaeum hirundinaceum	Mistletoebird	P	34
Dicruridae				
	Grallina cyanoleuca	Magpie-lark	P	22
	Myiagra inquieta	Restless Flycatcher	P	8
	Myiagra rubecula	Leaden Flycatcher	P	5
	Rhipidura albiscapa	Grey Fantail	P	25
	Rhipidura leucophrys	Willie Wagtail	P	40
Estrildidae				
	Neochmia modesta	Plum-headed Finch	P	3
	Neochmia temporalis	Red-browed Finch	P	1
	Stagonopleura guttata	Diamond Firetail	V	6
	Taeniopygia bichenovii	Double-barred Finch	P	13
	Taeniopygia guttata	Zebra Finch	P	5
Falconidae				
	Falco berigora	Brown Falcon	P	5
	Falco cenchroides	Nankeen Kestrel	P	11
	Falco longipennis	Australian Hobby	P	5
	Falco peregrinus	Peregrine Falcon	P	1
	Falco subniger	Black Falcon	P	2
Halcyonidae				
	Dacelo novaeguineae	Laughing Kookaburra	P	18
	Todiramphus pyrrhopygia	Red-backed Kingfisher	P	2
	Todiramphus sanctus	Sacred Kingfisher	P	8

Fauna Checklist for the Gunnedah / Boggabri Region

Aves (Birds)	Scientific Name	Common Name	Legal Status	Count
Hirundinidae				
	Cheramoeca leucosternus	White-backed Swallow	P	3
	Hirundo neoxena	Welcome Swallow	P	8
	Petrochelidon ariel	Fairy Martin	P	5
	Petrochelidon nigricans	Tree Martin	P	3
Laridae				
	Chlidonias hybridus	Whiskered Tern	P	2
	Larus novaehollandiae	Silver Gull	P	2
	Sterna caspia	Caspian Tern	P	2
Maluridae				
	Malurus cyaneus	Superb Fairy-wren	P	27
	Malurus lamberti	Variegated Fairy-wren	P	8
Megapodiidae				
	Leipoa ocellata	Malleefowl	E1	1
Meliphagidae				
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	P	27
	Anthochaera carunculata	Red Wattlebird	P	2
	Grantiella picta	Painted Honeyeater	V	1
	Lichenostomus chrysops	Yellow-faced Honeyeater	P	12
	Lichenostomus fuscus	Fuscous Honeyeater	P	8
	Lichenostomus leucotis	White-eared Honeyeater	P	18
	Lichenostomus penicillatus	White-plumed Honeyeater	P	43
	Lichenostomus virescens	Singing Honeyeater	P	2
	Lichmera indistincta	Brown Honeyeater	P	2
	Manorina flavigula	Yellow-throated Miner	P	2
	Manorina melanocephala	Noisy Miner	P	29
	Meliphaga lewinii	Lewin's Honeyeater	P	1
	Melithreptus brevirostris	Brown-headed Honeyeater	P	7
	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	1
	Philemon citreogularis	Little Friarbird	P	13
	Philemon corniculatus	Noisy Friarbird	P	31
	Plectorhyncha lanceolata	Striped Honeyeater	P	25
	Xanthomyza phrygia	Regent Honeyeater	E1	1
Meropidae				
	Merops ornatus	Rainbow Bee-eater	P	8
Motacillidae				
	Anthus australis	Australian Pipit	P	4
Neosittidae				
	Daphoenositta chrysoptera	Varied Sittella	P	4
Oriolidae				
	Oriolus sagittatus	Olive-backed Oriole	P	9
Pachycephalidae				
	Colluricincla harmonica	Grey Shrike-thrush	P	37
	Falcunculus frontatus	Eastern Shrike-tit	P	4
	Pachycephala pectoralis	Golden Whistler	P	1
	Pachycephala rufiventris	Rufous Whistler	P	46

Fauna Checklist for the Gunnedah / Boggabri Region

Aves (Birds)	Scientific Name	Common Name	Legal Status	Count
Pardalotidae				
	Pardalotus punctatus	Spotted Pardalote	P	8
	Pardalotus striatus	Striated Pardalote	P	40
Passeridae				
	*Passer domesticus**	House Sparrow	U	6
Pelecanidae				
	Pelecanus conspicillatus	Australian Pelican	P	2
Petroicidae				
	Eopsaltria australis	Eastern Yellow Robin	P	39
	Melanodryas cucullata	Hooded Robin	V	9
	Microeca fascinans	Jacky Winter	P	18
	Petroica goodenovii	Red-capped Robin	P	4
Phalacrocoracidae				
	Phalacrocorax carbo	Great Cormorant	P	1
	Phalacrocorax melanoleucos	Little Pied Cormorant	P	2
	Phalacrocorax sulcirostris	Little Black Cormorant	P	1
	Phalacrocorax varius	Pied Cormorant	P	3
Phasianidae				
	Coturnix pectoralis	Stubble Quail	P	5
	Coturnix ypsilophora	Brown Quail	P	1
Podargidae				
	Podargus strigoides	Tawny Frogmouth	P	10
Podicipedidae				
	Podiceps cristatus	Great Crested Grebe	P	2
	Tachybaptus novaehollandiae	Australasian Grebe	P	4
Pomatostomidae				
	Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	18
Psittacidae				
	Alisterus scapularis	Australian King-Parrot	P	13
	Aprosmictus erythropterus	Red-winged Parrot	P	9
	Barnardius zonarius	Australian Ringneck	P	1
	Barnardius zonarius barnardi	[Mallee Ringneck]	P	10
	Glossopsitta concinna	Musk Lorikeet	P	6
	Glossopsitta pusilla	Little Lorikeet	P	19
	Lathamus discolor	Swift Parrot	E1	1
	Neophema pulchella	Turquoise Parrot	V	19
	Northiella haematogaster	Blue Bonnet	P	4
	Platycercus adscitus eximius	Eastern Rosella	P	34
	Platycercus elegans	Crimson Rosella	P	2
	Psephotus haematonotus	Red-rumped Parrot	P	23
	Psephotus varius	Mulga Parrot	P	1
Rallidae				
	Fulica atra	Eurasian Coot	P	1
Recurvirostridae				
	Himantopus himantopus	Black-winged Stilt	P	1
	Recurvirostra novaehollandiae	Red-necked Avocet	P	2

Fauna Checklist for the Gunnedah / Boggabri Region

Aves (Birds)	Scientific Name	Common Name	Legal Status	Count
Scolopacidae				
	Tringa nebularia	Common Greenshank	P	1
Strigidae				
	Ninox boobook	Southern Boobook	P	22
	Ninox connivens	Barking Owl	V	5
Sturnidae				
	*Sturnus vulgaris**	Common Starling	U	16
Sylviidae				
	Cincloramphus cruralis	Brown Songlark	P	1
	Cincloramphus mathewsi	Rufous Songlark	P	8
	Cisticola exilis	Golden-headed Cisticola	P	1
Threskiornithidae				
	Platalea flavipes	Yellow-billed Spoonbill	P	4
	Threskiornis molucca	Australian White Ibis	P	1
	Threskiornis spinicollis	Straw-necked Ibis	P	3
Turnicidae				
	Turnix varia	Painted Button-quail	P	8
	Turnix velox	Little Button-quail	P	2
Tytonidae				
	Tyto alba	Barn Owl	P	6
	Tyto novaehollandiae	Masked Owl	V	3
Zosteropidae				
	Zosterops lateralis	Silvereye	P	8

* Exotic (non-native) species

Mammalia [21]	Scientific Name	Common Name	Legal Status	Count
Bovidae				
	*Bos taurus**	European cattle	U	3
	*Capra hircus**	Goat	U	1
Canidae				
	*Canis lupus (familaris)**	Dingo, domestic dog	U	3
	*Vulpes vulpes**	Fox	U	16
Dasyuridae				
	Antechinus flavipes	Yellow-footed Antechinus	P	55
	Dasyurus maculatus	Spotted-tailed Quoll	V	2
	Sminthopsis murina	Common Dunnart	P	5
Emballonuridae				
	Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	8
Felidae				
	*Felis catus**	Cat	U	6
Leporidae				
	*Lepus capensis**	Brown Hare	U	8
	*Oryctolagus cuniculus**	Rabbit	U	8

[21] This Region also have up to nine presumed extinct species of mammals.

Fauna Checklist for the Gunnedah / Boggabri Region

Mammalia	Scientific Name	Common Name	Legal Status	Count
Macropodidae				
	Macropus dorsalis	Black-striped Wallaby	E1	1
	Macropus giganteus	Eastern Grey Kangaroo	P	22
	Macropus robustus	Common Wallaroo	P	9
	Macropus rufogriseus	Red-necked Wallaby	P	10
	Wallabia bicolor	Swamp Wallaby	P	10
Molossidae				
	Mormopterus norfolkensis	Eastern Freetail-bat	V	1
	Mormopterus sp 1 [22]	undescribed mastiff-bat	P	3
	Mormopterus sp.4 (big penis)	undescribed mastiff-bat	P	9
	Mormopterus sp.3 (little penis)	undescribed mastiff-bat	P	3
	Tadarida australis	White-striped Freetail-bat	P	9
Muridae				
	Hydromys chrysogaster	Water-rat	P	1
	*Mus musculus**	House Mouse	U	20
	Pseudomys pilligaensis	Pilliga Mouse	V	1
	*Rattus rattus**	Black Rat	U	5
Petauridae				
	Petaurus breviceps	Sugar Glider	P	7
	Petaurus norfolcensis	Squirrel Glider	V	1
Phalangeridae				
	Trichosurus vulpecula	Common Brushtail Possum	P	44
Phascolarctidae				
	Phascolarctos cinereus	Koala	V	74
Pseudocheiridae				
	Pseudocheirus peregrinus	Common Ringtail Possum	P	4
Suidae				
	*Sus scrofa**	Pig	U	4
Tachyglossidae				
	Tachyglossus aculeatus	Short-beaked Echidna	P	13
Vespertilionidae				
	Chalinolobus dwyeri	Large-eared Pied Bat	V	1
	Chalinolobus gouldii	Gould's Wattled Bat	P	24
	Chalinolobus morio	Chocolate Wattled Bat	P	16
	Chalinolobus picatus	Little Pied Bat	V	3
	Nyctophilus geoffroyi	Lesser Long-eared Bat	P	108
	Nyctophilus gouldi	Gould's Long-eared Bat	P	13
	Nyctophilus timoriensis	Eastern Long-eared Bat	V	1
	Scotorepens balstoni	Inland Broad-nosed Bat	P	7
	Scotorepens greyii	Little Broad-nosed Bat	P	12
	Scotorepens orion	Eastern Broad-nosed Bat	P	2
	Vespadelus darlingtoni	Large Forest Bat	P	2
	Vespadelus vulturnus	Little Forest Bat	P	105

* Exotic (non-native) species

[22] This could be represent *Mormopterus sp ,6* a little known listed vulnerable species (see Pennay *et al* 2004) .

Fauna Checklist for the Gunnedah / Boggabri Region

Reptilia	Scientific Name	Common Name	Legal Status	Count
Agamidae				
	Amphibolurus muricatus	Jacky Lashtail	P	1
	Amphibolurus nobbi	Nobbi Lashtail	P	8
	Lophognathus burnsi	Burns' Dragon	P	3
	Pogona barbata	Eastern Bearded Dragon	P	8
	Tympanocryptis tetraporophora	Long-tailed Earless Dragon	P	1
Boidae				
	Morelia spilota variegata	Carpet Python	P	1
Chelidae				
	Chelodina longicollis	Eastern Snake-necked Turtle	P	9
Elapidae				
	Brachyurophis australis	Eastern Shovel-nosed Snake	P	3
	Furina diadema	Red-naped Snake	P	9
	Hoplocephalus bitorquatus	Pale-headed Snake	V	1
	Parasuta dwyeri	Variable Black-naped Snake	P	1
	Pseudechis guttatus	Spotted Black Snake	P	2
	Pseudonaja textilis	Eastern Brown Snake	P	1
Gekkonidae				
	Diplodactylus vittatus	Eastern Stone Gecko	P	2
	Gehyra dubia	Dubious Dtella	P	10
	Gehyra variegata	Varied Dtella	P	3
	Heteronotia binoei	Prickly Gecko	P	4
	Oedura robusta	Robust Velvet Gecko	P	11
	Strophurus williamsi	Eastern Spiny-tailed Gecko	P	7
	Underwoodisaurus milii	Thick-tailed Gecko	P	11
	Underwoodisaurus sphyrurus	Border Thick-tailed Gecko	V	2
Pygopodidae				
	Aprasia parapulchella	Pink-tailed Legless Lizard	V	1
	Lialis burtonis	Burton's Snake-lizard	P	1
	Pygopus schraderi	Eastern Hooded Scaly-foot	P	2
Scincidae				
	Anomalopus leuckartii	Two-clawed Worm-skink	P	5
	Carlia vivax	Tussock Rainbow-skink	P	1
	Cryptoblepharus virgatus	Cream-striped Shinning-skink	P	11
	Ctenotus allotropis	Brown-blazed Wedgesnout Ctenotus	P	3
	Ctenotus robustus	Robust Ctenotus	P	9
	Ctenotus taeniolatus	Copper-tailed Ctenotus	P	1
	Egernia striolata	Tree-crevice Skink	P	55
	Eulamprus tenuis	Bar-sided Forest-skink	P	2
	Lerista muelleri	Wood Mulch-slider	P	1
	Lygisaurus foliorum	Tree-base Litter-skink	P	10
	Morethia boulengeri	South-eastern Morethia Skink	P	17
	Tiliqua scincoides	Common Bluetongue	P	3

Fauna Checklist for the Gunnedah / Boggabri Region

Reptilia	Scientific Name	Common Name	Legal Status	Count
Typhlopidae				
	Ramphotyphlops proximus	Proximus Blind Snake	P	2
	Ramphotyphlops wiedii	Brown-snouted Blind Snake	P	1
Varanidae				
	Varanus gouldii	Sand Monitor	P	1
	Varanus varius	Lace Monitor	P	8

Search Results : LGA - GUNNEDAH returned a total of 2848 records of 282 species.
Report generated in May 2007 with supplement from Bionet in April 2007.

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Appendix 2

Sampling Intensity

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Sampling Intensity

Sampling Methods	Project Site	Haul Road[23]	Road Corridor (Wean Rd & Jaeger Lane)	Season
Elliott Traps Type A	400 trapnights (4x4x25 on ground)			Summer Dec 01
Elliot Traps Type B			60 Trapnights (15x4 at 2m on trees)	Spring Oct 06
	10 trapnights (5x4 at 2m on trees)			Spring Oct 06
Cage Traps	40 trapnights (10x4 on ground)			Summer Dec 01
			40 trapnights (10x4 on ground)	Spring Sept 06
Hair Sampling Tubes	200 trapnights (20x10 half 6m on trees)			Summer Dec 01
			140 trapnights (35x4 at 6m on trees)	Spring Oct 06
Harp Traps	4 trapnights (2 nights at 2 locations)			Summer Dec 01
			4 trapnights (2 nights at 2 locations)	Spring Oct 06
		1 trapnight		Autumn March 07
Anabat Recordings	10hrs			Summer Dec 01
			37.4 hrs (Targeting microbats)	Spring Oct 06
		6 hrs overnight		Autumn March 07
Hand Searching	9 hrs (3hrs x 3 days)			Summer Dec 01
			8 hrs (2hrs x 4 days)	Spring Oct 06
		2 hr (1hr afternoon and 1hr late morning)		Autumn March 07
Funnel Traps	32 trapnights (8 x4 nights)			Spring Oct 06
Call Back Broadcasts	4 hrs (4 location 1hr each)			Summer Dec 01
			4 hrs (4 locations 1hr each)	Spring Oct 06
		1 hr (one location)		Autumn March 07

[23] This refers to the section of the proposed Transport Route between the Project Site and Blue Vale Road.

Sampling Intensity

Sampling Methods	Project Site	Haul Road[24]	Road Corridor (Wean Rd & Jaeger Lane)	Season
Pitfall Traps	16 trapnights (4x4 nights)			Summer Dec 01
Spotlighting	8hrs			Summer Dec 01
		2hrs		Autumn March 07
			6hrs	Spring Oct 06
Bird Censuses	8hrs (4x4 mornings)			Summer Dec 01
			8hrs (4x4 mornings)	Spring Oct 06
		2hrs (1hr evening and 1hr morning)		Autumn March 07
	2hrs (1x2 mornings targeting winter birds)			Winter July 02
General Searches	6hrs (Animal remains and signs)			Summer Dec 01
	(4hrs Animal remains and signs)			Winter July 02
			6hrs (Animal remains and signs)	Spring Oct 06
		2hrs (Animal remains and signs)		Summer March 07

Although the Project Site is over 300ha, the area that have not been ploughed and contoured for agriculture that has some vertical habitat structure that has survived in the creeklines, roadside corridors and as patches of remnant vegetation is less than 100ha.

The construction of the section of the Transport Route between the Project Site and Hoad lane, I am instructed, will only necessitate the removal of a number of small Callitris from a patch of regrowth vegetation and two native trees along Shannon Harbour Road Reserve.

[24] This refers to the section of the Transport Route between the Project Site and Hoad Lane.