

# Mt Piper Power Station Ash Placement Project

## APPENDIX E

### FLORES AND FAUNA IMPACT ASSESSMENT

- August 2010





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Sinclair Knight Merz  
ABN 37 001 024 095  
710 Hunter Street  
Newcastle West NSW 2302 Australia  
Postal Address  
PO Box 2147 Dangar NSW 2309 Australia  
Tel: +61 2 4979 2600  
Fax: +61 2 4979 2666  
Web: [www.skmconsulting.com](http://www.skmconsulting.com)





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# 1. Introduction

## 1.1 Project Description

Delta Electricity has identified a need to expand its current Mt Piper Power Station ash placement facilities. Previous feasibility and site selection studies have selected four potential sites for which Delta is proposing to undertake planning activities and obtain relevant approvals for ash placement. The four sites are:

- Lamberts North
- Lambert South
- Neubecks Creek
- Ivanhoe No. 4.

Delta Electricity is seeking Project Approval for the future development of the proposed placement sites at Lamberts North and Lamberts South, which are part of the Lamberts Gully Mine and are currently being mined for coal. Concept approval is being sought for Neubecks Creek and Ivanhoe No. 4 and ash placement at these sites would only be considered after ash placement at Lamberts North and Lamberts South is completed.

## 1.2 Flora and Fauna Assessment

Field surveys for the Flora and Fauna Assessment component of the approval application were undertaken within the Lamberts North and South areas, with desktop assessments only conducted for the Neubecks Creek and Ivanhoe No.4 sites.

The information presented in the report has utilised a review of available data in conjunction with these field investigations to assess the potential impacts of the proposal in relation to species, and communities listed on the schedules of the NSW *Threatened Species Conservation Act 1995* (TSC Act) and the Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

## 2. Review of Existing Knowledge

### 2.1 Methods: Previous Investigations

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 three vegetation map units in the study area, described further in Section 2.1.1

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. A summary of the results are presented in Section 2.1.1 and 2.2.2.

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

- Western Coal Unloader (2006)
- Conveyer options report (2007)
- Mt Piper Power Station Extension (2009).

#### 2.1.1 Results: Flora Assemblage

Vegetation communities mapped in the study area by DEC (2006) include the following map units:

- Map Unit 37: Cox's Permian Red Stringybark – Brittle Gum Woodland.
- Map Unit 33: Tableland Broad-leaved Peppermint – Brittle Gum – Red Stringybark Grassy Open Forest.
- Map Unit 11: Tablelands Gully Snow Gum – Ribbon Gum Grassy Forest.

A total of over 200 plant species have been recorded from the Mt Piper perimeter lands (Ecotone 1996). The vegetation communities identified are typical of those expected in the wider region and





primarily linked to local geology and soil. The eight mapped vegetation communities of the perimeter lands as described in Ecotone (1996) comprise the following:

<b>Geology</b>	<b>Vegetation communities of the perimeter lands</b>
Triassic Sandstone	Silvertop ash open Forest Sydney Peppermint Open forest Brown Stringybark Open Forest Scribbly Gum Open Woodland / Forest Thin-leaved Stringybark Open Forest
Permian Sediment (Illawarra Coal Measures)	Brittle Gum/ Red Stringybark/ Scribbly Gum Open Woodland Snow Gum Grassy Open Woodland Ribbon Gum/ Apple Box / Snow Gum Open Woodland

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.

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. Additionally the threatened species *Persoonia marginata* was considered as potentially occurring in the study area based on the habitats present.

### **2.1.2 Results: Fauna Assemblage**

A considerable amount of information is available in relation to the vertebrate fauna of the perimeter lands and nearby Thompsons Creek dam, based on the seasonal surveys reported in Ecotone (1996). The results indicate a moderately high species richness comprising:

- 11 amphibians;
- 26 reptiles;
- 104 birds; and
- 34 mammals (three arboreal, eight terrestrial, 14 bat species and nine introduced species).



This diversity is a reflection of the size and diversity of habitat types present within the perimeter lands and represents considerably greater species richness than would be expected to occur within the proposed ash placement areas which have been highly disturbed from mining activities with the exception of several remnant patches of vegetation.

Seven fauna species listed under the TSC Act have been positively recorded within the Mt Piper power station perimeter lands including the Spotted-tailed Quoll (*Dasyurus maculata maculata*) (also listed under EPBC Act), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Eastern Bent-wing Bat (*Miniopterus schreibersii*), Gang Gang Cockatoo (*Callocephalon fimbriatum*), Painted Honeyeater (*Grantiella picta*), Brown Treecreeper (eastern ssp *Climacteris picumnus victoriae*) and Glossy Black Cockatoo (*Calyptorhynchus lathami*). An additional two species were tentatively identified – the Greater Broad-nosed Bat (*Scoteanax rueppellii*) and Powerful Owl (*Ninox strenua*).

Ecological surveys undertaken for the Lamberts Gully Mine (International Environmental Consultants Pty Ltd 2006) identified the presence of two threatened fauna species comprising Brown Treecreeper (eastern ssp *Climacteris picumnus victoriae*) and Painted Honeyeater (*Grantiella picta*). Five additional species were considered to potentially occur based on the habitats present.

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). In this study a total of 46 fauna species were recorded, comprising 31 bird species, 13 mammal species and two frogs.

## 2.2 Database Searches

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).

### 2.2.1 Threatened Flora

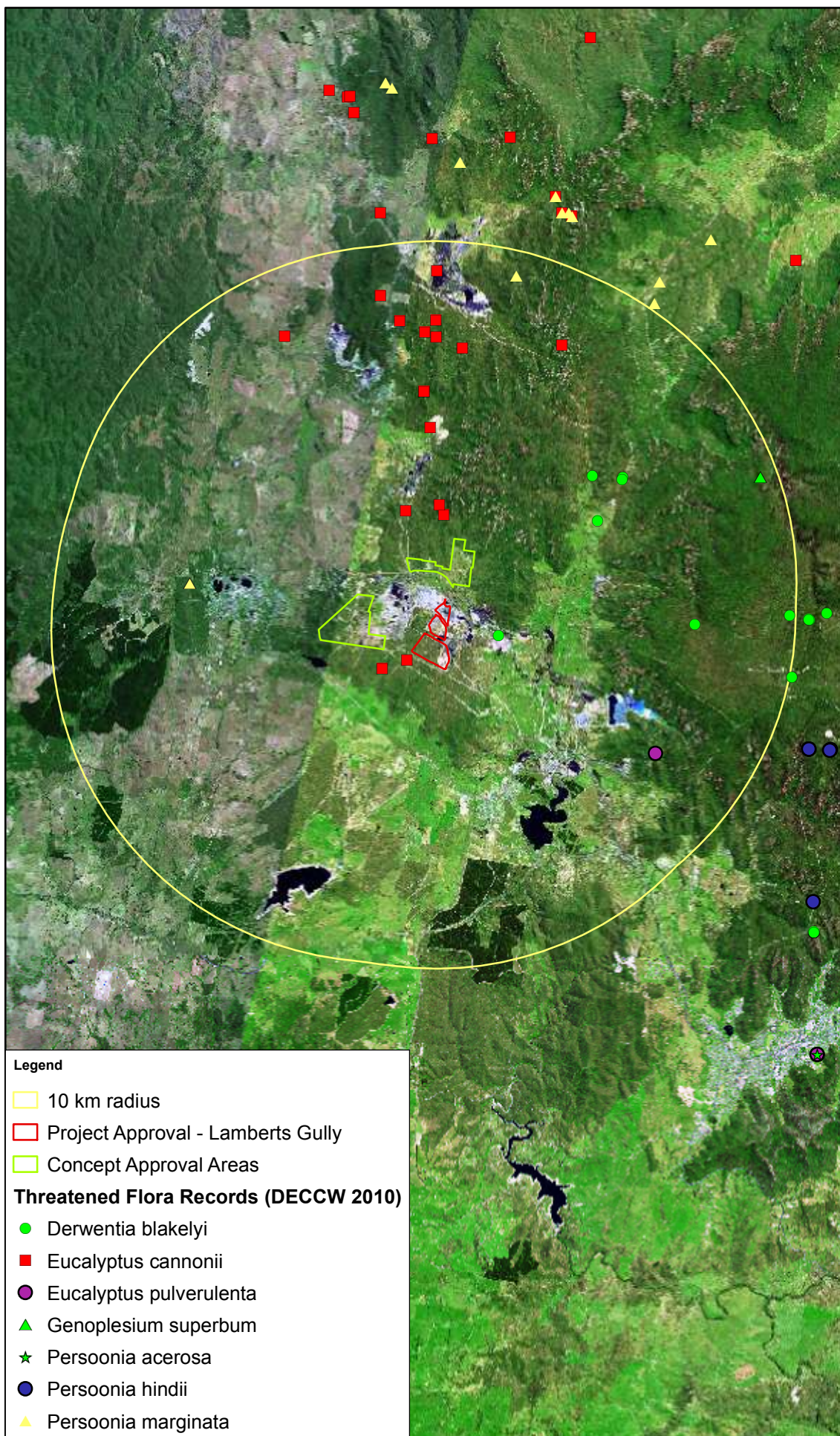
Twenty-four threatened flora species has previously been recorded in the wider locality (10 kilometre radius) of the proposed ash placement site, and/or have potential to occur in the study area based on the species distribution and habitat requirements (Table 2-1; Figure 2-1). The presence of these species was targeted during field surveys carried out within the proposed ash placement areas.

■ **Table 2-1 Threatened flora previously recorded or potentially occurring in the locality**

Threatened Flora	Status		Recorded in the locality (10 km radius)
	Cwth	NSW	
<i>Acacia baueri</i> subsp. <i>Aspera</i>	-	V	
<i>Acacia clunies-rossiae</i>	-	V	
<i>Acacia flocktoniae</i>	V	V	
<i>Calotis glandulosa</i>	V	V	
<i>Darwinia peduncularis</i>	-	V	
<i>Dillwynia tenuifolia</i>	V	V	
<i>Derwentia blakelyi</i>	-	V	✓
<i>Diuris aequalis</i>	E	V	
<i>Eucalyptus cannonii</i>	V	V	✓
<i>Eucalyptus pulverulenta</i>	V	V	✓
<i>Genoplesium superbum</i>	-	E	✓
<i>Grevillea evansiana</i>	V	V	
<i>Grevillea obtusifolia</i>	E	E	
<i>Hibbertia puberula</i>	-	E	
<i>Lepidium hyssopifolium</i>	E	E	
<i>Persoonia acerosa</i>	V	V	
<i>Persoonia hindii</i>	-	E	
<i>Persoonia hirsute</i>	E	E	
<i>Persoonia marginate</i>	V	V	✓
<i>Prostanthera stricta</i>	V	V	
<i>Pultenaea glabra</i>	V	V	
<i>Thesium austral</i>	V	V	
<i>Zieria citriodora</i>	V	E	
<i>Zieria murphyi</i>	V	V	

V = Vulnerable; E = Endangered

**Figure 2-1: Threatened Flora Records**

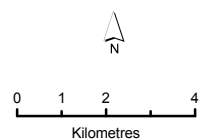


**Legend**

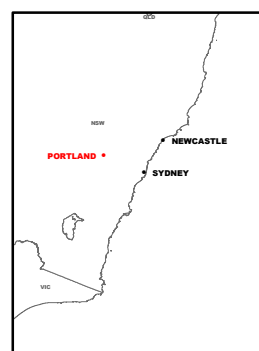
- 10 km radius
- Project Approval - Lamberts Gully
- Concept Approval Areas

**Threatened Flora Records (DECCW 2010)**

- *Derwentia blakelyi*
- *Eucalyptus cannonii*
- *Eucalyptus pulverulenta*
- ▲ *Genoplesium superbum*
- ★ *Persoonia acerosa*
- *Persoonia hindii*
- ▲ *Persoonia marginata*



1:170,000



Source:  
Aerial photograph: NSW Dept Lands  
Threatened Species Records: DECCW 2010



### 2.2.2 Threatened Fauna

Thirty-five threatened fauna species have been recorded in the wider locality (i.e. within a 10 kilometre radius) or potentially occur in the study area based on the distribution and habitat requirements of the species (Table 2-2; Figure 2-2).

■ **Table 2-2 Threatened fauna previously recorded in the locality**

Common name	Species	Status		Recorded in the locality (10 km radius)
		C'wlth	NSW	
Barking Owl	<i>Ninox connivens</i>		V	✓
Bathurst Copper Butterfly	<i>Paralucia spinifera</i>	V	E	✓
Black-chinned Honeyeater	<i>Melithreptus gularis gularis</i>		V	
Blue-billed Duck	<i>Oxyura australis</i>		V	
Blue Mountains Water Skink	<i>Eulamprus leuraensis</i>		E	✓
Booroolong Frog	<i>Litoria booroolongensis</i>	E	E	
Broad-headed Snake	<i>Hoplocephalus bungaroides</i>	V	E	
Brown Treecreeper	<i>Climacteris picumnus victoriae</i>		V	✓
Brush-tailed Rock Wallaby	<i>Petrogale penicillata</i>	E	E	
Diamond Firetail	<i>Stagonopleura guttata</i>		V	✓
Eastern Bent-wing Bat	<i>Miniopterus schreibersii</i>		V	✓
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>		V	✓
Eastern Free-tail Bat	<i>Mormopterus norfolkensis</i>		V	✓
Eastern Long-eared Bat	<i>Nyctophilus timoriensis</i>	V	V	
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>		V	✓
Giant Dragonfly	<i>Petalura gigantea</i>		E	✓
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>		V	✓
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>		V	✓
Green and Golden Bell Frog	<i>Litoria aurea</i>	V	E	
Grey-crowned Babbler	<i>Pomatostomus temporalis temporalis</i>		V	
Hooded Robin	<i>Melanodryas cucullata</i>		V	✓
Koala	<i>Phascolarctos cinereus</i>		V	✓
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V	
Little John's Tree Frog	<i>Litoria littlejohni</i>	V	V	
Painted Honeyeater	<i>Grantiella picta</i>		V	✓
Pink-tailed Legless Lizard	<i>Aprasia parapulchella</i>		V	
Powerful Owl	<i>Ninox strenua</i>		V	✓
Regent Honeyeater	<i>Xanthomyza phrygia</i>	E	E	✓
Speckled Warbler	<i>Pyrrholaemus sagittata</i>		V	✓
Spotted-tailed Quoll	<i>Dasyurus maculatus maculatus</i>	E	V	✓
Squirrel Glider	<i>Petaurus norfolcensis</i>		V	✓

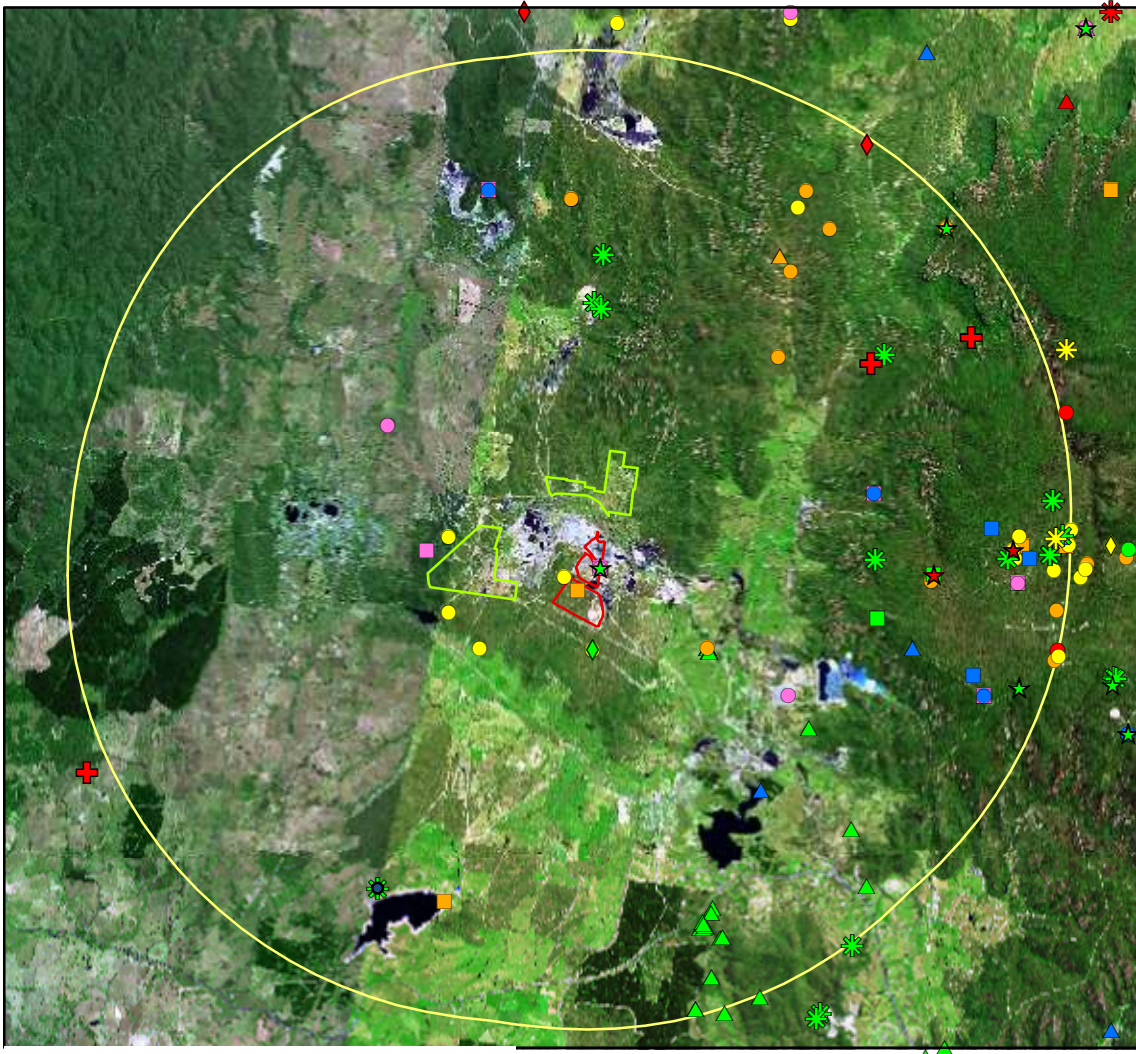


Common name	Species	Status		Recorded in the locality (10 km radius)
		C'wlth	NSW	
Square-tailed Kite	<i>Lophoictinia isura</i>		V	
Stuttering Frog	<i>Mixophyes balbus</i>		E	
Swift Parrot	<i>Lathamus discolor</i>	E	E	
Turquoise Parrot	<i>Neophema pulchella</i>		V	
Yellow-bellied Glider	<i>Petaurus australis</i>		V	

### 2.2.3 Endangered Ecological Communities

Of the eight vegetation communities identified from the Mt Piper power station perimeter lands in Ecotone (1996), or map units as identified by DEC (2006) none of these is consistent with a endangered ecological communities listed under the schedules of the EPBC Act or TSC Act.

The TSC Act endangered White Box Yellow Box Blakely's red Gum Woodland and the EPBC Act critically endangered White Box Yellow Box Blakely's Red Gum Grassy Woodland and derived Native Grassland have are listed as in the region. This community is not present in the study area.



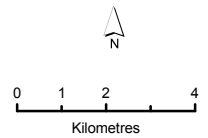
**Figure 2-2: Threatened Fauna Records**

**Legend**

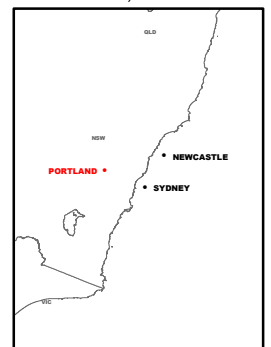
- 10 km radius
- Project Approval - Lamberts Gully
- Concept Approval Areas

**Threatened Fauna Records (DECCW 2010)**

- |  |   |
|--|---|
| <span style="color: green;">■</span> Barking Owl                                   | <span style="color: green;">★</span> Large-eared Pied Bat |
| <span style="color: green;">▲</span> Bathurst Copper Butterfly                     | <span style="color: green;">+</span> Little Lorikeet      |
| <span style="color: green;">●</span> Black-chinned Honeyeater (eastern subspecies) | <span style="color: green;">◆</span> Painted Honeyeater   |
| <span style="color: red;">●</span> Blue Mountains Water skink                      | <span style="color: green;">★</span> Powerful Owl         |
| <span style="color: red;">■</span> Blue-billed Duck                                | <span style="color: red;">◆</span> Regent Honeyeater      |
| <span style="color: red;">▲</span> Broad-headed Snake                              | <span style="color: red;">★</span> Speckled Warbler       |
| <span style="color: yellow;">●</span> Brown Treecreeper                            | <span style="color: red;">+</span> Spotted-tailed Quoll   |
| <span style="color: yellow;">■</span> Brush-tailed Rock-wallaby                    | <span style="color: red;">★</span> Square-tailed Kite     |
| <span style="color: yellow;">▲</span> Diamond Firetail                             | <span style="color: yellow;">★</span> Squirrel Glider     |
| <span style="color: pink;">●</span> Eastern Bentwing-bat                           | <span style="color: yellow;">◆</span> Stuttering Frog     |
| <span style="color: pink;">■</span> Eastern False Pipistrelle                      | <span style="color: yellow;">★</span> Turquoise Parrot    |
| <span style="color: pink;">▲</span> Eastern Freetail-bat                           |   |
| <span style="color: orange;">●</span> Gang-gang Cockatoo                           |   |
| <span style="color: orange;">▲</span> Giant Dragonfly                              |   |
| <span style="color: orange;">■</span> Glossy Black-Cockatoo                        |   |
| <span style="color: blue;">●</span> Greater Broad-nosed Bat                        |   |
| <span style="color: blue;">■</span> Hooded Robin                                   |   |
| <span style="color: blue;">▲</span> Koala  |   |



1:170,000



Source:  
Aerial photograph: NSW Dept Lands  
Threatened Species Records: DECCW 2010



### 3. Concept Approval Areas

A desktop ecological assessment of the Concept Approval areas (Neubecks Creek and Ivanhoe No. 4) 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.

#### 3.1 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

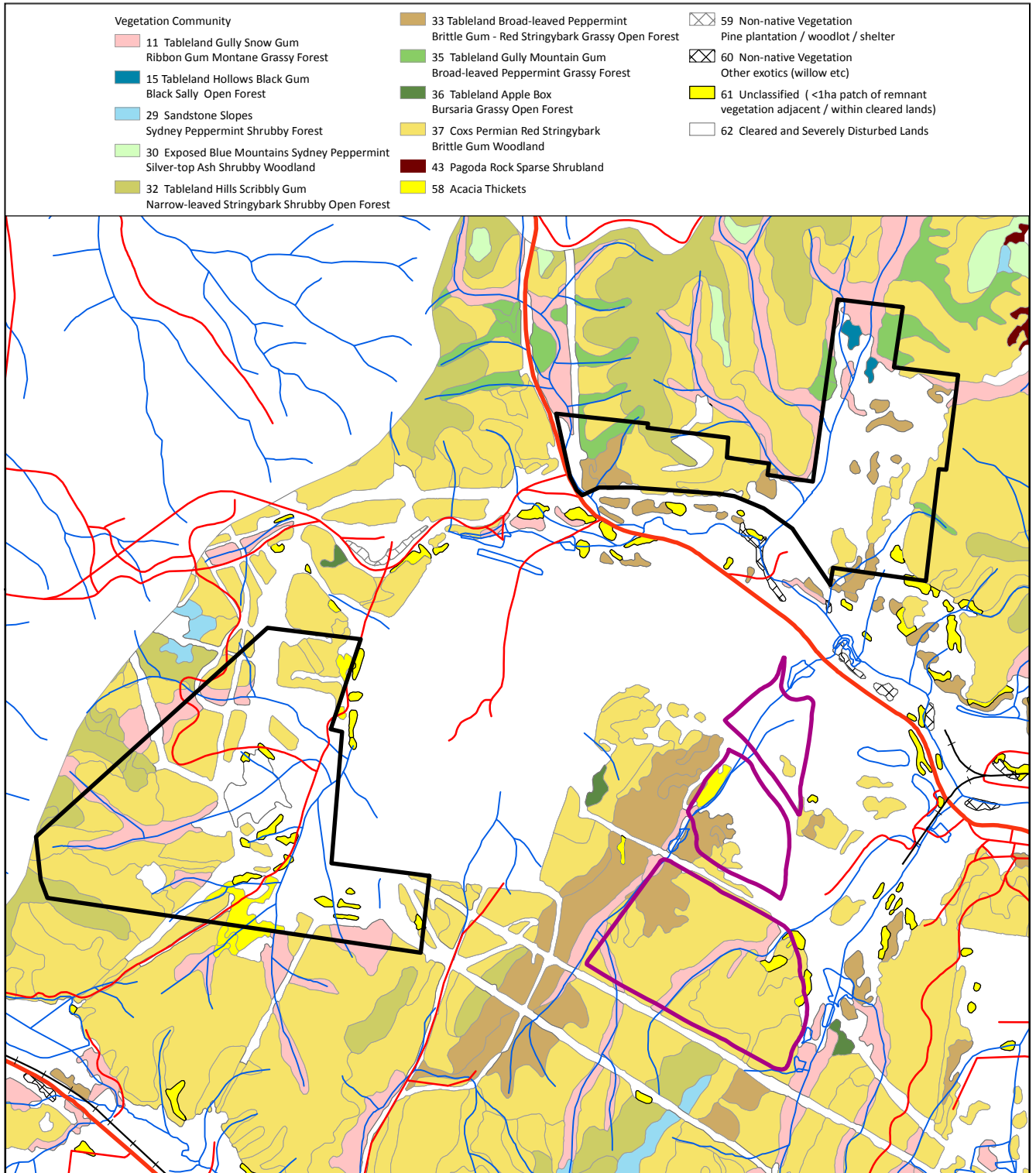
Both study areas include creek systems with extensive vegetation clearing in the lower slopes. Vegetation largely occurs in the upper slopes where it is contiguous with open forest and woodland habitats outside the proposed impact areas. Vegetation communities are shown in Figure 3-1.

#### 3.2 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 in Chapter 2 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 3-1) (DEC 2006).



FIG 3-1 | Vegetation of Concept Approval Areas

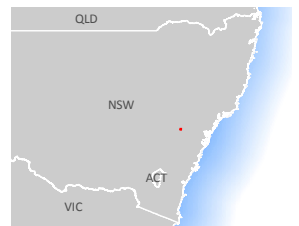


LEGEND

- Concept Approval Areas
- Project Approval Areas
- Rivers
- Roads
- Major Roads
- Railway Line



DATA SOURCES  
Vegetation Community supplied by DEC 2006





- **Table 3-1 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	<ul style="list-style-type: none"> <li>■ <i>Trachymene scapigera</i></li> </ul>	<ul style="list-style-type: none"> <li>■ <i>Baloskion longipes</i></li> <li>■ <i>Derwentia blakelyi</i></li> <li>■ <i>Diurus aequalis</i></li> <li>■ <i>Eucalyptus camphora</i></li> <li>■ <i>Eucalyptus macarthurii</i></li> <li>■ <i>Euphrasia scabra</i></li> </ul>
33	Tableland Broad-leaved Peppermint – Brittle Gum – Red Stringybark Grassy Open Forest		<ul style="list-style-type: none"> <li>■ <i>Diurus aequalis</i></li> <li>■ <i>Diurus tricolor</i></li> <li>■ <i>Eucalyptus macarthurii</i></li> <li>■ <i>Eucalyptus robertsonii</i> subsp. <i>hemisphaerica</i></li> <li>■ <i>Thesium austral</i></li> </ul>
35	Tableland Gully Mountain Gum – Broad-leaved Peppermint Grassy Forest		<ul style="list-style-type: none"> <li>■ <i>Baloskion longipes</i>,</li> <li>■ <i>Derwentia blakelyi</i></li> <li>■ <i>Diurus aequalis</i>,</li> <li>■ <i>Eucalyptus cannonii</i></li> </ul>
37	Cox’s Permian Red Stringybark – Brittle Gum Woodland	<ul style="list-style-type: none"> <li>■ <i>Eucalyptus cannonii</i></li> <li>■ <i>Derwentia blakelyi</i></li> </ul>	<ul style="list-style-type: none"> <li>■ <i>Austrotricha crassifolia</i></li> </ul>

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 decorticating 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.

### 3.3 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 previously been subject to coal extraction remnant vegetation exists and a full flora and fauna assessment would be required 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 DECCW (2004) *Threatened Biodiversity Survey and Assessment: Guidelines for Development and Activities*.

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.



## 4. Project Approval Areas

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 (effectively isolated from the adjoining State forest), totalling approximately 9 ha. For the purposes of this discussion, the proposed ash placement areas are described as three separate areas and the vegetation and fauna habitat values in each area discussed.

### 4.1 Methods

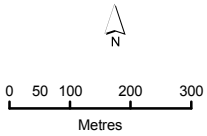
The flora survey involved identification of the floristics and structure of the vegetation within the proposed ash placement areas and the type and distribution of any plant communities. Field surveys were concentrated within the naturally vegetated areas of the study area, comprising numerous traverses 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 listed in Table 2-2. The location of field survey methods conducted is depicted in Figure 4-1.

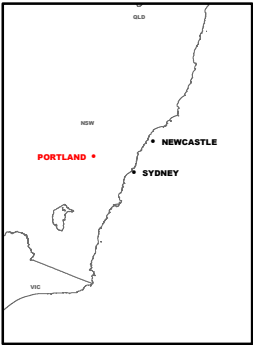
A combination of habitat assessment, spotlighting, Anabat detection, bird surveys, stag watching and call playback was used to survey fauna throughout the three remaining habitat patches. Given the relatively small area of the proposed ash placement and the lack of fauna habitat attributes, a detailed investigation using the full range of survey techniques was not considered necessary. Information on the fauna assemblage previously recorded from Mt Piper power station perimeter lands was sourced from Ecotone (1996).



**Figure 4-1: Field Survey Methods**



1:12,500



**Legend**

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

Source:  
Aerial photograph: NSW Dept Lands  
Survey methods: SKM 2010





The field surveys were based on precautionary habitat assessment and the adoption of protective strategies for features deemed likely to be critical habitat for threatened fauna species recorded by Ecotone (1996) and known from the proximal area. During the survey, all opportunistic sightings and signs of fauna species were recorded. Birds were identified on the basis of observations and by characteristic call. Investigations for evidence of the presence of faunal species were also conducted. This involved inspections for droppings, tracks, owl pellets and other evidence that could be attributable to individual species. Spotlighting was conducted within the site area on one occasion for a total of two person hours, and concluded with call playback for arboreal mammals and owls.

#### 4.2 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 (Figure 3-2) and these are described below.

##### 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.



#### 4.3 Floristic Diversity / Condition

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 B.

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.

#### 4.4 Threatened Flora

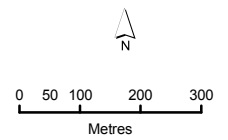
One threatened flora species was found to occur at the southern end of the proposed ash placement area within areas of remnant vegetation (Figure 4-2), namely Capertee Stringybark (*Eucalyptus cannonii*). The species is scheduled as Vulnerable under both the TSC Act (State listed species) and the EPBC Act (nationally threatened species). This species was found to be restricted to three individuals on the edge of a patch of remnant vegetation.

The closely related species Red Stringybark (*Eucalyptus macrorhyncha*) is dominant in the areas of remnant vegetation and hybridisation between these two species is common (DEC 2005). Hybrids were observed in the study area having distinctive morphological features of both species, although the three individuals identified in Figure 4-2 have mainly distinctive features of *Eucalyptus cannonii* and therefore have been identified as the threatened species. The site is likely to be a hybrid zone with both species occurring in the same area.

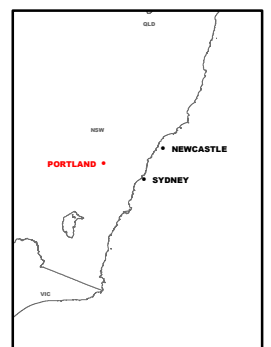




**Figure 4-2: Vegetation Communities and Threatened Flora**



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**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

Source:  
Aerial photograph: NSW Dept Lands  
Vegetation: SKM 2010





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 (Hunter and White 1999). Hunter and White (1999) consider the listing of this species as Vulnerable under the TSC Act as no longer appropriate due to the variation and size of populations within the current reserve network and non-productive private land.

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.

#### **4.5 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 4-3. 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 (Plate 4-1 )
- Log piles at the remnant perimeters providing refuge habitat for reptiles, small mammals and birds (Plate 4-2)
- 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 (Plate 4-3)
- 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 (Plate 4-4).

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 (Plate 4-5, Plate 4-6 respectively). These areas provide refuge, foraging and breeding habitat for amphibians, and provide an important water source for other fauna.



- **Plate 4-1 Typical Brittle Gum supporting several hollows in remnant vegetation at the study site**



- **Plate 4-2 Log piles at the perimeter of remnant vegetation**



- **Plate 4-3 Fallen wood and standing dead trees of a range of sizes are abundant throughout remnant vegetation at the study site**



- **Plate 4-4 Decortivating bark occurs on the Brittle Gum throughout the study area**



- **Plate 4-5 Ephemeral creekline with terminal pond**

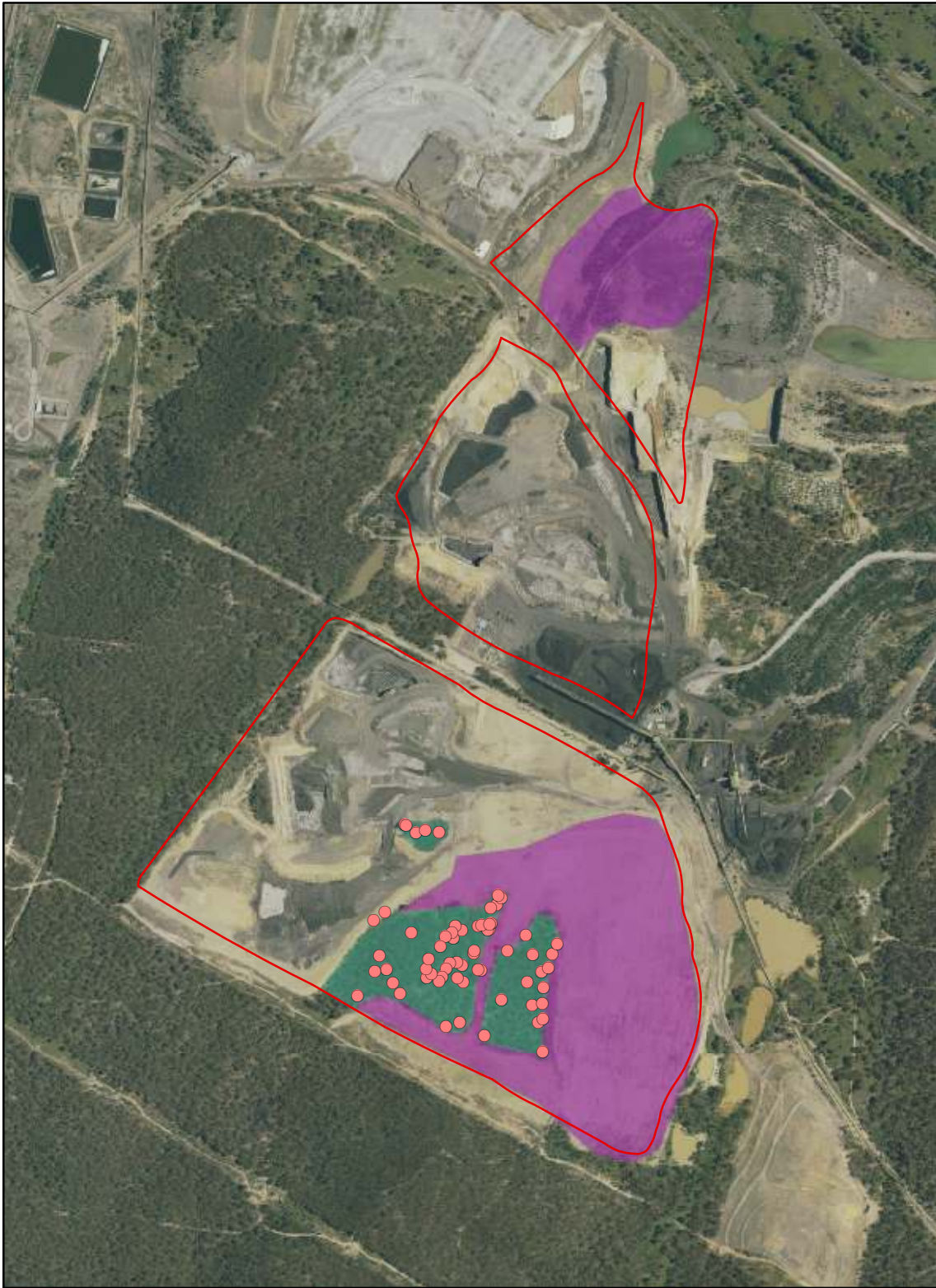


- **Plate 4-6 Ephemeral wetland**

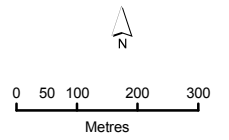
#### **4.6 Fauna Species**

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 C.

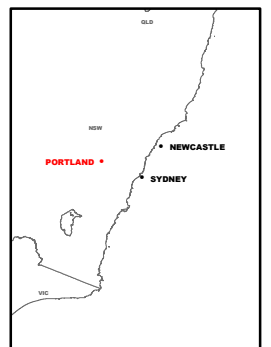
The majority of bird species present were common species of woodlands with the most abundant including the Crimson Rosella (*Platycercus elegans*), White-throated Treecreeper (*Cormobates leucophaeus*), Yellow-faced Honeyeater (*Lichenostomus chrysops*), Superb Fairy-Wren (*Malurus cyaneus*) and thornbills (*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.



**Figure 4-3: Hollow Trees and Fauna Habitat**



1:12,500



**Legend**

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

Source:  
Aerial photograph: NSW Dept Lands  
Vegetation: SKM 2010





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 as 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.

#### **4.7 Threatened Fauna**

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. Further discussion on threatened species is provided in Section 5 of the report.





## 5. Impact Assessment

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. There are, however, three patches of high quality remnant vegetation in the southern-most area proposed for ash placement. It is proposed that the ash storage areas are rehabilitated with native vegetation following placement.

### 5.1.1 Vegetation Clearance

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 5-1.

#### ■ Table 5-1: 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
<b>Total</b>	<b>40.3</b>

### 5.1.2 Fauna Habitat

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 placement areas, the loss of habitat (particularly the hollows, trees with decorticating 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, if mitigated appropriately, impacts on local populations will not lead to an increased risk of extinction, and hence the loss of habitat is considered not significant. Remaining areas of the ash placement area are cleared and modified lands and there are no areas of conservation value for fauna.



## **5.2 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 A.

### **5.2.1 Critical habitat**

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.

### **5.2.2 Endangered Ecological Communities**

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.

### **5.2.3 National Park Estate**

There will be no direct impacts on national parks or conservation reserves in the region as a result of the proposed ash placement works. The proposed ash placement area adjoins Ben Bullen State Forest along the southern boundary. Indirect impacts to this area are expected to be minimal considering storm runoff from the site generally flows to the north.

### **5.2.4 Threatened Flora**

One plant species listed as threatened 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.

### **5.2.5 Threatened Fauna**

The list of threatened fauna species recorded from the Mt Piper power station perimeter lands and the surrounding study area is provided in Section 2. 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).

■ **Table 5-1 Assessment of the potential for threatened fauna species to occur at habitats present in the ash placement area**

Common name	Species	Habitat requirements	Likely presence in the ash placement area
Brush-tailed Rock Wallaby	<i>Petrogale penicillata</i>	Open forest habitats with exposed rocks, rock overhangs and steep topography	Not expected
Regent Honeyeater	<i>Xanthomyza phrygia</i>	A nomadic species typically associated with forest and woodland habitats with the presence of suitable foraging species such as Yellow Box and Red Ironbark	Not expected
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	Open and closed forest habitats, requires large expansive areas of habitat to sustain territory size	Potential foraging area
Green and Golden Bell Frog	<i>Litoria aurea</i>	Ephemeral creeks, dams, ponds with adjacent grassy areas	Not expected
Bathurst Copper Butterfly	<i>Paralucia spinifera</i>	Inhabits open forest / woodland areas above 900 m in elevation and prefers sites that receive full all-day sun. Also requires the presence of the Native Blackthorn ( <i>Bursaria spinosa</i> ssp <i>lasiophylla</i> ) in the understorey an important host plant critical for larvae.	Not expected. There are no previous records of the species surrounding the Mt Piper power station and the habitat is not suitable
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	Open forest and woodland habitats, a cave roosting species which favours sandstone escarpment areas for roosting	Potential foraging area, no roosting habitat present
Painted Honeyeater	<i>Grantiella picta</i>	Dry open forests and woodlands, and is strongly associated with mistletoe.	Potential foraging area
Broad-headed Snake	<i>Hoplocephalus bungaroides</i>	Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in hollows in large trees within 200 m of escarpments in summer.	Not expected
Blue Mountains Water Skink	<i>Eulamprus leuraensis</i>	Sedge swamps, hanging swamps in the upper Blue mountains area	Not expected
Giant Dragonfly	<i>Petalura gigantea</i>	Sedge swamps, freshwater wetlands and peat bogs	Not expected
Little John's Tree Frog	<i>Litoria littlejohni</i>	It occurs along permanent rocky streams with thick fringing vegetation associated with eucalypt woodlands and heaths among sandstone	Not expected



Common name	Species	Habitat requirements	Likely presence in the ash placement area
		outcrops.	
Stuttering Frog	<i>Mixophyes balbus</i>	Permanent streams in moist and wet sclerophyll forests	Not expected
Booroolong Frog	<i>Litoria booroolongensis</i>	A highland species (200 – 1000m asl) associated with western-flowing rocky streams on the slopes and tablelands of the Great Dividing Range. Streams are slow-flowing and bordered by grassy vegetation.	Not expected
Koala	<i>Phascolarctos cinereus</i>	Open forests and woodlands with favoured food tree species	Not expected
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	Moist and tall open forests, particularly in steep topographic areas	Not expected
Powerful Owl	<i>Ninox strenua</i>	Open forests with dense wet gullies and creek areas, requires large mature trees with hollows for breeding and dense areas of vegetation for prey and roosting	Potential foraging area
Eastern Bent-wing Bat	<i>Miniopterus schreibersii</i>	Forages in a variety of habitat types including cleared and modified environments, a cave roosting species	May forage for insects in all areas
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	Open forest habitats with She-oak species ( <i>Allocasuarina</i> sp.) required for food.	Not expected, no food trees identified from the works area
Yellow-bellied Glider	<i>Petaurus australis</i>	Tall open forest habitats, favours mature wet sclerophyll forest and dense gullies.	Not expected
Brown Treecreeper	<i>Climacteris picumnus victoriae</i>	Woodland bird species, favour dry sclerophyll forests and woodlands, generally with a sparse understorey, grassy areas and logs.	Potential foraging area for all species. Brown Treecreeper may nest in tree hollows on site
Grey-crowned Babbler	<i>Pomatostomus temporalis</i>		
Black-chinned Honeyeater	<i>Melithreptus gularis gularis</i>		
Hooded Robin	<i>Melanodryas cucullata</i>		
Diamond Firetail	<i>Stagonopleura guttata</i>		
Speckled Warbler	<i>Pyrrholaemus sagittata</i>		
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	Occurs in a variety of open forest and woodland habitats, with hollow-bearing trees required for roosting, may forage in younger regrowth and modified environments	Potential foraging and roosting area
Eastern Free-tail Bat	<i>Mormopterus norfolkensis</i>		
Eastern Long-eared Bat	<i>Nyctophilus timoriensis</i>		
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>		



Common name	Species	Habitat requirements	Likely presence in the ash placement area
Barking Owl	<i>Ninox connivens</i>	Forest and woodland habitats, particularly drier western slopes and riverine areas, hunts for birds and small mammals.	Potential foraging area
Squirrel Glider	<i>Petaurus norfolcensis</i>	Forest and woodland habitats, particularly areas with a diversity of eucalypt species in the canopy.	Not expected. Not recorded from the Mt Piper perimeter lands despite intensive four seasonal trapping survey (Ecotone 1996).
Square-tailed Kite	<i>Lophoictinia isura</i>	Occurs in a variety of open forest and woodland habitats, particularly riverine woodlands	Not expected
Pink-tailed Legless Lizard	<i>Aprasia parapulchella</i>	In general, occurs in open grassland habitats that have a substantial cover of small rocks. A population is known from the Bathurst area	Not expected
Swift Parrot	<i>Lathamus discolor</i>	Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> .	Unlikely, limited favoured feed trees present
Turquoise Parrot	<i>Neophema pulchella</i>	Open forest and woodlands	Potential foraging area

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 likely provides 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.

### 5.3 Environment Protection and Biodiversity Conservation Act, 1999

Actions that have the potential to significantly impact matters of national environmental significance (NES) need to be subject to rigorous 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
- 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. Discussion on the matters of NES in relation to the proposal is presented in Table 5-2.

■ **Table 5-2 Assessment of matters of NES with regard to the proposal**

Matters of NES	Comments relevant to the Proposal
<p><b>Nationally threatened species and ecological communities</b></p>	<p>A review of the DEWHA environmental reporting tool – 6 May 2010, data and coordinates shown in Appendix D. The PM report indicates that there are 19 nationally threatened species (excluding fishes) and one threatened EEC that have distributional ranges that cover the study area and therefore may potentially occur. These are:</p> <ul style="list-style-type: none"> <li>■ White Box – Yellow Box – Blakely’s Gum Grassy Woodland and derived Native Grassland (EEC)</li> <li>■ Bathurst Copper Butterfly</li> <li>■ Painted Snipe</li> <li>■ Regent Honeyeater</li> <li>■ Swift Parrot</li> <li>■ Large-eared Pied Bat</li> <li>■ Spotted-tail Quoll</li> <li>■ Eastern Long-eared Bat</li> <li>■ Littlejohn’s Tree Frog</li> <li>■ Booroolong Frog</li> <li>■ Brush-tailed Rock-wallaby</li> <li>■ Long-nosed Potoroo</li> <li>■ Grey-headed Flying-fox</li> <li>■ Broad-headed Snake</li> <li>■ <i>Apatophyllum constablei</i></li> <li>■ <i>Eucalyptus cannonii</i></li> <li>■ <i>Eucalyptus pulverulenta</i></li> <li>■ <i>Prasophyllum sp Wybong</i></li> <li>■ <i>Pultenaea glabra</i></li> <li>■ <i>Thesium australe</i></li> </ul> <p>Of these species and EEC, the Grey-headed Flying-fox, Large-eared Pied Bat and Spotted-tail Quoll are considered to potentially occur in areas of vegetation in the proposed ash placement area. Of the flora only <i>Eucalyptus cannonii</i> would be expected on the site and it was recorded on the site in low abundance (three individuals).</p> <p>The habitat of the study area inspected during the field surveys is not suitable to the remainder of these listed threatened species and none is expected to occur and as a result are unlikely to be impacted by the proposal.</p> <p>The guidelines within the EPBC Act were reviewed in terms of assessing the</p>



Matters of NES	Comments relevant to the Proposal
	<p>potential impacts on the Large-eared Pied Bat, Spotted-tail Quoll, Grey-headed Flying-fox and <i>Eucalyptus cannonii</i>, based on the areas surveyed for this project. The assessment considers whether the action is likely to have a significant impact on a threatened species if it is likely to:</p>
	<p><i>1. Lead to a long-term decrease in the size of an important population of a species.</i></p> <p>There is no evidence to suggest that the loss of habitat in the study area would decrease the size of an important population of any of these threatened species.</p> <p>Spotted-tailed Quoll occupies a large home range (up to about 750 ha for females and 3 500 ha for males) of which the study area would occupy a small proportion. Foraging resources for the Grey-headed Flying-fox and Large-eared Pied Bat occur throughout all naturally vegetated areas of the Mt Piper power station perimeter lands. The proposal would not remove important food resources nor impact on a roosting colony of this species.</p> <p>Three individuals of <i>Eucalyptus cannonii</i> were recorded at the southern end of the study area. The species is known to occur in “several localities in areas surrounding Mt Piper” (Ecotone 1996; SKM 2007/2008) and is widespread across the region with an estimated 20 000 plants located in four dedicated conservation areas.</p> <p>Given that the site has not been recognised as important for populations of this species within the species recovery plan, it is unlikely to constitute significant habitat.</p>
	<p><i>2. Reduce the area of occupancy of an important population</i></p> <p>The loss of open forest and woodland from the study area is not considered likely to reduce the area of occupancy of Spotted-tailed Quoll, Grey-headed Flying-fox and Large-eared Pied Bat. These species occur in habitats throughout the region.</p> <p>The area of occupancy for <i>Eucalyptus cannonii</i> will be reduced, however considering only three individuals occur in an area up to 400 m<sup>2</sup>, it is not anticipated that there will be a large reduction in the area of occupancy.</p>
	<p><i>3. Fragment an existing important population into two or more populations</i></p> <p>The open forest and woodland remnants are currently fragmented with the smallest patch completely isolated, and the two larger patches connected to each other and adjacent vegetation via young rehabilitation vegetation. They are surrounded by disturbed areas currently being mined for coal. Thus, the proposed action cannot further isolate populations.</p> <p>No population of <i>eucalyptus cannonii</i> will be fragmented into two or more populations. The habitats in the proposal area are currently fragmented with minor connectivity to more extensive areas of vegetation to the south of the proposal area.</p>
	<p><i>4. Adversely affect habitat critical to the survival of a species</i></p> <p>No critical habitat areas relate to the study area.</p>
	<p><i>5. Disrupt the breeding cycle of an important population</i></p> <p>There is no evidence to suggest that an important population occurs in the study area.</p> <p>The grey-headed Flying-fox is widespread and there are no roosting colonies within proximity to the proposed ash placement area. Given the large home ranges occupied by the Spotted-tailed Quoll and Large-eared Pied Bat and the relatively small size of the remnant open forest and woodland to be removed, it is similarly considered unlikely their breeding cycles could be disrupted.</p> <p>Further, the site has not been recognised as important for populations of this species within the species recovery plan, hence it is unlikely to constitute significant habitat and would therefore not disrupt the breeding cycle of the species.</p> <p>Considering the three individuals of <i>Eucalyptus cannonii</i> in the study area occur within a fragmented landscape with limited connectivity to other individuals, opportunities for cross pollination are currently limited. These individuals are unlikely to be important for pollination of the broader population of <i>Eucalyptus cannonii</i> in habitats surrounding the study area. Therefore, no disruption is expected to the reproductive cycle of this species.</p>



Matters of NES	Comments relevant to the Proposal
<p>6. <i>Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</i></p>	<p>The area of habitat destroyed by the proposed action is small relative to adjacent available habitats, and as such is considered unlikely to affect the availability of habitat such that a species is likely to decline.</p> <p>The proposed as placement is not considered to significantly modify, destroy, remove or isolate any significant area of habitat for <i>Eucalyptus cannonii</i> and large populations are known to occur in surrounding areas of habitat.</p>
<p>7. <i>Result in invasive species that are harmful to a vulnerable species becoming established in the threatened species habitat</i></p>	<p>The proposal is unlikely to result in the increased spread of invasive species, and weed control measures will be employed to ensure the colonisation and reproduction of exotic species is limited.</p> <p>Weed species are prevalent in existing cleared and disturbed parts of the proposed ash placement areas of the plant. Landscape plantings have been used locations are the plant infrastructure to minimise colonisation by weeds. This is recommended for areas that will be adjacent to the ash placement area. Disturbed and degraded edges present an ideal location for weed growth and establishment and the proposal could potentially result in future colonisation of disturbed areas, and needs to be managed.</p>
<p>8. <i>Interferes substantially with the recovery of the species</i></p>	<p>The small scale of the proposal and minimal disturbance required for future infrastructure in the designated areas is unlikely to interfere with the recovery of these threatened species on a national scale.</p> <p>The proposal is not likely to result in any impacts on nationally threatened species and no further provisions of this Act apply to the proposal in relation to threatened species.</p> <p>No nationally threatened ecological communities exist on the site.</p>
<p><b>Migratory species</b></p>	<p>There are 12 migratory species potentially occurring within the broader study area.</p> <ul style="list-style-type: none"> <li>■ White-bellied Sea-Eagle (<i>Haliaeetus leucogaster</i>)</li> <li>■ White-throated Needletail (<i>Hirundapus caudacutus</i>)</li> <li>■ Rainbow Bee-eater (<i>Merops ornatus</i>)</li> <li>■ Black-faced Monarch (<i>Monarcha melanopsis</i>)</li> <li>■ Satin Flycatcher (<i>Myiagra cyanoleuca</i>)</li> <li>■ Rufous Fantail (<i>Rhipidura rufifrons</i>)</li> <li>■ Latham's Snipe (<i>Gallinago hardwickii</i>)</li> <li>■ Regent Honeyeater (<i>Xanthomyza phrygia</i>)</li> <li>■ Painted Snipe (<i>Rostratula benghalensis s. lat.</i>)</li> <li>■ Great Egret (<i>Ardea alba</i>)</li> <li>■ Cattle Egret (<i>Ardea ibis</i>)</li> <li>■ Swift Parrot (<i>Lathamus discolor</i>)</li> </ul> <p>Of these only the Rainbow Bee-eater is considered to utilise the habitats with the proposal area. The proposal would not create any direct or indirect impacts on migratory species, their prey species nor their habitat and current population sizes and visitation rates of migratory species in the locality are likely to be maintained post-construction.</p>
<p><b>World Heritage Areas</b></p>	<p>The Greater Blue Mountains Area was inscribed on the World Heritage list in 2000. The total area consists of 1.03 million hectares of mostly forested landscape which includes eight conservation reserves, the Blue Mountains, Wollemi, Yengo, Nattai, Kanangra-Boyd, Gardens of Stone and Thirlmere Lakes National Parks and the Jenolan Caves Karst Conservation Reserve. This large area preserves a diversity of forests including tall forests at the margins of rainforest in deep valleys, through open forests and woodlands, to shrublands of stunted mallees on the exposed tablelands.</p>





Matters of NES	Comments relevant to the Proposal
	<p>At its nearest point Mt Piper power station is located approximately 18 km to the southwest of the Greater Blue Mountains Area (Gardens of Stone NP) and 30 km west of the Blue Mountains NP and Wollemi NP. There will be no direct impacts on World Heritage areas as a result of the proposed new infrastructure for the power plant ash placement.</p>

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.



## 6. Avoidance and Mitigation Measures

### 6.1 Avoidance

The majority of the proposed ash placement area is currently cleared and highly modified, although up to 8.9 ha of remnant vegetation cannot be avoided and will require removal. Considering this area of habitat cannot be avoided, impacts to this area should be offset.

Where possible native vegetation should 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.

### 6.2 Offsetting

An area of up to 9 ha of remnant vegetation should be offset to ensure there is no net loss of flora and fauna values in the area. This will provide a habitat offset of 1:1. No threatened species or ecological communities would be affected by the loss of the 8.9ha of vegetation, but 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 3 specimens of Capertee Stringybark would be lost to the development, the proposed offset area should contain specimens of that species if possible.

### 6.3 Mitigation

The following mitigation measures should be implemented to minimise direct impacts from the development.

#### 6.3.1 Vegetation Clearing

- 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 should 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.

### 6.3.2 Revegetation

Revegetation of the ash placement areas should 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 at Table 6-1.

■ **Table 6-1: Native flora species suitable for revegetation of ash placement areas**

Species	Scientific Name
<b>Trees</b>	
Brittle Gum	<i>Eucalyptus mannifera</i>
Inland Scribbly Gum	<i>Eucalyptus rossii</i>
Red Stringybark	<i>Eucalyptus macrorhyncha</i>
Broad-leaved Peppermint	<i>Eucalyptus dives</i>
Ribbon Gum	<i>Eucalyptus viminalis</i>
Apple Box	<i>Eucalyptus bridgesiana</i>
Candlebark	<i>Eucalyptus rubida</i>
Snow Gum	<i>Eucalyptus pauciflora</i>
<b>Shrubs</b>	
Silver Wattle	<i>Acacia dealbata</i>
Ploughshare Wattle	<i>Acacia gunnii</i>
Daphne Heath	<i>Brachyloma daphnoides</i>
Peach Heath	<i>Lissanthe strigosa</i>
Silky Parrot Pea	<i>Dillwynia sericea</i>
<b>Grasses</b>	
Kangaroo Grass	<i>Themeda australis</i>
Snowgrass	<i>Poa sieberiana</i>

Additional to revegetation of the ash placement areas, augmentation of fauna habitats from within the remnant vegetation in the proposal area should 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.



### **6.3.3 Introduced species**

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 however control measures will be implemented to limit the spread of weed species.

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

### **6.3.4 Sedimentation and erosion control**

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.



## 7. Conclusion

The information presented in this report has utilised field investigations and a review of available data to assess the potential impacts of the proposed Mt Piper power station ash placement in relation to relevant environmental and threatened species legislation. The assessment has concluded the following:

- The proposed ash placement of the Mt Piper power station into areas included in the field surveys is unlikely to impose a 'significant impact' on local populations of threatened species, endangered communities or their habitats. This conclusion is based on consideration of the extent of comparable habitat available to local populations of the threatened species.
- The proposal would not impact significantly on nationally threatened species or International migratory species or World Heritage Areas as listed under the EPBC Act in areas included in the field survey.
- An appropriate mitigation measure would be to provide a habitat offset of 1:1 which would contain a habitat of similar structure and complexity to that being removed.



## 8. References

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## Appendix A Assessment of Significance (Part 3A TSC Act)

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).

### Critical habitat

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.

### Endangered Populations

No endangered populations were recorded in the study area

### Endangered Ecological Communities

No endangered ecological communities were recorded in the study area.

### Threatened Flora

#### Capertee Stringybark *Eucalyptus cannonii*

The listed *Eucalyptus cannonii* (Schedule 2 TSC Act) was recorded in the proposal area in low abundance (three individuals). It has been recorded previously in surrounding lands as locally common (Ecotone 1996; SKM 2007/2008) recorded it as locally common throughout the Mt Piper perimeter lands.

This species is well represented within conservation reserves, and has limited potential threats other than land clearing (Hunter and White 1999). Hunter and White (1999) consider the listing of this species as Vulnerable under the TSC Act as no longer appropriate due to the variation and size of populations within the current reserve network and non-productive private land.

#### ***How is the proposal likely to affect the lifecycle of a threatened species and/or population?***

*Eucalyptus cannonii* is restricted to an area of about 100 x 60 km in the central tablelands of NSW, with the western extent comprising a line between Bathurst and Mudgee and the eastern extent comprising a line between Lithgow and the town of Bylong (DEC 2005). Within the region *Eucalyptus cannonii* is often locally frequent (DEC 2005). Some populations are quite large, with one population in Winburndale Nature Reserve estimated to be at a minimum of 6000 individuals with the total closer to 10,000 individuals. The species is also reserved in other conservation reserves comprising Avisford Nature Reserve, Wollemi National Park and Gardens of Stone





National Park, with the total reserved population estimated to exceed 20,000 plants in at least 14 separate populations (DEC 2000a). The species has limited potential threats other than land clearing (Hunter and White 1999).

The distribution of *Eucalyptus cannonii* in the surrounding area is relatively extensive with previous studies from the surrounding area recording *Eucalyptus cannonii* as relatively abundant and widespread (SKM 2007/2008; Ecotone 1996).

A total of 3 *Eucalyptus cannonii* individuals will require removal. A relatively large number of individuals will remain in surrounding areas of remnant vegetation. It is not expected that the proposal would significantly disrupt ecological processes such as pollination that may cause genetic isolation of *Eucalyptus cannonii*. Considering these factors, the proposal is unlikely to adversely affect the life cycle of *Eucalyptus cannonii* at in the local area.

***How is the proposal likely to affect the habitat of a threatened species, population or ecological community?***

The proposal will disturb a relatively small area of habitat (8.9 ha) considering the larger areas of habitat surrounding the proposal area. The proposed area of disturbance represents a very small fraction of the potential habitat for *Eucalyptus cannonii* in the local area.

With the implementation of adequate weed management principles and other mitigation measures surrounding areas of *Eucalyptus cannonii* habitat is unlikely to be disturbed. It is unlikely that the proposal will adversely affect potential habitat for *Eucalyptus cannonii*. Additionally, it is recommended that the ash placement areas are rehabilitated following completion which will potentially provide available areas of habitat for *eucalyptus cannonii*.

***Does the proposal affect any threatened species or populations that are at the limit of its known distribution?***

The *Eucalyptus cannonii* population at Mt Piper is towards the southern edge of the species distribution (DEC 2000). However, the proposal will not significantly reduce the distributional extent of *Eucalyptus cannonii* considering the known abundance of this species in surrounding areas.

***How is the proposal likely to affect current disturbance regimes?***

Weed invasion, grazing and fire are the major disturbance regimes within the study area. With the removal of remnant vegetation in the proposal area, weed species will also be removed, habitat for grazing species (including rabbits and Macropods) will be removed and fuel loads will be



significantly decreased. Therefore it is likely that disturbance regimes will cease or become less frequent with the implementation of the proposal.

***How is the proposal likely to affect habitat connectivity?***

Considering the existing high degree of fragmentation in the proposal area the proposal is unlikely to significantly affect habitat connectivity. The remnant vegetation in the proposal area does not provide a significant link between two patches of vegetation but is rather a ‘dead end’ with some connectivity to vegetation to the south of the proposal area.

***How is the proposal likely to affect critical habitat?***

No critical habitat has been identified for this species.

### Threatened Fauna

The list of threatened fauna species recorded from the Mt Piper power station perimeter lands and the surrounding study area is provided in Table 8-1. Through an analysis of the known habitat requirements of these threatened species, in relation to the diversity of habitats present within the proposed impact 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.

■ **Table 8-1 Assessment of the potential for threatened fauna species to occur at habitats present in the impact area**

Common name	Species	Habitat requirements	Likely presence in the extension area
Brush-tailed Rock Wallaby	<i>Petrogale penicillata</i>	Open forest habitats with exposed rocks, rock overhangs and steep topography	Not expected
Regent Honeyeater	<i>Xanthomyza phrygia</i>	A nomadic species typically associated with forest and woodland habitats with the presence of suitable foraging species such as Yellow Box and Red Ironbark	Not expected
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	Open and closed forest habitats, requires large expansive areas of habitat to sustain territory size.	Extensive areas of habitat within Ben Bullen State Forest suitable for this species. Suitable foraging and refuge habitat present.
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	No camps known to be present in the local area, nearest camps in Western Sydney. Suitable foraging habitat present.
Green and Golden Bell Frog	<i>Litoria aurea</i>	Ephemeral creeks, dams, ponds with adjacent grassy areas	Not expected
Bathurst Copper	<i>Paralucia spinifera</i>	Inhabits open forest / woodland areas above 900 m in elevation and prefers sites that	Low potential. While the habitat is marginal,

Common name	Species	Habitat requirements	Likely presence in the extension area
Butterfly		receive full all-day sun. Also requires the presence of the Native Blackthorn ( <i>Bursaria spinosa</i> ssp <i>lasiophylla</i> ) in the understorey an important host plant critical for larvae.	there are several records of this species approximately 7-8 km to the southeast of the Mt Piper power station.
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	Open forest and woodland habitats, a cave roosting species which favours sandstone escarpment areas for roosting	Potential foraging area, no roosting habitat present
Blue Mountains Water Skink	<i>Eulamprus leuraensis</i>	Sedge swamps, hanging swamps in the upper Blue mountains area	Not expected
Giant Dragonfly	<i>Petalura gigantea</i>	Sedge swamps, freshwater wetlands and peat bogs	Not expected
Stuttering Frog	<i>Mixophyes balbus</i>	Permanent streams in moist and wet sclerophyll forests	Not expected
Booroolong Frog	<i>Litoria booroolongensis</i>	A highland species (200 – 1000 m asl) associated with western-flowing rocky streams on the slopes and tablelands of the Great Dividing Range. Streams are slow-flowing and bordered by grassy vegetation.	Not expected
Koala	<i>Phascolarctos cinereus</i>	Open forests and woodlands with favoured food tree species	Not expected
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	Moist and tall open forests, particularly in steep topographic areas	Not expected
Powerful Owl	<i>Ninox strenua</i>	Open forests with dense wet gullies and creek areas, requires large mature trees with hollows for breeding and dense areas of vegetation for prey and roosting	Potential habitat present, may occur
Eastern Bent-wing Bat	<i>Miniopterus schreibersii</i>	Forages in a variety of habitat types including cleared and modified environments, a cave roosting species	May forage for insects in all areas
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	Open forest habitats with She-oak species ( <i>Allocasuarina</i> sp) required for food.	Not expected, no food trees identified from the works area
Yellow-bellied Glider	<i>Petaurus australis</i>	Tall open forest habitats, favours mature wet sclerophyll forest and dense gullies.	Not expected
Brown Treecreeper	<i>Climacteris picumnus</i>	Woodland bird species, favour dry sclerophyll forests and woodlands, generally with a sparse understorey, grassy areas and logs.	Potential habitat present, may occur
Grey-crowned Babbler	<i>Pomatostomus temporalis</i>		
Black-chinned Honeyeater	<i>Melithreptus gularis gularis</i>		
Hooded Robin	<i>Melanodryas cucullata</i>		
Diamond Firetail	<i>Stagonopleura guttata</i>		
Speckled Warbler	<i>Pyrrholaemus sagittata</i>		
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	Occurs in a variety of open forest and woodland habitats, with hollow-bearing trees required for roosting, may forage in younger regrowth and modified environments	May forage for insects in all areas, potential roost sites present.
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>		
Barking Owl	<i>Ninox connivens</i>	Forest and woodland habitats, particularly drier western slopes and riverine areas, hunts for birds and small mammals.	Potential habitat present, may occur
Squirrel Glider	<i>Petaurus norfolcensis</i>	Forest and woodland habitats, particularly	Not expected. Not



Common name	Species	Habitat requirements	Likely presence in the extension area
		areas with a diversity of eucalypt species in the canopy.	recorded from the Mt Piper perimeter lands despite intensive four seasonal trapping survey (Ecotone 1996).
Square-tailed Kite	<i>Lophoictinia isura</i>	Occurs in a variety of open forest and woodland habitats, particularly riverine woodlands	Not expected
Pink-tailed Legless Lizard	<i>Aprasia parapulchella</i>	In general, occurs in open grassland and woodland habitats that have a substantial cover of rocks and exposed rock. A small population is known from the Bathurst area	Low potential to occur on the basis that suitable sheltering habitat is very poorly represented in the proposed works area.
Turquoise Parrot	<i>Neophema pulchella</i>	Open forest and woodlands	Not expected

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 likely provides 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. The list of potential subject species includes:

<b>Woodland birds</b>	<ul style="list-style-type: none"> <li>■ Brown Treecreeper</li> <li>■ Diamond Firetail</li> <li>■ Speckled Warbler</li> <li>■ Powerful Owl</li> </ul>	<ul style="list-style-type: none"> <li>■ Grey-crowned Babbler</li> <li>■ Black-chinned Honeyeater</li> <li>■ Hooded Robin</li> <li>■ Barking Owl</li> </ul>
<b>Microchiropteran Bats</b>	<ul style="list-style-type: none"> <li>■ Eastern False Pipistrelle</li> <li>■ Large-eared Pied Bat</li> </ul>	<ul style="list-style-type: none"> <li>■ Greater Broad-nosed Bat</li> </ul>
<b>Other Mammals</b>	<ul style="list-style-type: none"> <li>■ Spotted-tail Quoll</li> </ul>	<ul style="list-style-type: none"> <li>■ Grey-headed Flying Fox</li> </ul>

## Impact Assessment

### *How is the proposal likely to affect the lifecycle of a threatened species and/or population?*

Potential impacts on populations of these threatened fauna may result from the clearing of vegetation and habitat to accommodate the ash placement. This relates to the net reduction in available habitat for local populations and loss of critical features that provide shelter such as tree hollows used by the Brown Treecreeper for breeding and as roost sites for hollow-roosting bats.

Fauna habitat identified within the works area is generally relatively low in value compared to the surrounding hillslopes and indeed the remainder of the Mt Piper perimeter lands, as evidenced by the fauna species diversity recorded in the study area compared to the broader perimeter lands (c.f. Ecotone 1996). Much of the tree cover is considered young in age and relatively few mature or



hollow-bearing trees were noted. Further the cover of rocks in the proposal area is very low in abundance compared to observations of the surrounding landscape, particularly on the upper slopes. However, the remnant open forest and woodland vegetation occurring in the southern-most portion of the study area is of high quality, supporting various habitat features appropriate for a diversity of fauna.

The habitat is to be disturbed potentially provides for foraging life-cycle events for woodland birds, mammals and microchiropteran bats. These species forage over large areas which may include forest and woodland but also open modified and degraded lands. The proposal will not significantly impact on the local availability of foraging habitat and the degree of clearing is not expected to significantly impact on feeding habitat for local populations of woodland birds given the extent of suitable habitats in the locality.

The proposal area provides potential foraging habitat for Spotted-tail Quoll and Grey-headed Flying Fox which both utilise large areas of habitat for hunting and foraging. The removal of 8.9 ha of potential habitat for these species is unlikely to have potential impacts to the life cycle of these species, as this area would comprise only a small proportion of the species home range.

There are no known roost sites 'flying-fox camps' for the Grey-headed Flying-fox in the study area and the nearest known camps are from the Sydney area including the Botanic Gardens, Cabramatta, Gordon, Penrith, and Wheeney Creek and Yarramundi in the Hawkesbury. There are no existing roost sites within the areas selected for ash placement.

Habitat for the Grey-headed Flying-fox and Spotted-tailed Quoll is extensive throughout all naturally vegetated areas of the region. In particular, high conservation value remnants are conserved in several national parks, conservation reserves and state forests within proximity to Mt Piper. Indeed the Mt Piper perimeter lands also provide potential habitat for these species.

***How is the proposal likely to affect the habitat of a threatened species, population or ecological community?***

The degree of clearing required for this project is not expected to significantly impact on local populations of the assessed species given the extent of suitable habitats present in the locality. Further pre-clearing surveys have been recommended to identify and flag hollow-bearing habitat trees in proximity to the works area with the aim of further minimising the loss of these features in the final design and construction phase of the project.

There are no known roost sites 'flying-fox camps' for the Grey-headed Flying-fox in the study area and the nearest known camps are from the Sydney area including the Botanic Gardens, Cabramatta, Gordon, Penrith, and Wheeney Creek and Yarramundi in the Hawkesbury. There are no existing roost sites within the areas selected for development.



Habitat for the Grey-headed Flying-fox and Spotted-tailed Quoll is extensive throughout all naturally vegetated areas of the region. In particular, high conservation value remnants are conserved in several national parks, conservation reserves and state forests within proximity to Mt Piper.

***Does the proposal affect any threatened species or populations that are at the limit of its known distribution?***

None of the species are at the limit of their distribution in the study area.

***How is the proposal likely to affect current disturbance regimes?***

The impacts from mining as well as gully erosion and weed invasion are the major disturbance regimes operating within the study area. With the procurement of these lands by Delta Electricity, these activities will cease.

Weed species within areas of remnant vegetation are most likely spread by stock allowed to intermittently graze this area. Therefore it is likely that disturbance regimes will be cease or become less frequent with the implementation of the proposal. Weeds should be monitored post-construction to determine their invasiveness and a weed management plan prepared if necessary.

The issue of erosion within creek areas should be addressed through stabilisation and restoration of creek areas as discussed in the recommendations section of the report.

***How is the proposal likely to affect habitat connectivity?***

The proposed ash placement will remove three patches of habitat already isolated by coal mining development. These areas form a 'peninsula' of remnant vegetation loosely connected by rehabilitation vegetation and largely surrounded by cleared areas. Given the current level of isolation and lack of connectivity, the proposal is considered unlikely to significantly affect habitat connectivity.

***How is the proposal likely to affect critical habitat?***

There is no evidence gathered by the field surveys to suggest that the proposal area provides critical habitat for the assessed species.

## Appendix B Flora of the Investigation Area

The following is a list of all flora species recorded in the investigation area. Note that this list should not be seen to be fully comprehensive, but an indication of the flora present. A period of some years is often needed to identify all the species present in an area, especially as some species are only apparent at certain times of the year ie orchids.

Classification/ Scientific name	Common Name
<b>Ferns</b>	
ADIANTACEAE	
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	Slender Cloak-fern
DENNSTAEDTIACEAE	
<i>Pteridium esculentum</i>	Bracken
<b>Conifers</b>	
PINACEAE	
<i>Pinus radiata</i>	Monterey Pine i
<b>Flowering Plants - Dicotyledons</b>	
APIACEAE	
<i>Centella asiatica</i>	Swamp Pennywort
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
<i>Hydrocotyle peduncularis</i>	Hairy Pennywort
<i>Hydrocotyle tripartita</i>	Tre-foil Pennywort
<i>Oreomyrrhis eriopoda</i>	Australian Caraway
ASTERACEAE	
<i>Cassinia aculeata</i>	Dollybush
<i>Cassinia arcuata</i>	Sifton Bush
<i>Centipida cunninghamii</i>	Sneeze Weed
<i>Chrysocephalum apiculatum</i>	Yellow Buttons
<i>Cirsium vulgare</i>	Spear Thistle i
<i>Conyza sumatrensis</i>	Tall Fleabane i
<i>Coronidium scorpioides</i>	Button Everlasting
<i>Cymbonotus lawsonianus</i>	Bears-ear
<i>Epaltes australis</i>	
<i>Euchiton gymnocephalus</i>	
<i>Hypochoeris radicata</i>	Catsear i
<i>Lagenophora stipitata</i>	Bottle-daisy
<i>Leucochrysum albicans</i> subsp. <i>albicans</i>	
<i>Microseris lanceolata</i>	Yam Daisy
<i>Pseudognaphalium luteoalbum</i>	Jersey Cudweed
<i>Senecio diaschides</i>	
<i>Senecio hispidulus</i> var. <i>hispidulus</i>	Hill Fireweed
<i>Senecio madagascariensis</i>	Fireweed i
<i>Solenogyne bellioides</i>	Bottle-daisy
<i>Vittadenia muelleri</i>	Vittadenia
<i>Vittadenia cuneata</i>	Fuzzweed
BORAGINACEAE	
<i>Echium vulgare</i>	Vipers Bugloss i
CAMPANULACEAE	



<i>Wahlenbergia gracilis</i>	Sprawling Bluebell	
<i>Wahlenbergia stricta</i>	Tall Bluebell	
CLUSIACEAE		
<i>Hypericum gramineum</i>	Narrow-leaf St. Johns Wort	
<i>Hypericum japonicum</i>	Matted St. Johns Wort	
<i>Hypericum perforatum</i>	St. Johns Wort	ix
DILLENIACEAE		
<i>Hibbertia linearis</i>	Narrow-leaf Guinea-flower	
<i>Hibbertia obtusifolia</i>	Blunt-leaf Guinea-flower	
ERICACEAE		
<i>Astroloma humifusum</i>	Prickly Pine Heath	
<i>Brachyloma daphnoides</i>	Daphne Heath	
<i>Leucopogon virgatus</i>	Common Beard-heath	
<i>Lissanthe strigosa</i>	Peach Heath	
FABACEAE		
FABOIDEAE		
<i>Bossiaea buxifolia</i>		
<i>Bossiaea prostrata</i>		
<i>Dillwynia sericea</i>		
<i>Glycine clandestina</i> agg.	Twining Glycine	
<i>Gompholobium huegelii</i>	Small Wedge-Pea	
<i>Gompholobium inconspicuum</i>		
<i>Hardenbergia violacea</i>	Purple Twining-pea	
<i>Hovea heterophylla</i>		
<i>Mirbelia platylobioides</i>		
<i>Podolobium ilicifolium</i>	Prickly Shaggy Pea	
<i>Pultanaea microphylla</i>		
<i>Pultanaea rutosa</i>	Notched Bush-pea	
<i>Pultanaea tuberculata</i>	Wreath Bush-pea	
MIMOSOIDEAE		
<i>Acacia baileyana</i>	Cootamundra Wattle	n
<i>Acacia brownii</i>	Heath wattle	
<i>Acacia buxifolia</i>	Box-leaf Wattle	
<i>Acacia dealbata</i>	Silver Wattle	
<i>Acacia decurrens</i>	Fine-leaf Green Wattle	n
<i>Acacia gunnii</i>	Ploughshare Wattle	
<i>Acacia mearnsii</i>	Black Wattle	
	Green Wattle	
<i>Acacia parramattensis</i>		
<i>Acacia rubida</i>	Red-stemmed Wattle	
<i>Acacia ulicifolia</i>	Prickly Moses	
<i>Acacia venulosa</i>	Wattle	
GENTIANACEAE		
<i>Centaurium spicatum</i>	Spiked Centaury	
GERANIACEAE		
<i>Geranium solanderi</i> var. <i>solanderi</i>	Native Cranesbill	
GOODENIACEAE		
<i>Goodenia bellidiflora</i>	Goodenia	
<i>Goodenia hederacea</i> subsp. <i>hederacea</i>	Ivy-leaf Goodenia	
HALORAGACEAE		
<i>Gonocarpus tetragynus</i>	Poverty Raspwort	
<i>Gonocarpus teuroides</i>	Raspwort	





<i>Halorgis heterophylla</i>	Variable Raspwort	
HYPOXIDACEAE		
<i>Hypoxis hygrometrica</i> var. <i>villosisepala</i>	Yellow Weather-grass	
LAMIACEAE		
<i>Mentha satureioides</i>	Creeping Mint	
LAURACEAE		
<i>Cassytha pubescens</i>	Devils Twine	
MYRSINACEAE		
<i>Anagallis arvensis</i>	Pimpernell	i
MYRTACEAE		
EUCALYPTS		
<i>Eucalyptus bridgesiana</i>	Apple Box	
<i>Eucalyptus cannonii</i>	Capertee Stringybark	t
<i>Eucalyptus dives</i>	Broad-leaved Peppermint	
<i>Eucalyptus eugenoides</i>	Thin-leaved Stringybark	
<i>Eucalyptus macrorhyncha</i>	Red Stringybark	
<i>Eucalyptus mannifera</i>	Brittle Gum	
<i>Eucalyptus pauciflora</i>	Snow Gum	
<i>Eucalyptus rossii</i>	Tableland Scribbly Gum	
<i>Eucalyptus rubida</i> subsp. <i>rubida</i>	Candlebark	
<i>Eucalyptus sieberi</i>	Silvertop Ash	
<i>Eucalyptus viminalis</i>	Ribbon Gum	
OTHER MYRTACEAE		
<i>Callistemon rigidus</i>	Stiff Bottlebrush	n
<i>Leptospermum continentale</i>	Tea-tree	
<i>Leptospermum polygalifolium</i>	Yellow Tea-tree	
OXALIDACEAE		
<i>Oxalis exilis</i>	Yellow Oxalis	
<i>Oxalis radicata</i>		
PITTOSPORACEAE		
<i>Billardiera scandens</i>	Apple Berry	
<i>Bursaria longisepala</i>		
<i>Rhynchospora procumbens</i>		
PLANTAGINACEAE		
<i>Plantago lanceolata</i>	Plantain	i
<i>Plantago gaudichaudii</i>	Narrow plantain	
POLYGONACEAE		
<i>Persicaria decipiens</i>	Slender Knotweed	
<i>Rumex brownii</i>	Swamp Dock	
PROTEACEAE		
<i>Persoonia linearis</i>	Narrow-leaf Geebung	
RANUNCULACEAE		
<i>Ranunculus lappaceus</i>	Common Buttercup	
ROSACEAE		
<i>Acaena novae-zelandiae</i>	Bidgy-widgy	
<i>Acaena ovina</i>		
<i>Rosa rubiginosa</i>	Sweet Briar	i
<i>Rubus fruticosus</i> agg.	Blackberry	ix
RUBIACEAE		
<i>Galium propinquum</i>	Maori Bedstraw	i
<i>Opercularia diphylla</i>	Stinkweed	
<i>Opercularia hispida</i>	Hairy Stinkweed	
SANTALACEAE		

<i>Omphacomeria acerba</i>	
SCROPHULARIACEAE	
<i>Mimulus repens</i>	Creeping Monkey-flower
<i>Veronica plebilia</i>	Trailing Speedwell
SOLANACEAE	
<i>Solanum nigrum</i>	Black Nightshade i
VIOLACEAE	
<i>Viola betonicifolia</i>	Showy Violet

### Flowering Plants - Monocotyledons

ANTHERICACEAE	
<i>Tricoryne elatior</i>	Yellow Rush-lily
CYPERACEAE	
<i>Eleocharis spp.</i>	
<i>Isolepis spp.</i>	
<i>Lepidosperma laterale</i>	Variable Sword-sedge
<i>Schoenus apogon</i>	Common Bog-rush
IRIDACEAE	
<i>Patersonia sericea</i> var. <i>sericea</i>	Basal-leaf Purple-flag
JUNCACEAE	
<i>Juncus acutus</i>	Spiny Rush i
<i>Juncus planifolius</i>	Broadleaf Rush
<i>Juncus polyanthemus</i>	Many-flowered Rush
<i>Juncus prismatocarpus</i>	Branching Rush
<i>Juncus usitatus</i>	Common Rush
LOMANDRACEAE	
<i>Lomandra glauca</i> subsp. <i>glauca</i>	Glaucous Mat-rush
<i>Lomandra filiformis</i> subsp. <i>filiformis</i>	Wattle Mat-rush
<i>Lomandra longifolia</i> subsp. <i>longifolia</i>	Spiny Mat-rush
ORCHIDACEAE	
<i>Eriochilus cucullatus</i>	Parsons Band
<i>Pterostylis parviflora</i>	Tiny Greenhood
<i>Pterostylis reflexa</i>	Small Autumn Greenhood
PHORMIACEAE	
<i>Dianella revoluta</i> var. <i>revoluta</i>	Black-anther Flax Lily
<i>Thelionema caespitosum</i>	Tufted Blue-lily
POACEAE	
<i>Aristida ramosa</i>	Three-awned Spear Grass
<i>Austrodanthonia</i> spp	Wallaby Grass
<i>Austrodanthonia racemosa</i> var. <i>racemosa</i>	Wallaby Grass
<i>Austrodanthonia tenuior</i>	Wallaby Grass
<i>Austrostipa pubescens</i>	Tall Speargrass
<i>Bothriochloa macra</i>	Red Grass
<i>Dichelachne inaequiglumis</i>	
<i>Echinopogon ovatus</i>	Hedgehog Grass
<i>Eragrostis curvula</i>	African Lovegrass ix
<i>Lachnagrostis filiformis</i>	Blown Grass
<i>Microlaena stipoides</i>	Weeping Grass
<i>Paspalum dilatatum</i>	Paspalum i
<i>Phalaris aquatica</i>	Canary Grass
<i>Poa siebriana</i>	Snowgrass
<i>Themeda australis</i>	Kangaroo Grass



TOTALS

<i>Total Flora Species</i>	<i>147</i>
<i>Total Number of Families</i>	<i>39</i>
<i>Total Monocotyledons</i>	<i>34</i>
<i>Total Dicotyledons</i>	<i>110</i>
<i>Total Fern Species</i>	<i>2</i>
<i>Total Conifer &amp; Cycad Species</i>	<i>1</i>
<i>Total Exotic Species</i>	<i>13</i>
<i>Total Threatened Species</i>	<i>1</i>

ABBREVIATIONS:

i = introduced (i.e. not indigenous to Australia)

n = native Australian species not considered to be indigenous to the site

c = cultivated (i.e. planted on the site)

t = listed as a threatened species under State and/or Commonwealth legislation

x = Noxious weed species

spp. = several species of the one genus (sometimes occurring as a hybrid swarm)

sp. = unidentified species<sup>3</sup>

sp. aff. = unidentified species with characteristics similar to the indicated species or genus<sup>3</sup>

? = unconfirmed species<sup>3</sup>

var. = variety

subsp. = subspecies

cv. = cultivar (i.e. a anthropogenic form of the species)

r = RoTAP species

agg. = an aggregate of several yet to be defined species

## Appendix C Fauna of the Investigation Area

The following list includes fauna species recorded during the current survey. The list also includes the total number of species recorded in the Mt Piper power station perimeter lands during a comprehensive four seasonal survey (Ecotone 1996) and previous work conducted by SKM (SKM 2008).

**V** = Vulnerable Species (NSW Threatened Species Conservation Act, 1995)

**M** = Migratory Species (Commonwealth Environment Protection and Biodiversity Conservation Act, 1999)

\* exotic species

<b>FAMILY/Scientific Name</b>	<b>Common Name</b>	<b>Current Survey</b>	<b>SKM (2008)</b>	<b>Ecotone (1996)</b>
<b>MAMMALS</b>				
<b>TACHYGLOSSIDAE</b>				
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna			x
<b>DASYURIDAE</b>				
<i>Antechinus stuartii</i>	Brown Antechinus			x
<b>VOMBATIDAE</b>				
<i>Vombatus ursinus</i>	Common Wombat		x	x
<b>PETAURIDAE</b>				
<i>Petaurus breviceps</i>	Sugar Glider			x
<b>PSEUDOCHEIRIDAE</b>				
<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum	x		x
<b>PHALANGERIDAE</b>				
<i>Trichosurus vulpecula</i>	Common Brushtail Possum	x		x
<b>MACROPODIDAE</b>				
<i>Macropus giganteus</i>	Eastern Grey Kangaroo	x	x	x
<i>Macropus robustus</i>	Common Wallaroo			x
<i>Macropus rufogriseus</i>	Red-necked Wallaby			x
<i>Wallabia bicolor</i>	Swamp Wallaby			x
<b>MURIDAE</b>				
<i>Rattus fuscipes</i>	Bush Rat			x
<i>Mus musculus</i> *	House Mouse			x
<b>CANIDAE</b>				
<i>Canis familiaris</i> *	Dog			x
<i>Vulpes vulpes</i> *	Fox		x	x
<b>FELIDAE</b>				
<i>Felis catus</i> *	Feral Cat			x
<b>LEPORIDAE</b>				
<i>Lepus capensis</i> *	Brown Hare		x	x
<i>Oryctolagus cuniculus</i> *	Rabbit	x	x	x
<b>BOVIDAE</b>				
<i>Bos taurus</i> *	Cattle			x



<b>FAMILY/Scientific Name</b>	<b>Common Name</b>	<b>Current Survey</b>	<b>SKM (2008)</b>	<b>Ecotone (1996)</b>
<b>EQUIDAE</b>				
<i>Equus caballus*</i>	Horse			x
<b>SUIDAE</b>				
<i>Sus scrofa*</i>	Feral Pig			x
<b>RHINOLOPHIDAE</b>				
<i>Rhinolophus megaphyllus</i>	Eastern Horseshoe Bat			x
<b>MOLOSSIDAE</b>				
<i>Nyctinomus australis</i>	White-striped Freetail-bat			x
<b>VESPERTILIONIDAE</b>				
<i>Miniopterus schreibersii</i>	Large Bent-wing Bat (V)			x
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat			x
<i>Nyctophilus gouldi</i>	Gould's Long-eared Bat			x
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat			x
<i>Chalinolobus morio</i>	Chocolate Wattled Bat			x
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle			x
<i>Scotorepens greyii</i>	Little Broad-nosed Bat			x
<i>Scotorepens orion</i>	Eastern Broad-nosed Bat			x
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat			?
<i>Vespadelus darlingtoni</i>	Large Forest Bat			x
<i>Vespadelus regulus</i>	Southern Forest Bat			x
<i>Vespadelus vulturinus</i>	Little Forest Bat			x
<b>REPTILES</b>				
<b>CHELIDAE</b>				
<i>Chelodina longicollis</i>	Eastern Long-necked Tortoise			x
<i>Emydura macquarii</i>	Macquarie Tortoise			x
<b>GECKKONIDAE</b>				
<i>Diplodactylus vittatus</i>	Wood Gecko			x
<b>AGAMIDAE</b>				
<i>Amphibolourus muricatus</i>	Jacky Lizard			x
<i>Physignatuhus lesuerii</i>	Eastern Water Dragon			x
<i>Pogona barbata</i>	Bearded Dragon			x
<i>Tympanocryptis diemensis</i>	Mountain Dragon			x
<b>SCINCIDAE</b>				
<i>Calyptotis ruficauda</i>	Red-tailed Calyptotis			
<i>Cryptoblepharus virgatus</i>	Fence Skink			x
<i>Ctenotus robustus</i>	Robust Skink			x
<i>Ctenotus taeniolatus</i>	Copper-tailed Skink			x
<i>Egernia striolata</i>	Tree Skink			x
<i>Egernia whitii</i>	White's Skink			x
<i>Eulamprus heatwolei</i>	Heatwole's Skink			x
<i>Eulamprus quoyii</i>	Eastern Water Skink			x
<i>Hemiergis decresiensis</i>	Burrowing Skink			x

SINCLAIR KNIGHT MERZ



<b>FAMILY/Scientific Name</b>	<b>Common Name</b>	<b>Current Survey</b>	<b>SKM (2008)</b>	<b>Ecotone (1996)</b>
<i>Lampropholis delicata</i>	Delicate Skink			x
<i>Lampropholis guichenoti</i>	Grass Skink	x		x
<i>Pseudemoia entrecasteauxii</i>	Entrecasteauxii's Skink			x
<i>Pseudemoia platynota</i>	Red-throated Skink			x
<i>Saiphos equalis</i>	Three-toed Skink			x
<i>Saproscincus mustelinus</i>	Weasel Skink			x
<i>Tiliqua nigrolutea</i>	Blotched Blue-tongue			x
<i>Tiliqua scincoides</i>	Eastern Blue-tongued Lizard			x
<b>ELAPIDAE</b>				
<i>Austrelaps superbus</i>	Copperhead			x
<i>Pseudechis porphyriacus</i>	Red-bellied Black Snake			x
<i>Pseudonaja textilis</i>	Eastern Brown Snake			x
<i>Rhinoplocephalus nigrescens</i>	Eastern Small-eyed Snake			x
<i>Suta spectabilis</i>	Eastern Curl Snake			x
<b>AMPHIBIANS</b>				
<b>MYOBATRACHIDAE</b>				
<i>Crinia signifera</i>	Common Eastern Froglet	x		x
<i>Limnodynastes dumerillii insularis</i>	Eastern Banjo Frog			x
<i>Limnodynastes peronii</i>	Striped Marsh Frog			x
<i>Limnodynastes tasmaniensis</i>	Spotted Grass Frog			x
<i>Pseudophryne bibronii</i>	Brown Toadlet			x
<i>Uperoleia laevigata</i>	Red-groined Toadlet	x	x	x
<i>Uperoleia rugosa</i>	Red-thighed Toadlet			x
<b>HYLIDAE</b>				
<i>Litoria dentate</i>	Bleating Tree Frog			x
<i>Litoria ewingii</i>	Brown Tree Frog			x
<i>Litoria peronii</i>	Peron's Tree Frog			x
<i>Litoria verreauxii</i>	Verreaux's Tree Frog			x
<b>BIRDS</b>				
<b>ANATIDAE</b>				
<i>Chenonetta jubata</i>	Australian Wood Duck		x	x
<i>Cygnus atratus</i>	Black Swan			x
<i>Anas superciliosa</i>	Pacific Black Duck			x
<i>Aythya australis</i>	Hardhead			x
<i>Stictonetta naevosa</i>	Freckled Duck			?
<b>PODICIOEDIDAE</b>				
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe			x
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe			x
<b>PHALACROCORACIDAE</b>				
<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant			x
<b>ARDEIDAE</b>				
<i>Egretta novaehollandiae</i>	White-faced Heron			x

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FAMILY/Scientific Name	Common Name	Current Survey	SKM (2008)	Ecotone (1996)
<b>ACCIPITRIDAE</b>				
<i>Elanus notatus</i>	Black-shouldered Kite			x
<i>Accipiter fasciatus</i>	Brown Goshawk	x		x
<i>Aquila audax</i>	Wedge-tailed Eagle			x
<i>Hieraeetus morphnoides</i>	Little Eagle			x
<b>FALCONIDAE</b>				
<i>Falco cenchroides</i>	Nankeen Kestrel			x
<b>RALLIDAE</b>				
<i>Fulica atra</i>	Eurasian Coot			x
<i>Gallinula tenebrosa</i>	Dusky Moorhen			x
<b>CHARADRIIDAE</b>				
<i>Vanellus miles</i>	Masked Lapwing		x	x
<b>COLUMBIDAE</b>				
<i>Phaps chalcoptera</i>	Common Bronzewing		x	
<i>Ocyphaps lophotes</i>	Crested Pigeon			x
<b>CACATUIDAE</b>				
<i>Calyptorhynchus lathami</i>	Glossy Black Cockatoo			x
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black Cockatoo			x
<i>Callocephalon fimbriatum</i>	Gang-Gang Cockatoo			x
<i>Cacatua roseicapilla</i>	Galah		x	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo			x
<b>PSITTACIDAE</b>				
<i>Platycercus elegans</i>	Crimson Rosella	x	x	x
<i>Platycercus eximius</i>	Eastern Rosella			x
<i>Psephotus haematonotus</i>	Red-rumped Parrot			x
<b>CUCULIDAE</b>				
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo			x
<i>Chrysococcyx basalis</i>	Horsefield's Bronze-cuckoo			x
<i>Chrysococcyx lucidus</i>	Shining Bronze-cuckoo			x
<i>Cuculus pallidus</i>	Pallid Cuckoo			x
<i>Eudynamys scolopacea</i>	Common Koel			x
<b>STRIGIDAE</b>				
<i>Ninox novaeseelandiae</i>	Southern Boobook			x
<i>Ninox strenua</i>	Powerful Owl			x
<b>PODARGIDAE</b>				
<i>Podargus strigoides</i>	Tawny Frogmouth			x
<b>APODIDAE</b>				
<i>Hirundapus caudacutus</i>	White-throated Needletail			x
<b>ALCEDINIDAE</b>				
<i>Alcedo azurea</i>	Azure Kingfisher			
<b>HALCYONIDAE</b>				
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	x	x	x

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<b>FAMILY/Scientific Name</b>	<b>Common Name</b>	<b>Current Survey</b>	<b>SKM (2008)</b>	<b>Ecotone (1996)</b>
<i>Todiramphus sanctus</i>	Sacred Kingfisher			x
<b>CORACIIDAE</b>				
<i>Eurystomus orientalis</i>	Dollarbird			x
<b>CLIMACTERIDAE</b>				
<i>Cormobates erythropus</i>	Red-browed Treecreeper			x
<i>Cormobates leucophaeus</i>	White-throated Treecreeper	x		x
<i>Cormobates picumnus</i>	Brown Treecreeper			x
<b>MALURIDAE</b>				
<i>Malurus cyaneus</i>	Superb Fairy-wren	x	x	x
<i>Malurus lamberti</i>	Variiegated Fairy-wren			x
<i>Stipiturus malacharus</i>	Southern Emu-wren			x
<b>PARDALOTIDAE</b>				
<i>Origma solitaria</i>	Origma			x
<i>Pardalotus punctatus</i>	Spotted Pardalote	x		x
<i>Pardalotus striatus</i>	Striated Pardalote			x
<i>Sericornis frontalis</i>	White-browed Scrub-wren			x
<i>Gerygone mouki</i>	Brown Gerygone	x		x
<i>Gerygone olivacea</i>	White-throated Gerygone			x
<i>Acanthiza pusilla</i>	Brown Thornbill		x	x
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill		x	x
<i>Acanthiza lineata</i>	Striated Thornbill			x
<i>Acanthiza nana</i>	Yellow Thornbill		x	x
<i>Acanthiza reguloides</i>	Buff-rumped Thornbill	x		x
<b>MELIPHAGIDAE</b>				
<i>Anthochaera carunculata</i>	Red Wattlebird		x	x
<i>Philemon corniculatus</i>	Noisy Friarbird			x
<i>Manorina melanocephala</i>	Noisy Miner			x
<i>Meliphaga lewinii</i>	Lewin's Honeyeater			x
<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater	x		x
<i>Lichenostomus leucotis</i>	White-eared Honeyeater		x	x
<i>Melithreptus lunatus</i>	White-naped Honeyeater			x
<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill			x
<b>PETROICIDAE</b>				
<i>Microeca leucophaea</i>	Jacky Winter			x
<i>Eopsaltria australis</i>	Eastern Yellow Robin	x		x
<i>Petroica multicolor</i>	Scarlet Robin	x		x
<b>PSOPHODIDAE</b>				
<i>Cinclosoma punctatum</i>	Spotted Quail-thrush			x
<b>NEOSITTIDAE</b>				
<i>Daphoenositta chrysoptera</i>	Varied Sitella			x
<b>PACHYCEPHALIDAE</b>				
<i>Falcunculus frontatus</i>	Crested Shrike-tit			x





<b>FAMILY/Scientific Name</b>	<b>Common Name</b>	<b>Current Survey</b>	<b>SKM (2008)</b>	<b>Ecotone (1996)</b>
<i>Pachycephala pectoralis</i>	Golden Whistler			x
<i>Pachycephala rufiventris</i>	Rufous Whistler			x
<i>Colluricincla harmonica</i>	Grey Shrike-thrush			x
<b>DICRURIDAE</b>				
<i>Monarcha melanopsis</i>	Black-faced Monarch			x
<i>Myiagra rubecula</i>	Leaden Flycatcher			x
<i>Rhipidura leucophrys</i>	Willie Wagtail			x
<i>Rhipidura fuliginosa</i>	Grey Fantail	x		x
<i>Grallina cyanoleuca</i>	Magpie-lark			
<b>CAMPEPHAGIDAE</b>				
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike			x
<b>ORIOLIDAE</b>				
<i>Oriolus sagittatus</i>	Olive-backed Oriole			x
<b>ARTAMIDAE</b>				
<i>Artamus cyanopterus</i>	Dusky Woodswallow			x
<i>Gymnorhina tibicen</i>	Australian Magpie			x
<i>Strepera graculina</i>	Pied Currawong	x		x
<i>Strepera versicolor</i>	Grey Currawong			x
<b>CORVIDAE</b>				
<i>Corvus coronoides</i>	Australian Raven	x		x
<b>CORCORACIDAE</b>				
<i>Corcorax melanorhamphos</i>	White-winged Chough			x
<b>PASSERIDAE</b>				
<i>Passer domesticus</i> *	House Sparrow			x
<i>Taeniopygia bichenovii</i>	Double-barred Finch			x
<i>Neochmia temporalis</i>	Red-browed Firetail		x	x
<b>FRINGILLIDAE</b>				
<i>Carduelis chloris</i> *	European Goldfinch			x
<b>DICAEIDAE</b>				
<i>Dicaeum hirundinaceum</i>	Mistletoebird			x
<b>HIRUNDINIDAE</b>				
<i>Hirundo neoxena</i>	Welcome Swallow			x
<i>Hirundo ariel</i>	Fairy Martin			
<b>ZOSTEROPIDAE</b>				
<i>Zosterops lateralis</i>	Silvereye			x
<b>MUSCICAPIDAE</b>				
<i>Turdus merula</i> *	Common Blackbird			x
<b>STURNIDAE</b>				
<i>Sturnus vulgaris</i> *	Common Starling			x
<b>CRUSTACEAN</b>				
<b>PARASTICIDAE</b>				
<i>Cherax destructor</i>	Freshwater Yabby		x	



## Appendix D EPBC Protected Matters Report



Australian Government

Department of the Environment, Water, Heritage and the Arts

## Protected Matters Search Tool

You are here: [Environment Home](#) > [EPBC Act](#) > [Search](#)

6 May 2010 17:07

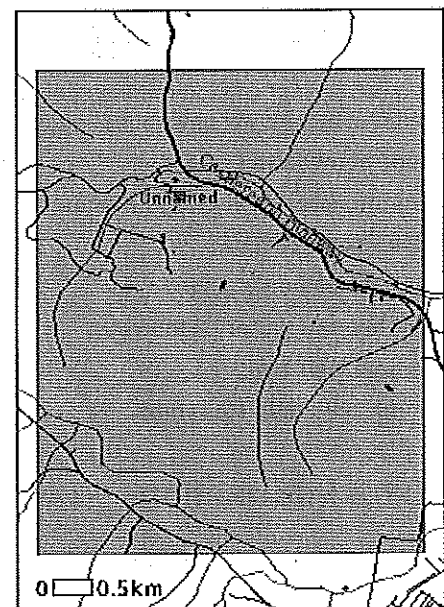
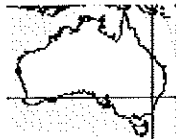
# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Information on the coverage of this report and qualifications on data supporting this report are contained in the [caveat](#) at the end of the report.

You may wish to print this report for reference before moving to other pages or websites.

The Australian Natural Resources Atlas at <http://www.environment.gov.au/atlas> may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at <http://www.environment.gov.au/epbc/assessmentsapprovals/index.html>

**Search Type:** Area  
**Buffer:** 0 km  
**Coordinates:** -33.33524,150.01867, -33.40064,150.01867, -33.40064,150.07086, -33.33524,150.07086



**Report Contents:** [Summary](#)  
[Details](#)  

- [Matters of NES](#)
- [Other matters protected by the EPBC Act](#)
- [Extra Information](#)

[Caveat](#)  
[Acknowledgments](#)

This map may contain data which are  
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## Summary

### Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see <http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html>.

<b>World Heritage Properties:</b>	None
<b>National Heritage Places:</b>	None
<b>Wetlands of International Significance: (Ramsar Sites)</b>	1
<b>Commonwealth Marine Areas:</b>	None
<b>Threatened Ecological Communities:</b>	1

<b>Threatened Species:</b>	22
<b>Migratory Species:</b>	14

### Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage/index.html>.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at <http://www.environment.gov.au/epbc/permits/index.html>.

<b>Commonwealth Lands:</b>	None
<b>Commonwealth Heritage Places:</b>	None
<b>Places on the RNE:</b>	None
<b>Listed Marine Species:</b>	12
<b>Whales and Other Cetaceans:</b>	None
<b>Critical Habitats:</b>	None
<b>Commonwealth Reserves:</b>	None

### Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

<b>State and Territory Reserves:</b>	None
<b>Other Commonwealth Reserves:</b>	None
<b>Regional Forest Agreements:</b>	None

### Details

#### Matters of National Environmental Significance

Wetlands of International Significance [ [Dataset Information](#) ]  
(Ramsar Sites)

**MACQUARIE MARSHES NATURE RESERVE** Within same catchment as Ramsar site

Threatened Ecological Communities [ <a href="#">Dataset Information</a> ]	Status	Type of Presence
---	--------	------------------

<u>White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland</u>	Critically Endangered	Community may occur within area
--	-----------------------	---------------------------------

Threatened Species [ <a href="#">Dataset Information</a> ]	Status	Type of Presence
--	--------	------------------

**Birds**

<u>Anthochaera phrygia</u> Regent Honeyeater	Endangered	Species or species habitat likely to occur within area
---	------------	--

<u><i>Lathamus discolor</i></u> Swift Parrot	Endangered	Species or species habitat may occur within area
<u><i>Rostratula australis</i></u> Australian Painted Snipe	Vulnerable	Species or species habitat may occur within area
<b>Frogs</b>		
<u><i>Litoria booroolongensis</i></u> Booroolong Frog	Endangered	Species or species habitat likely to occur within area
<u><i>Litoria littlejohni</i></u> Littlejohn's Tree Frog, Heath Frog	Vulnerable	Species or species habitat may occur within area
<b>Insects</b>		
<u><i>Paralucia spinifera</i></u> Bathurst Copper Butterfly, Purple Copper Butterfly, Bathurst Copper, Bathurst Copper Wing, Bathurst-Lithgow Copper, Purple Copper	Vulnerable	Species or species habitat likely to occur within area
<b>Mammals</b>		
<u><i>Chalinolobus dwyeri</i></u> Large-eared Pied Bat, Large Pied Bat	Vulnerable	Species or species habitat may occur within area
<u><i>Dasyurus maculatus maculatus (SE mainland population)</i></u> Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)	Endangered	Species or species habitat may occur within area
<u><i>Nyctophilus timoriensis (South-eastern form)</i></u> Greater Long-eared Bat, South-eastern Long-eared Bat	Vulnerable	Species or species habitat may occur within area
<u><i>Petrogale penicillata</i></u> Brush-tailed Rock-wallaby	Vulnerable	Species or species habitat may occur within area
<u><i>Potorous tridactylus tridactylus</i></u> Long-nosed Potoroo (SE mainland)	Vulnerable	Species or species habitat may occur within area
<u><i>Pteropus poliocephalus</i></u> Grey-headed Flying-fox	Vulnerable	Species or species habitat may occur within area
<b>Ray-finned fishes</b>		
<u><i>Maccullochella peelii peelii</i></u> Murray Cod, Cod, Goodoo	Vulnerable	Species or species habitat may occur within area
<u><i>Macquaria australasica</i></u> Macquarie Perch	Endangered	Species or species habitat may occur within area
<u><i>Prototroctes maraena</i></u> Australian Grayling	Vulnerable	Species or species habitat may occur within area
<b>Reptiles</b>		
<u><i>Hoplocephalus bungaroides</i></u> Broad-headed Snake	Vulnerable	Species or species habitat likely to occur within area
<b>Plants</b>		
<u><i>Apatophyllum constablei</i></u>	Endangered	Species or species habitat may occur within area
<u><i>Eucalyptus macrorhyncha subsp. cannonii</i></u> Cannon's Stringybark	Vulnerable	Species or species habitat likely to occur within area
<u><i>Eucalyptus pulverulenta</i></u> Silver-leaved Mountain Gum, Silver-leaved Gum	Vulnerable	Species or species habitat likely to occur within area
<u><i>Prasophyllum sp. Wybong (C.Phelps ORG 5269)</i></u> a leek-orchid	Critically Endangered	Species or species habitat may occur within area
<u><i>Pultenaea glabra</i></u> Smooth Bush-pea, Swamp Bush-pea	Vulnerable	Species or species habitat likely to occur within area
<u><i>Thesium australe</i></u> Austral Toadflax, Toadflax	Vulnerable	Species or species habitat likely to occur within area
Migratory Species [ <a href="#">Dataset Information</a> ]	Status	Type of Presence
<b>Migratory Terrestrial Species</b>		
<b>Birds</b>		

<u><i>Haliaeetus leucogaster</i></u> White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
<u><i>Hirundapus caudacutus</i></u> White-throated Needletail	Migratory	Species or species habitat may occur within area
<u><i>Merops ornatus</i></u> Rainbow Bee-eater	Migratory	Species or species habitat may occur within area
<u><i>Monarcha melanopsis</i></u> Black-faced Monarch	Migratory	Breeding may occur within area
<u><i>Myiagra cyanoleuca</i></u> Satin Flycatcher	Migratory	Breeding likely to occur within area
<u><i>Rhipidura rufifrons</i></u> Rufous Fantail	Migratory	Breeding may occur within area
<u><i>Xanthomyza phrygia</i></u> Regent Honeyeater	Migratory	Species or species habitat likely to occur within area

**Migratory Wetland Species****Birds**

<u><i>Ardea alba</i></u> Great Egret, White Egret	Migratory	Species or species habitat may occur within area
<u><i>Ardea ibis</i></u> Cattle Egret	Migratory	Species or species habitat may occur within area
<u><i>Gallinago hardwickii</i></u> Latham's Snipe, Japanese Snipe	Migratory	Species or species habitat may occur within area
<u><i>Rostratula benghalensis s. lat.</i></u> Painted Snipe	Migratory	Species or species habitat may occur within area

**Migratory Marine Birds**

<u><i>Apus pacificus</i></u> Fork-tailed Swift	Migratory	Species or species habitat may occur within area
<u><i>Ardea alba</i></u> Great Egret, White Egret	Migratory	Species or species habitat may occur within area
<u><i>Ardea ibis</i></u> Cattle Egret	Migratory	Species or species habitat may occur within area

**Other Matters Protected by the EPBC Act**Listed Marine Species [ [Dataset Information](#) ]**Birds**

Listed Marine Species [ <a href="#">Dataset Information</a> ]	Status	Type of Presence
<u><i>Apus pacificus</i></u> Fork-tailed Swift	Listed - overfly marine area	Species or species habitat may occur within area
<u><i>Ardea alba</i></u> Great Egret, White Egret	Listed - overfly marine area	Species or species habitat may occur within area
<u><i>Ardea ibis</i></u> Cattle Egret	Listed - overfly marine area	Species or species habitat may occur within area
<u><i>Gallinago hardwickii</i></u> Latham's Snipe, Japanese Snipe	Listed - overfly marine area	Species or species habitat may occur within area
<u><i>Haliaeetus leucogaster</i></u> White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
<u><i>Hirundapus caudacutus</i></u> White-throated Needletail	Listed - overfly marine area	Species or species habitat may occur within area
<u><i>Lathamus discolor</i></u>	Listed -	Species or species habitat may occur within

Swift Parrot	overfly marine area	area
<i>Merops ornatus</i> Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
<i>Monarcha melanopsis</i> Black-faced Monarch	Listed - overfly marine area	Breeding may occur within area
<i>Myiagra cyanoleuca</i> Satin Flycatcher	Listed - overfly marine area	Breeding likely to occur within area
<i>Rhipidura rufifrons</i> Rufous Fantail	Listed - overfly marine area	Breeding may occur within area
<i>Rostratula benghalensis s. lat.</i> Painted Snipe	Listed - overfly marine area	Species or species habitat may occur within area

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## Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the *Environment Protection and Biodiversity Conservation Act 1999*. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under "type of presence". For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the migratory and marine provisions of the Act have been mapped.

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

## Acknowledgments

This database has been compiled from a range of data sources. The Department acknowledges the following custodians who have contributed valuable data and advice:

- [New South Wales National Parks and Wildlife Service](#)
- [Department of Sustainability and Environment, Victoria](#)
- [Department of Primary Industries, Water and Environment, Tasmania](#)
- [Department of Environment and Heritage, South Australia Planning SA](#)
- [Parks and Wildlife Commission of the Northern Territory](#)
- [Environmental Protection Agency, Queensland](#)
- [Birds Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Atherton and Canberra](#)
- [University of New England](#)
- Other groups and individuals

[ANUCLIM Version 1.8](#), Centre for Resource and Environmental Studies, Australian National University was used extensively for the production of draft maps of species distribution. Environment Australia is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Last updated: Thursday, 20-Nov-2008 14:17:56 EST

[Department of the Environment, Water, Heritage and the Arts](#)  
GPO Box 787 Canberra ACT 2601 Australia  
Telephone:

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