Appendix 4

FAUNA ASSESSMENT

FAUNA STUDY AND ASSESSMENT

OF THE PROPOSED CANYON EXTENSION

WHITEHAVEN COAL MINE

NEAR GUNNEDAH, NSW

Prepared For: Whitehaven Coal Mining Limited
Ground Floor
895 Anne Street
PO Box 2440
FORTITUDE VALLEY BC QLD 4006

By: Dr Leong Lim
Countrywide Ecological Service
PO Box 650, Hornsby 1630 NSW

(In Conjunction with Gerry Swan, Cygnet Consulting P/L)

Ph/Fax: 02 9482 3356
Mobile: 0408 688 909
Email: countryw@bigpond.net.au

November 2004

COPYRIGHT

TABLE OF CONTENTS

Page

TABLE OF CONTENTS

Page

FIGURES

PLATES

Acknowledgements

Mr Gerry Swan assisted in the reptile and amphibian sampling. Ms Michiala Bowen analysed the hair samples. Ms Anne Conway assisted in the research, field sampling, report preparation and analyses.

EXECUTIVE SUMMARY

This report presents the results of a fauna study and assessment undertaken on behalf of Whitehaven Coal Mining Limited for the proposed Canyon Extension (the Subject Site) to the existing Whitehaven Mine. The Whitehaven Mine is located approximately 30 km northwest of Gunnedah. The Canyon area covers an area of approximately 46 ha, lies to the south of, and is contiguous with, the existing mine. Extension of the established coal extraction operation over the Canyon area will extend the current mine life to about 3 years.

The fauna Survey Area comprised a total area of some 100 hectares which includes all the area adjoining the Subject Site. (see **Figure 1** Location Diagram of the Subject Site).

Three habitat types can be distinguished; GCNRC (2004); cf CES (2000), GCNRC (1999):

i) Open Woodland Habitat

ii) Cleared paddocks (with scattered trees)

iii) Wetlands (Man-made Dams)

This report details the methods used and the results obtained from fauna surveys conducted in the Survey Area. 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. 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 NVC Act. The report also considers whether this proposal should be considered as a controlled action under the EP&BC Act.

The fauna checklist for the region defined by the Boggabri 1: 100 000, map sheet 8936 recorded 18 species of frogs, some 225 birds, 54 mammals and 47 reptiles.

The current surveys recorded 5 amphibians, 5 reptiles, 41 birds, including 2 listed vulnerable species and an exotic species, 19 mammals, including a listed vulnerable bat and 5 exotic species, 3 of which are listed as Key Threatening Ecological Processes.

Development of the proposed extension will require the removal of an additional 37 ha of open woodland. The likely cumulative impact of this proposal is discussed with particular reference to listed threatened species.

The 8-part test was conducted on the Yellow-bellied Sheathtail Bat, *Saccolaimus flaviventris,* Grey Falcon, *Falco hypoleucos*, Turqoiuse Parrot, *Neophema pulchella*, and Grey-crowned Babbler, *Pomatstomus temporalis,* which were recorded in or could potentially occur in the Survey Area other than as a vagrant or transient species.

This report makes 9 recommendations to ameliorate and minimise any adverse impact the proposed mine extension may have on the fauna community.

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-clearing inspections of mature trees for nesting birds and roosting bats should be conducted when mature trees are to be removed.

iii) Where possible, nesting and roosting hollows, and the nests used by listed threatened species, should be relocated to appropriate locations nearby.

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

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

vi) Post-mining rehabilitation should commence as soon as possible with the improvement of the connectivity of the wildlife corridor along Hoads Lane being the main priority.

vii) 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.

viii) Areas within the mining lease (outside cultivated areas) that are not directly affected by the proposed extension should remain free from grazing by domestic stock.

ix) The local population of Grey-crowned Babblers should be monitored, at least annually initially, in conjunction with the approved Whitehaven Mine Flora and Fauna Management Plan monitoring programme, to determine the impact of the proposed extension on their behaviour.

Having given consideration to the above and the nature of the operation of the proposed open cut mine extension (not withstanding the recent drought conditions), it is our 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 significantly affect any core or potential Koala habitat; and

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

Thus, the proposed extension should not be considered to constitute a controlled action, no SIS is warranted and no Koala Habitat Management Plan should be required.

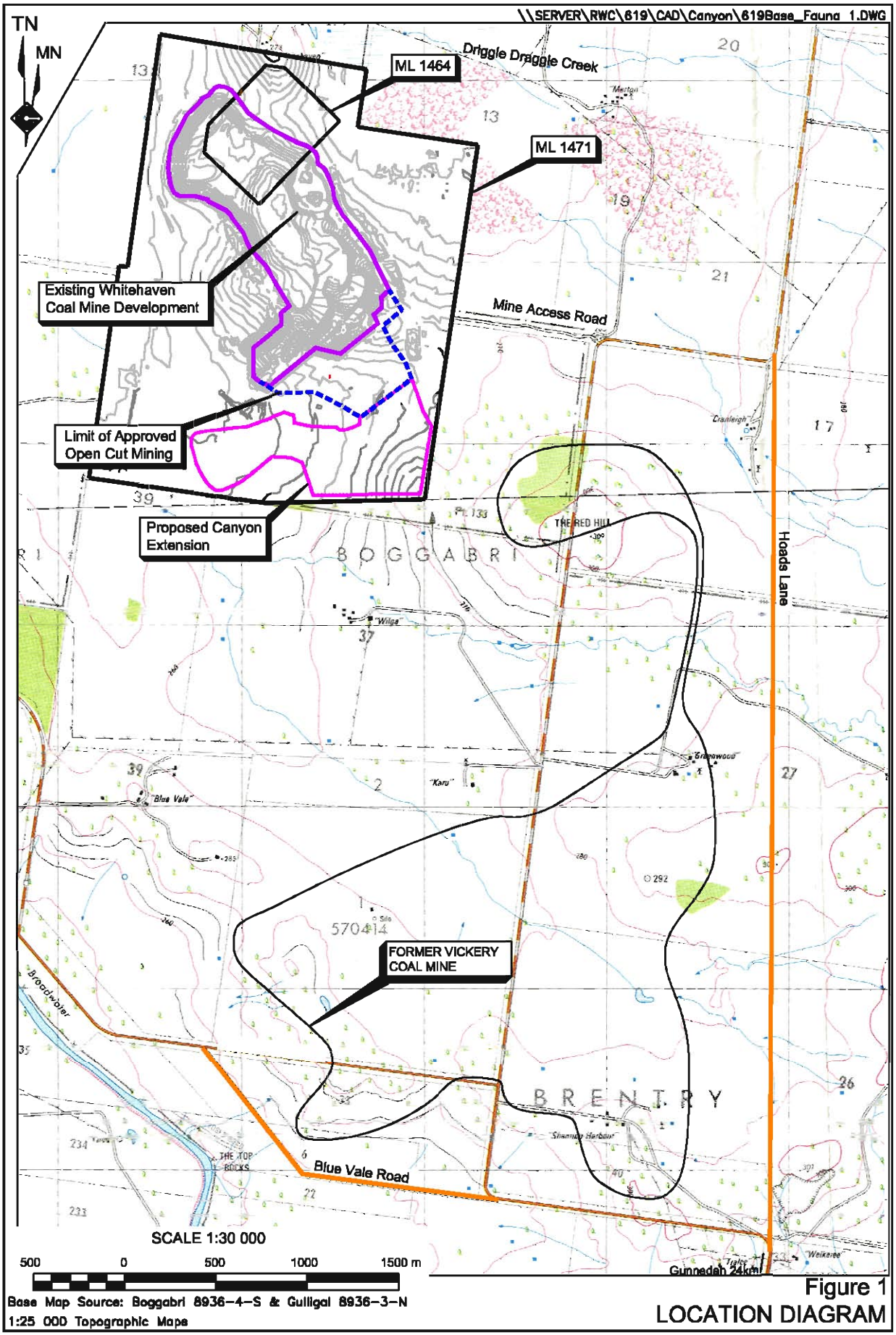

Figure 1
LOCATION DIAGRAM

1.0 INTRODUCTION

This report presents the results of a fauna study and assessment undertaken on behalf of Whitehaven Coal Mining Limited for the proposed Canyon Extension (the Subject Site) to the existing Whitehaven Mine. The Whitehaven Mine is located approximately 30 km northwest of Gunnedah. The Canyon area covers an area of approximately 46 ha, lies to the south of, and is contiguous with, the existing mine. Extension of the established coal extraction operation over the Canyon area will extend the current mine life by about 3 years.

The fauna Survey Area comprised a total area of some 100 hectares which includes all the area adjoining the Subject Site. (see **Figure 1** Location Diagram of the Subject Site).

This report details the methods used and the results obtained from fauna surveys conducted in July 2003 (winter) and April 2004 (autumn) in the Survey Area and is supplemented by the work carried out in the adjoining area since 1999. 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 development 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). 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 Conservation Act 1997* (hence NVC Act). The NVC Act is only considered in relation to the loss and fragmentation of fauna habitat and wildlife corridors 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).

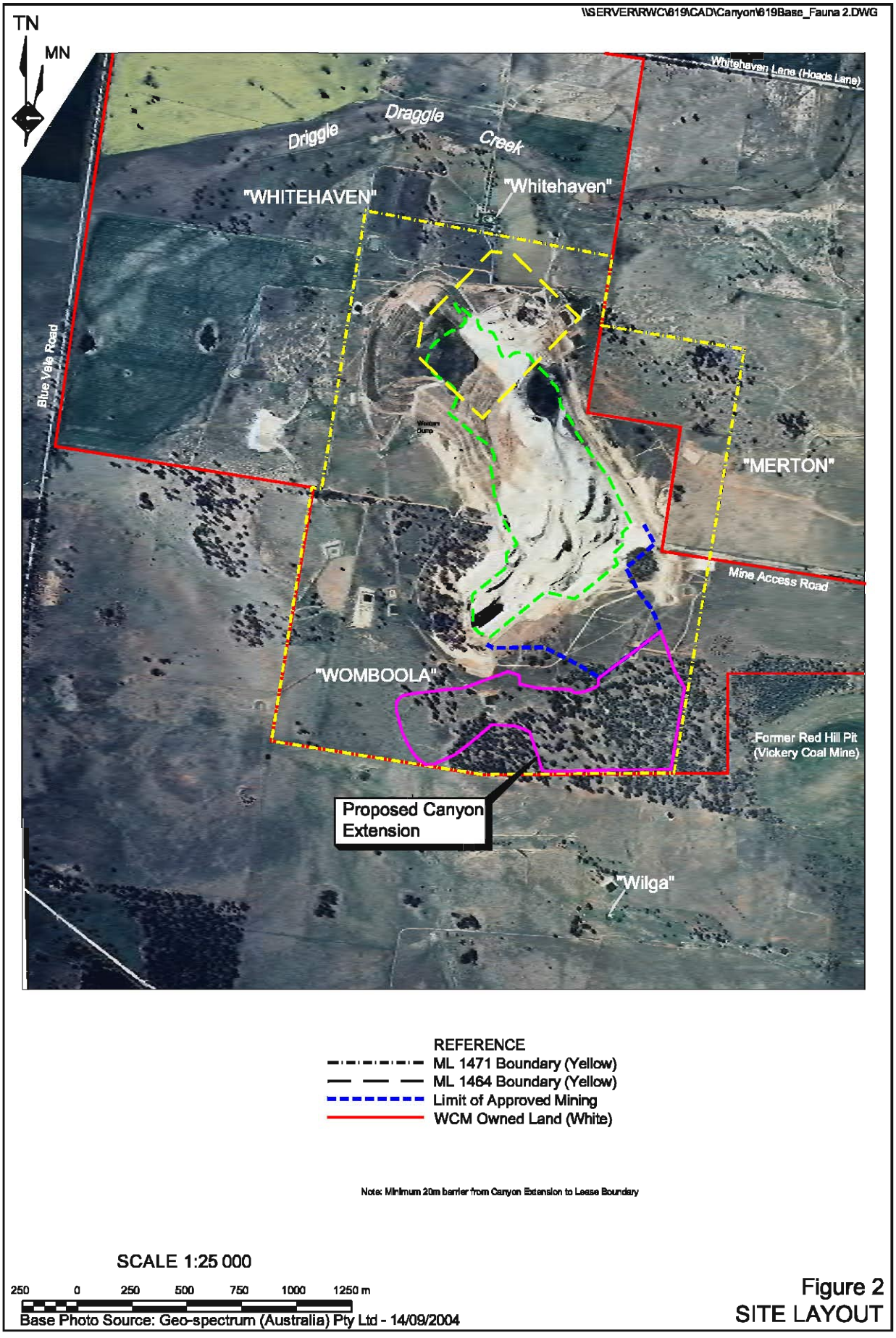

Figure 2
SITE LAYOUT

2.0 SURVEY AREA

The Survey Area is centred on an area of approximately 46 ha, south of the existing Whitehaven Coal Mine and located on the lower slopes of Red Hill within the catchment of Driggle Draggle Creek (see **Figure 2**).

Three habitat types can be distinguished on the Subject Site:

i) Open Woodland Habitat

ii) Cleared paddocks (with scattered trees)

iii) Wetlands (Man-made Dams)

For further description of the fauna habitat see GCNRC (2004); cf CES (2000) and GCNRC (1999). Fauna sampling with traps extended over the first 2 habitat types.

Photo 1: Open Woodland Habitat

Photo 2: Cleared Paddock

Photo 3: Wetland

3.0 METHODS AND MATERIAL

A variety of methods were used to sample the fauna. Some of the methods used targeted more than one fauna group. Trap and recording sites are shown on **Figure 3**. Fauna surveys were carried out to record the fauna over the Subject Site between 15 July and 16 July 2003 in winter and between 17 and the 20 April 2004 in autumn. The bird data from the pre-clearing survey in the immediate adjoining area on 14 October and 15 October 2004 has also been included. The survey methods used and intensity of sampling is generally in accordance with NPWS (2001).

Information about this fauna community was supplemented with a number of published and other unpublished sources see CES (2000), Churchill (1998), Barrett, *et al* (2003), Strahan (1995), Ayers *et al* (1996-99), NPWS (1999) and Cogger (2000). Field identifications were done with Anstis (2002), Barker *et al* (1995), Triggs (1996) and Slater *et al* (1994), Swan *et al* (2004) and Parnaby (1992). The bat calls were identified with the assistance of Reihold *et al* (2001) and Pennay *et al* (2004).

3.1 Amphibians

Pitfall trap lines comprising 2 PVC pipes 150mm x 600mm deep with a 30.0 cm high 10.0m drift fence extending 2.0 m each side of the pitfall traps were located in the various habitat types at sites P1-P4 (see **Figure 3**). Two tube traps were also installed between the pitfall traps, one each side of the drift fence.

The Survey Area had been subjected to past grazing by sheep and cattle and the location of pitfall traplines were limited to areas away from the open paddocks. Searches for frogs were made during the early evenings along the drainage line and around all the dams within and near the Survey Area.

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

3.2 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- C2 (**Figure 3**) to determine the presence of these species in the area.

Special effort was made to locate Grey-crowned Babblers and their nests.

3.3 Mammals

A variety of methods were used to sample mammals as discussed below. (See **Figure 3** for 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:

3.3.1 Small Mammals

Elliott live mammal traps (Type A, Elliott Scientific Equipment, Upwey, Victoria) were set along 2 lines through the remnant vegetation and through open areas as indicated in **Figure 3**. At each site, (identified as T1 to T3 on **Figure 3**), 50 traps were set for 4 nights. Each trap was placed about 10 m 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 3**), 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.

3.3.2 Microbats

Recordings of bat calls were made from mobile and stationary positions using Anabat-CF ultrasonic recorders (Titley Electronics, Ballina, N.S.W.). Harp traps were deployed for 2 nights at locations Hp1 and Hp2 (**Figure 3**).

3.3.3 Nocturnal Species and Arboreal Mammals

Two 2-hr spotlight searches were conducted on the evenings of the 18 and 19 April 2004 (early autumn) and the 15 and 16 July 2003 (winter) in the Survey Area using a 50-watt spotlight on each side of a slow moving vehicle. Each spotlight transect (**Figure 3**) was traversed at least once per night and the fauna observed noted.

Recorded calls of the following listed threatened species were played at point C1-C2 (**Figure 3**) while spotlighting.

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

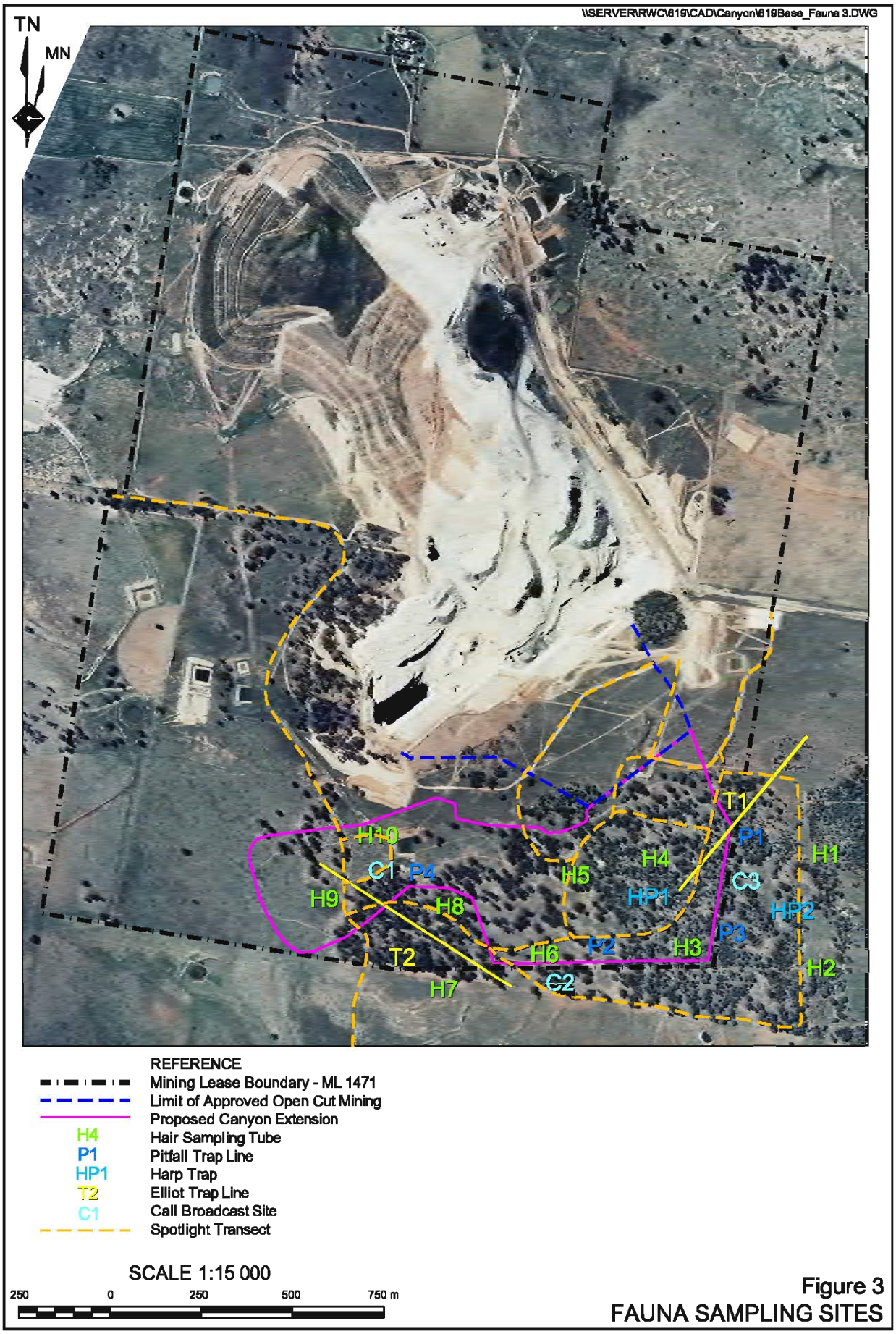

Figure 3
FAUNA SAMPLING SITES

3.4 Reptiles

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

3.5 Invertebrates

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

3.6 Fish

The fish fauna was not targeted for sampling as no listed threatened fish species is likely to be adversely affected in or near the proposed mine extension.

4.0 REGIONAL FAUNA

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

The fauna checklist for the region defined by the Boggabri (1: 100 000, mapsheet 8936) showed that 18 species of frogs, some 225 birds, 54 mammals and 47 reptiles are on the data base (NPWS 2004).

4.1 Threatened Terrestrial Vertebrates

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

i) Amphibians

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

ii) Birds

At least 225 species of birds could occur in the region of which 2 are listed as endangered and 8 are listed as vulnerable. Three other listed vulnerable species have also been recorded in this and the previous study (see CES 2000) and are included in the list below.

- **Endangered Species**

Common Name	**Scientific Name**
1. Regent Honeyeater	*Xanthomyza phrygia*
2. Black-necked Stork	*Ephippiorhynchus asiaticus*

- **Vulnerable Species**

Common Name	**Scientific Name**
1. Speckled Warbler	*Pyrrholaemus sagittus*
2. Brown Treecreeper	*Climacteris picumnus*
3. Diamond Firetail	*Stagonopleura guttata*
4. Blue-billed Duck (W)*	*Oxyura australis*
5. Black-chinned Honeyeater	*Melithreptus gularis*
6. Hooded Robin*	*Melanodryas cucullata*
7. Grey-crowned Babbler**	*Pomatostomus temporalis*
8. Turquoise Parrot*	*Neophema pulchella*
9. Masked Owl	*Tyto novaehollandiae*
10. Grey Falcon*	*Falco hypoleucos*
11. Glossy Black-Cockatoo**	*Calyptorhynchus lathami*

W denotes wetland species
* denotes species that has been observed by the author in the region.
** denotes recorded during this survey

There have been at least 3 exotic birds recorded in the region: the House Sparrow, *Passer domesticus,* the Common Starling, *Sturunus vulgaris* and the Rock Dove, *Columba livia.*

iii) Mammals

At least 54 species of mammals including 12 introduced species may occur in the region. Seven species are listed as Endangered (presumed extinct), 1 species is listed as endangered and 6 species are listed as vulnerable.

- **Endangered (presumed extinct) Species**

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*

- **Endangered Species**

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

- **Vulnerable Species**

Common Name	**Scientific Name**
1. Yellow-bellied Sheathtail Bat**	*Saccolaimus flaviventris*
2. Eastern Freetail Bat	*Mormopterus norfolkensis*
3. Koala	*Phascolarctos cinereus*
4. Large-eared Pied Bat	*Chalinobus dwyeri*
5. Greater Long-eared Bat	*Nyctophilus timoriensis*
6. Little Pied Bat **	*Chalinolobus pictus*

** denotes recorded during this study.

iv) Reptiles

At least 47 species of reptiles may occur in the region but there is only 1 record of listed as vulnerable species: the Border Thick-tailed Gecko, *Underwoodisaurus sphyrurus*. It is noteworthy that the Subject Site is in the catchment of the Namoi River, where a listed vulnerable turtle, the Namoi River Elseya, *Elseya* sp. also occurs.

4.2 Native Fish

The Survey Area is not within the distributional range of any fish listed as threatened under the F M Act.

4.3 Invertebrates

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

4.4 EPBC Act

A search for Commonwealth listed threatened species, international agreement listed species, threatened populations and ecological communities and key threatening processes in the Environment Australia on-line data base centered on Longitude 150.17 E, Latitude -30.75 S (see **Figure 4** below) in November 2004 revealed the following.

i) Threatened Communities

The only listed threatened ecological community that may occur in this area is the Grassy White Box Woodlands community which is listed as Endangered. See GCNRC (2004).

ii) Threatened Species

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

Common Name	**Scientific Name**	**Status**
Birds		
1. Swift Parrot	*Lathamus discolor*	Endangered
2. Superb Parrot	*Polytelis swainsonii*	Vulnerable
3. Australia Painted Snipe	*Rostratula australis*	Vulnerable
4. Regent Honeyeater	*Xanthomyza phrygia*	Endangered
Mammals		
5. Large-eared Pied Bat	*Chalinolobus dwyeri*	Vulnerable
6. Brush-tailed Rock Wallaby	*Dasyurus maculatus*	Vulnerable
7. Greater Long-eared Bat	*Nyctophilus timoriensis*	Endangered
Reptile		
8. Namoi River Elseya	*Elseya* sp. nov. (AMS-R140984)	Vulnerable
9. Border Thick-tailed Gecko	*Underwoodisaurus sphyrurus*	Vulnerable
Fishes		
10. Murray Cod	*Maccullochella pelli*	Vulnerable

Neither the Namoi River Elseya nor the Murray Cod require further consideration as the proposed mine extension will not affect any river or creek or their water quality.

iii) Migratory Species

Terrestrial and wetland species (JAMBA and CAMBA) covered by migratory provisions of the EP&BC Act, 1999 that may occur on the Subject Site are as follows:

Common Name	**Scientific Name**
11. White-bellied Sea-Eagle	*Haliaeetus leucogaster*
12. White-throated Needletail	*Hirundapus caudacutus*
13. Regent Honeyeater	*Xanthomyza phrygia*
14. Latham's Snipe	*Gallinago hardwickii*
15. Painted Snipe	*Rostratula benghalensis*

iv) Listed Marine Species

Other than those that are already listed as threatened or migratory species and which are also marine species, the following listed marine species may also occur within the Subject Site.

Common Name	**Scientific Name**
16. Fork-tailed Swift	*Apus pacificus*
17. Great Egret	*Ardea alba*
18. Cattle Egret	*Ardea ibis*
19. Rainbow Bee-eater	*Merops ornatus*
20. Painted Snipe	*Rostratula benghalensis*

v) Listed Sites

There are no World Heritage Properties, National Heritage Places, Ramsar Sites or Critical Habitats within 10km of the Subject Site

5.0 FAUNA IN THE SURVEY AREA

5.1 Amphibians

The following frog species were recorded on or in areas adjoining the Survey Area.

Common Name	**Scientific Name**	**Status**
1. Broad-palmed Frog	*Litoria latopalmata*	P
2. Peron's Tree Frog	*Litoria peronii*	P
3. Desert Tree Frog	*Litoria rubella*	P
4. Spotted Marsh Frog	*Limnodynastes tasmaniensis*	P
5. Striped Marsh Frog	*Limnodynastes peronii*	P

All these are common frog species. There are also likely to be other burrowing species that have not been recorded during the recent survey due to the lateness of the season (it being early autumn). Many of the burrowing species will also only emerge for limited periods after heavy rain in the warmer months. However, none of the burrowing species are listed as threatened.

5.2 Birds

The following table lists the 41 bird species observed in or near the Survey Area.

Common Name	Scientific Name	Autumn	Spring	Winter	Status
1. Brown Quail	*Coturnix australis*	*			P
2. Australian Wood Duck	*Chenonetta jubata*	*	*	*	P
3. Grey Teal	*Anas gracilis*	*			P
4. White-faced Heron	*Ardea novaehollandiae*			*	P
5. Straw-necked Ibis	*Theskiornis sinicollis*			*	P
6. Black-shouldered Kite	*Elasnus notatus*	*			P
7. Spotted Harrier	*Circus assimilis*	*			P
8. Brown Falcon	*Falco berigora*	*			P
9. Grey Falcon	*Falco hypoleucos*			**	V
10. Australian Hobby	*Falco longipennis*	*			P
11. Nankeen Kestrel	*Falco cenchroides*	*			P
12. Common Bronzewing	*Phaps chalcoptera*			*	P
13. Crested Pigeon	*Ocyphaps lophotes*	*	*	*	P
14. Glossy Black Cockatoo ◆	*Calyptorhynchus latirostris*	*			V
15. Galah	*Cacatua roseicapilla*	*	*	*	P
16. Little Corella	*Cacatua sanguinea*	*			P
17. Sulphur-crested Cockatoo	*Cacatua galerita*	*	*		P
18. Cockatiel	*Nymphicus hollandicus*	*			P
19. Eastern Rosella	*Platycercus eximius*	*	*		P
20. Mallee Ringneck	*Platycercus zonarius*	*	*		P
21. Red-rumped Parrot	*Psephotus haematonotus*	*			P
22. Mulga Parrot	*Psephotus varius*		*		P
23. Southern Boobook	*Ninox novaeseelandiae*	*	*		P
24. Laughing Kookaburra	*Dacelo novaeguineae*	*	*		P
25. Superb Fairy-wren	*Malurus cyaneus*			*	P
26. Variegated Fairy-wren	*Malurus lamberti*	*			P
27. Striated Pardalote	*Pardalotus striatus*			*	P
28. Noisy Miner	*Manorina melanocehrla*	*	*	*	P
29. Grey-crowned Babbler	*Pomatstomus temporalis*	*	*	*	V
30. Magpie-lark (Pee Wee)	*Myiagra inquieta*	*			P
31. Black-faced Cuckoo-strike	*Coracina novaehollandiae*	*			P
32. Grey Butcherbird	*Cracaticus torquatus*		*		P

Common Name	Scientific Name	Autumn	Spring	Winter	Status
33. Pied Butcherbird	*Cracaticus nigrogulsris*	*	*	*	P
34. Australian Magpie	*Gymnorhina tibicen*	*	*	*	P
35. Grey Currawong	*Strepera versicolor*	*			P
36. Australian Raven	*Corvus coronoides*		*		P
37. Little Crow	*Corvus bennetti*	*		*	P
38. White-winged Chough	*Corcorax melanorhamphos*	*	*	*	P
39. Apostlebird	*Struthidea cinerea*	*	*		P
40. Richard's Pipit	*Anthus novaeseelandiae*	*	*	*	P
41. Common Starling#	*Sturunus vulgaris*	*			U

** Recorded in the area outside the Survey Area but within 10km of the Subject Site.
# Introduced exotic species.
◆ Recorded once only as a flyover in sight distance of the Survey Area.

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

5.3 Mammals

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

Common Name	Scientific Name	Status
1. Brush-tailed Possum	*Trichosurus vulpecula*	P
2. Swamp Wallaby	*Wallabia bicolor*	P
3. Eastern Grey Kangaroo	*Macropus giganteus*	P
4. Red-necked Wallaby	*Macropus rufogriseus*	P
5. House Mouse*	*Mus domesticus*	U
6. European Rabbit *+	*Oryctolagus cuniculus*	U
7. European Red Fox*+	*Vulpes vulpes*	U
8. Feral Cat *+	*Felis cattus*	U
9. Domestic Dog	*Canis lupus familiaris*	U

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

The following microbat species were detected from call analysis.

Common Name	Scientific Name	Status
Family Molossidae		
1. White-striped Mastiff-bat	*Nyctinomus (Tadarida) australis*	P
2. Little Mastiff-bat (sp4 @ 24 kHz)	Undescribed *Mormopterus*	P
3. Little Mastiff-bat (sp2 29/30 kHz)	*Mormopterus planiceps*	P
Family Vespertilionidae		
4. Chocolate Wattled Bat	*Chalinolobus morio*	P
5. Lesser Long-eared Bat	*Nyctopilus geoffroyi*	P
6. Gould's Long-eared Bat	*Nyctopilus gouldii*	P
7. Gould's Wattled Bat	*Chalinolobus gouldii*	P
8. Little Forest Bat	*Vespadelus vulturnus*	P
9. Little Broad-nosed Bat	*Scotorepens greyii*	P
Family Emballonuridae		
10. Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	V

5.4 Reptiles

The following reptiles were caught in the traps and or recorded during searches under rocks, logs and leaf litter.

Common Name	Scientific Name	Status
1. Robust Skink	*Ctenotus robustus*	P
2. Tree Skink	*Egernia striolata*	P
3. Boulenger's Morethia	*Morethia boulengeri*	P
4. Wall Lizard	*Cryptoblepharus virgatus*	P
5. Eastern Bearded Dragon	*Ogona barbata*	P

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

6.0 DISCUSSION

The proposed Canyon extension of the existing Whitehaven Mine will involve the remove of around 46ha of Open Woodland and grassland (see GCNRC 2004). The cumulative impact of this additional removal of native vegetation is discussed in Section 6.3 below.

The likely impact this loss of fauna habitat will have on the native fauna, in particular the listed threatened species should be considered with the following factors in mind. Firstly, this area of the state is still overcoming the adverse effect of the recent drought conditions on the local fauna community and, secondly, there has been a positive effect resulting from the exclusion of stock grazing since 1999. This has benefited species that are dependent on Open Woodland habitat, eg on fauna like the Grey-crowned Babbler. Thirdly it is also possible that because of the widespread nationwide drought condition, species like the Little Pied Bat that are usually found in the more arid regions may have moved east into areas that would normally be their marginal habitats.

Finally, the on-going rehabilitation of post-mining areas and the proposed enhancement of adjoining areas to improve the conductivity and connectivity of habitat remnants and the wildlife corridor along Hoads Lane with Vickery State Forest nearby will have positive impacts upon the local ecology and biodiversity (see **Figure 4**).

Notwithstanding, the likely adverse impact of the proposed extension on listed threatened species are assessed below.

6.1 Likely Impact on Threatened Species

With regards to listed amphibians, no listed threatened frogs are known from the Boggabri region and none have been recorded from the immediate area to the Study Site. The only listed vulnerable frog, the Booroolong Frog is confined to clear high mountain streams and is thus not relevant to any consideration for this proposal.

With regards to listed birds, the area of the proposed mine extension is neither a permanent wetland area nor is it associated with any extensive wetland. None of the listed threatened species that are associated with or dependent on wetlands are likely to affected by this proposed mine extension as no wetland habitat exists in or adjoining the survey area except an ephemeral creek, the Driggle Draggle Creek nearby. It is however noteworthy that the Blue-billed Duck was recorded near Gunnedah from a single vagrant (CES 2002). The proposal will thus be unlikely to significantly impact on any listed threatened wetland or wetland dependent species.

Neither the Malleefowl, Bush Thick-knee nor the Plains Wanderer were recorded during the surveys. Due to the presence of foxes and the degraded understorey in the habitat remnants between the extensive areas of cleared cultivated paddocks, it is unlikely that any of these species will occur in the Survey Area. This location is, in any case, arguably outside the historical range of the Malleefowl.

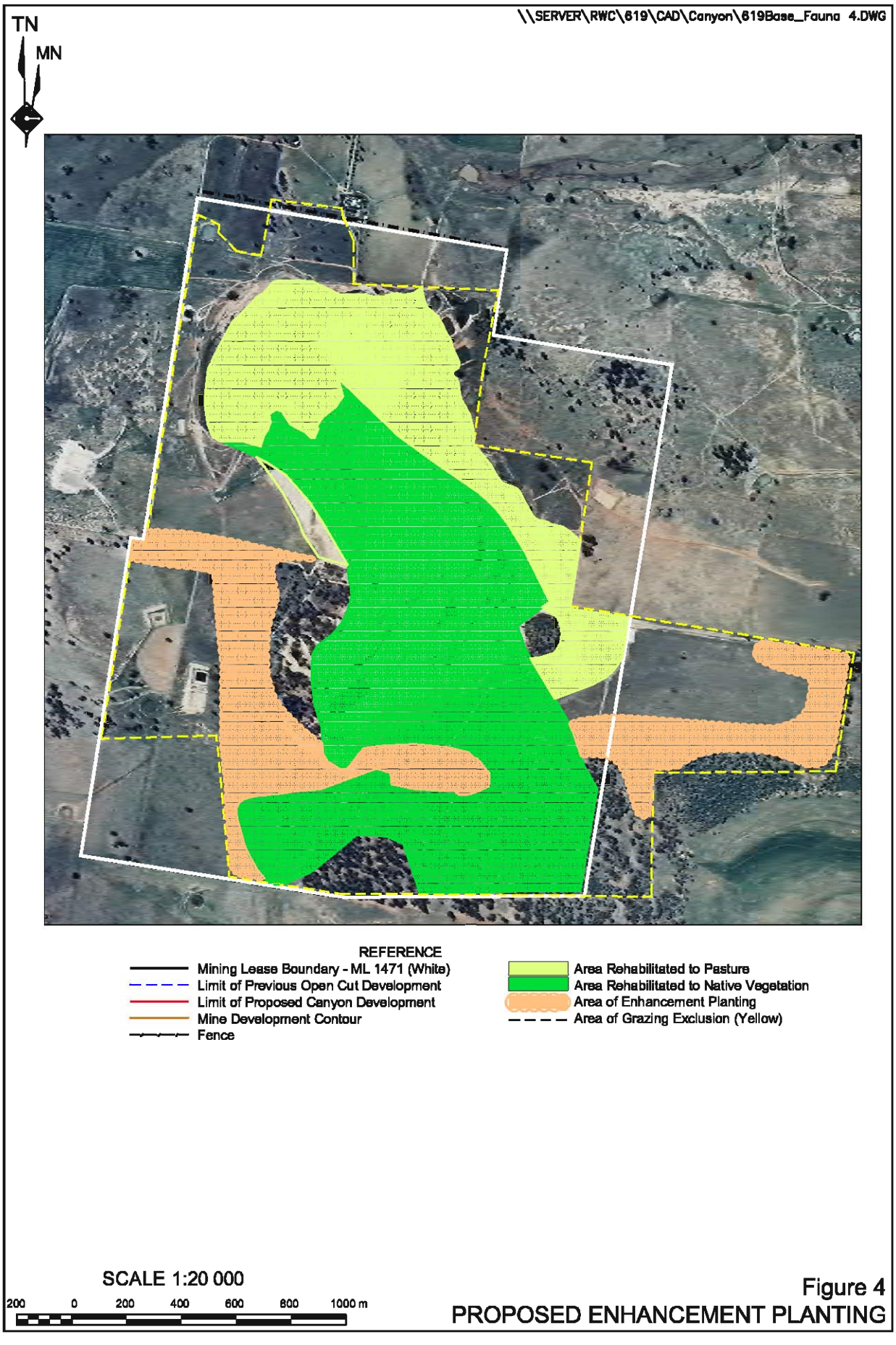

Figure 4
PROPOSED ENHANCEMENT PLANTING

Other than the Grey Falcon, which is discussed in detail in Section 6.1.2 of this report, the raptors and owls that are within the distribution range of the Survey Area and have been listed as threatened may use the area from time to time. However, none of these species were recorded during the surveys. All these species also have very large home ranges and are dependent on habitats with large trees, for example the River Red Gums along large rivers, with large tree hollows to roost and high prey density (or as in the case if the Grass Owl, grassland). None of these species are therefore likely to be significantly affected by the proposed mine extension.

With regard to the Glossy Black Cockatoo, as there are no Casuarina stands within the Survey Area, the planned activities would be of no consequence to this threatened species.

The Turquoise Parrot was not recorded during the current surveys. However, it is known to occur nearby in recent years (Lim pers obs). Notwithstanding that it is a nomadic species the likely impact the proposed Canyon extension may have on this parrot is discussed in Section 6.1.3.

The listed endangered Swift Parrot, a species that is also listed in the EPBC Act, is nomadic in this part of its range. This parrot is therefore unlikely to be significantly affected by the proposed activity due to their transient behaviour.

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

Neither the Pied 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 Survey Area and environs. These species are thus unlikely to occur at or near the proposed mine site or be affected by the proposed activity.

Two other listed vulnerable species, the Diamond Firetail and Speckled Warbler were not recorded during these surveys, although the former species was recorded in 1999 among the gilgai vegetation east of the existing Whitehaven Coal Mine. The latter species appears to be confined to undisturbed open woodland and the former, a seedeater, to frequent woodland and forest with grassy understorey and a good shrub cover, especially near a water source.

The inclusion of Calmanthus in the regional checklist is an aberration in the 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. No Calmanthus was recorded during the surveys and none is expected.

As far as the listed mammals are concerned, it is unlikely that any of the listed presumed extinct species, including the Bilby and Bridled Nailtail Wallaby, are likely to be found in or near the Survey Area. There are, however, persistent and recent unverified reports of Bilbies in the Boggabri region.

The Survey Area is also within range of the listed endangered Black-striped Wallaby. However, this species was not recorded in the area during the surveys and there has not been any recent record of this species in the area. Given the well-established land use history of the Gunnedah area since European settlement and the poor natural habitat quality around the proposed mine, it is most unlikely that this wallaby species or the listed vulnerable Rufous Bettong, a species that often occurs with this wallaby, 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 eastern parts of NSW. It periodically occurs in plague density in the Channel Country in SE Queensland, South Australia and the Northern Territory. Neither of these species is expected to ever be found in the Survey Area.

Of the listed vulnerable arboreal species, the Koala is subject to 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 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. This species was not recorded in the Survey Area and there is only one record of it near the eastern limit of the region dating back to 1966. Given the habitat quality of the local environs, it is unlikely that this squirrel glider will occur in the area around the Whitehaven Mine.

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 6.1.1 of this report.

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

The Little Pied Bat has recorded at the Whitehaven Coal Mine in 1999 (CES 2000). This species may therefore occur from time to time this far east but it is unlikely to be significantly affected by the mining proposal in this marginal part of its range. It is probable that it has been driven farther east than it normally prefers by the recent drought.

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

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

With regards to reptiles, there are early records of *Hoplocephalus bitorquatus* from around both Boggabri and Gunnedah, so the surveyed site is within its known range. This listed vulnerable snake is nocturnal and arboreal, using hollow limbs and lifting bark on mature standing trees. As it is largely a frog eater it usually occurs along watercourses, both permanent and ephemeral. Given the lack of watercourses around the Whitehaven Mine and absence of any recent records of this species in the region, it is extremely unlikely this snake occurs on the proposed Canyon extension area. The 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 listed endangered burrowing Five-clawed Worm Skink, *Anomalopus mackayi,* is reported in Hoser (1989) as occurring at Boggabri. The animal featured in his book is actually *Lerista punctattovittata*. *Anomalopus mackayi* has never been found in this region. It is an inhabitant of open woodland with moist black soil and grass cover. This cracking self-mulching soil type habitat is not present in this region.

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

The Namoi River Elseya or Bell's Turtle, *Elseya bellii* (Gray 1884), another listed vulnerable species, is found between 700m and 800m asl in the headwaters of the Namoi, Macdonald and Gwydir Rivers (Cann 1998 cf Ayers *et al* 1996-99). Although the proposed extension area is within the Namoi River catchment, the Namoi River Elseya is unlikely to be found around the Whitehaven Mine, including the proposed Canyon extension area.

Cann (1998) discusses the *Elseya* species from mid-eastern Australia. He describes populations in the Namoi, Gwydir and MacDonald Rivers in NSW and in Bald Rock Creek in Queensland. He has put them together under *Elseya belli* while recognising that there may be several species or sub-species involved. He noted further that:

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

"Their general habitats are narrow runs of river approximately 30-40m wide, adjoined by sheep and cattle grazing land. The terrain is granite country. The riverbed is sandy and rocky, with small beds of weed with many willow trees and gums along the banks. Rarely are the holes deeper than 3m." (at 212)

No further consideration of listed threatened reptiles is thus warranted for this proposed extension.

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

6.1.1 Yellow-bellied Sheathtail Bat *(Saccolaimus flaviventris)*

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 (1983b, 1995b).

It has never been recorded in caves, and large colonies (around 40 individuals) have been found in some roosts (L.S. Hall, *pers. comm*.). 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).

This species is listed as Vulnerable in the NSW TSC Act, but is not listed in the national Bat Action Plan (Richards and Hall 1996) 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. "

Ayers *et al* (1996-99) at page 144 identified the 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).

The bat call recordings indicate that this species forages and ranges extensively over the Survey Area but no roosting site emergence call patterns was recorded

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

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/Migration

There is no information available in relation to movement or migration patterns that this species may exhibit. Richards (1983c, 1995c) 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. “

It is unlikely, however, that the removal of the Open Woodland habitat in the Canyon Extension area will affect this species’ life history in a manner that will cause its local extinction. This proposed mine extension represents only a small portion of its normal extensive home range and the proposed activity will not preclude it from hunting and foraging over the surrounding area.

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

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

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

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

Some large trees will be lost, however, it is unlikely that the proposed activity over 46 ha will affect this species as only few hollow-bearing trees will be lost.

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

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

e) Whether critical habitat will be affected.

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

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

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

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

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

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

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

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

6.1.2 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 Yarrawonga Lane on both sides of Wean Road some 10km to the east in December 2001.

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).

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

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 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 Blakely's Red Gum appear to be favored (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.

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).

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

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

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

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

The proposal will remove or modify some feeding habitat on the edge of the woodland area affected by the proposed Canyon extension. Cursory inspections of mature trees with hollows that have been proposed for removal did not located any nesting site of this parrot in the Canyon extension area.

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

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

The proposed mine extension is unlikely to isolate the local population of Turquoise Parrot from any currently interconnecting or proximate areas of habitat of this semi-nomadic bird.

e) Whether critical habitat will be affected.

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

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

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

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

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

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

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

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

6.1.3 Grey Falcon, *Falco hypoleucos*.

This listed vulnerable small falcon which has been recorded locally (see CES 2000 and pers obs.) has a widespread distribution that extends throughout NSW. This species has, in recent times, been recorded to breed only along major inland waterways (see Ayers *et al* 1996-99).

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

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

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

Breeding

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

Foraging

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

Nesting

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

Movements

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

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

Clearing of mature trees close to watercourses or floodplains and in drought refugia (eg Murray-Darling confluence).

Cultivation that results in fragmentation of habitat, which in turn affects the abundance and variety of prey species.

DDT – related eggshell thinning. Since this pesticide is now completely banned in Australia, this threat is no longer relevant.

Egg collecting. This is, however, a law enforcement issue and has no relevance in any consideration of this mining proposal.

Competition from other Falcon species which is problematic (J Brickhill *per comm.* in Ayers *et al* 1996-99)

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.

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

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

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

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

No shrubland or large trees in a riparian zone will be affected. Some large trees will be lost in the Open Woodland habitat on the proposed Canyon extension area (see Section 6.3 below). It is unlikely that the proposed activity over 46 ha will adversely affect this species in this part of its distribution range where it is most probably a vagrant.

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

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

e) Whether critical habitat will be affected.

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

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

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

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

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

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

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

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

6.1.4 Grey-crowned Babbler, *Pomatstomus temporalis.*

The Grey-crowned Babbler was recorded on the Survey Area and in the habitat nearby. It has also been recorded elsewhere in the region (NPWS 2004) and will be affected by the proposed Canyon extension.

“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).

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

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.

Breeding

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

Foraging

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

Nesting

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

Movements

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

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

Four nests and a breeding family of up to 14 individuals of this listed vulnerable babbler were located on or within sight distance of the Survey Area. One nest is located within the Canyon extension area and 3 others are within 50m of the proposed extension limits. The habitat patch quality around the Whitehaven mine has been improved by the exclusion of stock and the sensitive use of felled and fallen timber. This babbler has been recorded in the Whitehaven area since 1999 (before it was listed as a vulnerable species). Its numbers have increased despite the mining activity. It is unlikely that the current proposed extension will affect this species significantly as there is probably sufficient Open Woodland habitat in the surrounding remnants to support this local babbler family. However, it will probably alter the behaviour of family group in the remaining habitat but this will be ameliorated by the improvement in the habitat patch quality in the surrounding remaining Open Woodland from the on-going rehabilitation and proposed ameliorative plantings (see **Figure 4**).

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

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

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

This proposal does not involve the removal or modification of a significant area of this Babbler's known habitat.

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

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

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

e) Whether critical habitat will be affected.

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

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

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

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

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

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

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

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

6.1.5 Summary

As detailed in the assessments above, the proposed open cut mine extension is unlikely to significantly affect the Yellow-bellied Sheathtail Bat, Turquoise Parrot, Grey Falcon or Grey-crowned Babbler. Therefore no SIS should be warranted.

6.2 EPBC Act

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

6.2.1 International Agreement Listings

Given the size of the proposed mine extension and that no tailings or discharged dam that can be potentially hazardous to waterbirds will be constructed, the migratory species listed under CAMBA and JAMBA or marine under the EPBC Act, 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 proposed mine extension.

6.2.2 Listed Threatening Ecological Processes

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

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

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

6.2.3 Summary

From the considerations above, the proposed mine extension 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.

6.3 Native Vegetation Conservation

Ameliorative actions in response to this loss of native vegetation and fauna habitat including post-mining rehabilitation have been described in the approved Flora and Fauna Management Plan for the existing Whitehaven Mine. Extensive fauna habitat safeguards are recommended for this mine extension proposal in Section 7.0.

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 about 15% cover of Bimble Box, *Eucalyptus populnea*, a feed tree species listed in Schedule 2 (see GCNRC 2004).

No Koala nor sign of Koala was encountered during the current surveys. One Koala was recorded during a pre-clearing survey in 2001 although there is no historical evidence of Koala in the local area. It was a transient adult male and despite extensive searches could not be relocated around the Whitehaven Mine. It is also probable that this species may occur in very low densities in Vickery State Forest nearby.

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

6.5 ESD Principles

The proposed activity is not likely to adversely affect the biodiversity locally or otherwise. Therefore it does not raise any issue of either intergenerational equity nor value-added considerations relating to fauna or their habitats. It is thus consistent with ESD principles in these 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 extension will necessitate some clearing of more native vegetation and it will have some short term cumulative effect on the diminishing habitat remnants that form a network of habitat patches between the surrounding properties and Vickery State Forest.

In accordance with precautionary principles the adverse impact of this proposed mine extension on the native vegetation will be minimised by compensatory and ameliorative measures on the native vegetation and fauna habitat which are detailed in the Section 7.0 below.

7.0 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. These precautions together with additional management measures to ameliorate adverse impacts of the proposed mine extension 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-clearing inspections of mature trees for nesting birds and roosting bats should be conducted when mature trees are to be removed.

iii) Where possible, nesting and roosting hollows, and the nests used by listed threatened species, should be relocated to appropriate locations nearby.

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

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

vi) Post-mining rehabilitation should commence as soon as possible with the improvement of the connectivity of the wildlife corridor along Hoads Lane being the main priority.

vii) 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.

viii) Areas within the mining lease (outside cultivated areas) that are not directly affected by the proposed extension should remain free from grazing by domestic stock.

ix) The local population of Grey-crowned Babblers should be monitored, at least annually initially, in conjunction with the approved Whitehaven Mine Flora and Fauna Management Plan monitoring programme, to determine the impact of the proposed extension on their behaviour.

8.0 CONCLUSION

Having given consideration to the above and the nature of the operation of the proposed open cut mine extension, it is our 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 significantly affect any core or potential Koala habitat; and

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

Thus, the proposed mine extension should not be considered to constitute a controlled action and no SIS is warranted. The proposal is also unlikely to affect Koalas and hence no Koala Habitat Management Plan should be required.

REFERENCES

Anstis, M (2002) Tadpoles of South-eastern Australia – A Guide with Keys. New Holland, Sydney.

Ayers, D., Nash, S. and Baggett, K. (1996-99). "Threatened Species of Western New South Wales". NSW National Parks and Wildlife Service: Hurstville.

Barrett, G., et al (2003) The New Atlas of Australian Birds. Birds Aust., Melb.

Cann, J. (1998). Australian Freshwater Turtles. Beaumont Publishing P/L Singapore.

CES (2000) Fauna Survey and Assessment of the Proposed Whitehaven Open Cut Coal Mine, Gunnedah NSW. Countrywide Ecological Service for RW Corkery and Co P/L, Orange NSW for AMCI Australia P/L, Brisbane QLD.

CES (2002) Fauna Study and Assessment Proposed Coal Washery and Loading Facility Former Vickery Rail Siding, Gunnedah, NSW. Countrywide Ecological Service for Whitehaven Coal Mining Limited, Brisbane.

Christidis, L and Boles, WE (1994). The Taxonomy and Species of Birds of Australia and its Territories. RAOU Mono. No.2, Vic.

Cogger, H. G. (2000). Reptiles and Amphibians of Australia. Aust. Mus/Reed books: Sydney.

GCNRC (1999) Flora Study of the Proposed Whitehaven Coal Mine near Gunnedah, NSW. Geoff Cunningham Natural Resources Consultants P/L, Killara NSW for Whitehaven Coal Mining Co. P/L.

GCNRC (2004) Flora Study of the Proposed Canyon Extension of the Whitehaven mine near Gunnedah, NSW. Geoff Cunningham Natural Resources Consultants P/L, Killara NSW for Whitehaven Coal Mining Co. P/L.

Morris, A.K. (1980). The status and distribution of the Turquoise Parrot in New South Wales. *Australian Birds* 14: 57-67.

NPWS (1999) Threatened Species Management: Species Information. NPWS (NSW), Hurstville.

NPWS (2001) Draft Regional Diversity Survey & Assessment: Guidelines for Developments and Activities. NPWS, NSW, Hurstville.

NPWS (2004) Atlas of NSW Wildlife (1:100 000 Map Sheet 8936 October 2004). Nat. Parks and Wildlife Service (NSW), Hurstville now part of DEH, NSW.

Parnaby (1992). An interim guide to identification of insectivorous bats of south-eastern Australia. Tech. Rep. Number 8. Australian Museum: Sydney.

Pressey, RL, Hager, TC, Ryan, KM, Schwartz, J, Wall, S and Creaser, PM (2000) New South Wales: gaps, bias and priorities to minimise further loss of native vegetation. Biol. Cons. 96: 55-82.

Richards, G (1995) Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* (Peters,1867). Pp. 467-468 in, *The Mammals of Australia* (ed. R. Strahan). Reed Books : Chatswood, NSW.

Robinson, M (1995). A field Guide to Frogs of Australia. Aust. Mus./Reed. Sydney.

Slater, P., Slater, P. and Slater, R. (1990). "The Slater Field Guide to Australian Birds". Weldon Publishing: Willoughby, NSW.

Smith,P.J., Smith, J.E., Pressey, R.L. and Whish, G.L. (1995). "Birds of Particular Conservation Concern in the Western Division of New South Wales: Distributions, Habitats and Threats." Occcasional Paper 20. National Parks and Wildlife Service (NSW): Hurstville.

Smith, PL, Wilson, B, Nadolny, C and Lang, D. (2000) The Ecological Role of the Native Vegetation of New South Wales: a background paper of the NSW Native Vegetation Advisory Council. Dept. Land and Water Conservation, Sydney.

Strahan, R. (1995) Ed. The Mammals of Australia. Reed Books: Sydney.

Swan, G., Shean, G and Sadlier, R (2004). "A Field Guide to the Snakes and Lizards of New South Wales." Reed New Holland, Syd. 2nd Ed.