



Mt Piper Power Station Ash Placement Project

ENVIRONMENTAL ASSESSMENT

CHAPTER 8 – ECOLOGY

■ August 2010



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8. Ecology

This chapter provides an assessment of the ecological impacts of the proposal. The Director-General's requirements are:

- *For the Neubecks Creek and Ivanhoe No 4 sites (concept plan application only), include an analysis of potential ecological constraints to the development of these sites including available mitigation and / or management options (including any offsets applying to the concept plan as a whole) that may be applied to achieve acceptable environmental outcomes, with consideration of cumulative impacts from the project and other existing or proposed activities in close proximity to the project sites. Key ecological risk factors and / or design criteria that would require further detailed investigation prior to the development of these sites must be identified;*
- *For the Lamberts North and Lamberts South sites (project application), must include an assessment of the likely impacts on native vegetation, threatened species, populations, ecological communities and their habitats (both terrestrial and aquatic as relevant), with particular reference to downstream aquatic habitats. The assessment, including field surveys and identification of any actions to avoid or mitigate impacts, must be prepared in accordance with the Draft Guidelines for Threatened Species Assessment (DEC & DPI, 2005).*

8.1. Introduction

This chapter provides a quantified assessment of the potential ecological impacts for the development of Lamberts North and Lamberts South as ash storage sites. Together these two sites are referred to as Lamberts Gully. An overview assessment for the sites at Neubecks Creek and Ivanhoe No 4 is also provided. A specialist study was undertaken for the assessment of ecological impacts and this is provided in **Appendix E**.

8.2. Review of Information

A review of previous ecological assessments undertaken within the Mt Piper Power Station perimeter lands and the surrounding locality was conducted for this assessment. These included:

- Vegetation of the Western Blue Mountains (DEC 2006);
- Ecotone Ecological Consultants (1996);
- International Environmental Consultants Pty Ltd (2006).

Broad-scale vegetation mapping of the study area is presented in the 'Vegetation of the Western Blue Mountains' (DEC 2006). These data describe vegetation map units in the study area.

The data presented in the Ecotone assessment (Ecotone 1996) documents the results of seasonal surveys conducted within the Mt Piper Power Station perimeter lands. Surveys for terrestrial flora

and fauna were undertaken over four seasons from autumn 1995 to the summer of 1995/1996. These surveys involved the identification and mapping of vegetation communities, transect and quadrat surveys for flora, and targeted surveys for threatened plant species. Fauna surveys included live-trapping using Elliott, cage and pit traps as well as mist nests and harp traps for microchiropteran bats. Additional techniques included spotlighting, ultrasonic bat detectors, owl call playback, scat collection and analysis and searches for scratch-marks, tracks and other signs.

The Ecotone (1996) surveys within the perimeter lands identified the presence of one vulnerable plant species, the Capertee Stringybark *Eucalyptus cannonii*, scheduled under the TSC Act and the EPBC Act.

Various ecological assessments have also recently been undertaken by SKM in the lands surrounding Mt Piper Power Station, including:

- Studies for the Western Rail Coal Unloader (SKM 2007; 2008);
- The EA for the Mt Piper Power Station Extension (SKM 2009).

Ecology field surveys were also undertaken for the proposed coal unloader to the south and east of the Mt Piper power station site (SKM 2007) and the proposed power station extension (SKM 2009). In these studies over 109 flora species were recorded within the two vegetation communities occurring in this area. *Eucalyptus cannonii* was found to be locally abundant in these areas.

The ecological assessment for Lamberts Gully Mine (International Environmental Consultants Pty Ltd 2006) identified five individual *Eucalyptus cannonii* trees.

Additional data sources used in this review included the:

- DECCW Atlas of NSW Wildlife Database (access April 2010);
- Database of the Royal Botanic Gardens PlantNET and Australian Museum FaunaNET;
- records published in scientific journals, reports and general flora and fauna distribution texts; and
- other relevant databases including the National Herbarium, Protected Matters Search Tool (EPBC Act accessed May 2010).

All of the threatened flora and fauna species, endangered populations and ecological communities known to occur within the study locality have been tabulated. This information was utilised in the preparation of lists of threatened species deemed potential inhabitants of the study area (i.e. potential subject species).

8.3. Survey Results from Lamberts North and Lamberts South

The following section documents the results of a site assessment to record the vegetation, fauna habitats and species diversity present within the proposed ash placement area. The majority of the land proposed for the ash placement has been previously cleared of natural vegetation for coal mining activities and currently comprise active mining areas, rehabilitation areas at various stages of regeneration, other highly disturbed areas and several sediment basins. Areas of remnant vegetation occur at the edges of the proposed ash placement areas, and at the southern end of the proposal area there are three patches of vegetation present totalling approximately 9 ha. Two of these areas are isolated from nearby vegetation in the State forest, while the third is connected by a narrow corridor.

8.3.1. Methods

The flora survey involved identification of the floristics and structure of the vegetation within the proposed ash placement areas and the type and distribution of any plant communities. Field surveys were concentrated within the naturally vegetated areas of the study area, comprising numerous traverses and plot based assessments to identify potentially occurring threatened species, populations and ecological communities listed under the TSC Act and EPBC Act. The overall condition of the site vegetation was noted, including the extent of modification and weed invasion.

The fauna field survey included a threatened species habitat assessment and fauna census. Surveys were conducted for threatened and common fauna species as well as an investigation of the presence of critical habitat requirements for threatened species. The location of field survey methods conducted is depicted in **Figure 8-1**. A combination of habitat assessment, spotlighting, Anabat detection, bird surveys, stag watching and call playback was used to survey fauna throughout the three remaining habitat patches. Given the relatively small area of the proposed ash placement and the lack of fauna habitat attributes, a detailed investigation using the full range of survey techniques was not considered necessary.

8.3.2. Vegetation Communities

The quality of the vegetation communities present within the proposed ash placement area is affected by the extent of previous clearing and disturbance from mining activities. The majority of the ash placement areas comprise highly disturbed areas that are currently being utilised for mining activities and rehabilitation areas where mining has been completed. These areas are devoid of vegetation. However, there are three patches of remnant vegetation in the southern-most proposed ash placement area. At this site four different vegetation communities including regenerating vegetation in rehabilitation areas were identified in the proposed ash placement lands (as shown in **Figure 8-2**) and these are described below.



- Legend
- Project Approval - Lamberts Gully
 - Floristic Quadrats
 - Fauna Habitat Assessments
 - Traverses (flora survey, spotlighting)
 - Anabat locations

■ Figure 8-1 Survey Locations



Legend

- Project Approval - Lamberts Gully
- Map Unit 1: Brittle Gum - Red Stringybark Woodland
- Map Unit 2: Scribbly Gum Woodland
- Map Unit 3: Ribbon Gum Woodland
- Map Unit 4: Rehabilitation Areas
- Eucalyptus cannonii

■ **Figure 8-2 Vegetation and Threatened Flora Species**

Map Unit 1: Brittle Gum – Red Stringybark Woodland

Areas of intact remnant vegetation in the southern portion of the Lamberts Gully area are dominated by this map unit. Dominant canopy species comprise Brittle Gum (*Eucalyptus mannifera*) and Red Stringybark (*Eucalyptus macrorhyncha*) up to 15 m high. The understorey is dominated by grasses and forbs with scattered shrubs. Dominant shrub species include Silver Wattle (*Acacia dealbata*), Showy Parrot-pea (*Dillwynia sericea*) and Peach Heath (*Lissanthe strigosa*). Dominant groundcovers include Snowgrass (*Poa siebriana*), Raspwort (*Gonocarpus tetragynus*), Wattle Mat-rush (*Lomandra filiformis*) and Forest Goodenia (*Goodenia hederacea*).

Map Unit 2: Scribbly Gum Woodland

A small area of this vegetation community is present in areas of intact remnant vegetation in the southern portion of the Lamberts Gully area. The dominant canopy species is Inland Scribbly Gum (*Eucalyptus rossii*) occurring with Brittle Gum and Red Stringybark approximately to 15-17 m high. The understorey is dominated by a mix of shrubs and groundcovers grasses. Dominant shrub species include Box-leaf Wattle (*Acacia buxifolia*), Ploughshare Wattle (*Acacia gunnii*) and *Mirbelia platylobioides*. Dominant groundcovers include Snowgrass, Silky Purple-flag (*Patersonia sericea*), Variable Sword-sedge (*Lepidosperma laterale*) and Button Everlasting (*Coronidium scorpioides*).

Map Unit 3: Ribbon Gum Woodland

A small area of this vegetation community is present along the main drainage line within the area of intact remnant vegetation in the southern portion of the Lamberts Gully area. The dominant canopy species is Ribbon Gum (*Eucalyptus viminalis*) occurring with Broad-leaved Peppermint (*Eucalyptus dives*), Candlebark (*Eucalyptus rubida*), Brittle Gum and Red Stringybark approximately to 16-19 m high. The understorey is dominated by a mix of grasses and forbs, including Weeping Grass (*Microlaena stipoides*), Speargrass (*Austrostipa pubescens*), Raspwort, Maori Bedstraw (*Galium propinquum*), Yam Daisy (*Microseris lanceolata*), Narrow Plantain (*Plantago gaudichaudii*) and Bottle-daisy (*Solenogyne bellioides*). A sparse cover of shrub species are present including Silver Wattle, Sifton Bush (*Cassinia arcuata*) and Bracken (*Pteridium esculentum*).

Map Unit 4: Rehabilitation Areas

There are several areas within the study area that are being rehabilitated with native trees and shrubs including a large area at the northern end of Lamberts Gully and surrounding remnant vegetation at the southern end of the Lamberts Gully. These areas are dominated by various shrub species including Silver Wattle, Red-stemmed Wattle (*Acacia rubida*), Box-leaf Wattle, Black Wattle (*Acacia mearnsii*), Sifton Bush, Green Wattle (*Acacia parramattensis*) and Fine-leaf Green Wattle (*Acacia decurrens*). Eucalypt species are also interspersed within these areas including Ribbon Gum, Brittle Gum and Candlebark.

Much of the rehabilitation area is recently completed, with seedlings and low shrubs sparsely distributed throughout. However, there are two areas of well-established rehabilitated vegetation at

the site – in the narrow ‘laneway’ between the two largest remnant patches, and in-between the two largest remnant patches and Ben Bullen State Forest beyond the southern boundary of the site. These areas are taller and denser than other rehabilitated vegetation at the site.

The significance of the rehabilitated area is that it is comprised of species native to the area, is weed-free and, as it matures, will increase the area of hospitable habitat for flora and fauna at the site. The rehabilitated vegetation is also significant because it reconnects the two largest patches of remnant vegetation, with each other and with vegetation in Ben Bullen State Forest. For most fauna the rehabilitated vegetation (especially in the narrow laneway), is effectively connecting the two patches, providing sufficient refuge and cover to facilitate movement.

8.3.3. Results of Flora Surveys

In total, 147 different plant taxa from 39 families were represented. This total comprised 34 species of monocotyledons, 110 species of dicotyledons, 2 species of fern and 1 conifer. Of this total, 16 introduced species are present, consisting of approximately 11% of the total species recorded. A list of all flora species recorded on the site is presented in Appendix 5.

Of the introduced species three species declared as Noxious were recorded, comprising St John’s Wort (*Hypericum perforatum*), Blackberry (*Rubus fruticosus*) and African Lovegrass (*Eragrostis curvula*). These species are listed as Class 4 noxious weeds meaning “the growth and spread of the plant must be controlled” according to the measures specified in a management plan published by the local control authority.

One threatened flora species was found to occur at the southern end of the proposed ash placement area within areas of remnant vegetation (**Figure 8-2**), namely Capertee Stringybark (*Eucalyptus cannonii*). The species is scheduled as Vulnerable under both the TSC Act (State listed species) and the EPBC Act (nationally threatened species). This species was found to be restricted to three individuals on the edge of a patch of remnant vegetation.

Studies in the surrounding areas indicate that Capertee Stringybark is widely dispersed. Ecotone (1996) recorded it as locally common throughout the Mt Piper perimeter lands, surveys in the Ben Bullen State Forest (SKM 2008) has determined the presence of this species between Baal Bone Mine and Mt Piper Power Station, where it was found to be relatively abundant, and it has been recorded as locally abundant within a proposed coal unloader site to the south and east of the Mt Piper power station (SKM 2007). This species is well represented within conservation reserves, and has limited potential threats other than land clearing.

No other threatened flora species were recorded despite targeted searches within areas of suitable habitat. It is unlikely that other threatened flora species are present considering the extent and type of habitats present and the degree of survey effort.

8.3.4. Fauna Habitats

Primary habitat for fauna within the proposed ash placement occurs at the three areas of remnant woodland remaining at the site. These are shown in **Figure 8-3**. The patches are characterised by low, open woodland with abundant hollows, fallen wood, overstorey tree species with decorticated bark, abundant groundcover, and mixed mid-storey vegetation. The two larger patches are also bordered by rehabilitation areas, comprising a range of understorey and tree species and sparse to dense vegetation cover to 2 m. This contributes to connecting them to each other and to larger woodland and forest areas bordering the study area, and provides alternative refuge and foraging habitat for fauna.

Despite the differences in remnant patch size, all three areas support similar habitat opportunities for a suite of fauna. These are:

- Tree hollows for arboreal mammals and birds;
- Log piles at the remnant perimeters providing refuge habitat for reptiles, small mammals and birds;
- Tree canopy cover providing refuge, breeding and foraging habitat for birds, and foraging habitat for arboreal mammals;
- Standing dead and fallen timber and logs providing foraging, refuge and breeding habitat for a suite of terrestrial species;
- Leaf litter and ground cover providing foraging, refuge and breeding habitat for a suite of terrestrial species;
- Decorticated bark providing refuge habitat for amphibians, reptiles, microchiropteran bats and invertebrates.

Remnant vegetation at the site also includes numerous small and one large ephemeral drainage line and an ephemeral wetland at the south-western edge of the largest remnant patch. These areas provide refuge, foraging and breeding habitat for amphibians, and provide an important water source for other fauna.



- Legend
- Project Approval - Lamberts Gully
 - Woodland
 - Regenerating Woodland
 - Hollow Trees

■ Figure 8-3 Fauna Habitat

8.3.5. Fauna Species

A total of 21 species were recorded within the proposed plant ash placement areas, comprising 14 birds, four mammals, one reptile and two frogs. This total represents a small proportion of the known species richness for the Mt Piper power station perimeter lands (Ecotone 1996). This is due to the brevity of the survey period imposed, and the relative isolation and size of the remnant vegetation. The full species list, along with a comparison with the Ecotone (1996) and SKM (2008) surveys is provided at **Appendix E**.

The majority of bird species present were common species of woodlands with the most abundant including the Crimson Rosella (*Platycercus elegans*), White-throated Treecreeper (*Cormobates leucophaeus*), Yellow-faced Honeyeater (*Lichenostomus chrysops*), Superb Fairy-Wren (*Malurus cyaneus*) and thornbills (*Acanthiza* spp.). Less commonly encountered species included Spotted Pardalote (*Pardalotus punctatus*), and Brown Goshawk (*Accipiter fasciatus*). The diversity of guilds represented at the site is indicative of the range and quality of foraging habitats occurring in the remnant vegetation and adjacent rehabilitation areas.

The most common mammals observed were Common Brushtail and Ringtail Possums (*Trichosurus vulpecula* and *Pseudocheirus peregrinus* respectively), Eastern Grey Kangaroo (*Macropus giganteus*), and the introduced Rabbit (*Oryctolagus cuniculus*). Tracks and dung of the Wombat and Fox were also observed. Further native arboreal mammals such gliders were not detected at the remnant vegetation, however these are known to occur in the area, and habitat occurs at the site.

Previous surveys for insectivorous bats have detected several species, including threatened species (Ecotone 1996). Remnant vegetation at the study site includes abundant roosting sites and foraging opportunities. There is also abundant fallen hollow wood, ground cover and leaf litter at the site, providing habitat for terrestrial small mammals, such as Antechinus.

The ephemeral wetland and creekline with associated pond provide foraging, breeding and refuge habitat for frogs at the site. Two species were detected at the ephemeral wetland during the survey, and it is likely others encountered by Ecotone during their 1996 survey also occur at the study area. The ephemeral wetland is in particularly good condition, with abundant littoral vegetation and apparently good water quality. Both habitats offer abundant adjacent terrestrial and riparian refuge.

No threatened fauna species (TSC Act or EPBC Act) were identified from the field surveys, although several species are known from the Mt Piper power station perimeter lands (Ecotone 1996) and may occupy and utilise the site.

8.4. Impact Assessment for Lamberts North and Lamberts South

The proposed ash placement would comprise an area of approximately 108 ha in the Lamberts Gully area. The majority of this area comprises disturbed lands currently part of an active mine and areas rehabilitated following mining activities.

8.4.1. Vegetation and Fauna Habitat

Native vegetation within the proposal area is limited to three patches of vegetation at the southern end of the Lamberts Gully area. There will also be impacts to regenerating vegetation within rehabilitation areas at the northern and southern end of the Lamberts Gully area. The areas of vegetation potentially affected by the ash placement at Lamberts Gully are specified in **Table 8-1**.

■ **Table 8-1: Areas of vegetation potentially impacted by the proposal**

Vegetation Community	Area (ha)
Map Unit 1: Brittle Gum - Red Stringybark Woodland	7.5
Map Unit 2: Scribbly Gum Woodland	1.1
Map Unit 3: Ribbon Gum Woodland	0.3
Map Unit 4: Rehabilitation Areas	31.4
Total	40.3

Habitat for fauna within the proposed ash placement areas is limited to the remnant vegetation patches in the southern-most area proposed for ash placement. The remnant vegetation is of high habitat value, supporting an abundance and diversity of foraging, refuge and breeding opportunities for fauna. Although there is vegetation adjacent to the ash storage areas, the loss of habitat (particularly the hollows, trees with decorticated bark and wetland) constitutes a net loss for the locality with consequences for local fauna, including reduced breeding and refuge habitat opportunities and disturbance to remaining habitats. However, impacts on local populations would not lead to an increased risk of extinction, and hence the loss of habitat is considered not significant. Remaining areas of the ash storage area are cleared and modified lands and there are no areas of conservation value for fauna.

8.4.2. Threatened Species Conservation Act, 1995

An assessment of the impacts of this proposal on species, populations and ecological communities listed under Schedules 1, 1A and 2 of the TSC Act has been undertaken. The proposal is to be assessed under Part 3A of the EP&A Act and consequently this impact assessment was undertaken in accordance with the Draft Guidelines for Threatened Species Assessment (DEC 2005). The assessment of significance is provided in **Appendix E**.

Critical habitat is defined as an area that is critical to the survival of an endangered species, population or ecological community. The proposal will not impact on critical habitat declared under the TSC Act.

The proposed ash placement areas do not contain remnant or regrowth vegetation that is considered characteristic of an endangered ecological community listed under the TSC Act.

One plant species listed as vulnerable under both the TSC Act and the EPBC Act, Capertee Stringybark (*Eucalyptus cannonii*) was observed in one location comprising 3 individuals. Previous study undertaken in the area by Ecotone (1996), SKM (2007, 2008) also recorded the presence of this species in the perimeter lands, and noted its widespread distribution.

Up to three individuals of the *Eucalyptus cannonii* will be removed to accommodate the proposed ash placement. No other threatened flora species were recorded despite targeted searches within areas of suitable habitat, and it is unlikely that other threatened flora species are present considering the extent and type of habitats present and the degree of survey effort undertaken. Hence, the results of the TSC Act and EPBC Act tests of significance indicate the loss of habitat would not significantly affect the viability of threatened species in the area.

The threatened fauna species recorded from the Mt Piper power station perimeter lands and the surrounding study area were analysed through an analysis of the known habitat requirements of these threatened species, in relation to the diversity of habitats present within the proposed ash placement area, a list of potential subject species has been compiled. Potential subject species are defined as those threatened species considered likely to occur in the habitats present within the study area (NPWS 1996).

No threatened fauna species (TSC Act or EPBC Act) were identified on the site during the field surveys. However, the remnant open forest and woodland vegetation likely provides habitat for threatened species including microbats and woodland bird species, and threatened species have previously been detected in the area (Ecotone 1996). The site may provide at least foraging and possibly roosting habitat for a suite of microbat species, and could form part of the territory of Spotted-tail Quoll, owl and glider species. However, the results of the TSC Act and EPBC Act tests of significance indicate the loss of habitat would not significantly affect the viability of threatened species in the area.

8.4.3. Environment Protection and Biodiversity Conservation Act, 1999

Actions that have the potential to significantly affect matters of national environmental significance (NES) are subject to assessment and approval under the provisions of this Act. The matters of NES identified in the Act that trigger the Commonwealth assessment and approval regime are:

- World Heritage Properties;
- Ramsar wetlands;
- Nationally threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas; and
- Nuclear actions (including uranium mining).

This assessment deals specifically with the significance of impacts from the proposed ash placement on nationally threatened species and endangered ecological communities in addition to commonwealth migratory species and world heritage properties.

The *Administrative Guidelines for determining whether an action has, will have, or is likely to have a significant impact on a matter of national environmental significance under the EPBC Act 1999*, was consulted and reviewed in relation to the findings of this study. This has enabled determination as to whether the project requires a referral to DEWHA for consideration as a Controlled Action.

This assessment indicates that listed matters of NES (in this instance nationally threatened species and Migratory species and World Heritage Areas) would not be significantly disrupted or affected as a result of the proposed works.

8.5. Management of Ecological Impacts

8.5.1. Avoidance

The majority of the proposed ash placement area is currently cleared and highly modified, although up to 9 ha of remnant vegetation cannot be avoided and will require removal. Considering this area of habitat cannot be avoided impacts to this area would need to be offset.

Where possible native vegetation would be retained including regenerating trees and shrubs in rehabilitation areas. During construction mitigation measures need to be implemented to protect areas of vegetation on adjacent lands surrounding the proposal area from accidental incursions and indirect impacts such as runoff and dust.

8.5.2. Offsetting

An area of up to 9 ha of remnant vegetation would be offset to ensure there is no net loss of flora and fauna values in the area. This would provide a habitat offset of 1:1. Although no threatened species or ecological communities would be affected by the loss of the 9ha of vegetation, the generally good habitat value would suggest that an offset would be appropriate. The remnant vegetation within the offset location should have similar habitat attributes as the remnant vegetation within the proposal area, comprising a relatively mature area of vegetation with an abundance of hollow trees and fallen

timber. Although only three specimens of Capertee Stringybark would be lost to the development, the proposed offset area should contain specimens of that species, if possible.

8.5.3. Mitigation

The following mitigation measures would be implemented to minimise direct impacts from the development:

- Pre-clearing survey to identify and flag any significant hollow-bearing habitat trees in areas of remnant vegetation in the proposal area, with the aim of identifying fauna occupying trees and other habitats;
- The removal of hollow-bearing trees and other habitat features (fallen timber, wombat burrows) needs to be supervised by an ecologist to ensure any fauna species are relocated safely to adjacent habitats or in the case of juvenile or injured fauna, these should be given to a qualified local wildlife carer for rehabilitation;
- Timber felled for clearing and existing fallen timber should be stockpiled for use in future rehabilitation activities on top of the ash placement to used on the ground as habitat for terrestrial fauna and erosion control;
- The native top soil within the areas of remnant vegetation would be salvaged and re-spread over existing ash placement sites ready to be rehabilitated, or other disturbed areas requiring rehabilitation. Topsoil in this area is likely to have a significant seed-bank and is a highly valuable resource for any rehabilitation activities.

Revegetation of the ash placement areas would use native species which occur in the local area and are adapted to the local conditions. A list of flora species suitable for revegetation of the various habitats of this area is provided in **Appendix E**.

In addition to the revegetation of the ash placement areas, augmentation of fauna habitats from within the remnant vegetation in the proposal area would be implemented. This would comprise stockpiling coarse woody debris including hollow limbs and logs and redistributing within the ash placement rehabilitation areas. Coarse woody debris could also be used to control water runoff from the ash placement mounds.

Introduced fauna are currently present within the study area. The construction would not be expected to increase populations or exacerbate the impacts of introduced fauna. The use of the construction machinery and exposure of the ground surface could potentially result in increased spread of weeds, including noxious species. Control measures would be implemented, however, to limit the spread of weed species.

Weed management principles would be implemented during construction such as the appropriate disposal of removed weed material including soil containing propagules and washing down machinery.

The use of best-practice sedimentation and erosion controls is required to limit contamination runoff leaving the proposal area. Controls need to be regularly maintained.

8.6. Neubecks Creek and Ivanhoe No 4

A desktop ecological assessment of the Neubecks Creek and Ivanhoe No. 4 areas was undertaken to identify the broad-scale vegetation communities and potential for threatened species habitat. Although the proposed ash placement areas have been cleared and disturbed by previous mining and agricultural activities, grassland and open forest and woodland communities occur throughout both areas. Vegetation communities in the areas are typical of those in the wider region.

8.6.1. Vegetation Communities

Vegetation communities at Ivanhoe No. 4 are a sub-set of those occurring at Neubecks Creek (DEC 2006) and include:

- Map Unit 61: Cleared land and severely disturbed lands;
- Map Unit 37: Cox's Permian Red Stringybark – Brittle Gum Woodland;
- Map Unit 11: Tablelands Gully Snow Gum – Ribbon Gum Grassy Forest.

A further two communities occur at Neubecks Creek. These are:

- Map Unit 33: Tableland Broad-leaved Peppermint – Brittle Gum – Red Stringybark Grassy Open Forest;
- Map Unit 35: Tableland Gully Mountain Gum – Broad-leaved Peppermint Grassy Forest.

Both study areas include creek systems with extensive vegetation clearing in the lower slopes. Vegetation largely occurs in the upper slopes where it is contiguous with open forest and woodland habitats outside the proposed impact areas. These areas are mapped in Figure 8-4.

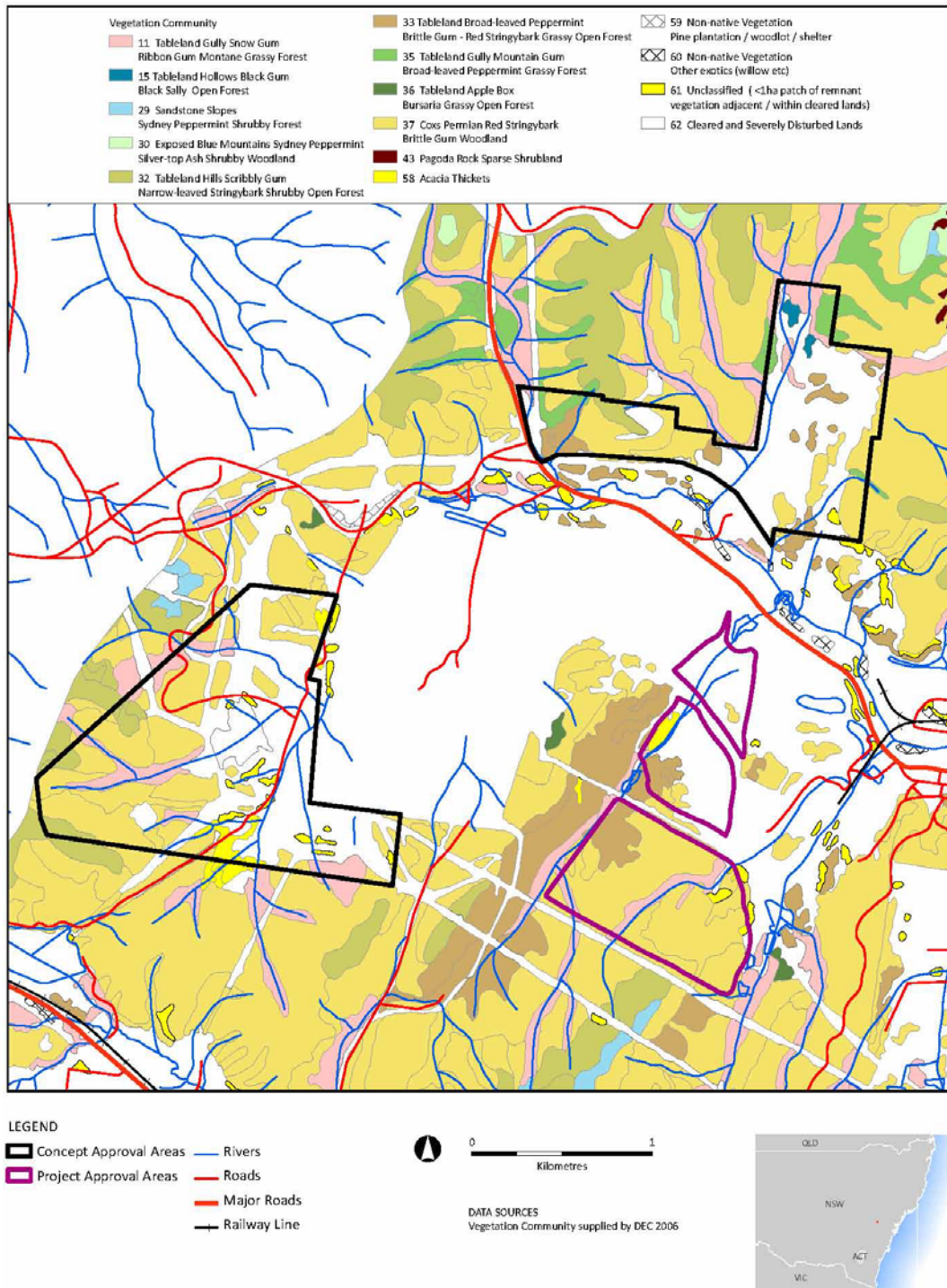


Figure 8-4 Concept Area Vegetation Communities

8.6.2. Threatened Species

The review of existing knowledge and wildlife databases undertaken to identify the documented locations of threatened flora and fauna species within a 10 km radius of the Mt Piper Power Station revealed 24 threatened flora and 25 threatened fauna are known to occur habitats throughout the area. Of these several threatened flora are known to occur in the specific vegetation communities occurring at the study areas (**Table 8-2**) (DEC 2006).

■ **Table 8-2 Threatened flora species and their corresponding vegetation communities in the study areas.**

Map Unit	Description	Definite Species	Possible Species
11	Tableland Gully Snow Gum – Ribbon Gum Grassy Forest	■ <i>Trachymene scapigera</i>	■ <i>Baloskion longipes</i> ■ <i>Derwentia blakelyi</i> ■ <i>Diurus aequalis</i> ■ <i>Eucalyptus camphora</i> ■ <i>Eucalyptus macarthurii</i> ■ <i>Euphrasia scabra</i>
33	Tableland Broad-leaved Peppermint – Brittle Gum – Red Stringybark Grassy Open Forest		■ <i>Diurus aequalis</i> ■ <i>Diurus tricolor</i> ■ <i>Eucalyptus macarthurii</i> ■ <i>Eucalyptus robertsonii</i> subsp. <i>hemisphaerica</i> ■ <i>Thesium austral</i>
35	Tableland Gully Mountain Gum – Broad-leaved Peppermint Grassy Forest		■ <i>Baloskion longipes</i>, ■ <i>Derwentia blakelyi</i> ■ <i>Diurus aequalis</i>, ■ <i>Eucalyptus cannonii</i>
37	Cox's Permian Red Stringybark – Brittle Gum Woodland	■ <i>Eucalyptus cannonii</i> ■ <i>Derwentia blakelyi</i>	■ <i>Austrotricha crassifolia</i>

Open forest and woodland communities, creeks and grassy fields at Neubecks Creek and Ivanhoe No. 4 likely provide habitat for several threatened species known to occur in the area. Depending on their quality these areas may provide abundant hollows, fallen wood, overstorey tree species with decorticated bark, abundant groundcover, mixed mid-storey vegetation, instream and riparian habitats, and grassy fields suitable for foraging. These areas provide habitat for threatened woodland birds, Microchiropteran bats and other mammals, owls, amphibians, reptiles and invertebrates.

8.6.3. Further Studies

Several of the listed threatened flora and fauna species identified could potentially occur in the habitats occurring at the proposed ash placement areas. Although both areas have been subject to mining in the past, remnant vegetation is present and a flora and fauna assessment would need to be undertaken prior to project approval for ash placement.

These studies would need to assess potential impacts of the project on threatened species, populations and communities. They would include an updated review of relevant literature, legislation and databases to determine any new listing of threatened species, populations and communities, as well as field studies. The field studies should focus on vegetation, fauna habitats and species diversity occurring within the proposed ash placement areas and any additional areas potentially affected by the proposal. Further, the proposed methodology for the ecological assessment should be conducted in accordance with the DEC (2004) *Threatened Biodiversity Survey and Assessment: Guidelines for Development and Activities* and DEC & DPI (2005) *Draft Guidelines for Threatened Species Assessment*.

Mitigation measures for identified impacts would include:

- Avoidance of any areas of impact if practicable;
- The use of biodiversity offsets to manage impacts on valuable habitats which may not be able to be avoided;
- Appropriate management of any vegetation clearing; and
- Measures to control the spread of introduced flora and fauna.