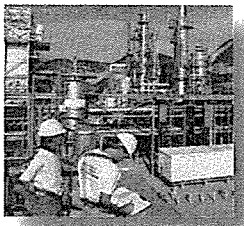
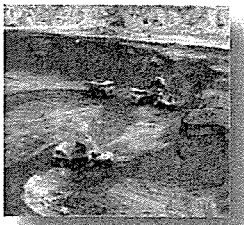
Summer Targeted Surveys for Threatened Species Ashton Coal Project

HLA-Envirosciences Pty Limited
Environmental, Planning,
Engineering & OHS Services

Summer Targeted Surveys for Threatened Species Ashton Coal Project

Prepared for

White Mining Limited
PO Box 699
Singleton NSW 2330

HLA-Envirosciences Project No U909

by

Neil McElhinney BAApplSc
Ecologist

28 February 2002

This document was prepared for the sole use of White Mining Limited and the regulatory agencies that are directly involved in this project, the only intended beneficiaries of our work. No other party should rely on the information contained herein without the prior written consent of HLA-Envirosciences Pty Limited and White Mining Limited.

CONTENTS

FIGURES

TABLES

APPENDICES

EXECUTIVE SUMMARY

Targeted surveys for threatened species were completed to supplement field investigations that took place in winter and spring at the location of the proposed Ashton Coal Project. Targeted species included those for the Grey-crowned Babbler (*Pomatostomus temporalis temporalis*), Hooded Robin (*Melanodryas cucullata cucullata*), Black-chinned Honeyeater (*Melithreptus gularis gularis*), Brown Treecreeper (*Climacteris picumnus victoriae*), Speckled Warbler (*Pyrrholaemus sagittata*) and Diamond Fire-tail (*Stagonopleura guttata*). Additionally, aquatic habitats were characterised in order to assess the potential for the Green and Golden Bell Frog (*Litoria aurea*) to be present within the study area. A survey for mircopteran bats was completed.

No additional threatened species were observed during the field investigations. The only threatened species positively identified was the Grey-crowned Babbler, while the threatened Great Pipistrelle (*Falsistrellus tasmaniensis*) was tentatively recorded at the southern woodland. Neither species is likely to be significantly impacted by the proposed development, either through direct habitat loss or by habitat modification as a result of subsidence.

A number of recommendations regarding the rehabilitation and management of the post mining landscape was made that could improve the long term viability of threatened species in the local area, while enhancing marginal vegetation communities to encourage the repopulation of the area with threatened species that were not detected during the targeted survey.

1.0 INTRODUCTION

1.1 Location Of Works

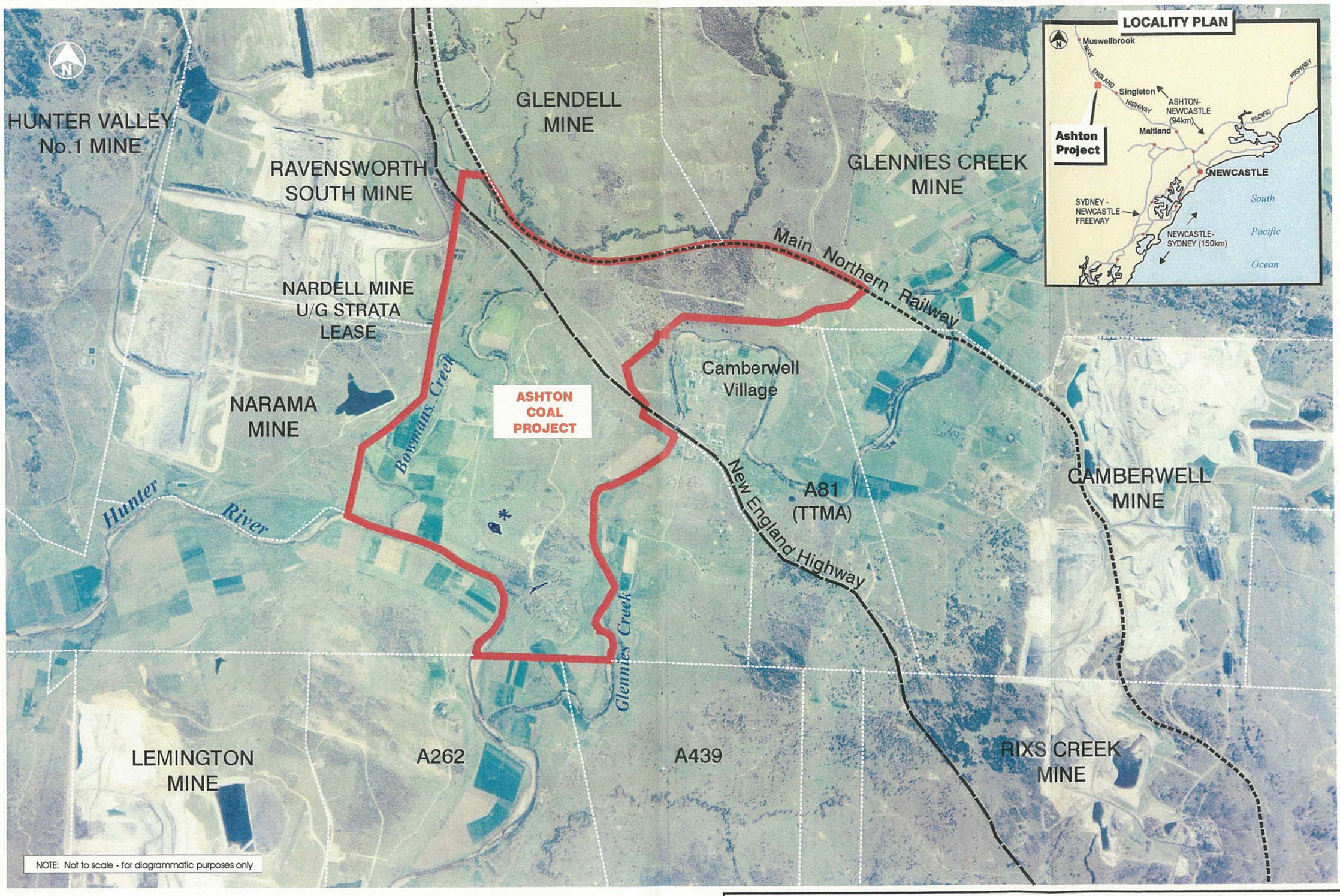
The Ashton Coal Project is situated 14 km north west of Singleton in the Hunter Valley of NSW as indicated in **Figure 1**. The Ashton Coal Project has an area of approximately 1100 hectares and generally consists of undulating country. The village of Camberwell is located approximately 600 m to the south east of the proposed open cut and mine surface facilities. The Main Northern Railway forms the northern boundary of the site. The New England Highway is located to the south of the open cut and surface mine facilities. Glennies Creek Road, which intersects with the New England Highway, is located along the southern boundary of the proposed open cut operation, before it crosses the Main Northern Railway and travels north.

The power stations of Liddell and Bayswater are located north west of the site and neighbouring mines include Glendell (north), Camberwell (east) Ravensworth South and Narama (west) and Lemington (south). Underground mines close to Ashton include Glennies Creek (north east), Nardel (north west) and Cumnock (north). The area to which the Development Application (DA) applies is shown in **Figure 1** and lies wholly within the Shire of Singleton.
Surface impacts will be a result of the proposed development of pit top facilities, open cut coal mine and an underground mine. The pit top facilities and open cut coal mine will result in the removal of degraded pasture and 25 hectares of woodland vegetation dominated by a mixture of Narrow-leaved Ironbark (*E. crebra*), Grey Box (*E. moluccana*) and Bull Oak (*Allocasuarina leuhmanii*) that has a sparse understorey of grasses and shrubs.

The underground mine will extract coal from areas south of the New England Highway, targeting the Pikes Gully (PG), Upper Liddell (ULD), Upper Lower Liddell (ULLD) and the Lower Barrett (LB) seams. Permanent access to the mine will be from entries constructed off the highwall of the Arties Pit. Longwall blocks are approximately 250m wide and aligned parallel to the western boundary, with subsidence of up to 6 m occurring at the high point within the southern woodland. Subsidence will result in gentle 1:30 changes to the gradient. Some cracking is expected and within drainage lines these are expected to fill with surface material.

1.2 Scope

Following discussions between White Mining Limited, PlanningNSW and the NSW NPWS, it was agreed that further information regarding the impact to threatened species that are known to occur in the region was required. The species of particular concern were the Grey-crowned Babbler (*Pomatostomus temporalis temporalis*), Black-chinned Honeyeater (*Melithreptus gularis gularis*), Brown Treecreeper (*Climacteris picumnus victoriae*), Hooded Robin (*Melanodryas cucullata cucullata*), Speckled Warbler (*Pyrrholaemus sagittata*), Diamond Fire-tail (*Stagonopleura guttata*), Green and Golden Bell Frog



HLA-Envirosciences Pty Limited
18 Warabrook Boulevarde
Warabrook, NSW
(02) 4968-0044

REGIONAL LOCATION PLAN
White Mining Limited
Ashton Coal Project - Water Management Report
Camberwell, New South Wales

FIGURE **1**

DRAWN	PROJECT - TASK NUMBER	APPROVED	DATE	REVISED DATE
LJF	U842		October 2001	

(*Litoria aurea*) and also insectivorous bats. Targeted surveys have been conducted in suitable habitats to undertake an assessment of impacts to these threatened species. The assessment will be in terms set out under Section 5A of the Environmental Planning and Protection Act 1979.

1.3 Literature Review

A review of literature concerning threatened species and habitats found in nearby areas was completed in Appendix J of the EIS for the Ashton Coal Project (HLA-Envirosciences 2001). The vegetation types that were found within the Ashton Coal Project area were similar to those found in adjacent areas, based on the interpretation of the results of other reports prepared in the surrounding area. Much of the vegetation described in the previous reports has since been mined or has development consent for continuation of mining. Vegetation close to the Hunter River has had a long history of disturbance since the Hunter Valley has been utilised for agricultural purposes. The alluvial flats have been utilised for dairy production, stock agistment, cropping and orchard production. This has resulted in 99% of the lower floor of the Hunter Valley having being modified (Peake 2000). No comparison as to how common the vegetation types are within the Sydney biogeogrphic region can be made on the basis that comprehensive studies detailing the vegetation communities have not been completed for the vast majority of the region and such a study is outside of the scope of the present study (Bell 2000).

1.4 Review of National Parks & Wildlife Service Wildlife Atlas

There are records for fourteen species of threatened vertebrate in National Parks & Wildlife Service Wildlife Atlas (NPWS WA). These are listed in **Table 1**. Habitats for the majority of the species does not exist within the area to be impacted by the proposed Ashton Coal Project and the impact to these species have already been addressed in the EIS for the Ashton Coal Project (HLA-Envirosciences 2001).

recorded in localities

A sub set of the NPWS WA containing the observations for the Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) and Hooded Robin (*Melanodryas cucullata cucullata*) that have been recorded within 25km of Camberwell was made, and these are given in **Table 2**. There are no records for the Black-chinned Honeyeater (*Melithreptus gularis gularis*), Brown Treecreeper (*Climacteris picumnus victoriae*), Speckled Warbler (*Pyrrholaemus sagittata*) and Diamond Fire-tail (*Stagonopleura guttata*) within this distance of Camberwell.

The NPWS WA was further interrogated to identify insectivorous bat species that have been recorded within the 20 km x 20 km search area. The 14 species that have records are listed in **Table 3**. Of these, 3 are protected by the provisions of the Threatened Species Conservation (TSC) Act 1995.

TABLE 1
THREATENED FAUNA SPECIES WITH NPWS WA RECORDS WITHIN A 20 KM X 20 KM SEARCH AREA CENTRED ON SITE.

Scientific Name	Common Name	Status
Erythrotriorchis radiatus	Red Goshawk	E1
Stictonetta naevosa	Freckled Duck	V
Calyptorhynchus lathami	Glossy Black-Cockatoo	V
Xanthomyza phrygia	Regent Honeyeater	E1
Ninox connivens	Barking Owl	V
Melanodryas cucullata cucullata	Hooded Robin	V
Pomatostomus temporalis temporalis	Grey-crowned Babbler	V
Dasyurus maculatus	Spotted-tailed Quoll	V
Petrogale penicillata	Brush-tailed Rock-wallaby	V
Petaurus norfolcensis	Squirrel Glider	V
Phascolarctos cinereus	Koala	V
Pteropus poliocephalus	Grey-headed Flying-fox	V
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V
Miniopterus schreibersii	Common Bent-wing Bat	V
Myotis adversus	Large-footed Myotis	V

V - Vulnerable (TSC Act)
E1 - Endangered (TSC Act)

TABLE 2
OBSERVATIONS OF THREATENED WOODLAND SPECIES WITHIN 25 KM OF CAMBERWELL (NPWS WA).

Species	Location	Grid	Year
Hooded Robin *Melanodryas cucullata*	Warkworth, 12 km SW	313000E 6395000N	1997
	22 km NWW	299000E 6411000N	2000
	Ravensworth State Forests, 8 km N	322000E 6414000N	1995
Grey-crowned Babbler *Pomatostomus temporalis*	22 km NWW	299000E 6411000N	2000
	Warkworth, 12 km SW	313000E 6395000N	1980 1986 1997
	Minimbah, 25 km SSE	334000E 6385000N	1993
	Ravensworth State Forests, 7 km N	321000E 6413000N	1994
	Warkworth, 12 km SW	314000E 6394000N	1994
	Middle Creek, 20 km NE	339000E 6397000N	1994
	Ravensworth State Forests, 8 km N	322000E 6414000N	1995
	Wambo, 18 km SW	305000E 6396000N	1995

Names are a guide to locality. Distances are given from Camberwell.

TABLE 3 MICOPTERAN BAT SPECIES WITHIN A 20 KM X 20 KM SEARCH AREA CENTRED ON SITE (NPWS WA)				
Family	Scientific Name	Common Name	Status	Year
Molossidae	*Mormopterus planiceps*	Little Mastiff-bat	P	1995
Molossidae	*Mormopterus sp*	mastiff-bat	P	1997
Molossidae	*Nyctinomus australis*	White-striped Mastiff-bat	P	1997
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	P	1997
Vespertilionidae	*Chalinolobus morio*	Chocolate Wattled Bat	P	1997
Vespertilionidae	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V	1997
Vespertilionidae	*Miniopterus schreibersii*	Common Bent-wing Bat	V	1997
Vespertilionidae	*Myotis adversus*	Large-footed Myotis	V	1997
Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat	P	1997
Vespertilionidae	*Nyctophilus gouldi*	Gould's Long-eared Bat	P	1995
Vespertilionidae	*Scotorepens balstoni*	Inland Broad-nosed Bat	P	1997
Vespertilionidae	*Vespadelus darlingtoni*	Large Forest Bat	P	1997
Vespertilionidae	*Vespadelus regulus*	Southern Forest Bat	P	1995
Vespertilionidae	*Vespadelus vulturnus*	Little Forest Bat	P	1997

Status P – Protected (NPW Act 1974)
V – Vulnerable (TSC Act 1995)

date, time, weather conditions → all needed for verification of surveys.

2.0 METHODOLOGY

2.1 Woodland Bird Species

2 blocks? northern + southern veg comm.

Bird species utilising the woodlands were surveyed for using visual and aural observation of distinctive territorial calls. Extensive slow walking transects were undertaken in each woodland, with at least 6 hours spent in each woodland block, for a minium of 12 hours observation time. Bird vocalisations were identified and visual confirmation was made for species with less distinctive calls. Observation was concentrated where there was a developed understorey, around flowering trees and near stock dams where these occurred adjacent to woodland.

* At what time?

2.2 Green and Golden Bell Frog

Habitat for the Green and Golden Bell Frog was characterised. Aquatic habitats that were characterised included those that had still or slow moving water during the winter survey in areas that are likely to be impacted by subsidence, open cut mine operations or infrastructure development. Bowmans Creek was

→ wasn't the survey conducted in Summer?

not included in the study as it is unsuitable habitat. An inventory of aquatic species was made and the approximate percentage of cover for each vegetation species within the stock dam was estimated where the cover was greater than 5%. The surrounding vegetation was characterised and potential refuge locations noted. Where possible, these were checked for the presence of the Green and Golden Bell Frog. In the early to late evening, an aural survey was made of dams that had the potential for Green and Golden Bell Frogs to occur within. These lasted approximately half an hour at each aquatic environment. Locations of aquatic environments characterised and aural assessments are shown in **Figure 2**.

2.3 Isopteran Bats

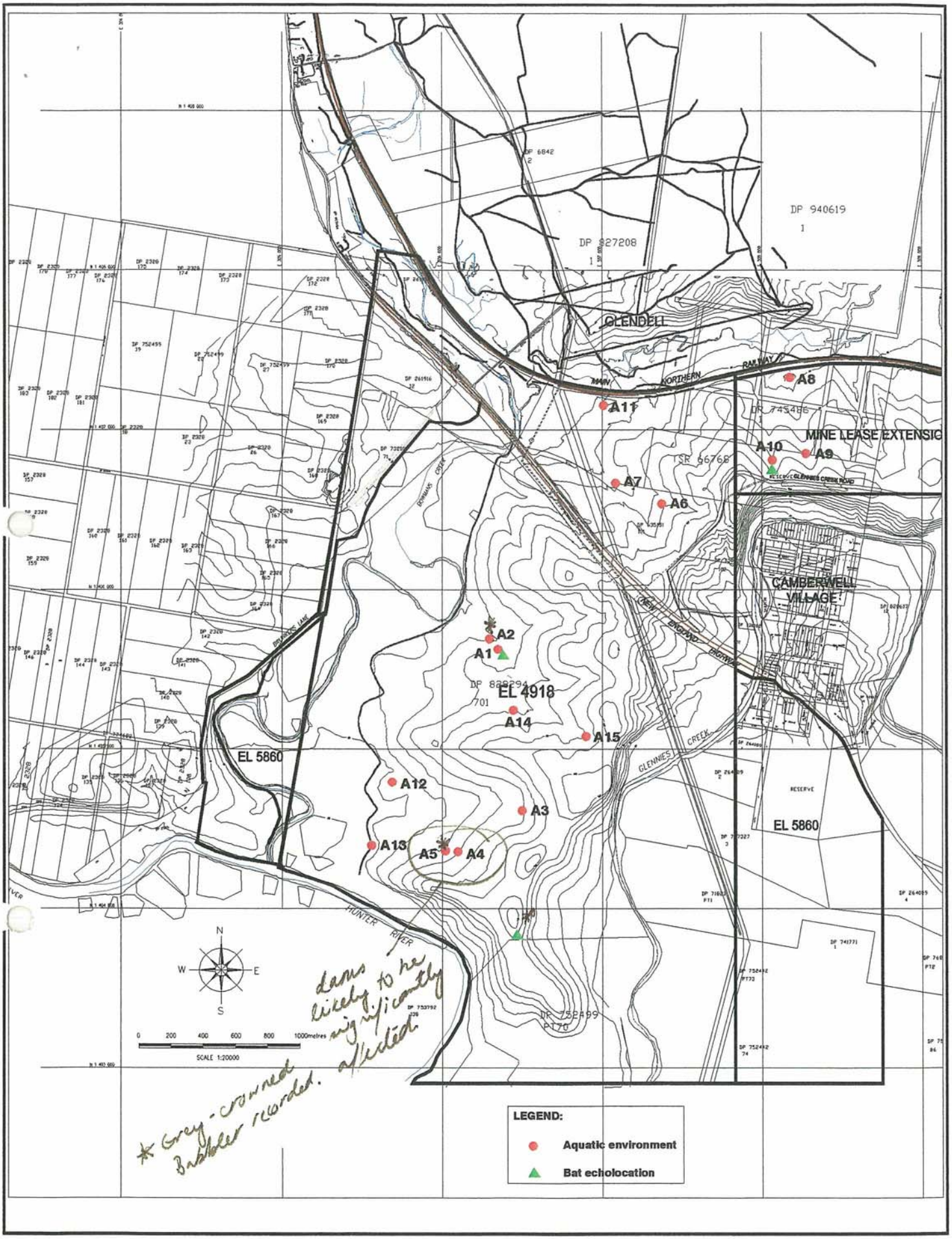
Micopteran bats were surveyed by recording the bat echolocations onto a tape using the ANABAT II bat detector. Passive listening for bat echolocations began at sunset. Recording began at the first bat detected and lasted for 45 minutes. The locations of the echolocation recordings are shown in **Figure 2**. Echolocations were then compared to images of known bat echolocation recordings using ANABAT V software.

3.0 EXISTING ENVIRONMENT

3.1 Aquatic Environments

As the majority of aquatic environments are part of pastures that are actively grazed, they are impacted by cattle accessing the water. They appear to be less than 2 m deep, and are usually less than 900 m^2. As a result, the surrounding vegetation was modified by trampling and grazing cattle. Most had a reduction in the water level between the winter assessment period and the summer assessment period, resulting in a bare edge that was heavily impacted by cattle. As a result of this, and increased grazing pressure there are few refuge opportunities within or nearby the stock dams.

Some aquatic environments that contained water during the winter assessment were dry during the summer assessment. These were the small swamps located within the common, a part of the former mine workings adjacent to the Main North Railway, a holding dam for bore water and the lagoon in the south of the study area. The small swamp was dominated by *Eleocharis pusilla*, and had an area of less than 100 m^2 during the winter survey. The former mine working showed no sign of aquatic vegetation, indicating the aquatic environment is very ephemeral and unlikely to contain water except after periods of prolonged rainfall. The lagoon to the south was dry and dominated by weed species. The surface was not bound, having being trampled by cattle. The water level within a well 50 m to the west of the lagoon was approximately 10 m below the water surface. Details of individual aquatic environments assessed are given in **Appendix 1**.



HLA-Envirosciences Pty Limited
18 Warabrook Boulevarde
Warabrook, NSW
(02) 4968-0044

LOCATION OF AQUATIC ENVIRONMENTS
BAT ECHOLOCATION DETECTION

FIGURE
2

DRAWN	PROJECT-TASK NUMBER	APPROVED	DATE
	U909		February 2002

There is few stock dams that had significant woodland vegetation nearby, with the most significantly vegetated dam located within the common. The paddock in which the dam was located had not been grazed for some time. Approximately one quarter of the surrounding vegetation was dominated by grass, with another quarter being Grey Box/Narrow-leaved Iron Bark Woodland. The remainder was dominated by Bulloak regrowth that had very little ground cover. This dam is relatively permanent, being approximately 20 m in diameter. The depth is unknown, but it is likely to contain a significant layer of soft organic matter as a result of the build up of material from the Cumbungi.

3.2 Existing Fauna Environment

No additional threatened species of woodland bird were observed during the targeted surveys. The Grey-crowned Babbler was observed in three locations. Two of the locations were near the stock dams (A2 and A5), utilising Bull Oak (*Allocasuarina luehmannii*) woodlands, that had sparse understoreys of mainly dry pasture species and some fallen timber. The third observation was of birds utilising the southern woodland. It is likely that the population observed near A5 and the woodland is the same social unit. It is not known if the group seen near A2 was a separate group.

No Green and Golden Bell Frogs were either observed or detected during the aural assessments in the evening. The conditions for aural survey were good for aural assessment as there was thunderstorm activity in the local area and periodic light rainfall. Very few of the aquatic environments had emergent vegetation and aural assessments occurred at A3, A5, A8 and A11. On 23 January 2002, temperatures at the aquatic environments ranged from 26°C and 62% humidity (7:30pm) to 24 °C and 72% humidity (10pm). On 24 January 2002, temperatures at the aquatic environments ranged from 23°C and 59% humidity (8:00pm) to 21 °C and 68% humidity (10pm).

? Mixha microchiropteran

3.3 Micropteran Bats

Seven species of insectivorous bat were detected at two of the recording locations, listed in **Table 4**. Four of the bat species were positively identified from recordings taken from the southern woodland, while the threatened Great Pipistrelle (*Falsistrellus tasmaniensis*) was tentatively identified. Four species were positively identified at the northern woodland. No bats were recorded at stock dams located south of the New England Highway. Bat activity occurred within 30 minutes of sunset, in the late twilight.

a southern woodland.

TABLE 4
INSECTIVOROUS BAT SPECIES DETECTED DURING THE FIELD INVESTIGATIONS

Species	Status	1	2	3
Gould's Wattled Bat (*Chalinolobus gouldii*)	P	✓		?
Great Pipistrelle (*Falsistrellus tasmaniensis*)	V			?
Lesser Long-eared Bat (*Nyctophilus geoffroyi*)	P			✓
Gould's Long-eared Bat (*Nyctophilus gouldi*)	P	✓		
Eastern Broad-nosed Bat (*Scotorepens orion*)	P	✓		✓
Little Cave Eptesicus (*Vespadelus pumilus*)	P			✓
Little Forest Eptesicus (*Vespadelus vulturnus*)	P	✓		✓

Status P - Protected (NPW Act 1974)
V - Vulnerable (TSC Act 1995)
✓ Positive identification
? Tentative identification
1 Northern Woodland (320129E 6406421N)
2 Stock Dams (318425E 6405254N)
3 Southern Woodland (318518E 6403446N)

4.0 IMPACT ASSESSMENT

4.1 Impacts Aquatic Environments

There is likely to be some alteration to the stock dams, however this is not likely to significantly affect threatened woodland species. It is likely that this will impact aquatic species in the short term, until the cracks refill and pooling occurs elsewhere. The predicted pooling along subsided sections of Bowmans Creek will provided additional habitat for aquatic bird species.

Dams that are most likely to be significantly impacted by subsidence are A4 and A5 as these occur on the upslope side of subsidence, closer to where the longwall support pillars are located. It is also possible that the lagoon, that was dry during the summer survey period, may also become a more significant wetland.

4.2 Impacts to Fauna

All locations where the Grey-crowned Babbler was observed will be impacted by mine subsidence. The level of subsidence is predicted to be a maximum 6m within the southern woodland community. As all

of the woodland community is relatively elevated, the main impact from subsidence is expected to be from erosion where surface cracking and increased slope will destabilise the soil. The soil of the woodland with an east aspect is presently eroding, a result of stock destabilising the surface particularly under dense Bull Oak regrowth which suppresses the shrub and ground cover. Removal of cattle from this community will allow an understorey to develop and reduce the erosion potential. Observations of subsidence occurring where similar habitat occurs in the local area (Davis Creek, Cumnock No.1 Colliery) suggests that subsidence will only affect larger trees on steeper slopes, for example those adjacent to gullies. Erosion was stabilising possibly as a result of less intense grazing and lower runoff (R.J. Connolly Environment Management Consulting. 1999a). Mining itself did not appear to have a detrimental effect of the vegetative cover (R.J. Connolly Environment Management Consulting 1999b), although subsidence is generally less at Davis Creek.

Surface cracks should also be filled to reduce slumping of soil upslope of the crack into the crack, reducing the potential for further erosion. There is no evidence that the Green and Golden Bell Frog exists within the study area, and the potential reduction in aquatic environments through subsidence is highly unlikely to result in an impact to this species. Any loss of habitat is likely to be offset by the increase in habitat as a result of ponding along the Bowmans Creek bed and other local depressions over the longwall extraction area.

4.3 Impacts to Mircopteran Bats

No habitat for subterranean bat species is likely to be impacted by the proposed Ashton Coal Project. All insectivorous bat species that were recorded during the field investigations were those that utilised tree hollows, exfoliating bark or crevices. No cave specialists were recorded. Those species recorded within the northern woodland will have total roosting habitat lost, while there is unlikely to be a significant reduction in foraging habitat for species that are present within the local area. Some tree loss may be experienced along the steeper slopes of the southern ~~woodland~~, however this is unlikely to be significant in the long term as hollow roosts will still be available in the short to medium term within dead trees. Mature trees with hollow development along Glennies Creek will not be impacted. As Bowmans Creek is planned to be diverted, there is unlikely to be a significant loss of trees along the present creek alignment as flow that may undercut the stream bank will be significantly reduced. The present bank is unstable in many places, however in these places erosion has already resulted in the loss of older riparian vegetation.

Any long term impact is likely to be ameliorated by the rehabilitation program, and also by allowing the southern woodland to regenerate. Excluding stock will allow regrowth to occur, whist continued grazing in other areas will allow an open woodland to develop. The provision of nest boxes in the southern woodland, particularly in the early stages of the proposed development, will provide compensatory habitat. It is important that the artificial roost boxes, either affixed to trees or placed on upright poles (similar to electricity cable supports) be maintained for the life of the mine. At the cessation of mining

activities, hollow natural development in the southern woodland should have replaced potential bat roost sites that may be lost from the northern woodland. – Doubt whether hollows would have dev't by then.

4.4 Statutory Considerations

4.4.1 Environmental Planning and Assessment Act (1979) Considerations

The following eight part test of significance (Section 5A) details the likely impact to the following threatened woodland species: Grey-crowned Babbler (*Pomatostomus temporalis temporalis*), Hooded Robin (*Melanodryas cucullata cucullata*) Black-chinned Honeyeater (*Melithreptus gularis gularis*), Brown Treecreeper (*Climacteris picumnus victoriae*), Speckled Warbler (*Pyrrholaemus sagittata*) and Diamond Fire-tail (*Stagonopleura guttata*). The Great Pipistrelle (*Falsistrellus tasmaniensis*) is also included as the species was tentatively recorded along the ridgeline within the southern woodland.

* NO 5.5A for GGB Frog.

In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

Grey-crowned Babbler (*Pomatostomus temporalis*)

A viable local population of the Grey-Crowned Babbler is defined by Davidson and Robinson (1992) as being greater than 5 groups within 10km of each other. No evidence of communal roosting or breeding was observed within the woodland north of the New England Highway, proposed to be developed as an open cut coal mine and associated surface facilities for the processing and handling of coal for transportation. The southern woodland does contain a viable population of the Grey-crowned Babblers, of at least 15 individuals, utilising numerous communal nests. This population will not be significantly impacted as the area is proposed to be mined using longwall underground mining techniques. This will not significantly impact nesting opportunities for the species as it is appearing to be utilising regenerating woodland, nor will the mine subsidence impact foraging opportunities. Why are they not occurring here? Ground water impacts to foraging habitat?

While there is a viable local population of the Grey-crowned Babbler within the study area, it is not at risk of extinction as a result of the proposed mining activities.

Brown Treecreeper (*Climacteris picumnus*)

The Brown Treecreeper was not observed or heard during the winter or summer surveys within woodlands. It is unlikely there is a viable population of this species utilising the habitats within the study area. Both woodland remnants are smaller than 200 hectares, the limit that a long term population requires (NSW NPWS 2000) and it is likely the species has been absent from the study area for some time.

Diamond Firetail (*Stagonopleura guttata*)

The Diamond Firetail was not observed or heard during the winter or summer surveys within woodlands. It is unlikely there is a viable population of this species within the study area as the woodland remnants are less than the estimated 200 hectares of remnant woodland required for a stable population to exist.

Black-chinned Honeyeater (*Melithreptus gularis*)

The Black-chinned Honeyeater was not observed or heard during the winter or summer surveys within woodlands. It is unlikely there is a viable population of this species significantly utilising the habitats within the study area.

Hooded Robin (*Melanodryas cucullata*)

The Hooded Robin was not observed or heard during the winter or summer surveys within woodlands. It is unlikely there is a viable population of this species significantly utilising the habitats within the study area.

Speckled Warbler (*Chthonicola sagittata*)

The Speckled Warbler was not observed or heard during the winter or summer surveys within woodlands. It is unlikely there is a viable population of this species significantly utilising the habitats within the study area.

Great Pipistrelle (*Falsistrellus tasmaniensis*)

The Great Pipistrelle may utilise the southern woodland, based on a tentative identification of an echolocation. If the species does exist within the study area, it is likely that there is a viable population of the species present. The loss of habitat in the northern woodland is unlikely to lead to the loss of a significant foraging habitat for the species. In the southern woodland there is the potential for the loss of some trees in the short to medium term from erosion. It is unlikely that this will lead to the local viable population being placed at the risk of extinction.

how many? - not mentioned for GC Babbler

What about breeding habitat here. Assuming surveys were comprehensive to find this spp.

In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

Grey-crowned Babbler (*Pomatostomus temporalis*)

There are no endangered populations of the Grey-crowned Babbler that is listed within the schedules of the Threatened Species Conservation Act 1995.

Brown Treecreeper (*Climacteris picumnus*)

There are no endangered populations of the Brown Tree Creeper that is listed within the schedules of the Threatened Species Conservation Act 1995.

Diamond Firetail (*Stagonopleura guttata*)
There are no endangered populations of the Diamond Firetail that is listed within the schedules of the Threatened Species Conservation Act 1995.

Black-chinned Honeyeater (*Melithreptus gularis*)
There are no endangered populations of the Black-chinned Honeyeater that is listed within the schedules of the Threatened Species Conservation Act 1995.

Hooded Robin (*Melanodryas cucullata*)
There are no endangered populations of the Hooded Robin that is listed within the schedules of the Threatened Species Conservation Act 1995.

Speckled Warbler (*Chthonicola sagittata*)
There are no endangered populations of the Speckled Warbler that is listed within the schedules of the Threatened Species Conservation Act 1995.

Great Pipistrelle (*Falsistrellus tasmaniensis*)
There are no endangered populations of the Great Pipistrelle that is listed within the schedules of the Threatened Species Conservation Act 1995.

In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed.

Grey-crowned Babbler (*Pomatostomus temporalis*)
Within the region the Grey-crowned Babbler occupies habitats dominated by open woodland, typically those dominated by Narrow-leaved Ironbark (*E. crebra*), Grey Box (*E. moluccana*) and Bull Oak (*Allocasuarina leuhmanii*) with a sparse understorey of shrubs and a ground cover of open grass tussock.
– How much will be impacted, impacts from subsidence; regional significance not addr

Brown Treecreeper (*Climacteris picumnus*)
The preferred habitat for the Brown Tree Creeper is Eucalypt dominated woodlands that include a grassy understorey, a limited shrub layer and abundant fallen timber (Higgins *et al.* 2001). This habitat is present within the woodlands both to the north and south of the New England Highway. The woodland to the north of the New England Highway will be removed and the woodland to the south will be impacted by subsidence. Both woodland remnants are smaller than 200 hectares, the limit that a long term population requires.
→ What about cumulative impacts?

Diamond Firetail (*Stagonopleura guttata*)
The habitats within the study area are not known to support a population of the Diamond Firetail. The woodland habitats within the study area are smaller than the estimated 200 hectares required for the

Diamond Firetail to be present in the long term. The understorey is absent or severely degraded for many parts of the woodland, particularly where Bull Oak dominates. A significant area of preferred habitat for the Diamond Firetail is not present within the study area.

Black-chinned Honeyeater (*Melithreptus gularis*)

The preferred habitat for the species is Box-ironbark woodland, which is present in the southern and northern woodlands, however the remnant habitats within the study area are smaller than 200ha and are likely to be too small to support a population of the Black-chinned Honeyeater. It is unlikely that a significant area of known habitat will be removed as a result of the proposed development.

Hooded Robin (*Melanodryas cucullata*)

The species prefers open Eucalypt habitats that have areas of dead timber and sparse shrub cover. The species is known to occupy habitats that are 18 ha and therefore could utilise habitats within the study area, however the habitats within the study area are not known to support a population of the Hooded Robin. The northern woodland will be removed in the short to medium term, and may become potential habitat after rehabilitation. The southern woodland will not be further modified by subsidence to an extent that will exclude the Hooded Robin. The proposed rehabilitation will provide additional habitat in the short tern in the southern part of the study area.

↳ don't agree with the proposed reveg map

Speckled Warbler (*Chthonicola sagittata*)

The preferred habitat for the species is Eucalypt and cypress woodland. Cypress woodland is not present in the southern and northern woodlands. The habitats within the study area are not known to support a population of the Speckled Warbler and the remnant Eucalypt habitats within the study area are smaller than the 100ha (not including the open regeneration present surrounding the woodlands) and are likely to be too small to support a population of the Speckled Warbler. It is unlikely that a significant area of known habitat will be removed as a result of the proposed development.

Great Pipistrelle (*Falsistrellus tasmaniensis*)

The Great Pipistrelle prefers sclerophyll woodland and may utilise the southern woodland. The loss of habitat in the northern woodland is unlikely to lead to the loss of a significant foraging habitat for the species. In the southern woodland there is the potential for the loss of some trees in the short to medium term from erosion, however the majority of the habitat will remain. Most larger trees within the woodlands have been selectively logged for construction, for example for fencing material. It is unlikely that a significant area of known habitat will be removed in the long term.

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.

Grey-crowned Babbler (*Pomatostomus temporalis*)

The northern woodland is presently relatively isolated from similar habitat types, with potential interconnecting habitat located along the riparian zones. The southern woodland habitat that supports a population of the Grey-crowned Babbler is adjacent to riparian vegetation, however it is relatively isolated from regenerating Narrow-leaved Ironbark/Grey Box/Bulloak woodland habitat for which this species is typically associated with in the local area. The proposed development will not further isolate known habitat for the species as the southern woodland vegetation will not be significantly altered, including potential habitat in areas adjacent to what that is presently being utilized by the species.

Brown Treecreeper (*Climacteris picumnus*)

The woodland habitats are relatively isolated. They do have some connectivity with other remnant woodlands via the riparian vegetation of Betty's Creek, Bowmans Creek, Glennies Creek and the Hunter River. These riparian corridors will not be affected by the proposed development with the exception of Bowmans Creek that it is proposed to divert. Much of the riparian vegetation of Bowmans Creek is exotic and it is proposed to replace the remnant vegetation with native species associated with riparian habitats.

Diamond Firetail (*Stagonopleura guttata*)

The woodland habitats are relatively isolated from potential populations for the Diamond Firetail. Riparian vegetation would allow some movement between the habitats. It is likely that the woodlands would not be significantly utilised by the Diamond Firetail as they are likely to not be of an adequate size.

Black-chinned Honeyeater (*Melithreptus gularis*)

The woodlands are not large enough to support a viable population of the Black-chinned Honeyeater, and they do not provide a link between large remnant woodlands. They may provide additional foraging resources for dispersing individuals that could utilise the riparian vegetation, however the removal of modification of the woodland will not result in existing populations of the Black-chinned Honeyeater being isolated from potential habitats. The southern woodland will not be modified to an extent that will significantly reduce the role the woodland may have.

Hooded Robin (*Melanodryas cucullata*)

The woodlands are potentially large enough to support a viable population of the Hooded Robin, but they do not provide a link between other large remnant woodlands. They may provide additional foraging resources for dispersing individuals that could utilise the riparian vegetation, however the removal of modification of the woodland will not result in existing populations of the Hooded Robin being isolated

from potential habitats. The southern woodland will not be modified to an extent that will significantly reduce the role the woodland may have.

Speckled Warbler (*Chthonicola sagittata*)

The habitats within parts of the northern and southern woodland appear to be structurally suitable for the Speckled Warbler to utilise. The species utilises grass tussocks and other dense ground cover to build nests and forage on the ground for arthropods and seeds. This terrestrial habitat is likely to leave the species vulnerable to predation by predators, for example cats and foxes, both of which were observed within the study area. The preferred habitat is susceptible to modification by weed invasion and by cattle grazing. Both of these processes are operating to some degree, particularly in the southern woodland. The woodlands are of a size that may support populations of the Speckled Warbler. In view of the level of degradation, and the apparent absence of the species from the study site, it is unlikely that known habitat will be modified by the proposed development.

Great Pipistrelle (*Falsistrellus tasmaniensis*)

The Great Pipistrelle prefers sclerophyll woodland (Churchill 1998) and may utilise the southern woodland. The loss of the northern woodland is unlikely to result in the species being unable to move between other suitable habitats. The proposed development will not further isolate habitats for this species.

Whether critical habitat will be affected.

Grey-crowned Babbler (*Pomatostomus temporalis*)

Critical habitat, as defined within the Threatened Species Conservation Act 1995, will not be affected. Critical habitat, in an ecological sense, is habitat that is utilized by a viable population. The woodland north of the New England Highway does not support a viable population of the Grey-crowned Babbler, while the habitat south of the New England Highway that does support a viable population of the Grey-crowned Babbler, will have only minor floristic change as a result of subsidence. The viable population of the Grey-crowned Babbler within the study area will not be significantly impacted by the proposed development.

Brown Treecreeper (*Climacteris picumnus*)

Critical habitat for this species is remnant vegetation that is over 200 hectares in size that has a significant component of fallen timber and exfoliating bark for the species to forage for invertebrates within. Remnant woodland of this size does not exist within the study area.

Diamond Firetail (*Stagonopleura guttata*)

Critical habitat for this species is remnant vegetation that is over 200 hectares in size that has an understorey of grasses for the species to forage for seeds within. Although there are significant areas of

grassland that is a foraging resource, it is likely that the species is not present as remnant woodland of 200 hectares does not exist within the study area. Critical habitat will not be affected by the proposed development.

Black-chinned Honeyeater (*Melithreptus gularis*)
Critical habitat for this species is large remnant woodland blocks that provide foraging and breeding opportunities for the species. The species was not recorded during the field investigations and there are no records of the species in the local area. Critical habitat will not be affected by the proposed development.

Hooded Robin (*Melanodryas cucullata*)
Critical habitat would include woodland with areas of dead timber and sparse shrub cover that are greater than 18 ha that support a population of the Hooded Robin. The Hooded Robin is not known to significantly utilise the habitats within the study area. Critical habitat will not be affected by the proposed development.

Speckled Warbler (*Chthonicola sagittata*)
Critical habitat does not exist within the study area. A population of the species was not located and there are potential threats to the species present within the study area, including land modification by cattle, and predation by cats and canids.

Great Pipistrelle (*Falsistrellus tasmaniensis*)
Critical habitat, ie habitat where a known population occurs, does not exist in the northern woodland. Roosting habitats within the southern woodland are unlikely to be significantly impacted. Critical habitat for this species will not be affected by the proposed development.
→ Is there roosting habitat in the north.

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.

Grey-crowned Babbler (*Pomatostomus temporalis*)
It is unlikely that the Grey-crowned Babbler is adequately reserved in similar habitats types in the region. The habitat type within the study area has been utilized for agricultural and mining purposes since european settlement of the Hunter Valley, over 150 years ago. Within the Sydney Bio-geographic region Grey-crowned Babbler is not known to occur in any nature reserve.

Brown Treecreeper (*Climacteris picumnus*)
The Brown Treecreeper has been recorded within the Wollemi National Park and Yengo National Park, however most habitat within the Hunter Valley Plain would have been modified to some extent (Peake

2000) and it is unlikely that this habitat type is significantly reserved within the Sydney biogeographic region.

Diamond Firetail (*Stagonopleura guttata*)
The Diamond Firetail has been recorded within the Wollemi National Park, however most habitat within the Hunter Valley Plain would have been modified to some extent (Peake 2000) and it is unlikely that this habitat type is significantly reserved within the Sydney biogeographic region.

Black-chinned Honeyeater (*Melithreptus gularis*)
There are no records of the Black-chinned Honeyeater within reserves in the Hunter Valley or adjoining areas. It is unlikely that the species is adequately reserved in the Sydney biogeographic region.

Hooded Robin (*Melanodryas cucullata*)
The Hooded Robin has been recorded within the Wollemi National Park, however most habitat within the Hunter Valley Plain would have been modified to some extent (Peake 2000) and it is unlikely that this habitat type is significantly reserved within the Sydney biogeographic region.

Speckled Warbler (*Chthonicola sagittata*)
The Speckled Warbler has been recorded within the Wollemi National Park, however most habitat within the Hunter Valley Plain would have been modified to some extent (Peake 2000) and it is unlikely that this habitat type is significantly reserved within the Sydney biogeographic region.

Great Pipistrelle (*Falsistrellus tasmaniensis*)
It is likely that the species is adequately reserved in the Sydney biogeographic region as the Great Pipistrelle has been recorded in the Brisbane Water National Park, Lower Hunter National Park and Jervis Bay National Park (NSW). It is likely that there is habitat for the species in the Blue Mountains National Park, Yengo National Park and Wollemi National Park. Adjacent to the mid Hunter Valley, the species has also been recorded at Barrington Tops National Park.

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

The clearing of native vegetation is a threatening process that has some potential to have a significant impact on local woodland utilising species of bird. While the habitats within the study area are not presently significantly utilised by threatened species of woodland bird, they may be used in times of dispersal and removing wooded corridors will lead to the isolation of corridors. Provided corridors of woodland vegetation are maintained along the riparian corridors, as is intended, this impact may not be significant. The existing riparian vegetation along Bowmans Creek will be retained, although some sections have limited value due to the dominance of exotic species. The retention of woody debris to be

this requires clarification

utilised in rehabilitated areas will enhance habitat for insect prey for many woodland species including the Hooded Robin, Grey-crowned Babbler and Brown Treecreeper. If the rehabilitation program detailed in Appendix J of the Ashton Coal Project EIS (HLA-Envirosciences 2001) is successfully implemented, then the long term woodland habitat would increase on what is present. None of the present habitats are true remnants as they have had a history of clearing and modification of the understorey, and as such the rehabilitation program, particularly for the southern woodland, would enhance the value of local habitats for woodland species of bird. The grazing of cattle within the southern woodland and parts of the northern woodland has resulted in the continuing of the modification of shrub layer.

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

Grey-crowned Babbler (*Pomatostomus temporalis*)

The sub-species of Grey-crowned Babbler that occurs in the area is historically known from South Australia to Cape York Peninsula. The species is not known from east of the Great Dividing Range south of the Sydney Region. The species is now considered extinct in South Australia, and is threatened in Victoria and New South Wales. In the Sydney Bio-geographic Region the species is present in the Lower Hunter Valley (Seaham), Singleton district near Bulga, Warkworth and to the north at Muswelbrook. The species is not at the limit of the species distribution.

Brown Treecreeper (*Climacteris picumnus*)

The Brown Treecreeper is historically known to occur from the tropics to south Australia, with the greatest area being the western slopes and plains of NSW and Victoria. The species is known to occur along coastal draining valleys, such as the Cann River Valley (Victoria), Hunter Valley and also northern NSW (Higgins *et al.* 2001). The species, if present, is not at the distributional limit at the study area.

Diamond Firetail (*Stagonopleura guttata*)

The Diamond Firetail is known to occur in suitable habitats from Queensland to South Australia. As the species has declined from drier coastal habitats, the species, if present, may be at the eastern limit of the its distribution.

Black-chinned Honeyeater (*Melithreptus gularis*)

The Black-chinned Honeyeater is known to occur in suitable habitats mainly west of the Great Dividing Range from Queensland to Victoria, however is also historically known to occur in drier coastal habitats. The species has also declined from some coastal populations. The species, if present, is not at the limits of the species distribution.

Hooded Robin (*Melanodryas cucullata*)

The race of the Hooded Robin that occurs in the region occurs in a patchy distribution from southern Queensland to South Australia, mainly on the western slopes and plains. The species is declining from some coastal areas (eg Cumberland Woodland), but is still present in the wider local area (NPWS WA 2001). The species, if present, is not at its distributional limit.

Speckled Warbler (*Chthonicola sagittata*)

The Speckled Warbler is known to occur from the tropics to western Victoria where it is more commonly found west of the Great Dividing Range (Simpson and Day 1999). The species has declined from drier coastal areas. The species, if present in the local area, may be approaching the eastern limit of its distribution.

Great Pipistrelle (*Falsistrellus tasmaniensis*)

The Great Pipistrelle is not at the limits of the species distribution. It is known from coastal and the eastern ranges from southern Queensland to western Victoria and also Tasmania (Churchill 1998).

5.0 CONCLUSIONS

The ~~proposed~~ development will result in the loss of woodland habitat. The woodland habitat to the north does not appear to be utilised by threatened species, while the southern woodland may undergo some modification on steeper slopes and lower alluvial flats, the majority of which have been cultivated and have little ecological value for woodland specialists. The woodlands are generally small, and are unlikely to support viable populations of many threatened species. The proposed development, and recommended rehabilitation, including restricting grazing and allowing the regeneration of the southern woodland and adjacent habitats will offset long term loss of habitat. The Grey-crown Babbler is unlikely to experience a significant loss of habitat through subsidence. Similarly, there is not likely to be a significant loss of hollow bearing trees from the southern woodland, that may impact the Great Pipistrelle, if the species is present. There is not likely to be a significant impact to the Green and Golden Bell Frog as the species is unlikely to occur within the study area. Most aquatic environments lack emergent vegetation, and those habitats with emergent vegetation have been impacted by cattle, or are unsuitable due to shading or lack of foraging or refuge opportunities near the aquatic environment. The proposed development is unlikely to further threaten species protected by the provisions of the TSC Act 1995. Adoption of the recommendations is likely to improve the long term habitat potential for threatened species.

how much modification? I thought it was going to be impacted by subsidence.

Need to quantify how many hollows. Also whether any are present in the northern stand.

6.0 RECOMMENDATIONS

The following recommendations will enhance the long term potential for threatened species to maintain long term viable populations within the study area:

- Restricting access by cattle to the southern woodland;
- Allowing low density grazing in areas adjacent to the woodland to maintain an open woodland;
- Limiting cattle access to large lagoons that may form from subsidence;
- Construction and maintenance of artificial bat roost boxes; and
- Following rehabilitation plan as detailed in HLA-Envirosciences (2001).

↳ Do these work? What is being tested?

7.0 REFERENCES

Churchill, S. 1998. *Australian Bats*. Reed New Holland, Sydney.

Higgins, P.J. Peter, J.M. and Steele, W.K. (Eds.) 2001. Handbook of Australian, New Zealand and Antarctic Birds. Volume 5: Tyrant-flycatchers to Chats. Oxford University Press, Melbourne.

NSW National Parks and Wildlife Service. 2001. Final Determination Brown Treecreeper Climacteris picumnus. Crown Copyright.

Peake, T. 2000. The vegetation of the mid-Hunter Valley: what state is it in currently? In: (Falding, M. ed.) Vegetation Management and Biodiversity Conservation. Workshop held by Hunter Environment Lobby Inc. Pp: 4-34.

R.J. Connolly Environment Management Consulting. 1999b. *Inspection of Davis Creek and Longwall Panel 12 Subsidence*. March 1999. Cumnock No. 1 Colliery Pty Limited.

R.J. Connolly Environment Management Consulting 1999d. *Davis Creek Inspection – Post Longwall 13 Pass. June 1999*. Prepared for Cumnock No. 1 Colliery Pty Limited.

Simpson, K. and Day, N. 1999. Field Guide to the Birds of Australia. Penguin, Australia.

APPENDIX 1
CHARACTERISATIONS OF AQUATIC ENVIRONMENTS

Habitat Number	1	Habitat Type	Stock Dam	Location	318407 6405244
Component		Species			% cover
Edge		Water Primrose (*Ludwigia peploides*) Water Couch (*Paspalum distichum*) *Juncus* sp.			50% 40%
Surrounds		Dry pasture and open woodland dominated by: Spear grass (*Stipa* sp.) Couch (*Cynodon dactylon*) Bull Oak (*Allocasuarina luehmannii*) With: Wallaby Grass (*Danthonia* sp.) Yellow Buttons (*Chrysocephalum apiculatum*) Paddy's Lucerne (*Sida rhombifolia*) *Sida corrugata* Ribwort (*Plantago lanceolota*) Paspalum (*Paspalum dilatatum*) Galenia (*Galenia pubescens*) Fireweed (*Senecio madagascariensis*) Eastern Cotton Bush (*Maireana microphylla*) African Boxthorn (*Lycium ferocissimum*)			
Impacts		Cattle trampling vegetation			
Microhabitats		Corrugated iron			
Fauna		None			

Habitat Number	2	Habitat Type	Stock Dam	Location	318407 6405244
Component		Species			% cover
Water		Azolla (*Azolla filiculoides*)			20%
		Floating Pondweed (*Pomatogeton tricarinatus*)			20%
		Water Primrose (*Ludwigia peploides*)			10%
Edge		Water Primrose (*Ludwigia peploides*)			40%
		Water Couch (*Paspalum distichum*)			40%
		Azolla (*Azolla filiculoides*)			
		Juncus sp.			
Surrounds		Dry pasture and open woodland dominated by: Slender Rats-tail (*Sporobolus creber*) Couch (*Cynodon dactylon*) Bull Oak (*Allocasuarina luehmannii*) With: Paddy's Lucerne (*Sida rhombifolia*) *Sida corrugata* Ribwort (*Plantago lanceolota*) Paspalum (*Paspalum dilatatum*) Bindweed (*Convolvulus erubescens*) Saffron Thistle (*Carthamus lanatus*) Eastern Cotton Bush (*Maireana microphylla*)			
Impacts		Cattle trampling vegetation			
Microhabitats		None			
Fauna		Grey Crown Babbler (*Pomatostomus temporalis*) Eastern Rosella (*Platycercus eximius*) Wood Duck (*Chenonetta jubata*) Grey Teal (*Anas gracilis*)			

Habitat Number	3	Habitat Type	Stock Dam	Location	318407 6405244
Component		Species			% cover
Water		Swamp Lily (*Ottelia ovalifolia*)			20%
		Cumbungi (*Typha domingensis*)			5%
Edge		Water Couch (*Paspalum distichum*)			<5%
		Paspalum (*Paspalum dilatatum*)			<5%
		Cyperus sp.			
Surrounds		Dry pasture and open woodland dominated by: Bull Oak (*Allocasuarina luehmannii*) Grey Box (*Eucalyptus moluccana*) Speargrass (*Stipa* sp.) Wallaby Grass (*Danthonia* sp.) With: Paddy's Lucerne (*Sida rhombifolia*) *Sida corrugata* Couch (*Cynodon dactylon*) Paspalum (*Paspalum dilatatum*) Burr (*Xanthium* sp.) Fireweed (*Senecio madagascariensis*)			
Impacts		Cattle trampling vegetation			
Microhabitats		None			
Fauna		Grey Teal (*Anas gracilis*)			
		Dwalf Green Tree Frog (*Litoria fallax*)			

Habitat Number	4	Habitat Type	Stock Dam	Location	318140 6403892
Component		Species			% cover
Water		-			-
Edge		Water Couch (*Paspalum distichum*) Water Primrose (*Ludwigia peploides*)			95%
Surrounds		Dry pasture and very open woodland dominated by: Bull Oak (*Allocasuarina luehmannii*) Grey Box (*Eucalyptus moluccana*) Couch (*Cynodon dactylon*) Speargrass (*Stipa* sp.) With: Purple Top (*Verbena bonariensis*) Saffron Thistle (*Carthamus lanatus*)			
Impacts		Cattle trampling vegetation			
Microhabitats		None			
Fauna		None			

Habitat Number	5	Habitat Type	Stock Dam	Location	318098 6403930
Component		Species			% cover
Water		Swamp Lily (*Ottelia ovalifolia*)			10%
		Cumbungi (*Typha domingensis*)			5%
		Azolla (*Azolla filiculoides*)			
Edge		Water Couch (*Paspalum distichum*)			<5%
		Speargrass (*Stipa* sp.)			
		Couch (*Cynodon dactylon*)			
		Azolla (*Azolla filiculoides*)			<5%
		Cumbungi (*Typha domingensis*)			<5%
Surrounds		Dry pasture and very open woodland dominated by:			
		Bull Oak (*Allocasuarina luehmannii*)			
		Grey Box (*Eucalyptus moluccana*)			
		Speargrass (*Stipa* sp.)			
		Couch (*Cynodon dactylon*)			
		With:			
		Purple Top (*Verbena bonariensis*)			
		Saffron Thistle (*Carthamus lanatus*)			
Impacts		Cattle trampling vegetation			
Microhabitats		Some fallen fence posts			
Fauna		Wood Duck (*Chenonetta jubata*)			
		Grey Butcherbird (*Cracticus torquatus*)			
		Grey Crown Babbler (*Pomatostomus temporalis*)			
		Eastern Rosella (*Platycercus eximius*)			
		Galah (*Cacatua roseicapilla*)			
		Noisy Minor (*Manorina melanocephala*)			
		Australian Grebe (*Tachybaptus novaehollandiae*)			
		Eastern Long-necked Turtle (*Chelodina longicollis*)			

Habitat Number	6	Habitat Type	Stock Dam	Location	318409 6406188
Component		Species			% cover
Water		Floating Pondweed (*Pomatogeton tricarinatus*)			50%
		Azolla (*Azolla filiculoides*)			5%
Edge		Cyperus sp. Water Couch (*Paspalum distichum*) Paspalum (*Paspalum dilatatum*) Couch (*Cynodon dactylon*) *Eleocharis pusilla* *Juncus* sp.			80%
Surrounds		Dry pasture and very open woodland dominated by: Narrow-leaved Ironbark (*Eucalyptus crebra*) Couch (*Cynodon dactylon*) Slender Rats-tail (*Sporobolus crebra*) With: Paddy's Lucerne (*Sida rhombifolia*) Centaury (*Centaurium tenuiflorum*) Plantago (*Plantago lanceolata*) Fireweed (*Senecio madagascariensis*) Threeawn Speargrass (*Aristida vagrans*)			
Impacts		Cattle trampling vegetation			
Microhabitats		None			
Fauna		Grey Teal (*Anas gracilis*) Eastern Long-necked Turtle (*Chelodina longicollis*)			

Habitat Number	7	Habitat Type	Stock Dam	Location	319148 6406288
Component		Species			% cover
Water		*Eleocharis pusilla*			5%
		Floating Pondweed (*Pomatogeton tricarinatus*)			5%
		Azolla (*Azolla filiculoides*)			
Edge		Water Couch (*Paspalum distichum*)			20%
		Cyperus sp.			5%
Surrounds		Dry pasture and very open woodland dominated by: Bull Oak (*Allocasuarina luehmannii*) Couch (*Cynodon dactylon*) With: Cudweed (*Gnaphalium* sp.) Centaury (*Centaurium tenuiflorum*) Plantago (*Plantago lanceolata*) Fireweed (*Senecio madagascariensis*) Purple Top (*Verbena bonariensis*) *Juncus* sp.			
Impacts		Cattle trampling vegetation			
Microhabitats		Fence posts within dam			
Fauna		Black Duck (*Anas superciliosa*) Eastern Long-necked Turtle (*Chelodina longicollis*)			

Habitat Number	8	Habitat Type	Stock Dam	Location	320194 6406939
Component		Species			% cover
Water		Floating Pondweed (*Pomatogeton tricarinatus*)			5%
		Eleocharis sp.			5%
Edge		*Eleocharis* pusilla			25%
		Eleocharis sp.			25%
		Azolla (*Azolla filiculoides*)			5%
		Water Primrose (*Ludwigia peploides*)			5%
Surrounds		Dry pasture and very open woodland dominated by: Narrow-leaved Ironbark (*Eucalyptus crebra*) Bull Oak (*Allocasuarina luehmannii*) Eastern Cotton Bush (*Maireana microphylla*) Slender Rats-tail (*Sporobolus crebra*) Couch (*Cynodon dactylon*) Barb Wire Grass (*Cymbopogon refractus*) With: Lemon Beauty Heads (*Calocephalus citreus*) Cudweed (*Gnaphalium* sp.) Centaury (*Centaurium tenuiflorum*) Plantago (*Plantago lanceolata*) Fireweed (*Senecio madagascariensis*) Purple Top (*Verbena bonariensis*) *Juncus* sp.			
Impacts		Cattle trampling vegetation			
Microhabitats		Some fallen timber, large rocks			
Fauna		White-faced Heron (*Egretta novaehollandiae*) Raven (*Corvus coronoides*) Super Fairy-wren (*Malurus cyaneus*) Magpie (*Gymnorhina tibicen*) Eastern Long-necked Turtle (*Chelodina longicollis*)			

Habitat Number	9	Habitat Type	Stock Dam	Location	320342 6406418
Component		Species			% cover
Water		DRY			
Edge		*Eleocharis pusilla* Water Couch (*Paspalum distichum*) Couch (*Cynodon dactylon*)			80% 10%
Surrounds		Dry pasture and very open woodland dominated by: Bull Oak (*Allocasuarina luehmannii*) Eastern Cotton Bush (*Maireana microphylla*) Threeawn Speargrass (*Aristida* sp.) Couch (*Cynodon dactylon*) With: Purple Top (*Verbena bonariensis*) Fireweed (*Senecio madagascariensis*) Spear Thistle (*Cirsium vulgare*)			
Impacts		None recent			
Microhabitats		Some fallen timber, well developed cover within small dry swamp.			
Fauna		Grey Butcherbird (*Cracticus torquatus*) Noisy Minor (*Manorina melanocephala*) Willie Wagtail (*Rhipidura leucophrys*)			

Habitat Number	10	Habitat Type	Stock Dam	Location	320129 6406421
Component		Species			% cover
Water		Cumbungi (*Typha domingensis*) Floating Pondweed (*Pomatogeton tricarinatus*) Azolla (*Azolla filiculoides*)			90% <5%
Edge		*Eleocharis pusilla* Paspalum (*Paspalum dilatatum*) Couch (*Cynodon dactylon*) *Cyperus* sp. *Juncus* usitatus			
Surrounds		Dry pasture and woodland dominated by: Bull Oak (*Allocasuarina luehmannii*) Grey Box (*Eucalyptus moluccana*) Narrow-leaved Ironbark (*Eucalyptus crebra*) Eastern Cotton Bush (*Maireana microphylla*) Threeawn Speargrass (*Aristida* sp.) Couch (*Cynodon dactylon*) Paspalum (*Paspalum dilatatum*) With: Plantago (*Plantago lanceolota*) Barb Wire Grass (*Cymbopogon refractus*) Centaury (*Centaurium tenuiflorum*) Lemon Beauty Heads (*Calocephalus citreus*) Western Boobialla (*Myoporum montanum*) Purple Top (*Verbena bonariensis*) Fireweed (*Senecio madagascariensis*) Fleabane (*Conyza bonariensis*) African Boxthorn (*Lycium ferocissimum*) Prickly Pear (*Opuntia stricta*) Paddy's Lucerne (*Sida rhombifolia*)			
Impacts		None recent, shaded			
Microhabitats		Some fallen timber, well developed grass tussocks.			
Fauna		Dwalf Green Tree Frog (*Litoria fallax*) Tyler's Tree Frog (*L.tyleri*)			

Habitat Number	11	Habitat Type	Mine workings	Location	319033 6406762
Component		Species			% cover
Water		Muskgrass (*Chara* sp.) Stonewort (*Nitella* sp.)			5% 5%
Edge		Cyperus sp.			
Surrounds		Dry pasture and woodland dominated by: Bull Oak (*Allocasuarina luehmannii*) Couch (*Cynodon dactylon*) Threeawn Speargrass (*Aristida* sp.) With: Plantago (*Plantago lanceolota*) Centaury (*Centaurium tenuiflorum*) Purple Top (*Verbena bonariensis*) Fireweed (*Senecio madagascariensis*) Paddy's Lucerne (*Sida rhombifolia*)			
Impacts		Edges largely bare due to fluctuating water levels			
Microhabitats		Loose surface rocks (mining waste), timber in Bulloak stand, poorly developed grass tussocks			
Fauna		None			

Habitat Number	12	Habitat Type	Stock Dam	Location	317761 6404376
Component		Species			% cover
Water		Cumbungi (*Typha domingensis*) Duckweed (*Lemna disperma*)			5%
Edge		Water Primrose (*Ludwigia peploides*)			
Surrounds		Dry pasture dominated by: Windmill Grass (*Chloris truncata*) Couch (*Cynodon dactylon*) Paspalum (*Paspalum dilatatum*) With: Juncus sp. Galenia (*Galenia pubescens*) Fireweed (*Senecio madagascariensis*) Eastern Cotton Bush (*Maireana microphylla*) Saffron Thistle (*Carthamus lanatus*) African Boxthorn (*Lycium ferocissimum*) Peppercress (*Lepidium pseudohyssopifolium*)			
Impacts		Trampled by cattle			
Microhabitats		Poorly developed grass tussocks			
Fauna		Wood Duck (*Chenonetta jubata*) Masked Lapwing (*Vanellus miles*) Black Duck (*Anas superciliosa*) Turtle (*Chelodina longicollis*)			

Habitat Number	13	Habitat Type	Lagoon	Location	317553 6404648
Component		Species			% cover
Water		Dry			
Edge		Water Primrose (*Ludwigia peploides*)			
Surrounds		Dry pasture dominated by: Windmill Grass (*Chloris truncata*) Couch (*Cynodon dactylon*) Paspalum (*Paspalum dilatatum*) Kikuyu (*Pennisetum clandestinum*) With: Turnip Weed (*Rapistrum rugosum*) *Juncus* sp. Galenia (*Galenia pubescens*) Fireweed (*Senecio madagascariensis*) Eastern Cotton Bush (*Maireana microphylla*) Saffron Thistle (*Carthamus lanatus*) African Boxthorn (*Lycium ferocissimum*) Slender Rats-tail (*Sporobolus crebra*) Spear Thistle (*Cirsium vulgare*)			
Impacts		Trampled by cattle			
Microhabitats		Poorly developed grass tussocks, some corrugated iron			
Fauna		Masked Lapwing (*Vanellus miles*)			

Habitat Number	14	Habitat Type	Lagoon	Stock Dam	318482 6404859
Component		Species			% cover
Water		None			
Edge		Clear to 2m Juncus sp.			
Surrounds		Dry pasture dominated by: Windmill Grass (*Chloris truncata*) Couch (*Cynodon dactylon*) With: Bull Oak (*Allocasuarina luehmannii*) Speargrass (*Stipa* sp.) Paspalum (*Paspalum dilatatum*) Galenia (*Galenia pubescens*) Eastern Cotton Bush (*Maireana microphylla*) African Boxthorn (*Lycium ferocissimum*) Slender Rats-tail (*Sporobolus crebra*) Forest Nightshade (*Solanum prinophyllum*)			
Impacts		Trampled by cattle			
Microhabitats		Poorly developed grass tussocks			
Fauna		Wood Duck (*Chenonetta jubata*)			

Habitat Number	15	Habitat Type	Lagoon	Stock Dam	318925 6404670
Component		Species			% cover
Water		Swamp Lily (*Ottelia ovalifolia*) Azolla (*Azolla filiculoides*)			30%
Edge		Couch (*Cynodon dactylon*) Water Couch (*Paspalum distichum*) Fireweed (*Senecio madagascariensis*) *Juncus usitatus*			
Surrounds		Dry pasture dominated by: Windmill Grass (*Chloris truncata*) Couch (*Cynodon dactylon*) With: Bull Oak (*Allocasuarina luehmannii*) Grey Box (*Eucalyptus moluccana*) Yellow Buttons (*Chrysocephalum apiculatum*) Saffron Thistle (*Carthamus lanatus*) Lemon Beauty Heads (*Calocephalus citreus*) Speargrass (*Stipa* sp.) Slender Rats-tail (*Sporobolus crebra*)			
Impacts		Trampled by cattle			
Microhabitats		Fallen timber, grass tussocks			
Fauna		Black Duck (*Anas superciliosa*) Magpie (*Gymnorhina tibicen*) Common Myna (*Acridotheres tristis*) Red-rumped Parrot (*Psephotus haematonotus*)			

DISTRIBUTION

Summer Targeted Surveys for Threatened Species
Ashton Coal Project

21 February 2002

.... copies	White Mining Limited PO Box 699 Singleton NSW 2330
Original	Project File

Quality Control Reviewer

Alan Wells BA, MRAPI, FAICD
Regional Manager

HLA-Envirosciences Pty Limited

Newcastle Office
18 Warabrook Boulevarde
Warabrook NSW 2304
PO Box 73
HRMC NSW 2310
Ph: (+61 2) 4968 0044
Fax: (+61 2) 4968 0005
Email: mail@hla-enviro.com.au

Sydney Office
Level 2, 55-65 Grandview Street
Pymble NSW 2073
PO Box 726
Pymble NSW 2073
Ph: (+61 2) 9988 4422
Fax: (+61 2) 9988 4441
Email: mail@syd.hla-enviro.com.au

Singleton Office
2/104 George Street
Singleton NSW 2330
Ph: (+61 2) 6571 2822
Fax: (+61 2) 6571 2959
Email: hlasing@sing.hla-enviro.com.au

Melbourne Office
305 Queensberry Street
North Melbourne VIC 3051
PO Box 507
North Melbourne VIC 3051
Ph: (+61 3) 9328 5533
Fax: (+61 3) 9328 5544
Email: mail@melb.hla-enviro.com.au

Brisbane Office
Suite 3, 11 Camford Street
Milton QLD 4064
PO Box 1943
Milton QLD 4064
Ph: (+61 7) 3367 2166
Fax: (+61 7) 3367 2279
Email: mail@bris.hla-enviro.com.au

Mackay Office
Suite 6, 12 Grendon Street
North Mackay QLD 4740
PO Box 3263
North Mackay QLD 4740
Ph: (+61 7) 4953 0866
Fax: (+61 7) 4953 0868
Email: hlamack@mack.hla-enviro.com.au