

Flora & Fauna Assessment
Invincible Open Cut Mine Extension
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Prepared for Coalpac Pty Ltd

by

AES

Environmental Consultancy

Principal: Paul Burcher (B.App.Sc.)
24 Alberta Avenue, Cowan. 2081
Phone and Fax: (02) 9456 3853
email: pburcher@ozemail.com.au
ABN: 75 407 030 097

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1. Introduction

Coalpac Pty Ltd is proposing to recommence coal extraction at the Invincible Colliery, two kilometres south-east of Cullen Bullen in the local government area of Greater Lithgow. The area proposed for the current development application involves land approved for extraction in 1998, the approval of which has since lapsed. This land includes ML68 which is freehold land owned by Coalpac and an area of Ben Bullen State Forest (See Figure 1 overleaf).

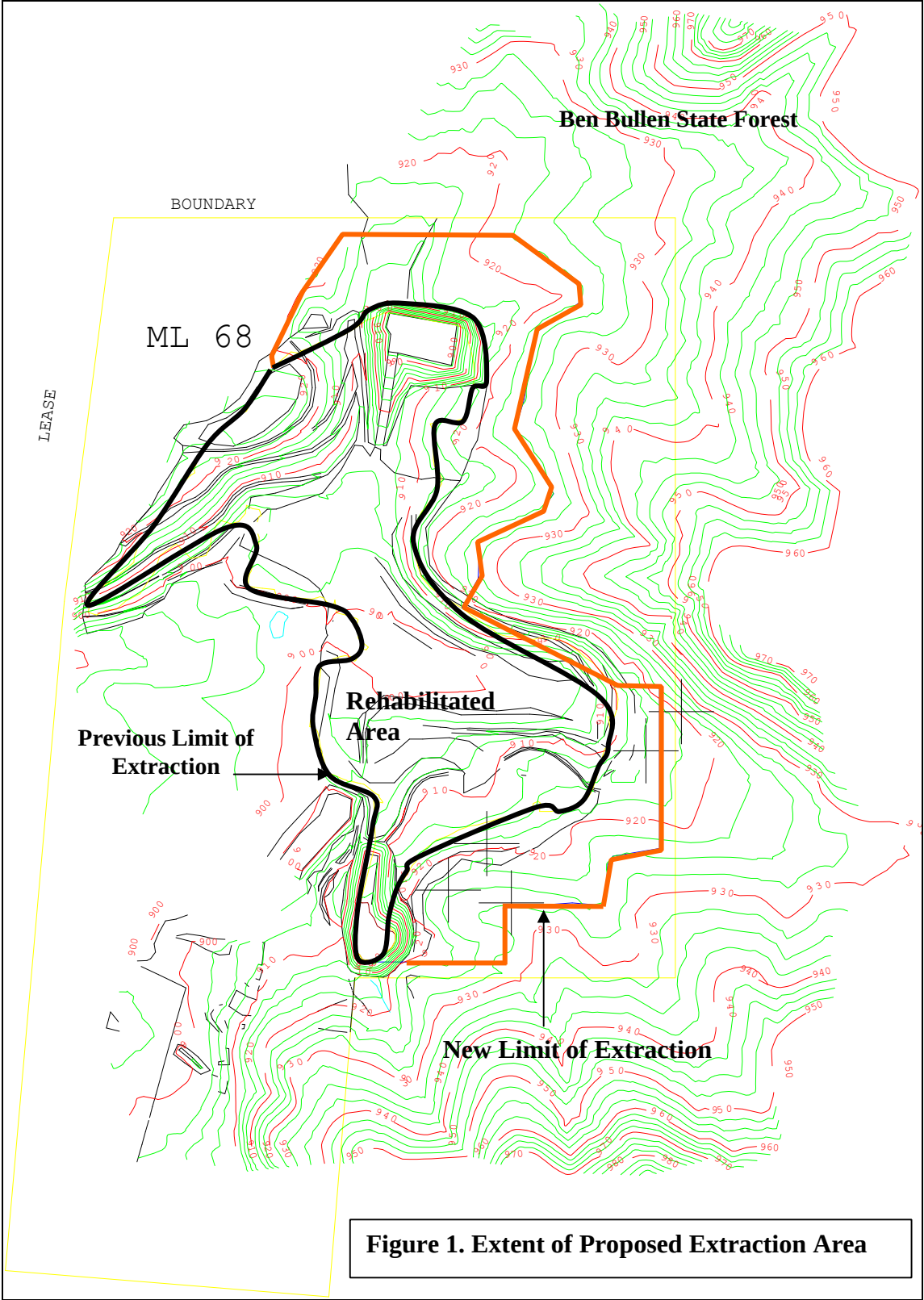
Coal produced from the open cut will be crushed and screened on an existing disturbed area and where necessary washed at an existing washing plant. The coal will then be transported by road to local power stations and the domestic market.

AES was requested by Coalpac to update flora and fauna assessment reports (Muir, 1997; Lavers 1998) that were produced to accompany the original development application. This document should be read in conjunction with those reports.

The purpose of this report is to determine:

- Whether the proposal is likely to have a "significant effect on threatened species, populations or ecological communities¹", based on the eight factors listed in Section 5A of the *Environmental Planning & Assessment Act*. If it is considered that there is likely to be a significant effect, a Species Impact Statement must accompany the development application.
- Whether the site represents "core" koala habitat as defined by State Environmental Planning Policy (SEPP) 44 - Koala Habitat Protection. If so, a koala management plan must accompany the development application.
- Impacts in relation to threatened species, populations or ecological communities listed on the Commonwealth *Environment Protection and Biodiversity Conservation Act 2000*, which has come into force since the original development application. If significant impacts are likely, referral to Environment Australia is required to determine whether the proposed action is a "controlled action" requiring ministerial approval.

¹ i.e. species, populations or ecological communities listed on Schedules 1 & 2 of the *Threatened Species Conservation Act 1995*.



2. Methods

2.1 Literature Review

The previous fauna survey and assessment was undertaken by Dean Lavers of Terra Sciences Pty Ltd during late 1997 (Lavers, 1998). Graeme Muir of Craven Elliston & Hayes Pty Ltd did the flora survey and assessment during 1997 (Muir, 1997). These reports were reviewed for accuracy and to determine whether species listed as occurring at the site include any now listed as threatened.

In addition to these reports reviews were undertaken of literature and databases relevant to the general area (the western coalfields and environs) were reviewed to assist in determining which threatened species were likely to occur on the site. This included ecological assessments of the Cullen Valley mine some four kilometres north-west of the site (Wildsearch, 1996; Gingra Ecological Surveys, 2003; AES, 2003, 2004); monitoring of fauna at the Mount Airly Coal Mine site (AES, 1998-2000; AES, unpublished data), annual reports of the NSW Field Ornithologists Club/Birding NSW from 1992-2001; the National Parks Association Biodiversity Survey of Sunny Corner State Forest (NPA 1999) and unpublished results of a fauna survey of a proposed open cut mine to the west of the Invincible colliery (AES, unpublished data).

Point records from the Bathurst and Wallerawang 1:100,000 map sheets of the NPWS Wildlife Atlas were obtained from the NSW Department of Environment & Conservation in June 2005. These were filtered to determine which threatened species have been recorded within a ten-kilometre radius of the site. The Bionet online database (NSW Government, 2005) was also accessed to include State Forests and Australian Museum records within this search area.

Vegetation mapping and descriptions by Keith & Benson (1990) and Keith (2002) were used to determine the vegetation communities present and their conservation status.

2.2 Field Survey

Surveys of the site were undertaken Paul Burcher (B.App.Sc) on 08/07/05 and 21/06/05 using the following methods

2.2.1 Flora

The previous flora survey was found to be thorough and not require any further work apart from checking for plant species and ecological communities that have been listed since the time of the report and are known to occur within ten kilometres of the site. This involved targeted searches of the site for the shrubs Wollemi Mint-bush (*Prostanthera cryptandroides*) and Clandulla Geebung (*Persoonia marginata*) and checking whether any of the vegetation communities present conform to White Box - Yellow Box - Blakely's Red Gum Woodland (TSC Act) or Grassy White Box Woodlands (EPBC Act), these communities having been listed since 1998.

2.2.2 Fauna

The fauna survey done by Lavers (1998) involved the following methods:

- Elliot trapping for mammals.
- Hair tube trapping.
- Pit-fall trapping for mammals, reptiles & frogs.
- Harp trapping for insectivorous bats.
- Anabat detection of the calls of insectivorous bats.
- Point censuses for diurnal birds.
- Spotlighting for nocturnal birds and mammals
- Searches for indirect evidence of mammals (vocalisations, tracks, scats, burrows etc).
- Opportunistic recording of fauna species.

No owl-call playback was carried out. AES did not consider it necessary to compensate for this deficiency, as owl call-playback has been done recently just to the west of the site (AES unpublished) and at Cullen Valley to the north-west (AES, 2004).

Therefore, in conjunction with results from other surveys carried out locally, it is considered that the previous fauna survey was adequate. Notes were made of all fauna species detected during the field inspection. Particular attention was paid to the identification of Treecreepers (*Climacteris* spp) and grassfinches (sub-family Estrildinae) as threatened species in these taxa have been listed since 1998 and are known to occur locally.

3. Results

The field survey confirmed that the descriptions of Muir (1997) and Lavers (1998) of the vegetation communities and fauna habitats at the site were accurate and still current.

3.1 Threatened Flora

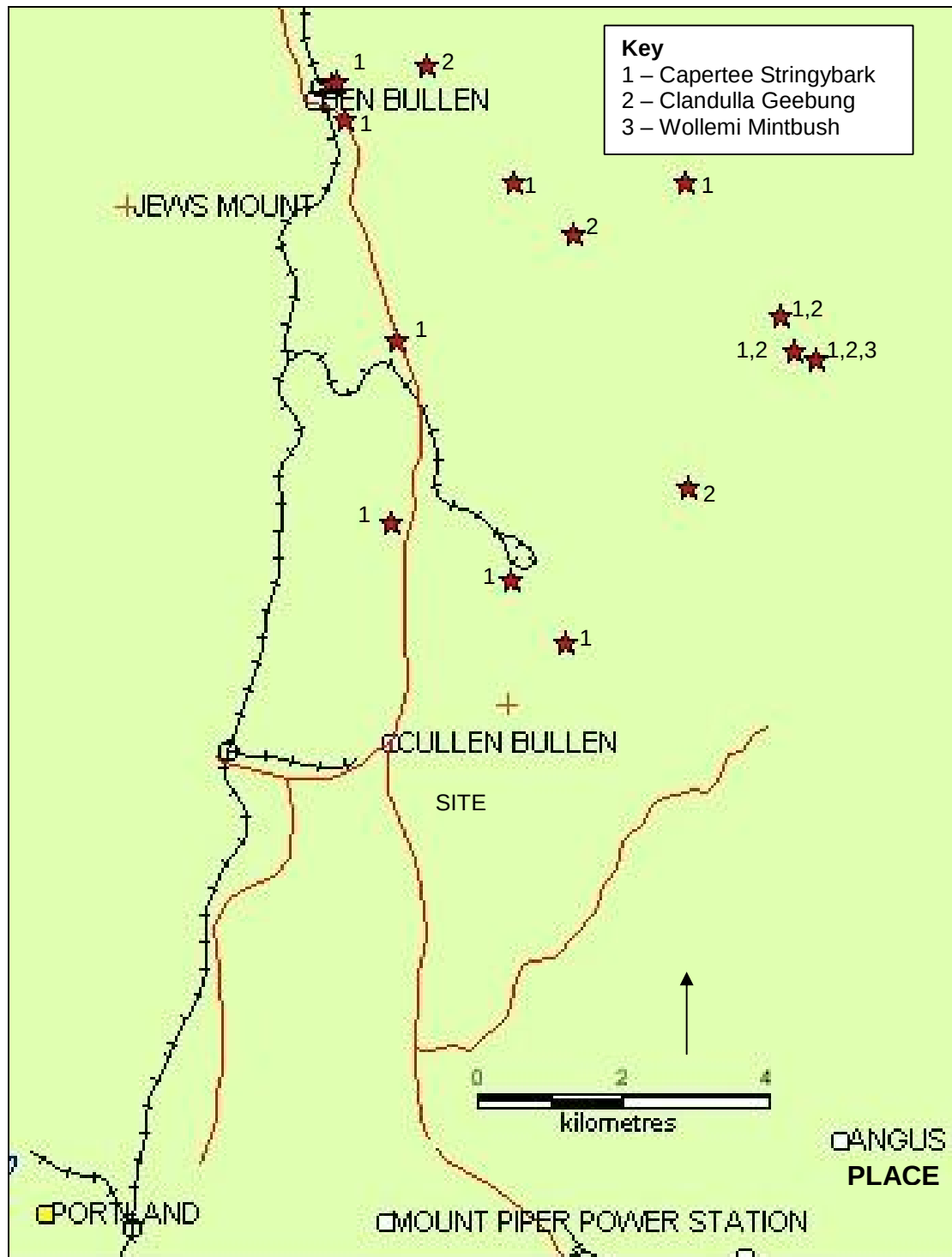
At the time of the original survey, Capertee Stringybark (*Eucalyptus cannonii*) was listed as vulnerable on the TSC Act and the EPBC Act, and known to occur locally (Figure 2 overleaf). Muir (1997) found no individuals of this species on site. During the current survey some stringybarks at the site were found to be *E.cannonii*, a rough estimate being that they comprise less than 10% of stringybarks present. As a result of this finding an eight-part test has been conducted on the impact of the proposed development on the species (See section 4).

Since Muir's report, two threatened flora species, Wollemi Mintbush (*Prostanthera cryptandroides*) and Clandulla Geebung (*Persoonia marginata*), have been recorded locally (see Figure 2).

Wollemi Mintbush occurs in a variety of vegetation types including open forest dominated by *Eucalyptus fibrosa*, Narrabeen Rocky Heath, Narrabeen Acacia Woodland, Narrabeen Exposed Woodland; Open Heath of *Calytrix tetragona*, *Leptospermum parviflorum*, *Isopogon dawsonii*; and Open Scrubland of *Eucalyptus dwyeri*, *Baeckea densifolia*, *Dillwynia floribunda*, *Aotus ericoides* and *Hemigenia cunefolia* (NPWS 2000a). These vegetation types do not correspond to those at the site.

Clandulla Geebung grows in dry sclerophyll forest and woodland communities on sandstone (NPWS 2000b). From interpretation of records and vegetation mapping (Benson & Keith, 1990), these communities correspond to those on site. Nevertheless, no specimens of the species were found. Accordingly, it is not further considered for the purposes of this report.

Figure 2 Locally Occurring Threatened Flora Species²



² Records from NPWS Wildlife Atlas [NSW DEC 2005a]; base map (C) Copyright Commonwealth of Australia (Geoscience Australia) 2002]

3.2 Endangered Ecological Communities

Muir (1997) described two native vegetation communities for the site being *Eucalyptus rossii* – *E.macrorhyncha* woodland and *E.viminalis* – *E.macrorhyncha* open forest. These communities conform to "Southern tableland dry sclerophyll forests" and "Southern tableland semi-mesic forests" of Keith (2002), respectively. Neither of these vegetation communities corresponds to any endangered ecological community currently listed on the *Threatened Species Conservation Act* or the *Environment Protection and Biodiversity Conservation Act*.

3.3 Threatened Fauna

No threatened fauna species were detected during the recent survey. A review of the NPWS Wildlife Atlas (NSW DEC 2005a) and records on Bionet (NSW Government, 2005) indicated that the following threatened fauna species have been recorded within ten kilometres of the site.

Table 1 Locally Occurring Threatened Fauna Species

Species	Status TSCA EPBCA	Assessed by Lavers (1998)?
Glossy Black-Cockatoo <i>Calyptorhynchus lathami</i>	V	Yes
Gang-gang Cockatoo <i>Callocephalon fimbriatum</i>	V	No – not listed at time
Powerful Owl <i>Ninox strenua</i>	V	Yes
Brown Treecreeper ³ <i>Climacteris picumnus victoriae</i>	V	No – not listed at time
Regent Honeyeater <i>Xanthomyza phrygia</i>	E E	Yes
Diamond Firetail <i>Stagonopleura guttata</i>	V	No – not listed at time
Spotted-tailed Quoll <i>Dasyurus maculatus</i>	V V	Yes
Koala <i>Phascolarctos cinereus</i>	V	Yes
Brush-tailed Rock-wallaby <i>Petrogale penicillata</i>	E E	No – habitat unsuitable
Large-eared Pied Bat <i>Chalinolobus dwyeri</i>	V V	Yes
Eastern False Pipistrelle <i>Falsistrellus tasmaniensis</i>	V	Yes
Eastern Bent-wing Bat <i>Miniopterus schreibersii oceanensis</i>	V	Yes
Greater Broad-nosed Bat <i>Scoteanax rueppellii</i>	V	No – no regional records at time
The Bathurst Copper Butterfly <i>Paralucia spinifera</i>	E	No – habitat unsuitable

Key: E- endangered; V – vulnerable.

Of these species, Brown Treecreeper is included in the species list for the site by Lavers (1998). However, it was not listed as vulnerable on the TSC Act at the time. The only treecreeper observed during the field inspection by AES was the Red-browed Treecreeper (*Climacteris erythroga*). There are six records of each species within ten kilometres of the site (DEC, 2005a). Literature on the two species (NSW DEC, 2005b; Pizzey, 1997; Blakers et al, 1984) indicates that the forest habitat at the site is more typical of that used by the Red-browed Treecreeper than that of the Brown Treecreeper. Therefore, Lavers may have mistakenly identified as Red-browed Treecreeper as a Brown Treecreeper. However, a precautionary approach is taken and it is assumed that the original identification of the

³ eastern subspecies

Brown Treecreeper was accurate. Likely impacts on the species are considered under the TSC Act in section 4.

Of the other species in Table 1, Lavers also considered that the Glossy Black-cockatoo, Masked Owl, Powerful Owl, Regent Honeyeater, Common Bentwing Bat, Large-eared Pied Bat and Eastern False Pipistrelle would occur at the site. In addition to these, he reviewed all threatened fauna records on the Bathurst and Wallerawang 1:100,00 map sheets of the NPWS Wildlife Atlas and considered that the TSC ACT-listed vulnerable species Bush Stone-curlew, Square-tailed Kite, Turquoise Parrot, Painted Honeyeater, Squirrel Glider, Yellow-bellied Sheath-tail Bat and Little Bentwing Bat would also occur.

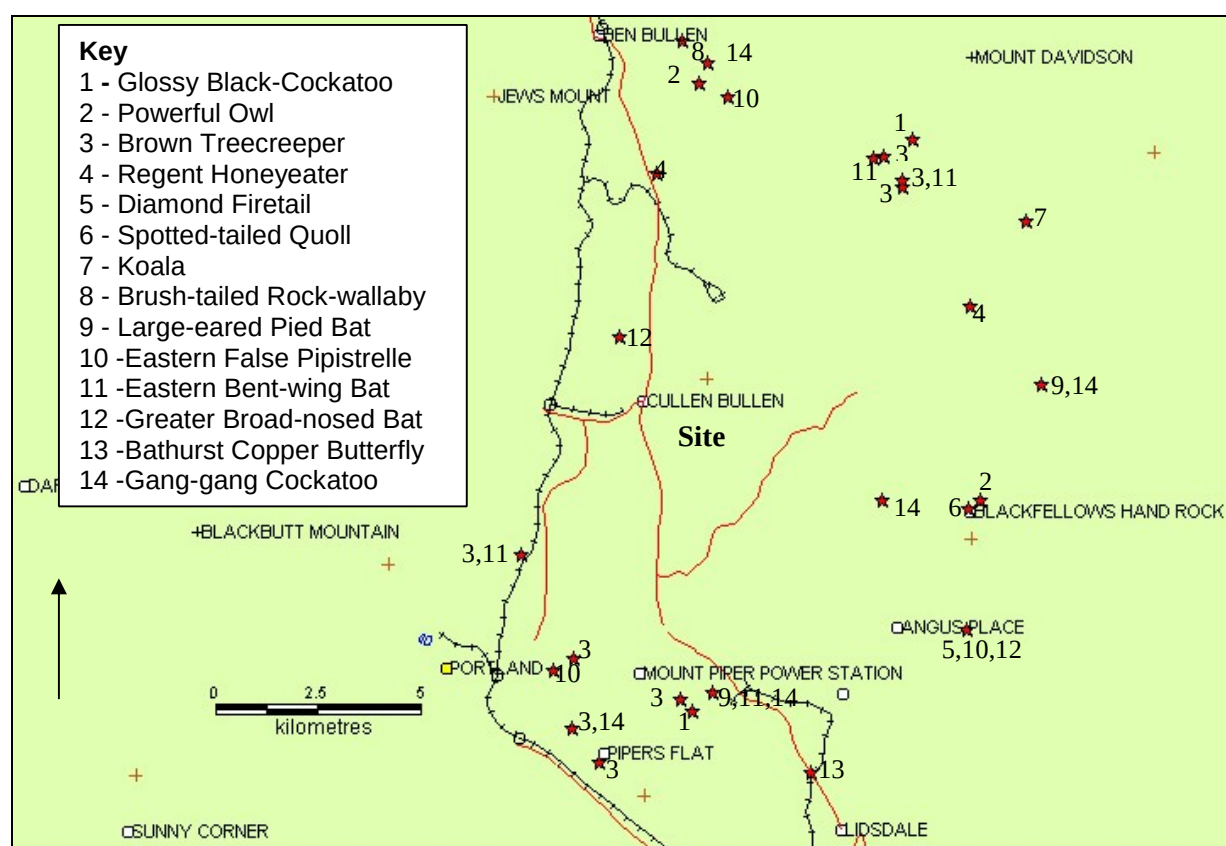


Figure 2. Threatened Fauna Records within 10 kilometres of the Site⁴

It is considered by AES that some of these species are unlikely to occur given that the site is only marginal habitat and there are few local records. These species are Squirrel Glider, Bush Stone-curlew, Painted Honeyeater and Regent Honeyeater. Nevertheless, it is agreed that the proposal is unlikely to have a significant effect on any of the species assessed by Lavers (1998), or their habitats.

Since 1998 the Greater Broad-nosed Bat (*Scoteanax rueppellii*) has also been recorded within ten kilometres of the site. This species roosts in tree hollows and forages at the edges of woodlands and forests (Churchill, 1998), habitat components that occur on site.

⁴ Records from NPWS Wildlife Atlas NSW DEC 2005a; base map (C) Copyright Commonwealth of Australia (Geoscience Australia) 2002.

Accordingly, an eight-part test has been conducted to determine whether the proposal is likely to have a significant effect on this species.

The Diamond Firetail and Gang-gang Cockatoo have been listed as vulnerable on the TSC Act since the Lavers (1998) report. The Diamond Firetail inhabits a range of habitats including grassy woodlands and sometimes lightly wooded farmland. The Gang-gang Cockatoo occurs in a range of forest habitats moving from tall montane forests and woodlands in summer to lower altitudes in drier, more open eucalypt forests and woodlands in winter (NSW Scientific Committee, 2005). Suitable habitat occurs for both species at the site and they are therefore considered under the provisions of the TSC Act in section 4.

4. Impacts of the Proposed Development

The proposed open cut will result in the removal of approximately 10 hectares of bushland being comprised of open forests and woodland. These vegetation types/fauna habitats are well represented in nearby State Forest and National Park areas and are unlikely to be critical for the survival of any species of flora or fauna. Nevertheless, local populations of those fauna species will be affected to some degree at least until revegetation of the site is well established. Given the extent of bushland around the site it is considered unlikely that any movement corridors for fauna will be significantly affected.

The proposed haul road will use an existing route and already disturbed land. Similarly, the mobile crusher plant will be situated on mostly cleared land the edges of which have a few wattles.

The following sections deal with legislative requirements regarding the impact of the proposal on flora and fauna.

4.1 Threatened Species Conservation Act

Section 5A of the *Environmental Planning and Assessment Act 1979* (as amended by the *Threatened Species Conservation Act 1995*) requires that a series of factors (the "eight part test") must be considered to determine whether a proposal is likely to have a "significant effect on threatened species, populations or ecological communities, or their habitats". If so, a Species Impact Statement must accompany the development application.

The vulnerable Capertee Stringybark was found to occur on the site during this survey. Muir (1997) considered this species under the provisions of this Act but this was based on the finding that the species was not present. Therefore, it is considered necessary to reassess the impacts of the proposal on this species. Lavers (1998) also detected the Brown Treecreeper on the site, this species now being listed as vulnerable. Therefore, an 8-part test is required.

The following threatened species listed on this Act are also considered likely to occur: Glossy Black-cockatoo, Gang-gang Cockatoo, Masked Owl, Powerful Owl, Diamond Firetail, Eastern Bentwing Bat, Large-eared Pied Bat, Greater Broad-nosed Bat and Eastern False Pipistrelle.

Of these, Lavers (1998) assessed Glossy Black-cockatoo, Masked Owl, Powerful Owl, Eastern (Common) Bentwing Bat, Large-eared (Large) Pied Bat and Eastern False Pipistrelle

under the provisions of this Act. He found that the proposed development is unlikely to have significant effect on these species, or their habitats. AES concurs with this and it is considered superfluous to conduct new 8-part tests.

No endangered populations or endangered ecological communities occur.

Therefore, in this report, 8-part tests are conducted on the Gang-gang Cockatoo, Diamond Firetail and Greater Broad-nosed Bat in addition to Capertee Stringybark and Brown Treecreeper.

4.1.1 Capertee Stringybark

(a) 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,

The development will result in the loss of a number of Capertee Stringybark individuals and approximately 10 hectares of habitat. Approximately 20 hectares of habitat will be unaffected. Similar habitat occurs to the east and north of the site and Capertee Stringybark has been confirmed as occurring at these locations. Re-establishment of Capertee Stringybark trees on areas rehabilitated after mining will be part of the management of proposed development.

Therefore it is considered that the local population of the species would not be placed at risk of extinction.

(b) 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,

No endangered population as defined in the *Threatened Species Conservation Act* occurs in the area affected by the proposed development.

(c) 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,

The maximum area of known habitat of Capertee Stringybark, which is to be removed as a result of the proposed development, is 10 hectares. It is intended that rehabilitation will take place following mining with topsoil and vegetation cover to be restored. Capertee Stringybark seeds will be collected and used in the rehabilitation of the site

In the region Capertee Stringybark has been recorded from Tablelands Grassy Woodland Complex communities and Talus Slope Woodland, and in Winburndale Nature Reserve within woodland dominated by Red Stringybark (*E.macrorhyncha*) and Long-leaved Box (*E.goniocalyx*). It occurs on a wide variety of geological types and soil substrates across a wide altitudinal range (DEC, 2005c).

R. Lembit (pers comm) has estimated that in the area covered by the Wallerawang 1:100,000 vegetation map sheet (Keith & Benson, 1990) Tablelands Grassy Woodland Complex communities and Talus Slope Woodland occupy a total area exceeding 15,000 hectares. Therefore, in relation to this, the amount of habitat affected represents less than 0.1%.

Significant areas of habitat also occur outside the Wallerawang sheet to the west e.g. in Winburndale Nature Reserve.

On this basis, it is considered that a significant area of known habitat will not be modified or removed as a result of the proposed development.

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

The open cut mining operation will affect the habitat of Capertee Stringybark. Suitable habitat for the species will remain around the site and habitat on the site will be rehabilitated following completion of mining operations.

No areas of known habitat will become isolated from any interconnecting or proximate areas of habitat as a result of the development.

(e) whether critical habitat will be affected,

No areas of critical habitat as defined in the *Threatened Species Conservation Act* occur in the study area.

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

Capertee Stringybark is known from Gardens of Stone National Park, Turon River National Park, Wollemi National Park, Winburndale Nature Reserve and Avisford Nature Reserve. It is estimated that there are more than 20,000 individuals within 14 separate populations in these reserves (R. Lembit pers comm). It appears that the species is adequately conserved in regional conservation reserves.

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

Clearing of native vegetation is listed as a threatening process on the *Threatened Species Conservation Act*. A threat abatement plan dealing with clearing of native vegetation is yet to be prepared.

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

E.cannonii is restricted to the western side of the Blue Mountains from Mount Piper in the south to the Mudgee area in the north. There are also populations to the west in Winburndale Nature Reserve and adjacent state forests (NSW DEC 2005c). It is near the southern limit of its distribution at the site.

Conclusion

The proposed development would remove a small proportion of Capertee Stringybark habitat. Upon cessation of mining, this will be rehabilitated and Capertee Stringybark included in the planting schedule. The species appears to be adequately conserved in regional conservation reserves. Given these factors, it is considered unlikely that the proposed development would have significant effect on the species, or its habitats.

4.1.2 Gang-gang Cockatoo

(a) 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,

Some tree hollows suitable for nesting by this species occur within the area to be cleared for the open cut mine. However, this habitat component is not confined to the site and appears to be adequately represented in nearby bushland. The site also represents foraging habitat. However, the foraging habitat is well represented in the locality. It is unlikely that the local population of the species is likely to be placed at risk of extinction due to the proposed development.

(b) 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,

No endangered populations occur in the vicinity.

(c) 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,

This species' habitat is forest and woodlands. This habitat type is abundant in the region. The level of modification to this habitat type in relation to its regional distribution is minimal.

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

The Gang-gang Cockatoo is able to traverse unsuitable habitat. The proposed development will not isolate any habitat areas.

(e) whether critical habitat will be affected,

Critical habitat is yet to be defined

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

The South Eastern Highlands Bioregion is managed in conservation tenures that together occupy about 726,530.55 hectares or 14.86 per cent of the bioregion. National parks and nature reserves make up the majority of this area, occupying an area of 596,638.58 hectares or 12.22 per cent of the bioregion. (NSW NP&WS, 2003).

The Gang-gang Cockatoo has been recorded in numerous regional conservation reserves including nearby Gardens of Stone NP, Turon River NP and Winburndale Nature Reserve as well as Kosciuszko NP, Wadbilliga NP, Abercrombie River NP, Deua NP, Budawang NP, Morton NP, Blue Mountains NP, Kanangra-Boyd NP and South-east Forest NP.

There are extensive areas of habitat and numerous records of the species in these reserves. However, a comparison of the first and second Atlas of Australian Birds (Barrett and Silcocks, 2002) showed that between atlas periods (1977-1981 and 1998-2001), the reporting rate for Gang-gang Cockatoo in the South Eastern Highlands bioregion declined 22%.

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

The causes of the reduction in the distribution and apparent reduction in abundance of the Gang-gang Cockatoo are unknown. The late age at which it first breeds and the species' dependence and specificity in its preferences for tree hollows may have rendered it vulnerable to decline as a result of habitat loss and degradation. Clearing of native vegetation, which is listed as a key threatening process in NSW, and degradation of habitat e.g. as a result of altered fire regimes, reduces the availability of tree hollows and may reduce the abundance of optimum foraging and roosting habitat (NSW Scientific Committee, 2005).

It is considered that the level of clearing associated with the proposal would not be sufficient to affect the local population.

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

In NSW, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes (NSW Scientific Committee, 2005). The western limit of its distribution at the same latitude as the site is near Winburndale Nature reserve (NSW Government, 2005), some 25 kilometres to the west of the site. Therefore, it is near the limit of its distribution at the site.

Conclusion

On the basis of the above discussion, it is concluded that the proposed development will not have a significant effect on the Gang-gang Cockatoo, or its habitat.

4.1.3 Brown Treecreeper

(a) 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,

This species is found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. Fallen timber is an important habitat component for foraging. The species is sedentary (DEC, 2005b).

The Brown Treecreeper was recorded at the site in 1997 (Lavers, 1998) and has been recorded at a number of locations within ten kilometres of the site (see Figure 2). However, it was not recorded during the recent survey.

Whilst the proposed development would remove some habitat available for dispersal in the medium term, there is ample habitat around the site affording movement corridors for the species between known habitat areas to the south and north-east.

Therefore, it is considered unlikely that there would be any effect on local populations of these species.

(b) 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,

The Brown Treecreeper is a vulnerable species, not an endangered population.

(c) 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,

A comparison of the first and second Atlas of Australian Birds (Barrett and Silcocks 2002) found that there was no significant change in the Brown Treecreeper's abundance in the South-east Highlands Bioregion between Australian Bird Atlas survey periods. It is considered that habitat removal will not be significant to local populations of the species. Therefore, at the wider regional scale the effect is also not significant.

(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,

As discussed in (a) above, the species may use the site for dispersal. However, alternatives routes for movement between known habitat areas will remain intact. Therefore, it is considered that there would be no isolation of habitat.

(e) whether critical habitat will be affected,

Critical habitat is yet to be defined.

(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 Brown Treecreeper has also been recorded in Abercrombie River National Park, Turon River NP and Winburndale Nature Reserve.

The species is probably inadequately conserved in bioregional conservation reserve. This is because its favoured habitat, grassy woodlands, has not been adequately represented in conservation reserves. Instead, rugged landscapes with poor soil fertility (especially those on sandstone) have been conserved. If the Brown Treecreeper did favour habitats occurring in reserves such as Gardens of Stone National Park, it is unlikely that they would be listed as threatened.

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

Clearing of native vegetation is listed as a Key Threatening Process on Schedule 3 of the *Threatened Species Conservation Act*.

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

The eastern subspecies of the Brown Treecreeper *Climacteris picumnus victoriae* is distributed through central NSW on the western side of the Great Dividing Range and sparsely scattered to the east of the Divide in drier areas such as the Cumberland Plain of Western Sydney, and in parts of the Hunter, Clarence, Richmond and Snowy River valleys (NSW DEC 2005b). It is not at the limit of its distribution at the site

Conclusion

The proposed development is unlikely to have a significant effect upon the Brown Treecreeper, or its habitat.

4.1.4 Diamond Firetail

(b) 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,

The Diamond Firetail is found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum (*Eucalyptus pauciflora*) Woodlands. It also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. It is often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. The Diamond Firetail feeds exclusively on the ground, on ripe and partly ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season) (DEC 2005d). In the local area, the species has been recorded east of Angus Place (NPWS Wildlife Atlas).

Should the species occur at the site it is most likely to use the interface of the rehabilitated area and the open forest/woodland. As this habitat type is common locally and will be restored upon cessation of mining it is considered unlikely that any local population would be placed at risk of extinction.

(b) 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,

The Diamond Firetail is a vulnerable species, not an endangered population.

(c) 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,

It is considered that habitat removal will not be significant to local populations of the species. Therefore, at the wider regional scale the effect is also not significant.

(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 operation of the mine may disrupt movement corridors for the species in the short term. However, alternative routes for movement occur to the west and it is considered no habitat would be isolated as a result of the proposal.

(e) whether critical habitat will be affected,

Critical habitat is yet to be defined.

(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 Diamond Firetail has been recorded in Kosciusko National Park. The species is probably inadequately conserved in bioregional conservation reserve. This is because its favoured habitat, grassy woodlands, has not been adequately represented in conservation

reserves. Instead, rugged landscapes with poor soil fertility (especially those on sandstone) have been conserved. If the Diamond Firetail did favour habitats occurring in reserves such as Gardens of Stone National Park, it is unlikely that they would be listed as threatened.

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

Clearing of native vegetation is listed as a Key Threatening Process on Schedule 3 of the *Threatened Species Conservation Act*.

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

The Diamond Firetail is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. It is not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over the rest of NSW. It is also found in the Australian Capital Territory, Queensland, Victoria and South Australia (DEC, 2005d). It is not at the limit of its distribution at the site

Conclusion

The proposed development is unlikely to have a significant effect upon the Diamond Firetail, or its habitat.

4.1.5 Greater Broad-nosed Bat

a) 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,

The Greater Broad-nosed Bat forages for insects in open areas on the edges of forests or along tree-lined creeks and utilises tree hollows for diurnal roosting sites (Hoye & Richards, 1995; Churchill, 1998). The species was recorded at Cullen Valley during 2004 (AES, 2004) and has also been recorded at Mt Piper Power Station in 1996 (R. Williams pers comm).

Tree hollows are common in the site and would provide potential roosting habitat for this species. The bushland habitats and bushland/clearing edges would also provide potential foraging habitat.

While the proposal will result in the loss of some roosting and foraging habitat, this is not of a magnitude to result in the local extinction of this species as these resources are represented abundantly elsewhere in the locality. Re-erection of hollow trees that have been felled within the mine area would mitigate against loss of this roosting resource.

b) 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,

No endangered populations occur in the vicinity of the site.

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 Greater Broad-nosed Bat is highly mobile and is unlikely to be affected by the temporary imposition of cleared habitat.

e) whether critical habitat will be affected,
Critical habitat is yet to be defined.

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 Greater Broad-nosed bat has been recorded in the following regional NPWS conservation reserves: Kanangra Boyd NP, Abercrombie NP and Wadbilliga NP.

Other conservation areas under management of State Forests and councils also occur in the bioregion. The South Eastern Highlands Bioregion is managed in conservation tenures that together occupy about 726,530.55 hectares or 14.86 per cent of the bioregion. National parks and nature reserves make up the majority of this area, occupying an area of 596,638.58 hectares or 12.22 per cent of the bioregion. (NSW NP&WS, 2003). Much of this is forested area and therefore suitable habitat for this species.

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

Clearing of native vegetation is listed as a Key Threatening Process on Schedule 3 of the *Threatened Species Conservation Act*.

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

The Greater Broad-nosed Bat is distributed along the coast and ranges of south-eastern Australia from north-east Queensland to southern NSW (Churchill, 1998). The site is at or near the western limit of this distribution.

Conclusion

The loss of some foraging and roosting habitat is unlikely to have a significant effect on the Greater Broad-nosed Bat, or its habitat.

4.2 SEPP 44 – Koala Habitat Protection

An assessment of the site was undertaken to ascertain its suitability as Koala habitat. The procedures involved in such an assessment are outlined in SEPP 44 - Koala Habitat Protection.

Step 1: Is the land potential Koala habitat? - Yes

Potential koala habitat is defined in the policy as areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.

Ribbon Gum (*Eucalyptus viminalis*), which is listed as a Koala feed tree on Schedule 2, constitutes more than 15% of the trees in the site's open forest habitat.

Step 2: Is the land potential Koala habitat? – No

Core koala habitat is defined in the policy as an area of land with a resident population of

koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population.

No evidence of the species using the site was found during this survey nor that of Lavers (1998). There are a number of records from the Wolgan Valley to the north-east the closest being approximately eight kilometres from the site. However, the land is not core koala habitat as there is no evidence of a resident population.

Therefore, the development application may proceed without the preparation of a Koala Management Plan being required.

4.3 Environment Protection and Biodiversity Conservation Act

Since the reports of Muir (1997) and Lavers (1998), the EPBC Act has come into force. Capertee Stringybark, which occurs at the site and Large-eared Pied bat, which is likely to occur, are both listed as vulnerable species on this Act. They are therefore Matters of National Environmental Significance and require assessment under this Act.

The following assessment guidelines are used to determine whether the action (i.e. the proposed development) has, will have, or is likely to have a significant impact on matters of national environmental significance. If so, referral to Environment Australia is required to determine whether the proposal is a controlled action requiring ministerial approval.

4.3.1 Capertee Stringybark

An action has, will have, or is likely to have a significant impact on a vulnerable species if it does, will, or is likely to:

- *lead to a long-term decrease in the size of an important population⁵,*

The development will result in the loss of a number of Capertee Stringybark individuals and approximately 10 hectares of habitat. Similar habitat occurs to the east and north of the site and Capertee Stringybark has been confirmed as occurring at these locations. Re-establishment of Capertee Stringybark trees on areas rehabilitated after mining will be part of the management of proposed development. There, it is considered that the proposed action would not result in a long-term decrease in the size of the population.

- *or reduce the area of occupancy of an important population,*

The proposed works will reduce the area of occupancy of Capertee Stringybark by 10 hectares. R. Lembit (pers comm) has estimated that in the area covered by the Wallerawang 1:100,000 vegetation map sheet (Keith & Benson, 1990) Tablelands Grassy Woodland Complex communities and Talus Slope Woodland occupy a total area exceeding 15,000 hectares. Furthermore, the species will be used in revegetation at the cessation of mining.

- *or fragment an existing important population into two or more populations,*

The open cut mining operation will affect the habitat of Capertee Stringybark. Suitable habitat for the species will remain around the site and habitat on the site will be rehabilitated

⁵ The guidelines to the Act state "an important population is one that is necessary for a species' long-term survival and recovery. This may include populations that are key source populations either for breeding or dispersal; populations that are necessary for maintaining genetic diversity, and/or populations that are near the limit of the species range." For the purposes of this assessment, both the Capertee Stringybark and Large-eared Pied Bt are considered to have important populations in the area.

following completion of mining operations. Given the small amount of habitat affected and the extent of habitat around the site, it is unlikely that the proposed action would fragment the population

- *or adversely affect habitat critical to the survival of a species,*

It is unlikely that the habitat at the site is critical to the survival of the species, given the extent of habitat elsewhere.

- *or disrupt the breeding cycle of an important population,*

Given the extent of the species' habitat beyond the site, the proposed action is unlikely to significantly affect the breeding cycle of the population.

- *or modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,*

It is unlikely that the extent of habitat removal will cause the decline of the species.

- *or result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat⁶,*

It is recommended that locally occurring native plant species, including Capertee Stringybark, be used in landscaping revegetation areas. This and strict control of sedimentation/erosion will prevent further establishment of weeds.

- *or interfere substantially with the recovery of the species.*

Given the extent of the species off-site and the inclusion of the species in the rehabilitation of the site, it is considered unlikely that the proposed action would significantly affect the recovery of the species.

Conclusion

The proposed action is unlikely to have a significant impact on the Capertee Stringybark. Referral to Environment Australia is not required.

4.3.2 Large-eared Pied Bat

An action has, will have, or is likely to have a significant impact on a vulnerable species if it does, will, or is likely to:

- *lead to a long-term decrease in the size of an important population, or*

The proposed works will only affect a small amount of habitat and therefore are unlikely to lead to a long-term decrease in the size of the population.

- *or reduce the area of occupancy of an important population,*

The proposed works will marginally reduce the area of occupancy of the local Large-eared Pied Bat population.

- *or fragment an existing important population into two or more populations,*

Given the small amount of habitat affected and the mobile nature of the species, it is unlikely that the proposed works would fragment the population

⁶ Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a vulnerable species by direct competition, modification of habitat, or predation

- *or adversely affect habitat critical to the survival of a species,*

It is unlikely that the habitat at the site is critical to the survival of the species.

- *or disrupt the breeding cycle of an important population,*

The Large-eared Pied Bat is unlikely to breed at the site, as there are no caves, mines or tunnels present. The loss of some foraging resources is also unlikely to disrupt breeding.

- *or modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,*

It is unlikely that the extent of habitat removal will cause the decline of the species.

- *or result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat,*

It is recommended that locally occurring native plant species be used in landscaping revegetation areas. This and strict control of sedimentation/erosion will prevent further establishment of weeds.

- *or interfere substantially with the recovery of the species.*

The proposed development will involve some foraging habitat loss that is unlikely to interfere substantially with the recovery of the species.

Conclusion

The proposed action is unlikely to have a significant impact on the Large-eared Pied Bat. Referral to Environment Australia is not required.

5. Conclusion and Recommendations

A flora and fauna assessment has been undertaken of the proposed extension to Invincible Open Cut Mine at Cullen Bullen New South Wales. It has found that the proposal would result in the loss of approximately ten hectares of open forest and woodland, which would be rehabilitated upon cessation of mining.

These open forest and woodland areas were found to be habitat of the Capertee Stringybark (*Eucalyptus cannonii*), which is listed as vulnerable on the NSW *Threatened Species Conservation Act* and the Commonwealth *Environment Protection and Biodiversity Conservation Act*. It was found that the proposal is unlikely to have a significant effect on this species, or its habitats. Hence a Species Impact Statement is not required to accompany the development application in regard to Capertee Stringybark. Nor is referral to Environment Australia required to determine whether the proposal is a controlled action requiring ministerial approval.

The Brown Treecreeper, which is now listed as vulnerable on the *Threatened Species Conservation Act* was recorded by Lavers (1998). A number of other fauna species listed on the *Threatened Species Conservation Act* were considered likely to occur at the site. These were Glossy Black-cockatoo, Gang-gang Cockatoo, Masked Owl, Powerful Owl, Diamond Firetail, Eastern Bentwing Bat, Large-eared Pied Bat, Greater Broad-nosed Bat and Eastern False Pipistrelle. The proposal is considered unlikely to have a significant effect on any of these species, or their habitats. Therefore, a Species Impact Statement in relation to these fauna species is not required to accompany the development application.

Of these fauna species, Large-eared Pied Bat is listed as vulnerable on *Environment Protection and Biodiversity Conservation Act*. The proposal is unlikely to have a significant effect on this species. Therefore, referral to Environment Australia is not required to determine whether the proposal is a controlled action requiring ministerial approval.

To ameliorate the impact of the loss of woodland and open forest habitats upon their component flora and fauna species, the following recommendations are made:

- Revegetation of the site should involve the use of the full range of those plant species now occurring on site. In particular seed of Capertee Stringybark should be collected at commencement of the open cut and stored for use in revegetation. Topsoil should be stockpiled for reapplication, as this will contain seed and propagules of many flora species.
- Revegetation areas should be checked regularly to assess establishment and growth rates. This will enable revegetation works to be adaptive to climatic conditions and any particular problems experienced during the re-establishment phase.
- Retain felled timber particularly those pieces with hollows, for reapplication to revegetation areas.
- Inform staff and subcontractors of appropriate procedures should fauna be encountered during construction or operation phases. This should be determined in consultation with the National Parks and Wildlife Service and specify actions to be taken and under what circumstances the Service should be contacted.

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