

## 7 Biodiversity Maintenance and Improvement

- The establishment of photo points in strategic areas that overlook large sections of the natural regeneration zones;
- The development of a photo monitoring program, whereby a qualified ecologist takes photos every 6 months at the identified photo points for a nominal three to five years and notes the changes in condition, using benchmark values for each community as described by the biometric vegetation type database (DECC 2008a);
- If the condition of the zones is still considered to be poor after one or two years, then implementation of replanting techniques should be considered.

### 7.3 Impact Offset

A key principle presented in the DEC (2005) guidelines is that project proposals should 'maintain or improve' biodiversity values (i.e. there is no net impact on threatened species or native vegetation). Where impacts cannot be avoided or mitigated then it is necessary to identify a suitable biodiversity 'offset' in order to maintain or improve biodiversity values.

As a key component of the Dalton Power Project a suitable biodiversity offset or conservation agreement will be negotiated between the proponent, OEH and SEWPaC to ensure that biodiversity is 'improved or maintained'. This offset must ensure that any loss of EEC vegetation and threatened species habitat is appropriately managed and matched with the conservation of land containing similar vegetation and habitat resources that is acceptable to all parties.

The offset site should be managed so that the condition of the relevant EEC's are improved, and to ensure that the overall vegetation condition within the Site is maintained, taking into consideration the following abiotic and biotic factors:

- Habitat connectivity and condition;
- Habitat resources such as existing hollow bearing trees, rocky outcrops, fallen timber, recruitment trees that will develop hollows in the future;
- Vegetation patch size;
- Species diversity and cover; and
- The condition of abiotic elements within the community (e.g. investigations to determine soil invertebrate composition which can be used as indicators of soil health or is the current flow regime of water within the catchment natural, if not can it be restored).

The offset site takes into consideration the habitat requirements of all known and predicted threatened biota, given the requirements of individual species is highly variable and in more natural setting ecological communities are heterogeneous. Ecological communities will often contain several ecological niches providing mosaic patches of habitat for a variety of species. Natural mosaic habitat patches are often produced from events such as fire, floods etc.

Vegetation clearing for the proposed development, and associated potential loss of biodiversity values, would be offset with the long-term protection and enhancement of vegetation condition and connectivity as well as the addition of significant habitat features within the proposed offset site.

The loss of biodiversity in the terms of this project are associated with the removal of two EECs; Natural Temperate Grassland (9.07 ha), and Box Gum Woodland (5.94 ha). In addition, there will be a reduction in significant habitat features including; stag trees, hollow bearing trees, feed trees, fallen timber and rocky outcrops. All of these features may provide breeding, nesting and/or foraging sources for threatened species in the local area. To compensate for the loss of biodiversity, AGL

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proposes to set aside and maintain land in areas adjacent to the development footprint for conservation. The proposed offset area is within the Site (on AGL owned land) and is shown in **Figure 9**.

URS has provided a comprehensive assessment of all tree hollows to be removed from within the project footprint, and of all tree hollows found within the proposed offset area (**Appendix O and Appendix P**).

The value of hollow bearing tree habitat in the proposed offset site was found to be significantly higher than that found within the proposed development footprint. The proposed offset site would conserve 49 hollow-bearing trees which were found to support  $\geq 108$  hollows, whilst the clearing of land within the development footprint would result in the removal of 39 hollow-bearing trees which were found to support  $\geq 73$  hollows. Furthermore, the hollow bearing trees present in the proposed offset area (supporting 71 small, 22 medium and 16 large hollows) provide a more diverse range of hollows, when compared to those found in the development footprint (supporting 58 small, 21 medium and no large hollows) (**Appendix O and P**).

The key threatened species identified on site that are dependent on hollow bearing tree resources, include the following:

- Brown Treecreeper (*Climacteris picumnus victoriae*);
- Gang Gang Cockatoo (*Callocephalon fimbriatum*);

**Table 7-2** outlines the characteristics of tree hollows used by the key threatened species identified for the site, in addition to those species that have the potential to occur on site. The data demonstrates the broad range of tree hollow characteristics required by the species. As such, the proposed offset area would provide more valuable hollow bearing tree resources for the key threatened species in terms of number and diversity of hollows (**Appendix O of Appendix H**), than those found in the proposed development footprint.

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**Table 7-2 Characteristics of tree hollows used by key threatened species**

	EPBC Act	TSC Act	Height (cm)	Mean DBH* (cm)	DBH range	Mean entrance height (m)	Entrance height range (m)	Mean entrance diameter (cm)	Entrance diameter range (cm)	Hollow depth (cm)	Preferred Tree Species	References
<b>Brown Treecreeper</b> <i>Climacteris picumnus victoricae</i>	-	V	17				1.5-15	6		35		(Franks and Franks 2003; DEC NSW 2005h)
<b>Gang-gang Cockatoo</b> <i>Callocephalon fimbriatum</i>	-	V	34				20-30	25		70-200	Eucalypts	(Simpson and Day 1999; Gibbons and Lindenmayer 2003)
<b>Barking Owl</b> <i>Ninox connivens</i>	-	V	40	120	60-260	10	5-19	27.8	14-76	104	Eucalypts & Melaleuca	(Taylor et al 2002 in Goldingay 2009, Gibbons and Lindenmayer 2003)
<b>Little Lorikeet</b> <i>Glossopsitta pusilla</i>	-	V	16	-	-	6.8	2-15	3.2	2.7-3.9	>65		(Courtney and Debus 2006 in Goldingay 2009)
<b>Powerful Owl</b> <i>Ninox strenua</i>	-	V	55	130	77-180	20	14-28	-	-	-		(Kavanagh 1996 in Goldingay 2009)
				163	88-233	22	8-40	-	-	-		(McNabb 1996 in Goldingay 2009)
<b>Superb Parrot</b> <i>Polytelis swainsonii</i>	V	V	38	115	-	10.1	5-20	>11	4-16+	<1-10		(Manning et al 2004 in Goldingay 2009)
<b>Squirrel Glider</b> <i>Petaurus norfolcensis</i>	-	V		93	35-159				4-51		Eucalypts	(Traill and Lill 1997; Crane et al 2008)
<b>Swift Parrot</b> <i>Lathamus discolor</i>	E	E	24	10	-	14	6-35	-	4-20	30-60	Eucalypts	(Higgins 1999 in Goldingay 2009; Gibbons and Lindenmayer 2003)
<b>Turquoise Parrot</b> <i>Neophema pulchella</i>	-	V	20	9/19	6-32	1/1.4	0.2-6	-	5-11	40	Eucalypts & Casuarina	(Higgins 1999 in Goldingay 2009; Quin and Baker-Gabb 1993 in Goldingay 2009; Gibbons and Lindenmayer 2003)

\*DBH – Diameter at Breast Height

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In addition, impact mitigation measures include the provision of further compensatory habitat for key threatened species, through the installation of nest boxes in the offset area. As the design and position of nestboxes can influence the patterns of occupancy by different species (Gibbons and Lindenmayer 2003), it is recommended that nest boxes be designed as per the measurements specified in **Table 7-1**, in order to meet the habitat requirements for key threatened species.

The proposed offset site would provide permanent, in perpetuity, conservation of existing native vegetation including Natural Temperate Grassland and Box Gum Woodland and the associated habitat features that provide habitat for a number of threatened fauna species. These would include: Pink-tailed Worm-lizard, Striped Legless Lizard and Golden Sun Moth, Gang-gang Cockatoo, Turquoise Parrot, Swift Parrot, Little Lorikeet, Superb Parrot, Speckled Warbler, Hooded Robin, Varied Sittella, White-fronted Chat, Scarlet Robin, Flame Robin, Diamond Firetail and Brown Tree Creeper and threatened flora species such as; Yass Daisy, Silky Swainson-pea, Button Wrinklewort and Hoary Sunray.

A portion of the offset site would include an area of degraded land that will potentially, and if well managed, qualify as part of the EEC Natural Temperate Grassland (**Figure 9**). Management initiatives would include the elimination of stock through fencing, weed management and assisted natural regeneration with some planting/direct seeding if necessary. This measure is considered to represent an 'offset', as it would successfully maintain and improve the vegetation that is floristically and structurally similar to that which is to be cleared.

The application of the 'maintain or improve' test to the proposal is summarised in **Table 7.3**.

**Table 7-3 Project Impacts, Mitigation Measures and Potential Offsets**

Impact	Mitigation	Offset
<ul style="list-style-type: none"> <li>Minimal impacts on vegetation or fauna habitat, corridors in the locality</li> <li>Removal of 5.94 ha of Box Gum Woodland EEC vegetation.</li> <li>Removal of 9.07 ha of Natural Temperate Grassland EEC vegetation.</li> <li>Removal of exotic pasture</li> <li>Removal of paddock trees, including some hollow bearing habitat trees.</li> <li>Removal of fallen timber, rocky outcrops and feed trees</li> </ul>	<ul style="list-style-type: none"> <li>CEMP and OEMP</li> <li>Flora and fauna management plan</li> <li>Vegetation clearing strategy including two-stage clearing and pre-clearing survey strategies</li> <li>Habitat replacement strategy</li> <li>Habitat corridor and connectivity plan</li> <li>Groundcover clearance strategy</li> <li>Site management plan</li> <li>Grazing management plan</li> <li>Edge effects strategy</li> <li>Sediment and erosion control plan</li> <li>Weed and pest management plan</li> <li>Complementary planting and rehabilitation plan</li> </ul>	<ul style="list-style-type: none"> <li>Provision of a biodiversity offset, with approximately 80.71 ha of Natural Temperate Grassland</li> <li>Provision of a biodiversity offset, with approximately 77.57 ha of Box Gum Woodland</li> <li>Provision of approximately 24.97 ha of Exotic Pasture that with appropriate management actions may become Natural Temperate Grasslands.</li> <li>Over 49 hollow bearing trees to be offset within the designated offset area</li> </ul>

On the basis of the above assessment, the offset site is consistent with the DEC (2005) and DEWHA (2007) guidelines for offsets and meets the key criteria for 'like-for-like or better' trade-offs of biodiversity values. Adoption of the proposed mitigation measures outlined in **Section 7**, along with the proposed offset described above, would compensate for the loss of vegetation associated with the proposal and would improve biodiversity values within the study area in the long term. Hence the current proposal 'maintains or improves' biodiversity values.

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### 7.3.1 Proposed Offset Area

The proposed offset area for the Dalton Power Project totals approximately 183.26 ha and is sited adjoining the development area, shown in **Figure 9**. A decision on which conservation mechanism to be adopted would be made following the determination of the project.

The proposed offset area recognises the importance of the native biodiversity of the development footprint and encompasses some of the areas of highest relative biodiversity value within the site. The offset site also includes areas that would otherwise not be conserved either naturally or through existing land management practices.

The key features of the offset site include:

- 158.29 ha of native vegetation which comprises vegetation of high conservation significance, namely, endangered ecological communities:
  - Natural Temperate Grassland (80.71 ha); and
  - Box Gum Woodland (77.57 ha).
- 24.97 ha of Exotic Pasture that with appropriate management has the potential to become Natural Temperate Grassland.
- Protection of areas of native vegetation that have the potential to support a range of threatened fauna species such as; Pink-tailed Worm-lizard, Striped Legless Lizard and Golden Sun Moth, Gang-gang Cockatoo, Turquoise Parrot, Swift Parrot, Little Lorikeet, Superb Parrot, Speckled Warbler, Hooded Robin, Varied Sittella, White-fronted Chat, Scarlet Robin, Flame Robin, Diamond Firetail and Brown Tree Creeper and threatened flora species such as; Yass Daisy, Silky Swainson-pea, Button Wrinklewort and Hoary Sunray as well as numerous common native species.
- Protection of 49 hollow bearing trees ( $\geq 108$  hollows) (**Appendix O** of **Appendix H**), providing potential habitat for a range of hollow-dependent threatened fauna species
- Protection of habitat features such as rocky outcrops and fallen timber that may be used by a range of threatened fauna species. The proposed offset area contains at least 49 suitable hollows to replace 33 that would be impacted within the development footprint.

**Table 7-4** summarises the potential offset site suggested by AGL to offset the proposed action.

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**Table 7-4 Proposed Offset Strategy**

Vegetation Community	EPBC Act Status	TSC Act Status	Total Area Mapped	Total Area to be Cleared	Total Area in Proposed Offset
Exotic Pasture (Potential Natural Temperate Grassland)	N/A	N/A	258.72	0.84	24.97
Box Gum Woodland	N/A*	Endangered Ecological Community	147.24	5.94	77.57
Natural Temperate Grassland	Endangered Ecological Community	N/A	92.58	9.07	80.71
<b>Total</b>			<b>498.54</b>	<b>15.85</b>	<b>183.25</b>

\* Community condition does not meet the condition required to be classified as Box Gum Woodland, under EPBC Act.

### 7.3.2 Management of Offset Site

Management of the conservation area to form part of discussions with OEHL and SEWPaC and would include, as a minimum:

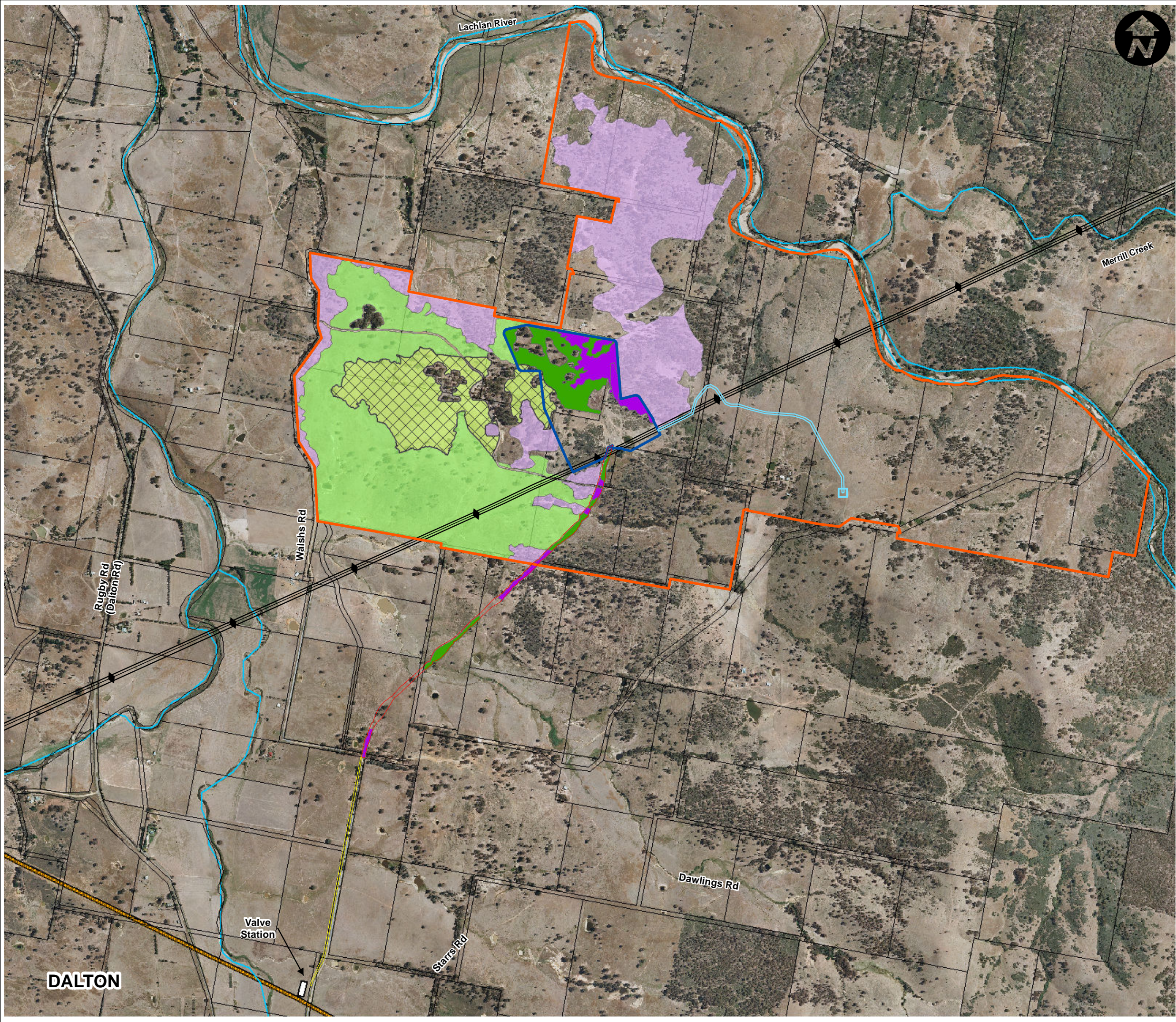
- Exclusion of grazing through stock proof fencing;
- Weed removal and control;
- Revegetation or assisted regeneration of disturbed areas;
- Retention of fallen timber, hollow logs, leaf litter, rocks and other habitat resources;
- Control of feral animals, where appropriate and practical;
- Erosion control, where appropriate and practical;
- Signage to indicate the offset area and to disallow access;
- Maintenance of existing fencing to control grazing pressures; and
- Ecological monitoring and reporting of biodiversity condition and effectiveness of mitigations measures over time.

AGL estimates that these works would require site establishment costs of around \$15,000 for exclusion fencing, as well as an average cost of rehabilitation of around \$24,000 per annum over a 20 year period. These costs are likely to be higher in the first 5 to 10 years than in the second 10 years of rehabilitation works.

Full details of the proposed management regime would be included in a management plan that would be prepared in consultation with OEHL and SEWPaC.



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**Legend**

- AGL Site Boundary
- Plant Footprint
- Gas Pipeline (northern) and Access Road
- Gas Pipeline (southern)
- Communications Tower and Hut Footprint
- Communications Tower Services and Access Track
- Moomba-Sydney Pipeline
- Transmission Line

**EEC's impacted by construction (URS):**

- Natural Temperate Grassland<sup>^</sup>
- Box Gum Woodland<sup>\*</sup>

**EEC's for Offset (URS):**

- Natural Temperate Grassland<sup>^</sup>
- Box Gum Woodland<sup>\*</sup>
- Potential Natural Temperate Grassland

<sup>\*</sup> TSC Act Listed Community  
<sup>^</sup> EBPC Act Listed Community

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Kilometres

Source: Aerial Image from AGL

Drawn: SB	Approved: JM	Date: 24/06/2011
Job No.: 43177661	File No.: 43177661.041.mxd	
Client		
AGL		
Project		
DALTON POWER PROJECT		
Title		
URS VEGETATION MAPPING OFFSETS		
Figure: 9		



## Conclusion

AGL proposes to construct and operate a gas-fired peaking power station and associated gas pipeline and access road in Dalton, NSW. This project will result in the removal of native vegetation that forms part of two endangered ecological communities:

- Natural Temperate Grasslands (listed under the EPBC Act); and
- Box Gum Woodland (listed under the TSC Act).

In addition to the removal of this vegetation, areas of exotic pasture will also be removed, as will potential habitat resources for a number of threatened species listed under the EPBC and TSC Acts, including hollow bearing trees, fallen timber and rocky outcrops.

State assessments of significance have been undertaken for all threatened flora, fauna, populations and communities predicted to occur within the site based on the presence of suitable habitat or identification during field surveys. The results of the assessments indicate that the action will not have a significant impact upon any TSC Act listed threatened biota.

Commonwealth significant impact criteria assessments have been completed for a range of threatened species and communities predicted to occur within the development footprint, based on the presence of suitable habitat or identification during field surveys. The results of the assessments indicate that there will not be a significant impact as a result of the proposed works on any threatened flora or fauna species; however there will be a significant impact on the EPBC Act listed EEC Natural Temperate Grasslands.

A number of mitigation measures are recommended in **Section 7** of this report to minimise the potential impact of this project on the native biota within the Site. In addition, a biodiversity offset will be provided by AGL. This offset will include:

- 158.28 ha of native vegetation which comprises of two EECs; Natural Temperate Grassland (80.71 ha); and Box Gum Woodland (77.57 ha) that have the potential to support a range of threatened fauna species such as; Pink-tailed Worm-lizard, Striped Legless Lizard and Golden Sun Moth, Gang-gang Cockatoo, Turquoise Parrot, Swift Parrot, Little Lorikeet, Superb Parrot, Speckled Warbler, Hooded Robin, Varied Sittella, White-fronted Chat, Scarlet Robin, Flame Robin, Diamond Firetail and Brown Tree Creeper and threatened flora species such as; Yass Daisy, Silky Swainson-pea, Button Wrinklewort and Hoary Sunray as well as numerous common native species.
- 24.97 ha of Exotic Pasture that with appropriate management has the potential to become Natural Temperate Grassland.
- Protection of habitat features such as hollow bearing trees, rocky outcrops and fallen timber that may be used by a range of threatened fauna species. The proposed offset area contains at least 49 suitable hollows to replace 33 that would be impacted within the development footprint.



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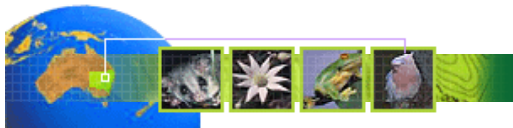
The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

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## Appendix A NPWS Atlas Data Search



## NSW National Parks & Wildlife Service atlas of nsw wildlife



[DECCW home](#) | [help](#) | [about the atlas](#)

### Search Results

**Your selection:** Fauna, threatened species, recorded since 1980, Selected Area - 149.15193,-34.73206,149.25193,-34.63206 returned a total of 0 records of 0 species.  
Report generated on 07/06/2010 - 14:19 (Data valid to 25/04/2010)

### No sightings recorded in the Atlas of NSW Wildlife

[search again](#)

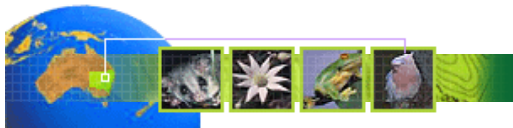
DISCLAIMER: The Atlas of New South Wales Wildlife contains data from a number of sources including government agencies, non-government organisations and private individuals. These data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Find out [more](#) about the Atlas.

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## NSW National Parks & Wildlife Service atlas of nsw wildlife



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### Search Results

**Your selection:** Flora, threatened species, recorded since 1980, Selected Area - 149.15193,-34.73206,149.25193,-34.63206 returned a total of 0 records of 0 species.  
Report generated on 07/06/2010 - 14:22 (Data valid to 25/04/2010)

### No sightings recorded in the Atlas of NSW Wildlife

[search again](#)

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## **Appendix B EPBC Act Matters of National Environmental Significance Search**



Australian Government

Department of the Environment, Water, Heritage and the Arts

## Protected Matters Search Tool

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

7 June 2010 14:07

# 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.

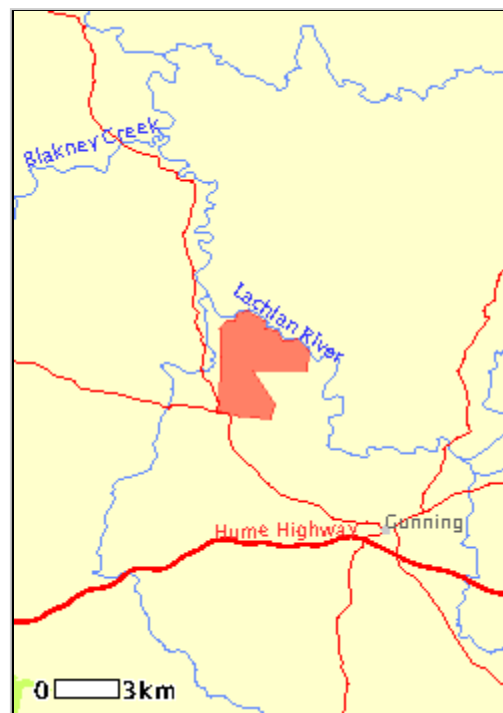
You may wish to print this report for reference before moving to other pages or websites.

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:** 10 km

**Coordinates:** -34.67533,149.18620, -  
34.67533,149.19037, -  
34.67217,149.19153, -  
34.67067,149.19670, -  
34.67583,149.20503, -  
34.67950,149.20537, -  
34.68100,149.21187, -  
34.68583,149.21420, -  
34.68517,149.22153, -  
34.69067,149.22753, -  
34.70083,149.22687, -  
34.70083,149.19903, -  
34.71800,149.21053, -  
34.72533,149.20820, -  
34.72383,149.19170, -  
34.72150,149.18220, -  
34.69400,149.18287, -  
34.67983,149.18253



This map may contain data which are  
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**Report Contents:** [Summary](#)

[Details](#)

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

[Act](#)

- [Extra Information](#)

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

---

## 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>.

**World Heritage Properties:** None

**National Heritage Places:** None

**Wetlands of International Significance:  
(Ramsar Sites)** None

**Commonwealth Marine Areas:** None

**[Threatened Ecological Communities:](#)** 2

**[Threatened Species:](#)** 14

**[Migratory Species:](#)** 12

### 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>	1
<b>Commonwealth Heritage Places:</b>	None
<b>Places on the RNE:</b>	4
<b>Listed Marine Species:</b>	10
<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

Threatened Ecological Communities [ [Dataset Information](#) ]

[Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory](#)

[White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland](#)

Threatened Species [ [Dataset Information](#) ]

#### Birds

[Anthochaera phrygia](#)  
Regent Honeyeater

[Lathamus discolor](#)  
Swift Parrot

[Polytelis swainsonii](#)  
Superb Parrot

[Rostratula australis](#)

Status	Type of Presence
Endangered	Community likely to occur within area
Critically Endangered	Community likely to occur within area
Status	Type of Presence
Endangered	Species or species habitat likely to occur within area
Endangered	Species or species habitat may occur within area
Vulnerable	Species or species habitat likely to occur within area
Vulnerable	Species or species habitat may occur

Australian Painted Snipe

within area

## Frogs

[\*Litoria booroolongensis\*](#)

Booroolong Frog

Endangered

Species or species habitat may occur within area

## Insects

[\*Synemon plana\*](#)

Golden Sun Moth

Critically

Endangered

Species or species habitat may occur within area

## Mammals

[\*Dasyurus maculatus maculatus \(SE mainland population\)\*](#)

Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)

Endangered

Species or species habitat may occur within area

## Ray-finned fishes

[\*Maccullochella peelii peelii\*](#)

Murray Cod, Cod, Goodoo

Vulnerable

Species or species habitat may occur within area

[\*Macquaria australasica\*](#)

Macquarie Perch

Endangered

Species or species habitat may occur within area

## Reptiles

[\*Aprasia parapulchella\*](#)

Pink-tailed Worm-lizard

Vulnerable

Species or species habitat likely to occur within area

[\*Delma impar\*](#)

Striped Legless Lizard

Vulnerable

Species or species habitat likely to occur within area

## Plants

[\*Ammobium craspedioides\*](#)

Yass Daisy

Vulnerable

Species or species habitat likely to occur within area

[\*Leucochrysum albicans var. tricolor\*](#)

Hoary Sunray

Endangered

Species or species habitat likely to occur within area

[\*Rutidosis leptorrhynchoides\*](#)

Button Wrinklewort

Endangered

Species or species habitat likely to occur within area

Migratory Species [ [Dataset Information](#) ]

Status

Type of Presence

## Migratory Terrestrial Species

### Birds

[\*Haliaeetus leucogaster\*](#)

White-bellied Sea-Eagle

Migratory

Species or species habitat likely to occur within area

[\*Hirundapus caudacutus\*](#)

White-throated Needletail

Migratory

Species or species habitat may occur within area

[\*Merops ornatus\*](#)

Rainbow Bee-eater

Migratory

Species or species habitat may occur within area

[\*Myiagra cyanoleuca\*](#)

Satin Flycatcher

Migratory

Breeding likely to occur within area

[\*Xanthomyza phrygia\*](#)

Regent Honeyeater

Migratory

Species or species habitat likely to occur within area

## Migratory Wetland Species

### Birds

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

### Migratory Marine Birds

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

## Other Matters Protected by the EPBC Act

Listed Marine Species [ [Dataset Information](#) ]

### Birds

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



	area	
<a href="#"><i>Merops ornatus</i></a> Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
<a href="#"><i>Myiagra cyanoleuca</i></a> Satin Flycatcher	Listed - overfly marine area	Breeding likely to occur within area
<a href="#"><i>Rostratula benghalensis s. lat.</i></a> Painted Snipe	Listed - overfly marine area	Species or species habitat may occur within area

Commonwealth Lands [ [Dataset Information](#) ]

Communications, Information Technology and the  
Arts - Telstra Corporation Limited

Places on the RNE [ [Dataset Information](#) ]

Note that not all Indigenous sites may be listed.

## Historic

[Boureong \(including later wing and outbuildings\) NSW](#)

[Gunning Courthouse / Police Buildings Complex NSW](#)

[Public School NSW](#)

## Natural

[Fossil Leaf Beds Specimen NSW](#)

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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

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## Appendix C CMA Sub-region Search



## New South Wales Threatened Species Website

You are here: [Home](#) > [Species](#) > [Find by geographic region](#) > [Browse by CMA](#) > [Lachlan](#) > Species found in Murrumbateman

### Murrumbateman CMA sub-region

Below is a list of the 34 threatened species found in the Murrumbateman sub-region. You can also see a list of:

- [threatened algae](#)
- [threatened animals](#)
- [threatened communities](#)
- [threatened fungi](#)
- [threatened plants](#)
- [see this complete list categorised by vegetation type](#)

#### Threatened species known or predicted to occur in the Murrumbateman CMA sub-region

Export this list

Scientific Name	Common Name	Type of species	Level of Threat	Known or Predicted to occur
<a href="#">Ammobium craspedioides</a>	<a href="#">Yass Daisy</a>	Plant > Herbs and Forbs	Vulnerable	Known
<a href="#">Anseranas semipalmata</a>	<a href="#">Magpie Goose</a>	Animal > Birds	Vulnerable	Known
<a href="#">Aprasia parapulchella</a>	<a href="#">Pink-tailed Worm-lizard</a>	Animal > Reptiles	Vulnerable	Predicted
<a href="#">Botaurus poiciloptilus</a>	<a href="#">Australasian Bittern</a>	Animal > Birds	Vulnerable	Predicted
<a href="#">Callocephalon fimbriatum</a>	<a href="#">Gang-gang Cockatoo</a>	Animal > Birds	Vulnerable	Known
<a href="#">Cercartetus nanus</a>	<a href="#">Eastern Pygmy-possum</a>	Animal > Marsupials	Vulnerable	Known
<a href="#">Circus assimilis</a>	<a href="#">Spotted Harrier</a>	Animal > Birds	Vulnerable	Predicted
<a href="#">Climacteris picumnus victoriae</a>	<a href="#">Brown Treecreeper (eastern subspecies)</a>	Animal > Birds	Vulnerable	Known
<a href="#">Dasyurus maculatus</a>	<a href="#">Spotted-tailed Quoll</a>	Animal > Marsupials	Vulnerable	Predicted
<a href="#">Eucalyptus aggregata</a>	<a href="#">Black Gum</a>	Plant > Trees	Vulnerable	Predicted
<a href="#">Glossopsitta pusilla</a>	<a href="#">Little Lorikeet</a>	Animal > Birds	Vulnerable	Predicted
<a href="#">Grantiella picta</a>	<a href="#">Painted Honeyeater</a>	Animal > Birds	Vulnerable	Predicted
<a href="#">Hieraetus morphnoides</a>	<a href="#">Little Eagle</a>	Animal > Birds	Vulnerable	Known
<a href="#">Lophoictinia isura</a>	<a href="#">Square-tailed Kite</a>	Animal > Birds	Vulnerable	Known
<a href="#">Melanodryas cucullata cucullata</a>	<a href="#">Hooded Robin (south-eastern form)</a>	Animal > Birds	Vulnerable	Known

<a href="#">Melithreptus gularis gularis</a>	<a href="#">Black-chinned Honeyeater (eastern subspecies)</a>	Animal > Birds	Vulnerable	Predicted
<a href="#">Miniopterus schreibersii oceanensis</a>	<a href="#">Eastern Bentwing-bat</a>	Animal > Bats	Vulnerable	Predicted
<a href="#">Natural Temperate Grassland of the Southern Tablelands (NSW and ACT)</a>	<a href="#">Natural Temperate Grassland of the Southern Tablelands (NSW and ACT)</a>	Community > Threatened Ecological Communities	Not listed	Known
<a href="#">Neophema pulchella</a>	<a href="#">Turquoise Parrot</a>	Animal > Birds	Vulnerable	Known
<a href="#">Petaurus norfolcensis</a>	<a href="#">Squirrel Glider</a>	Animal > Marsupials	Vulnerable	Predicted
<a href="#">Petroica boodang</a>	<a href="#">Scarlet Robin</a>	Animal > Birds	Vulnerable	Known
<a href="#">Petroica boodang</a>	<a href="#">Scarlet Robin</a>	Animal > Birds	Vulnerable	Known
<a href="#">Petroica phoenicea</a>	<a href="#">Flame Robin</a>	Animal > Birds	Vulnerable	Known
<a href="#">Phascolarctos cinereus</a>	<a href="#">Koala</a>	Animal > Marsupials	Vulnerable	Predicted
<a href="#">Polytelis swainsonii</a>	<a href="#">Superb Parrot</a>	Animal > Birds	Vulnerable	Known
<a href="#">Pyrrholaemus sagittatus</a>	<a href="#">Speckled Warbler</a>	Animal > Birds	Vulnerable	Known
<a href="#">Rostratula benghalensis</a>	<a href="#">Painted Snipe</a>	Animal > Birds	Endangered	Known
<a href="#">Scoteanax rueppellii</a>	<a href="#">Greater Broad-nosed Bat</a>	Animal > Bats	Vulnerable	Predicted
<a href="#">Stagonopleura guttata</a>	<a href="#">Diamond Firetail</a>	Animal > Birds	Vulnerable	Known
<a href="#">Swainsona sericea</a>	<a href="#">Silky Swainson-pea</a>	Plant > Herbs and Forbs	Vulnerable	Predicted
<a href="#">Synemon plana</a>	<a href="#">Golden Sun Moth</a>	Animal > Invertebrates	Endangered	Known
<a href="#">Varanus rosenbergi</a>	<a href="#">Rosenberg's Goanna</a>	Animal > Reptiles	Vulnerable	Predicted
<a href="#">White Box Yellow Box Blakely's Red Gum Woodland</a>	<a href="#">Box-Gum Woodland</a>	Community > Threatened Ecological Communities	Endangered Ecological Community	Known
<a href="#">Xanthomyza phrygia</a>	<a href="#">Regent Honeyeater</a>	Animal > Birds	Endangered	Known

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## Appendix D I&I NSW Fisheries Lachlan CMA Search

## Search results for listings by region

The provisions of the *Fisheries Management Act 1994* cover all fish (freshwater, estuarine and marine), aquatic invertebrates and marine plants. The definition of fish includes any marine, estuarine or freshwater fish or other aquatic animal (e.g., oysters, prawns, sharks, rays, starfish, insects and worms), at any stage of their life history. It does not include whales, mammals, birds, reptiles and amphibians.



### Listings found in the Lachlan CMA

ScientificName	CommonName	Status	Profile
<i>Notopala sublineata</i>	River snail	Endangered	<a href="#">profile</a>
<i>Bidyanus bidyanus</i>	Silver perch	Vulnerable	<a href="#">profile</a>
<i>Macquaria australasica</i>	Macquarie perch	Endangered	<a href="#">profile</a>
<i>Nannoperca australis</i>	Southern pygmy perch	Endangered	<a href="#">profile</a>
<i>Mogurnda adspersa</i>	Purple spotted gudgeon	Endangered	<a href="#">profile</a>
<i>Ambassis agassizii</i>	Olive perchlet	Endangered Population	<a href="#">profile</a>
<i>Aquatic ecological community in the natural drainage system of the lowland catchment of the Lachlan River</i>	Lachlan River ECC	Endangered Ecological Community	<a href="#">profile</a>



## Appendix E Flora Habitat Assessment

## Appendix E

Table E-1 Habitat Requirements for Threatened Flora and Ecological Communities with the Potential to Occur Within the Development Footprint

Botanical Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Flowering time/active period	Potential Occurrence on Site	Notes
Flora species							
<i>Ammobium craspedioides</i>	Yass Daisy	Vulnerable	Vulnerable	<p>Found in dry forest, Box Gum Woodland and secondary grassland derived from clearing of these communities.</p> <p>Grows in association with a large range of eucalypts (<i>Eucalyptus blakelyi</i>, <i>E. bridgesiana</i>, <i>E. dives</i>, <i>E. goniocalyx</i>, <i>E. macrorhyncha</i>, <i>E. mannifera</i>, <i>E. melliodora</i>, <i>E. polyanthemos</i>, <i>E. rubida</i>).</p> <p>Apparently unaffected by light grazing, as populations persist in some grazed sites.</p>	<p>Spring/Summer.</p> <p>Spring Flowering.</p> <p>Rosettes die off after fruiting.</p>	Medium	<p>This species has been recorded in the general locality.</p> <p>Suitable habitat is present in the study area given the presences of associated species such as <i>E. macrorhyncha</i>, <i>E. mannifera</i>, <i>E. melliodora</i> and vegetation communities such as Box Gum Woodland.</p> <p>The proposed works are likely to require the removal of habitat for this species.</p> <p>Given the suitable habitat and small potential for the removal of degraded habitat <b>an Assessment of Significance (7-part test) (Appendix J) and Commonwealth Significant Impact Criteria Assessment (Appendix K) has been carried out to further consider the potential impact of the proposed works on this species.</b></p>

## Appendix E

Botanical Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Flowering time/active period	Potential Occurrence on Site	Notes
<i>Eucalyptus aggregata</i>	Black Gum	Vulnerable	Not listed	Black Gum is found in the NSW Central and Southern Tablelands, with small isolated populations in VIC and the ACT. Has a moderately narrow distribution, occurring mainly in the wetter, cooler and higher parts of the tablelands, for example in the Blayney, Crookwell, Goulburn, Braidwood and Bungendore districts. Many populations occur on travelling stock reserves. Grows in the lowest parts of the landscape on alluvial soils, on cold, poorly-drained flats and hollows adjacent to creeks and small rivers. Often grows with other cold-adapted eucalypts, such as Snow Gum or White Sallee ( <i>Eucalyptus pauciflora</i> ), Manna or Ribbon Gum ( <i>E. viminalis</i> ), Candlebark ( <i>E. rubida</i> ), Black Sallee ( <i>E. stellulata</i> ) and Swamp Gum ( <i>E. ovata</i> ). Usually occurs in an open woodland formation with a grassy groundlayer dominated either by River Tussock ( <i>Poa labillardierei</i> ) or Kangaroo Grass ( <i>Themeda australis</i> ), but with few shrubs. Also occurs as isolated paddock trees in modified native or exotic pastures.	Flowers not required for identification.	Low	No previous records exist within 25km of the study area (DECCW Wildlife Atlas, 2010), with all records centred on the Crookwell locality. Given the lack of observations of this species within the area covered by the field surveys, and the non-cryptic nature of this species, it is considered unlikely that it occurs within the Site.  <i>Thus, this species or its habitat is deemed unlikely to be affected by the proposed works and no further assessment is required.</i>

## Appendix E

Botanical Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Flowering time/active period	Potential Occurrence on Site	Notes
<i>Eucalyptus macarthurii</i>	Camden Woollybutt	Vulnerable	Not listed	Camden Woollybutt has a moderately restricted distribution. It is currently recorded from the Moss Vale District to Kanangra Boyd National Park. In the Southern Highlands it occurs mainly on private land, often as isolated individuals in, or on the edges, of paddocks. Isolated stands occur in the north west part of the range on the Boyd Plateau. Occurs on grassy woodland on relatively fertile soils on broad cold flats.	Flowers not required for identification	Low	Nearest records of this species are at least 60 km to the east and further to the north east. Likely to be outside of the species natural range. Not known to occur within CMA sub-region. <i>Thus, this species or its habitat is deemed unlikely to be affected by the proposed works and no further assessment is required.</i>
<i>Irenepharsus trypherus</i>	Delicate Cress	Endangered	Endangered	Not common, grows in gullies on the coast and escarpment between Wollongong and the Shoalhaven River. The species has been recorded from 18 sites within the local government areas of Kiama, Shellharbour, Shoalhaven, Tallaganda, Wingecarribee, and Wollongong. Found at such places as Minnamurra Falls, the Jamberoo area, and Morton and Macquarie Pass National Parks. Typically inhabits steep rocky slopes near cliff lines and ridge tops. The species is less typically found growing out of rock crevices or on narrow benches along cliff lines.	Flowers not required for identification	Low	Not predicted to occur within the CMA sub-region, no previous records within 10km of the site. No suitable habitat within the vicinity of the development footprint or site. <i>Thus, this species or its habitat is deemed unlikely to be affected by the proposed works and no further assessment is required.</i>



## Appendix E

Botanical Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Flowering time/active period	Potential Occurrence on Site	Notes
				<p>The vast majority of sites are recorded from the upper slopes of the ridge systems that extend south and east of the Illawarra escarpment, although the species has also been recorded from the deep sandstone gorges of the Shoalhaven River.</p> <p>Associated vegetation includes moist sclerophyll forest, Ironwood <i>Backhousia myrtifolia</i> thicket, and rainforest.</p>			
<i>Leucochrysum albicans</i> var. <i>tricolor</i>	Hoary Sunray	Not listed	Endangered	<p>Generally found in grassy woodland, also in grassland on the Monaro. Large numbers of this species are known to colonise disturbed sites. Uncommon though widespread in the region.</p> <p>Occurs on the slopes and plains of NSW, Victoria, Tasmania and Queensland.</p>	Spring and Summer flowering	Medium	<p>Potential habitat for this species exists within the development footprint within the natural temperate grasslands EEC. Given the suitable habitat and potential for the removal of habitat a <b>Commonwealth Significant Impact Criteria Assessment (Appendix K)</b> has been carried out to further consider the potential impact of the proposed works on this species.</p>

## Appendix E

Botanical Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Flowering time/active period	Potential Occurrence on Site	Notes
<i>Rutidosis leptorrhynchoides</i>	Button Wrinklewort	Endangered	Endangered	<p>Local populations at Goulburn, the Canberra - Queanbeyan area and at Michelago. Other populations occur in Victoria. Occurs in Box Gum Woodland, secondary grassland derived from Box Gum Woodland or in Natural Temperate Grassland; and often in the ecotone between the two communities.</p> <p>Grows on soils that are usually shallow, stony red-brown clay loams; tends to occupy areas where there is relatively less competition from herbaceous species (either due to the shallow nature of the soils, or at some sites due to the competitive effect of woodland trees).</p> <p>Exhibits an ability to colonise disturbed areas (e.g. vehicle tracks, bulldozer scrapings and areas of soil erosion).</p> <p>Normally flowers between December to March; plants do not usually flower until their second year.</p> <p>Apparently susceptible to grazing, being retained in only a small number of populations on roadsides, rail reserves and other un-grazed or very lightly grazed sites.</p>	December-March flowering	Medium	<p>Potential habitat for this species exists within the Site.</p> <p><b>As such, an Assessment of Significance (7-part test) (Appendix J) and Commonwealth Significant Impact Criteria Assessment (Appendix K) has been carried out to further consider the potential impact of the proposed works on this species.</b></p>

## Appendix E

Botanical Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Flowering time/active period	Potential Occurrence on Site	Notes
<i>Swainsona sericea</i>	Silky Swainson-pea	Vulnerable	Not listed	Found in Natural Temperate Grassland and Snow Gum <i>Eucalyptus pauciflora</i> Woodland on the Monaro. Found in Box Gum Woodland in the Southern Tablelands and South West Slopes. Sometimes found in association with cypress-pines <i>Callitris</i> spp. Habitat on plains unknown.	Spring flowering	Medium	This species has not been recorded within the locality. Suitable habitat present in study area due to the presence of Box Gum Woodland. The proposed works is likely to require the removal of some degraded habitat for this species. Given the suitable habitat and small potential for the removal of degraded habitat an <b>Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).</b>
<b>Endangered Ecological Communities</b>							
Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory	Natural Temperate Grasslands	Not listed	Endangered Ecological Community	Fertile lower parts of the landscape where resources such as water and nutrients are abundant, but tree growth is restricted by other factors. Within an altitude range of between 560 and 1200 m.	Year round	High	Present on Site. The widening of the access track may require the removal of small portion of this community at the entry to the Holmes property. Given the presence of the community and the potential for impact, a <b>Commonwealth Significant Impact Criteria Assessment (Appendix K) has been carried out to further consider the potential impact of the proposed works on this species.</b>

## Appendix E

Botanical Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Flowering time/active period	Potential Occurrence on Site	Notes
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Box Gum Woodland	Endangered Ecological Community	Critically Endangered Ecological Community	Tablelands and western slopes of NSW, typically on fertile substrates in lower parts of the landscape	Year round	High	Present on Site This community occurs in varying qualities across the site. A portion of this community occurs within the footprint of the works and thus will be removed during the construction phase. Given the presence and likelihood of impact <b>an Assessment of Significance (7-part test) (Appendix J) and Commonwealth Significant Impact Criteria Assessment (Appendix K) has been carried out to further consider the potential impact of the proposed works on this species.</b>
Aquatic ecological community in the natural drainage system of the lowland catchment of the Lachlan River	Lachlan EEC	Endangered Ecological Community	Not listed	All natural rivers, creeks, streams and associated lagoons, billabongs, lakes, wetlands, paleo-channels, flood-runners, floodplains and effluent streams of the Lachlan River	N/A	Low	Site occurs at an elevation excluded from the EEC (greater than 500m ASL). <i>Thus, this EEC is deemed unlikely to be affected by the proposed works and no further assessment is required.</i>



## Appendix F Fauna Habitat Assessment

## Appendix F

Table F-2 Habitat Requirements for Threatened Fauna with the Potential to Occur Within the Development Footprint

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
Amphibians & Reptiles						
<i>Aprasia parapulchella</i>	Pink-tailed Worm Lizard	Vulnerable	Vulnerable	Inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass ( <i>Themeda australis</i> ). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks.  Commonly found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites. Feeds on the larvae and eggs of the ants with which it shares its burrows.	High	Large areas of native grassland on site containing <i>Themeda australis</i> and other scattered native tussock grasses.  Occasional outcrops of rock are present over much of the Site, providing required shelter.  Some areas of native grassland and rocky outcrops may be removed during the proposed works.  Given the suitable habitat and potential impact <b>an Assessment of Significance (7-part test) (Appendix J) and Commonwealth Significant Impact Criteria Assessment (Appendix K) has been carried out to further consider the potential impact of the proposed works on this species.</b>
<i>Delma impar</i>	Striped Legless Lizard	Vulnerable	Vulnerable	Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box Gum Woodland.  Its habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass ( <i>Themeda australis</i> ), spear-grasses ( <i>Austrostipa</i> spp.) and Poa tussocks ( <i>Poa</i> spp.), and occasionally wallaby grasses ( <i>Austrodanthonia</i> spp.). Sometimes present in modified grasslands with a significant content of exotic grasses. Sometimes found in grasslands with significant amounts of surface rocks, which are used for shelter.  The species actively hunts for spiders, crickets, moth larvae and cockroaches. Two papery eggs are laid in early summer. Goes below ground or under rocks or logs over winter.	High	Large areas of native grassland on site containing <i>Themeda australis</i> and other scattered native tussock grasses.  Occasional outcrops of rock are present over much of the Site, providing required shelter.  Some areas of native grassland and rocky outcrops may be removed during the proposed works.  Given the suitable habitat and potential impact <b>an Assessment of Significance (7-part test) (Appendix J) and Commonwealth Significant Impact Criteria Assessment (Appendix K) has been carried out to further consider the potential impact of the proposed works on this species.</b>

## Appendix F

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
<i>Litoria booroolongensis</i>	Booroolong Frog	Endangered	Endangered	Live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins. Shelter under rocks or amongst vegetation near the ground on the stream edge. Sometimes bask in the sun on exposed rocks near flowing water during summer. Breeding occurs in spring and early summer and tadpoles metamorphose in late summer to early autumn. Eggs are laid in submerged rock crevices and tadpoles grow in slow-flowing connected or isolated pools.	Low	No suitable habitat is present for this species on site given that the available creek lines have no rocky resources. There are no creeklines within the development footprint. <i>Thus, this species or its habitat is deemed unlikely to be affected by the proposed works and no further assessment is required.</i>
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	Vulnerable	Not listed	Rosenberg's Goanna occurs on the Sydney Sandstone in Wollemi National Park to the north-west of Sydney, in the Goulburn and ACT regions and near Cooma in the south. There are records from the South West Slopes near Khancoban and Tooma River. Also occurs in South Australia and Western Australia.	Low	No termite mounds (which are critical habitat for this species) exist within the Site. <i>Thus, this species or its habitat is deemed unlikely to be affected by the proposed works and no further assessment is required.</i>
				Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens. Lays up to 14 eggs in a termite mound; the hatchlings dig themselves out of the mounds.		

## Appendix F

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
<i>Birds</i>						
<i>Anseranas semipalmata</i>	Magpie Goose	Vulnerable	Not listed	<p>Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. Equally at home in aquatic or terrestrial habitats; often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes.</p> <p>Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level; most breeding now occurs in monsoonal areas; nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW.</p> <p>Often seen in trios or flocks on shallow wetlands, dry ephemeral swamps, wet grasslands and floodplains; roosts in tall vegetation.</p>	Low	<p>No wetland habitat present within the Site or in immediate surrounds. All aquatic resources within locality appear to be degraded and have little fringing vegetation.</p> <p><i>Thus, this species or its habitat is deemed unlikely to be affected by the proposed works and no further assessment is required.</i></p>
<i>Botaurus poiciloptilus</i>	Australasian Bittern	Vulnerable	Not listed	<p>Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.).</p> <p>Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails.</p> <p>Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains.</p> <p>Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds; there are usually six olive-brown eggs to a clutch.</p>	Low	<p>No wetland habitat present within the Site or in immediate surrounds. All aquatic resources within locality appear to be degraded and have little fringing vegetation. No reeds or bullrushes observed around Site.</p> <p><i>Thus, this species or its habitat is deemed unlikely to be affected by the proposed works and no further assessment is required.</i></p>

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Vulnerable	Not listed	In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. May also occur in sub-alpine Snow Gum <i>Eucalyptus pauciflora</i> woodland and occasionally in temperate rainforests. Move to lower altitudes in winter, preferring more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. Favours old growth attributes for nesting and roosting.	High	This species was observed during survey. The area of proposed works is likely to contain potential nesting and/or roosting habitat in the form of mature eucalypt species and areas of eucalypt woodland. Hollows were also observed in mature canopy trees in the woodlands surrounding the development footprint. Thus potential breeding habitat is available. Given the presence of suitable habitat and that the species has been seen utilising the site. <b>An Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).</b>
<i>Calyptrorhynchus lathamii</i>	Glossy Black Cockatoo	Vulnerable	Not listed	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak ( <i>Allocasuarina littoralis</i> ), Forest She-oak ( <i>A. torulosa</i> ) or Drooping She-oak ( <i>A. verticillata</i> ) occur. In the Riverina area, inhabits open woodlands dominated by Belah ( <i>Casuarina cristata</i> ). Feeds almost exclusively on the seeds of several species of she-oak ( <i>Casuarina</i> and <i>Allocasuarina</i> species), shredding the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites.	Low	It is unlikely that this species would utilise the study area given that only Minimal habitat is available in form of a few very young <i>Allocasuarina</i> 's along the creeklines. These areas occur outside of the footprint of the proposed works. <i>Thus, this species is deemed unlikely to occur and no further assessment is required.</i>
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	Vulnerable	Not listed	Found in eucalypt woodlands and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum ( <i>Eucalyptus camaldulensis</i> ). Fallen timber is an important habitat component for foraging. The species is considered to be sedentary, that is to be resident in many	High	This species was observed during survey. The area of proposed works is likely to contain potential foraging habitat in the form of rough barked Eucalyptus species (i.e. <i>E. melliodora</i> and <i>E. macrorhyncha</i> ) as well as sections with tussock grass understorey and fallen timber. The removal of a portion of Box Gum Woodland which contains some habitat resources for the species will be required during the proposed works.



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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
				<p>locations throughout its range; present in all seasons or year-round at many sites; territorial year-round, though some birds may disperse locally after breeding.</p> <p>When foraging in trees and on the ground, they peck and probe for insects, mostly ants, amongst the litter, tussocks and fallen timber, and along trunks and lateral branches; up to 80% of the diet is comprised of ants; other invertebrates (including spiders, insects larvae, moths, beetles, flies, hemipteran bugs, cockroaches, termites and lacewings) make up the remaining percentage; nectar from Mugga Ironbark (<i>E. sideroxylon</i>) and paperbarks, and sap from an unidentified eucalypt are also eaten, along with lizards and food scraps; young birds are fed ants, insect larvae, moths, crane flies, spiders and butterfly and moth larvae.</p> <p>Hollows in standing dead or live trees and tree stumps are essential for nesting.</p> <p>Endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range</p>		<p>Hollows were also observed in mature canopy trees in the surrounding woodlands to the easement. Thus potential breeding habitat is available.</p> <p>Given the presence of suitable habitat and that the species has been seen utilising the site an <b>Assessment of Significance (7-part test)</b> has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).</p>
<i>Circus assimilis</i>	Spotted Harrier	Vulnerable	Not listed	<p>Occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population.</p> <p>Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months.</p>	Medium	<p>Species predicted to occur on site. Suitable foraging habitat present and prey sources available on site. As such, an <b>Assessment of Significance (7-part test)</b> has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).</p>

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
				Preys on terrestrial mammals (e.g. bandicoots, bettongs, and rodents), birds and reptiles, occasionally insects and rarely carrion.		
<i>Daphoenositta chrysoptera</i>	Varied Sittella	Vulnerable	Not listed	Sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands, with a nearly continuous distribution in NSW from the coast to the far west. It inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decortivating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy. It builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.	High	Previous records of this species within 10km of the site. Suitable habitat present within the development footprint. Species observed within AGL owned land. <b>As such, an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).</b>
<i>Epthianura albifrons</i>	White-fronted Chat	Vulnerable	Not listed	Distributed across the southern half of Australia from southernmost Queensland to southern Tasmania, and across to Western Australia up to Carnarvon. In NSW it occurs in the southern half of the state in damp coastal habitat including saltmarsh vegetation, open grasslands and periodically in low shrubs bordering wetland areas. They also occur in arid areas near waterways or crops. Feeds on insects including flies and beetles. Breeds from July to early March; nests usually open cup of grass or twigs built in low vegetation.	Medium	Species predicted to occur within region. Suitable open grassland winter foraging habitat present on and adjacent to site. Observed during survey on property adjacent to AGL land. <b>As such, an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).</b>
<i>Glossopsitta pusilla</i>	Little Lorikeet	Vulnerable	Not listed	Distributed across the coastal and Great Divide regions of eastern Australia from Cape York to SA. NSW provides a large portion of the species' core habitat. Found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, some areas retain residents year round and 'locally nomadic' movements are suspected of breeding pairs.	Medium	Species predicted to occur on within the area. Suitable foraging habitat present on site. As such, <b>an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).</b>

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
<i>Hieraaetus morphnoides</i>	Little Eagle	Vulnerable	Not listed	Found throughout the Australian mainland except in the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used.	Medium	Species predicted to occur on site. Suitable foraging habitat present and prey sources available on site. Species observed during field surveys. As such, <b>an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).</b>
				Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.		
<i>Grantiella picta</i>	Painted Honeyeater	Vulnerable	Not listed	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits Boree, Brigalow and Box Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus <i>Amyema</i> . Insects and nectar from mistletoe or eucalypts are occasionally eaten. Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.	Low	Nearest records of this species are 90 km (or more) to the north west of the Site. Some foraging habitat is present within the Site given the presence of eucalyptus species supporting mistletoes. No mistletoe was present within the development footprint. Given the species nomadic lifecycle patterns, the clearing of some small, highly fragmented woodland remnants is not likely to constitute a reduction in a large portion of their feeding range. <i>Thus, this species or its habitat is deemed unlikely to be affected by the proposed works and no further assessment is required.</i>
<i>Lathamus discolor</i>	Swift Parrot	Endangered	Endangered	Migrates to south-eastern Australia in February-April to feed on winter blossoms, and returns to breed in Tasmania in Spring. Occur in a wide variety of habitats, depending on location of blossoms. They feed alone and in parties, mostly within the topmost branches of eucalypt trees. If sufficient food is	Low	Some foraging habitat is present within the study area given the presence of eucalyptus species including favoured feed trees such as <i>E. moluccana</i> . Other food resources such as seeding grasses also occur. However given the species nomadic lifecycle patterns, the removal

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
				<p>available within an area they may remain for about a week, returning to the same tree each night to roost. Details of breeding cycle are not well known.</p> <p>The nest is in a hollow limb or hole often high in a tree. 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>. Commonly used lerp infested trees include Grey Box <i>E. microcarpa</i>, Grey Box <i>E. moluccana</i> and Blackbutt <i>E. pilularis</i></p> <p>Principal foods are eucalypt nectar and pollen, as well as sugary lerps; although banksia nectar, insects and their larvae, seeds (e.g. grass) fruits and berries (including cultivated species) and some vegetative matter are also eaten. Species only ventures onto the ground when drinking and feeding on fallen seeds and flowers. In Western Sydney, it feeds in winter flowering eucalypts in remnant woodlands and isolated strands of mature trees in urban areas: <i>Eucalyptus crebra</i> and <i>E. robusta</i></p>		<p>of a few eucalyptus and grasses on site is not likely to constitute a reduction in a large portion of their feeding range.</p> <p>The site is outside of the species breeding and wintering territory. However to ensure that the legislative requirements of assessment are met, <b>an Assessment of Significance (7-part test) (Appendix J) and Commonwealth Significant Impact Criteria Assessment (Appendix K) has been carried out to further consider the potential impact of the proposed works on this species.</b></p>
<i>Lophoictinia isura</i>	Square tailed Kite	Vulnerable	Not listed	<p>Ranges along coastal and sub-coastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems.</p> <p>Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.</p> <p>In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland.</p> <p>A specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items</p>	Low	<p>One record of this species exists approximately 20 km to the south west of the Site within a reserve.</p> <p>Some hunting habitat is present within the study area along very small ephemeral drainage lines that have retained their vegetation. The presence of open woodland vegetation within the Site also provides habitat for this species.</p> <p>However given the species large home range, the removal of a small amount of highly fragmented woodland vegetation from within the development footprint is not likely to constitute a reduction in a large portion of their feeding range.</p> <p><i>Thus, this species or its habitat is deemed</i></p>

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
				from the outer foliage. Appears to occupy large hunting ranges of more than 100km <sup>2</sup> . Nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.		<i>unlikely to be affected by the proposed works and no further assessment is required.</i>
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	Vulnerable	Not listed	A large Australian robin to 17 cm in length. Common in few places, and rarely found on the coast. It is considered a sedentary species, but local seasonal movements are possible. The south-eastern form is found from Brisbane to Adelaide throughout much of inland NSW, with the exception of the north-west. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. Often perches on low dead stumps and fallen timber or on low-hanging branches, using a perch-and-pounce method of hunting insect prey. Nest is a small, neat cup of bark and grasses bound with webs, in a tree fork or crevice, from less than 1 m to 5 m above the ground.	Medium	Suitable habitat exists within the Site and development footprint. As such, <b>an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).</b>

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
<i>Melithreptus gularis gularis</i>	Black chinned Honeyeater (eastern subspecies)	Vulnerable	Not listed	<p>The subspecies is widespread, from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. It is rarely recorded east of the Great Dividing Range, although regularly observed from the Richmond River district. It has also been recorded at a few scattered sites in the Hunter, Central Coast and Illawarra regions.</p> <p>Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (<i>Eucalyptus sideroxylon</i>), White Box (<i>Eucalyptus albens</i>), Grey Box (<i>Eucalyptus microcarpa</i>), Yellow Box (<i>Eucalyptus melliodora</i>) and Forest Red Gum (<i>Eucalyptus tereticornis</i>).</p> <p>Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks and tea-trees.</p> <p>A gregarious species usually seen in pairs and small groups of up to 12 birds.</p> <p>Feeding territories are large making the species locally nomadic. Recent studies have found that the Black-chinned Honeyeater tends to occur in the largest woodland patches in the landscape as birds forage over large home ranges of at least 5 hectares.</p> <p>Moves quickly from tree to tree, foraging rapidly along outer twigs, underside of branches and trunks, probing for insects. Nectar is taken from flowers, and honeydew is gleaned from foliage.</p> <p>The nest is placed high in the crown of a tree, in the uppermost lateral branches, hidden by foliage. It is a compact, suspended, cup-shaped nest.</p>	Low	<p>One record of this species exists approximately 60 km to the east of the Site.</p> <p>Some habitat is present within the Site in the form of dry open woodlands, with preferred canopy species present.</p> <p>However given the species fairly large home range, and locally nomadic nature, the removal of a small amount of highly fragmented woodland vegetation from within the development footprint is not likely to constitute a reduction in a large portion of their feeding range.</p> <p><i>Thus, this species or its habitat is deemed unlikely to be affected by the proposed works and no further assessment is required.</i></p>



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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
<i>Neophema pulchella</i>	Turquoise Parrot	Vulnerable	Not listed	<p>Range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range.</p> <p>Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.</p> <p>Usually seen in pairs or small, possibly family, groups and have also been reported in flocks of up to thirty individuals.</p> <p>Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants, or browsing on vegetable matter.</p> <p>Forages quietly and may be quite tolerant of disturbance. However, if flushed it will fly to a nearby tree and then return to the ground to browse as soon as the danger has passed.</p> <p>Nests in tree hollows, logs or posts, from August to December.</p>	Medium	<p>The species is known to occur within the CMA subregion; however the nearest record of the species is approximately 60 km to the south of the Site.</p> <p>Nesting and foraging habitat is present within the Site and development footprint, as such; <b>an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).</b></p>
<i>Ninox connivens</i>	Barking Owl	Vulnerable	Not listed	<p>Found throughout Australia except for the central arid regions and TAS. Declined across much of its distribution in NSW and now occurs only sparsely.</p> <p>Most frequently recorded on the western slopes and plains, rarely recorded in the far west or in coastal and escarpment forests. Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timbered watercourses. Denser vegetation is used occasionally for roosting.</p>	Medium	<p>Suitable roosting, nesting and hunting habitat is present within the study area given the presence of intact canopy vegetation along creeklines for roosting, mature hollows for nesting and food sources such as Brush-tailed possums.</p> <p>Given the suitable habitat, <b>an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).</b></p>

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
				<p>Roost during the day along creek lines, usually in tall understorey trees with dense foliage such as <i>Acacia</i> and <i>Casuarina</i> species, or the dense clumps of canopy leaves in large Eucalypts.</p> <p>Feeds on a variety of prey, with invertebrates predominant for most of the year, and birds and mammals such as smaller gliders, possums, rodents and rabbits becoming important during breeding.</p> <p>Live alone or in pairs. Territories range from 30 to 200 ha and birds are present all year.</p> <p>Eggs are laid in nests in hollows of large, old eucalypts including River Red Gum (<i>Eucalyptus camaldulensis</i>), White Box (<i>E. albens</i>), Red Box (<i>E. polyanthemos</i>) and Blakely's Red Gum (<i>E. blakelyi</i>).</p>		
<i>Ninox strenua</i>	Powerful Owl	Vulnerable	Not listed	<p>Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well.</p> <p>The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats.</p> <p>It roosts by day in dense vegetation comprising species such as Turpentine (<i>Syncarpia glomulifera</i>), Black She-oak (<i>Allocasuarina littoralis</i>), Blackwood (<i>Acacia melanoxylon</i>), Rough-barked Apple (<i>Angophora floribunda</i>), Cherry Ballart (<i>Exocarpus cupressiformis</i>) and a number of eucalypt species.</p>	Medium	<p>Suitable roosting, nesting and hunting habitat is present within the study area given the presence of intact canopy vegetation along creeklines for roosting, mature hollows for nesting and food sources such as Brush-tailed possums.</p> <p>Given the suitable habitat and previous records of the species, <b>an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).</b></p>

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
				<p>The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider.</p> <p>As most prey species require hollows and a shrub layer, these are important habitat components for the owl.</p> <p>Pairs of Powerful Owls are believed to have high fidelity to a small number of hollow-bearing nest trees and will defend a large home range of 400-1450 ha.</p> <p>Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. During the breeding season, the male Powerful Owl roosts in a "grove" of up to 20-30 trees, situated within 100-200 metres of the nest tree where the female shelters.</p>		
<i>Petroica boodang</i>	Scarlet Robin	Vulnerable	Not listed	<p>Found from SE Queensland to SE South Australia and also in Tasmania and SW Western Australia. In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes. Some birds may appear as far west as the eastern edges of the inland plains in autumn and winter.</p> <p>Lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs.</p>	Medium	Species observed during field surveys. As such, an <b>Assessment of Significance (7-part test)</b> has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
				<p>This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps.</p> <p>Habitat usually contains abundant logs and fallen timber: these are important components of its habitat.</p> <p>The Scarlet Robin breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions; this species is occasionally found up to 1000 metres in altitude.</p> <p>The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding.</p> <p>In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees.</p> <p>Birds forage from low perches, fence-posts or on the ground, from where they pounce on small insects and other invertebrates which are taken from the ground, or off tree trunks and logs; they sometimes forage in the shrub or canopy layer.</p>		

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
<i>Petroica phoenicea</i>	Flame Robin	Vulnerable	Not listed	<p>Endemic to SE Australia, and ranges from near the Queensland border to SE South Australia and also in Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands.</p> <p>Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes.</p> <p>Prefers clearings or areas with open understoreys.</p> <p>The ground layer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense.</p> <p>Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgeland at high altitudes.</p> <p>In winter, birds migrate to drier more open habitats in the lowlands (i.e. valleys below the ranges, and to the western slopes and plains).</p> <p>Often occurs in recently burnt areas; however, habitat becomes unsuitable as vegetation closes up following regeneration.</p> <p>In winter lives in dry forests, open woodlands and in pastures and native grasslands, with or without scattered trees.</p> <p>In winter, occasionally seen in heathland or other shrublands in coastal areas.</p>	Medium	<p>Suitable habitat for this species occurs within the site and development footprint however it was not observed during any of the field surveys.</p> <p>Given the presence of suitable habitat, <b>an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).</b></p>
				<p>Birds forage from low perches, from which they sally or pounce onto small invertebrates which they take from the ground or off tree trunks, logs and other coarse woody debris.</p> <p>Nests are often near the ground and are built in sheltered sites, such as shallow cavities in trees, stumps or banks.</p>		

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
<i>Polytelis swainsonii</i>	Superb Parrot	Vulnerable	Vulnerable	<p>Inhabit Box Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.</p> <p>In the Riverina, nests are made in hollows of large trees mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes nest trees can be in open Box Gum Woodland or isolated paddock trees. Species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box.</p> <p>Nest in small colonies, often with more than one nest in a single tree. May forage up to 10 km from nesting sites, primarily in grassy box woodland.</p> <p>Feed in trees, understorey shrubs and on the ground. Diet consists mainly of grass seeds and herbaceous plants, as well as fruits, berries, nectar, buds, flowers, insects and grain.</p>	Medium	<p>Box Gum Woodland with hollow-bearing Yellow Box canopy trees occurs within the study area and within the footprint of the proposed works. Potential foraging resources such as seeding grasses, fruits and flowering Eucalyptus trees also occur within the study area.</p> <p>Given the suitable habitat, <b>an Assessment of Significance (7-part test) (Appendix J) and Commonwealth Significant Impact Criteria Assessment (Appendix K) has been carried out to further consider the potential impact of the proposed works on this species.</b></p>
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	Vulnerable	Not listed	<p>The Grey-crowned Babbler is found throughout large parts of northern Australia and in south-eastern Australia. In NSW, the eastern sub-species occur on the western slopes of the Great Dividing Range, and on the western plains reaching as far as Louth and Hay. It also occurs in woodlands in the Hunter Valley and in several locations on the north coast of NSW. It may be extinct in the southern, central and New England tablelands.</p> <p>Inhabits open Box Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Birds are generally unable to cross large open areas.</p> <p>Feed on invertebrates, either by foraging on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses</p> <p>Build and maintain several conspicuous, dome-shaped stick nests about the size of a football. A nest is used as a dormitory for roosting each night. Nests are usually located in shrubs or sapling eucalypts, although they may be built in the outermost leaves of</p>	Low	<p>No records of the species within 60 km of the Site. All records of this species are to the west of the Site.</p> <p><i>Thus, this species or its habitat is deemed unlikely to be affected by the proposed works and no further assessment is required.</i></p>



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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
				low branches of large eucalypts. Territories range from one to fifty hectares (usually around ten hectares).		
<i>Pyrrholaemus saggitatus</i>	Speckled Warbler	Vulnerable	Not listed	<p>The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies.</p> <p>Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy.</p> <p>Large, relatively undisturbed remnants are required for the species to persist in an area.</p> <p>The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees.</p> <p>Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding.</p> <p>The rounded, domed, roughly built nest of dry grass and strips of bark is located in a slight hollow in the ground or the base of a low dense plant, often among fallen branches and other litter. A side entrance allows the bird to walk directly inside.</p> <p>Some cooperative breeding occurs. The species may act as host to the Black-eared Cuckoo.</p> <p>Speckled Warblers often join mixed species feeding flocks in winter, with other species such as Yellow-rumped, Buff-rumped, Brown and Striated Thornbills.</p>	High	<p>This species was observed during field survey. Suitable large remnant woodland communities with a tussock grass understorey occur within the greater study area and along the edges of the study area. The remnant woodland within the footprint of the proposed works is not likely to provide shelter or nesting suitable habitat for the species, however it may provide some foraging resources such as seeding tussock grasses and insects.</p> <p>Given the presence of suitable habitat in the greater study area and observations of the species during survey, <b>an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).</b></p>

## Appendix F

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
<i>Rostratula australis</i>	Australian Painted Snipe	Vulnerable	Not listed	<p>Usually found in shallow inland wetlands, either freshwater or brackish, that is either permanently or temporarily filled. A cryptic bird that is often overlooked.</p> <p>Usually only single birds are seen, though larger groups of up to 30 have been recorded. It nests on the ground amongst tall reed-like vegetation near water, and feeds near the water's edge and on mudflats, taking invertebrates, such as insects and worms, and seeds.</p> <p>The Murray–Darling drainage system appears to have been a key area for this species, as many records of this species come from this region.</p>	Low	<p>No wetlands occur on site or with a 10km radius of the study area.</p> <p><i>Thus, this species is deemed unlikely to occur and no further assessment is required.</i></p>
<i>Rostratula benghalensis</i>	Painted Snipe	Endangered	Not listed	<p>In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray–Darling Basin.</p> <p>Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.</p> <p>Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.</p> <p>The nest consists of a scrape in the ground, lined with grasses and leaves.</p> <p>Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.</p>	Low	<p>No suitable habitat present within Site. Several farm dams exist, however are degraded and lack fringing vegetation.</p> <p>No marshy areas, no swamps, no low scrub. No mud flats present.</p> <p><i>Thus, this species is deemed unlikely to occur and no further assessment is required.</i></p>
<i>Stagonopleura guttata</i>	Diamond Firetail	Vulnerable	Not listed	<p>Found in grassy eucalypt woodlands, including Box Gum Woodlands and Snow Gum <i>Eucalyptus pauciflora</i> Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland.</p>	High	<p>This species has been previously recorded within a 10km radius of the site.</p> <p>Species observed within AGL owned land during field surveys, adjacent to development footprint.</p> <p>As the area does present some foraging potential, <b>an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the</b></p>

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
				<p>The species feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season). Usually encountered in flocks of between five to 40 birds, occasionally more. Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests. Birds roost in dense shrubs or in smaller nests built especially for roosting. Appears to be sedentary, though some populations move locally, especially those in the south. Has been recorded in some towns and near farm houses.</p> <p>The Diamond Firetail is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina.</p>		proposed works on this species (Appendix J).
<i>Xanthomyza phrygia</i>	Regent Honeyeater	Endangered	Endangered	<p>Inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests. Three known key breeding regions: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region.</p> <p>The species inhabits and breeds in dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River She-oak. These habitats must have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.</p> <p>A generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises: <i>Eucalyptus microcarpa</i>, <i>E. punctata</i>, <i>E. polyanthemus</i>, <i>E. mollucana</i>, <i>Corymbia robusta</i>, <i>E. crebra</i>, <i>E. caleyi</i>, <i>C. maculata</i>, <i>E. mckleana</i>, <i>E. macrorhyncha</i>, <i>E. laevopinea</i>, and <i>Angophora floribunda</i>. Nectar and</p>	Medium	<p>Box Gum woodlands with a large number of mature trees occur both within the footprint of the works and the wider study area. Primary feed trees associated with the species: Yellow Box, Blakely's Red Gum, and <i>E. macrorhyncha</i> also occur both within the footprint of the works and study area.</p> <p>As this species is known to partake in large scale nomadic movements dependent on flowering and other resource patterns, it is highly possible that the species may occur within the study area. On the same token, the species large scale mobility lessens the potential impacts that the works may have on the local population. The removal of a few canopy trees on the edge of an already cleared and disturbed woodland fragment is not likely to take out a significant amount of foraging habitat when the species have such large home ranges.</p> <p>One key component of habitat is also missing:</p>

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
				<p>fruit from the mistletoes <i>Amyema miquelii</i>, <i>A. pendula</i>, <i>A. cambagei</i> are also eaten during the breeding season. When nectar is scarce lerp and honeydew comprise a large proportion of the diet. Insects make up about 15% of the total diet and are important components of the diet of nestlings.</p> <p>A shrubby understorey is an important source of insects and nesting material. The species can undertake large-scale nomadic movements in the order of hundreds of kilometres.</p> <p>Usually nests in horizontal branches or forks in tall mature eucalypts and She Oaks.</p> <p>Also nest in mistletoe <i>Amyema haustoria</i>. An open cup-shaped nest is constructed of bark, grass, twigs and wool by the female.</p>		<p>a shrubby understorey for insect foraging.</p> <p><i>Thus, this species is deemed unlikely to be significantly affected by the proposed works and no further assessment is required.</i></p>
Mammals						
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	Vulnerable	Not listed	<p>Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred.</p> <p>Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. Also feeds on insects throughout the year; this feed source may be more important in habitats where flowers are less abundant such as wet forests.</p> <p>Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (<i>Pseudocheirus peregrinus</i>) drays or thickets of vegetation, (e.g. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks.</p>	Low	<p>Although adequate nesting habitat is present within the Site in the form of hollow bearing trees, no primary food resources such as banksias or bottlebrushes are present. No heath habitat present within the Site or in immediate surrounds. Very limited shelter habitat present, with a lack of grass trees and/or dense understorey vegetation providing adequate shelter.</p> <p><i>Thus, this species or its habitat is deemed unlikely to be affected by the proposed works and no further assessment is required.</i></p>
<i>Dasyurus maculatus</i>	Spotted-tailed	Vulnerable	Endangered	Utilises a variety of habitats including sclerophyll	Medium	Potential den sites such as granite boulder

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
	Quoll			forest and woodlands, coastal heathlands and rainforests and occasionally open country and rocky outcrops.		fields, rocky outcrops/ escarpments, tree hollows and fallen logs occur within the study area and the greater locality. Some of these habitat resources also occur within the footprint of proposed works.  Potential prey species (rabbits, possums, rats etc.) are also use the site and adjacent woodlands.  Given the suitable foraging/ den habitat and the recordings of the species in the greater locality <b>an Assessment of Significance (7-part test) (Appendix J) and Commonwealth Significant Impact Criteria Assessment (Appendix K) has been carried out to further consider the potential impact of the proposed works on this species.</b>
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	Vulnerable	Not listed	Prefers moist habitats, with trees taller than 20m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy.	Medium	Tree hollows, trees with loose bark and man-made structures such as sheds may provide roosting habitat for the species in the surrounding and area of proposed works. It is likely the species may also use some areas of the site as a fly zone, foraging for insects.  The proposed works will require the removal of some hollow-bearing trees.  Given the suitable foraging/ roosting habitat and the recent recordings of the species within the greater locality <b>an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).</b>

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-Bat	Vulnerable	Not listed	Use a broad range of habitats including rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grasslands. They are cave bats but also roost in man-made habitats such as mine adits and road culverts. Travels large distances and hibernates over winter in SE Australia.	Low	No caves were observed during survey; however man-made structures such as sheds within the study area may be used by the species for roosting. No structures are likely to be impacted during the proposed works. The species also tends to hunt in forested areas so it is unlikely that the area would form part of the fly-zone during foraging. <i>Thus, it is considered unlikely that the footprint of the proposed works provides suitable habitat for this species and no further assessment is required.</i>
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	Vulnerable	Not listed	The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Solitary and probably insectivorous.	Low	No records of this species within the vicinity of the Site, no records from within the CMA subregion. Species is largely restricted to coastal areas. <i>Thus, it is considered unlikely that the footprint of the proposed works provides suitable habitat for this species and no further assessment is required.</i>
<i>Petaurus norfolcensis</i>	Squirrel Glider	Vulnerable	Not listed	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub midstorey. Require abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.	High	Potential habitat in the form of hollow-bearing trees, however no suitable banksia or acacia midstorey species to sustain feeding during periods when Eucalypt species on site are not flowering. Given the suitable den/ nesting habitat and recordings of the species in greater locality, <b>an Assessment of Significance (7-part test) has been carried out to further consider the potential impact of the proposed works on this species (Appendix J).</b>



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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
<i>Phascolarctos cinereus</i>	Koala	Vulnerable	Not listed	Has a fragmented distribution throughout eastern Australia. In NSW it mainly occurs on the central and north coasts with some populations in the western region. It was historically abundant on the south coast of NSW, but now occurs in sparse and possibly disjunct populations. Koalas are also known from several sites on the southern tablelands. Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Spend most of their time in trees, but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	Low	No koala feed species on Site, no preferred feed trees, no core koala habitat. <i>Thus, this species is deemed unlikely to occur and no further assessment is required.</i>
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Vulnerable	Not listed	Found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m. Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 -6 .	Low	Site is located above 500m AHD, hence is unlikely to be used by this species. Site is also potentially too dry to support this species, with a lack of water courses within the Site. Development footprint does not contain suitable habitat for this species. <i>Thus, it is considered unlikely that the footprint of the proposed works provides suitable habitat for this species and no further assessment is required.</i>
				Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in		

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
				suitable trees, where they appear to exclude males during the birth and raising of the single young.		
Ray-finned Fish						
<i>Macquaria australasica</i>	Macquarie Perch	Vulnerable	Not listed	Macquarie perch are found in both river and lake habitats; especially the upper reaches of rivers and their tributaries. Macquarie perch spawn in spring or summer in shallow upland streams or flowing parts of rivers. Females produce around 50,000-100,000 eggs which settle among stones and gravel of the stream or river bed.	Low	No flowing rivers occur within the study area. <i>Thus, this species or its habitat is deemed unlikely to be affected by the proposed works and no further assessment is required.</i>
<i>Maccullochella peelii peelii</i>	Murray Cod	Vulnerable	Not listed	Murray cod habitat varies greatly, from quite small clear, rocky, upland streams with riffle and pool structure on the upper western slopes of the Great Dividing Range to large, meandering, slow-flowing, often silty rivers in the alluvial lowland reaches of the Murray-Darling Basin. It should be noted that Murray cod are not just inhabitants of the lowland reaches of the Murray Darling Basin (MDB), as is commonly believed. Murray cod had, and in some cases still do have, a significant presence in the upland reaches of the MDB. At the time of European settlement Murray cod appear to have had an altitudinal limit of around 700 metres in the southern half of the MDB, and around 1000 metres in the northern half. Murray cod prefer deep holes with cover in the form of large rocks, fallen trees, stumps, clay banks and overhanging vegetation.	Low	No flowing rivers or rocky streams occur within the study area. <i>Thus, this species or its habitat is deemed unlikely to be affected by the proposed works and no further assessment is required.</i>
Insects						
<i>Synemon plana</i>	Golden Sun Moth	Endangered	Critically endangered	NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut. Historical	Low	Potential habitat (Natural Temperate Grasslands) exists within the Site and

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Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements	Potential Occurrence on Site	Notes
				<p>distribution extended from Bathurst through the NSW Southern Tablelands, through to central and western Victoria, to Bordertown in eastern South Australia. Now known from only 40 sites in NSW, about 12 sites in the ACT and 8 sites in VIC.</p> <p>Occurs in Natural Temperate Grasslands and grassy Box Gum Woodlands in which the ground layer is dominated by wallaby grasses <i>Austrodanthonia</i> spp. Habitat may contain several wallaby grass species, which are typically associated with other grasses particularly spear-grasses <i>Austrostipa</i> spp. or Kangaroo Grass <i>Themeda australis</i>. The larvae are thought to feed exclusively on the roots of wallaby grasses. Eggs are laid at the bases of wallaby grass tussocks.</p> <p>Females have reduced hind wings and are reluctant to fly, even when disturbed, though males are capable of active and prolonged flight. However, males will not fly long distances (no greater than 100 m) away from areas of suitable habitat. Thus populations separated by distances of greater than 200 m can be considered effectively isolated and populations which have gone extinct, or vacant patches of suitable habitat, are highly unlikely to be recolonised.</p>		proposed footprint. Thus, an <b>Assessment of Significance (7-part test) (Appendix J) and Commonwealth Significant Impact Criteria Assessment (Appendix K) has been carried out to further consider the potential impact of the proposed works on this species.</b>

## Appendix G Flora Survey Results

## Appendix G

**Table G-3 Flora Species Identified Within the Development Footprint**

Scientific Name	Common Name
<i>Acacia dealbata</i>	Silver Wattle
<i>Acacia decurrens</i>	Black Wattle
<i>Acacia irrorata</i>	Green Wattle
<i>Acacia parramattensis</i>	Parramatta Wattle
<i>Acacia pravifolia</i>	Coil-pod Wattle
<i>Acaena ovina</i>	
<i>Acetosella vulgaris</i>	Sheep Sorrel
<i>Amyema miquelii</i>	Box Mistletoe
<i>Anagallis arvensis</i>	Scarlet Pimpernel
<i>Aristida ramosa</i>	Purple Wiregrass
<i>Aristida vagans</i>	Threeawn Speargrass
<i>Arthropodium milleflorum</i>	Pale Vanilla-lily
<i>Austrodanthonia caespitosa</i>	Ringed Wallaby Grass
<i>Austrodanthonia pilosa</i>	Smooth-flower Wallaby Grass
<i>Austrodanthonia racemosa</i>	Wallaby Grass
<i>Austrodanthonia setacea</i>	Smallflower Wallaby Grass
<i>Austrostipa bigeniculata</i>	Tall Speargrass
<i>Austrostipa nodosa</i>	Speargrass
<i>Austrostipa ramosissima</i>	Wallaby Grass
<i>Austrostipa scabra</i>	Corkscrew Speargrass
<i>Austrostipa scabra</i> subsp. <i>scabra</i>	Rough Speargrass
<i>Austrostipa setacea</i>	Corkscrew Grass
<i>Betula</i> sp.	Birch
<i>Bothriochloa macra</i>	Red Grass
<i>Brachyloma daphnoides</i>	Daphne Heath
<i>Brassica napus</i>	Rape
<i>Briza maxima</i>	Quaking Grass
<i>Briza minor</i>	Shivery Grass
<i>Bulbine bulbosa</i>	Bulbine Lily
<i>Capsella bursa-pastoris</i>	Shepherd's Purse
<i>Carex appressa</i>	Tall Sedge
<i>Carthamus lanatus</i>	Saffron Thistle
<i>Cassinia aculeata</i>	Dolly Bush
<i>Cassinia arcuata</i>	Sifton Bush
<i>Cassinia uncata</i>	Sticky Cassinia
<i>Cassytha melantha</i>	
<i>Cheilanthes austrotenuifolia</i>	Rock Fern

## Appendix G

Scientific Name	Common Name
<i>Cheilanthes sieberi</i>	Rock Fern
<i>Chloris truncata</i>	Windmill Grass
<i>Chrysocephalum apiculatum</i>	Common Everlasting
<i>Chrysocephalum semipapposum</i>	Clustered Everlasting
<i>Cirsium vulgare</i>	Spear Thistle
<i>Conospermum taxifolium</i>	Variable Smoke-bush
<i>Cucumis myriocarpus</i> subsp. <i>leptodermis</i>	Paddy Melon
<i>Cyperus gunnii</i> subsp. <i>gunnii</i>	
<i>Daviesia leptophylla</i>	
<i>Dianella longifolia</i>	Smooth Flax Lily
<i>Dianella revoluta</i>	Blueberry Lily
<i>Dichelachne hirtella</i>	Plumegrass
<i>Dichelachne micrantha</i>	Shorthair Plumegrass
<i>Dichondra repens</i>	Kidney Weed
<i>Dillwynia phyllicoides</i>	
<i>Echium plantagineum</i>	Patterson's Curse
<i>Einadia hastata</i>	Berry Saltbush
<i>Einadia nutans</i>	Climbing Saltbush
<i>Elymus scaber</i>	Common Wheatgrass
<i>Eragrostis</i> sp.	
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum
<i>Eucalyptus bridgesiana</i>	Apple Box
<i>Eucalyptus camaldulensis</i>	River Red Gum
<i>Eucalyptus cinerea</i>	Argyle Apple
<i>Eucalyptus macrorhyncha</i>	Red Stringybark
<i>Eucalyptus mannifera</i>	Brittle Gum
<i>Eucalyptus melliodora</i>	Yellow Box
<i>Eucalyptus moluccana</i>	Grey Box
<i>Eucalyptus polyanthemus</i>	Red Box
<i>Eucalyptus rossii</i>	Inland Scribbly Gum
<i>Eucalyptus rubida</i>	Candlebark
<i>Gamochaeta calviceps</i>	Cudweed
<i>Geranium homeanum</i>	
<i>Geranium retrorsum</i>	Common Cranesbill
<i>Geranium solanderi</i>	Native Geranium
<i>Glycine clandestina</i>	
<i>Gonocarpus tetragynus</i>	
<i>Goodenia hederacea</i>	Ivy Goodenia
<i>Hardenbergia violacea</i>	Purple Coral Pea



## Appendix G

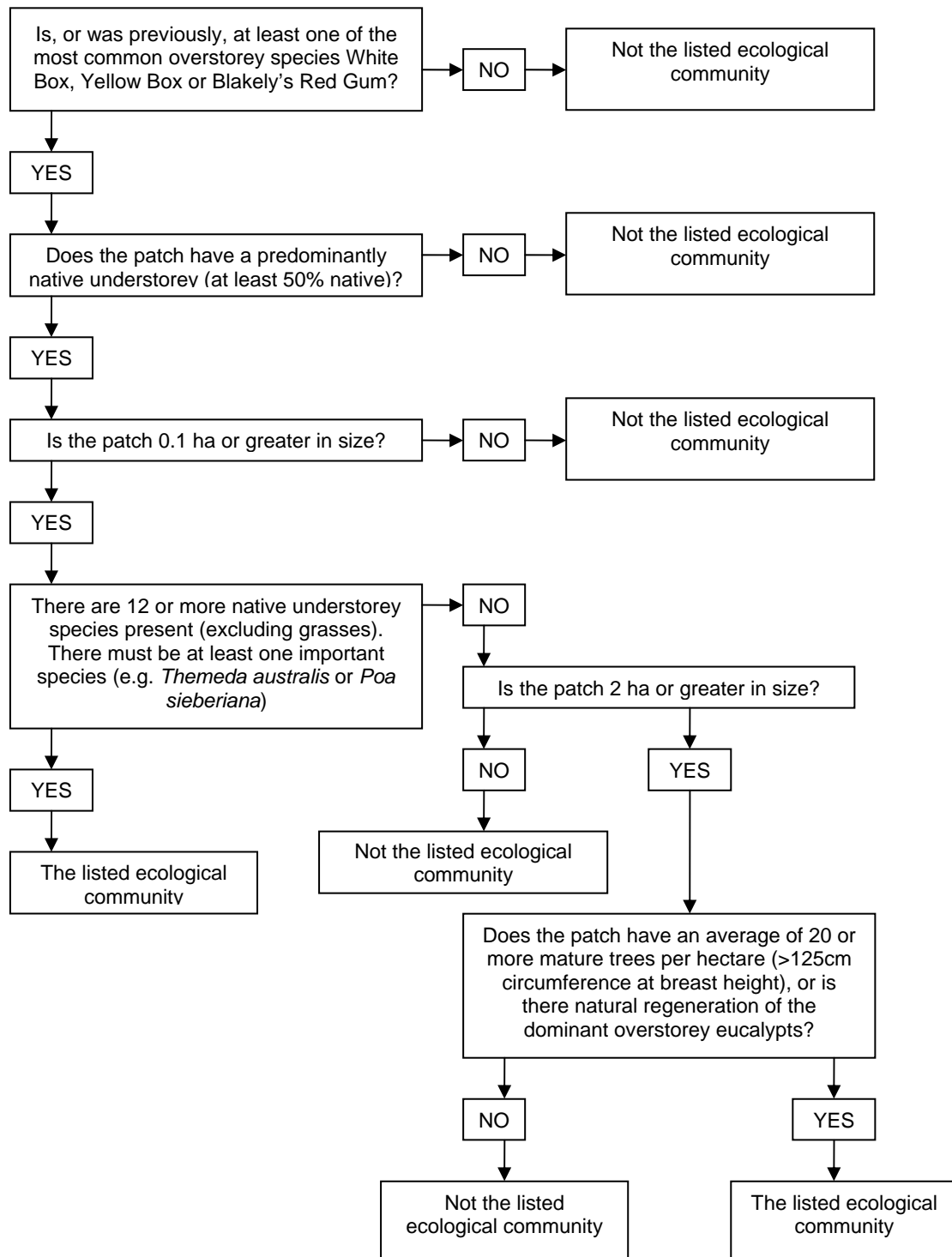
Scientific Name	Common Name
<i>Hibbertia obtusifolia</i>	Grey Guinea Flower
<i>Hirschfeldia incana</i>	Hairy Brassica
<i>Holcus lanatus</i>	Yorkshire Fog
<i>Hordeum hystrix</i>	Mediterranean Barley Grass
<i>Hordeum sp</i>	Barley Grass
<i>Hovea sp.</i>	
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
<i>Hypericum perforatum</i>	St Johns Wort
<i>Hypochaeris radicata</i>	Catsear
<i>Joycea pallida</i>	Silvertop Wallaby Grass
<i>Juncus australis</i>	Rush
<i>Juncus filicaulis</i>	Pinrush
<i>Juncus usitatus</i>	
<i>Kunzea ambigua</i>	White Kunzea
<i>Kunzea ericoides</i>	Burgan
<i>Lepidosperma concavum</i>	
<i>Lepidosperma laterale</i>	Variable Sword-sedge
<i>Leptospermum multicaule</i>	Silver Tea-tree
<i>Leptospermum phyllicoides</i>	Burgan
<i>Lomandra filiformis</i>	Wattle Mat-rush
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
<i>Lomandra multiflora subsp. multiflora</i>	Many-flowered Mat-rush
<i>Luzula densiflora</i>	Woodrush
<i>Marrubium vulgare</i>	White Horehound
<i>Melichrus urceolatus</i>	Urn-heath
<i>Microlaena stipoides</i>	Weeping Grass
<i>Microtis unifolia</i>	Common Onion Orchid
<i>Onopordum acanthium</i>	Scotch Thistle
<i>Opercularia aspera</i>	Coarse Stinkweed
<i>Opercularia hispida</i>	Hairy Stinkweed
<i>Oxalis perennans</i>	
<i>Panicum effusum</i>	Hairy Panic
<i>Paspalum dilatatum</i>	Paspalum
<i>Petrorhagia nanteuilii</i>	Proloferous Pink
<i>Phalaris aquatica</i>	Phalaris
<i>Pimelea curviflora</i>	
<i>Plantago debilis</i>	Shade Plantain
<i>Plantago lanceolata</i>	Lamb's Tongues
<i>Plantago varia</i>	

## Appendix G

Scientific Name	Common Name
<i>Poa labillardierei</i> var. <i>labillardierei</i>	Tussock
<i>Poa sieberiana</i>	Snowgrass
<i>Pratia purpurascens</i>	Whiteroot
<i>Pultenaea subspicata</i>	
<i>Rosa rubiginosa</i>	Sweet Briar
<i>Rubus</i> sp.	Blackberry
<i>Rumex brownii</i>	Swamp Dock
<i>Rumex conglomeratus</i>	Clustered Dock
<i>Salix</i> sp.	Willow
<i>Senecio madagascariensis</i>	Fireweed
<i>Senecio quadridentatus</i>	Cotton Fireweed
<i>Solanum nigrum</i>	Black-berry Nightshade
<i>Sporobolus africanus</i>	Parramatta Grass
<i>Styphelia triflora</i>	Pink Five-Corners
<i>Taraxacum officinale</i>	Dandelion
<i>Themeda australis</i>	Kangaroo Grass
<i>Trifolium arvense</i>	Haresfoot clover
<i>Trifolium repens</i>	White Clover
<i>Ulmus x hollandica</i>	Dutch Elm
Unidentified Poaceae (grazed)	
<i>Urtica incisa</i>	Stinging Nettle
<i>Velleia paradoxa</i>	Spur Velleia
<i>Wahlenbergia communis</i>	Tufted Bluebell

## Appendix H EPBC Act Box Gum Woodland Definition

## Appendix H



Adapted from DEH (2006). EPBC Act policy statement 3.5 - White box - yellow box - Blakely's red gum grassy woodlands and derived native grasslands. Department of the Environment and Heritage, Australian Government. Accessed online August 17, 2010.

<[http://www.environment.gov.au/epbc/publications/pubs/Box\\_Gum.pdf](http://www.environment.gov.au/epbc/publications/pubs/Box_Gum.pdf)>

## Appendix I Fauna Survey Results

## Appendix I

**Table I-1 Fauna Species Identified Within AGL owned land.**

Scientific Name	Common Name
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill
<i>Acanthiza nana</i>	Yellow (Little) Thornbill
<i>Acritoscincus duperreyi</i>	Eastern three-lined skink
<i>Alisterus scapularis</i>	Australian King-Parrot
<i>Amphibolorus muricatus</i>	Jacky Lizard
<i>Anas rhynchotis</i>	Australasian Shoveler
<i>Anthochaera carunculata</i>	Red Wattlebird
<i>Apus pacificus</i>	Fork-tailed Swift
<i>Aquila audax</i>	Wedge-tailed Eagle
<i>Ardea ibis</i>	Cattle Egret
<i>Artamus superciliosus</i>	White-browed Woodswallow
<i>Austronomus australis</i>	White-striped Freetail Bat
<i>Bos taurus</i>	Cow
<i>Cacatua galerita</i>	Sulphur Crested Cockatoo
<i>Callocephalon fimbriatum</i> *	Gang-gang Cockatoo
<i>Carduelis chloris</i>	European Greenfinch
<i>Carlia tetradactyla</i>	Southern rainbow skink
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat
<i>Chalinolobus morio</i>	Chocolate Wattled Bat
<i>Chenonetta jubata</i>	Australian Wood Duck
<i>Christinus marmoratus</i>	Marbled Gecko
<i>Cinclosoma punctatum</i>	Spotted Quail-thrush
<i>Climacteris affinis</i>	White-browed Treecreeper
<i>Climacteris picumnus</i> *	Brown Treecreeper
<i>Colluricincla harmonica</i>	Grey Shrike-thrush
<i>Columba leucomela</i>	White-headed Pigeon
<i>Coracina novaehollandiae</i>	Black-faced Cookoo-shrike
<i>Corcorax melanorhamphos</i>	White-winged Chough
<i>Cormobates leucophaeus</i>	White-throated Treecreeper
<i>Corvus coronoides</i>	Australian Raven
<i>Cracticus nigrogularis</i>	Pied Butcherbird
<i>Cracticus torquatus</i>	Grey Butcherbird
<i>Cryptoblepharus pannosus</i>	Wall Lizard
<i>Ctenotus robustus</i>	Robust Ctenotus
<i>Ctenotus taeniolatus</i>	Copper-tailed Skink
<i>Dacelo novaeguineae</i>	Laughing Kookaburra
<i>Daphoenositta chrysoptera</i> *	Varied Sitella
<i>Delma inornata</i>	Plain Snake-lizard
<i>Egernia striolata</i>	Tree Skink
<i>Entomyzon cyanotis</i>	Blue-faced Honeyeater

## Appendix I

Scientific Name	Common Name
<i>Eolophus roseicapillus</i>	Galah
<i>Eopsaltria australis</i>	Eastern Yellow Robin
<i>Epthianura albifrons</i> <sup>#</sup>	White-fronted Chat
<i>Falco berigora</i>	Brown Falcon
<i>Falco cenchroides</i>	Nankeen Kestrel
<i>Falco longipennis</i>	Australian Hobby
<i>Grallina cyanoleuca</i>	Australian Magpie Lark
<i>Gymnorhina tibicen</i>	Australian Magpie
<i>Hemiergis descrensiensis</i>	
<i>Hieraaetus morphnoides</i> <sup>*</sup>	Little Eagle
<i>Hirundo rustica</i>	Welcome Swallow
<i>Lampropholis delicata</i>	Delicate Skink
<i>Lampropholis guichenoti</i>	Grass Sun-skink
<i>Lichenostomus leucotis</i>	White-eared Honeyeater
<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater
<i>Lepus capensis</i>	Brown Hare
<i>Macropus giganteus</i>	Eastern Grey Kangaroo
<i>Macropus rufogriseus</i>	Red-necked Wallaby
<i>Malurus cyaneus</i>	Superb Fairy-wren
<i>Malurus lamberti</i>	Variegated Fairy-wren
<i>Marorina melanocephala</i>	Noisy Miner
<i>Merops ornatus</i> <sup>^</sup>	Rainbow Bee-eater
<i>Morethia boulengeri</i>	Boulenger's Morethia
<i>Neochmia temporalis</i>	Red-browed Finch
<i>Nyctophilus sp.</i>	
<i>Ocyphaps lophotes</i>	Crested Pigeon
<i>Oryctolagus cuniculus</i>	Rabbit
<i>Ovis aries</i>	Sheep
<i>Pardalotus striatus</i>	Striated Pardalote
<i>Passer domesticus</i>	House Sparrow
<i>Petrochelidon ariel</i>	Fairy Martin
<i>Petrochelidon nigricans</i>	Tree Martin
<i>Petroica boodang</i> <sup>*</sup>	Scarlet Robin
<i>Petroica phoenicea</i> <sup>*</sup>	Flame Robin
<i>Phaps chalcoptera</i>	Common Bronzewing
<i>Phaps elegans</i>	Brush Bronzewing
<i>Philemon corniculatus</i>	Noisy Friarbird
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater
<i>Physignathus leseurii</i>	Water Dragon
<i>Platycercus elegans</i>	Crimson Rosella
<i>Platycercus eximius</i>	Eastern Rosella
<i>Podargus strigoides</i>	Tawny Frogmouth



## Appendix I

Scientific Name	Common Name
<i>Pogona barbata</i>	Eastern Bearded Dragon
<i>Psephotus haematonotus</i>	Red-rumped Parrot
<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum
<i>Pseudonaja textilis</i>	Eastern Brown Snake
<i>Pyrrholaemus saggitatus</i> *	Speckled Warbler
<i>Rattus sp.</i>	
<i>Rhinolophus megaohyllus</i>	Eastern Horseshoe Bat
<i>Rhipidura albiscapa</i>	Grey Fantail
<i>Rhipidura leucophrys</i>	Willie Wagtail
<i>Sericornis frontalis</i>	White-browed Scrubwren
<i>Stagonopleura guttata</i> *	Diamond Firetail
<i>Strepera graculina</i>	Pied Currawong
<i>Streptopelia chinensis</i>	Spotted Turtle-dove
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna
<i>Taeniopygia bichenovii</i>	Double-barred Finch
<i>Tiliqua nigrolutea</i>	Blotched blue-tongue
<i>Tiliqua rugosa</i>	Shingle-back
<i>Tiliqua scincoides</i>	Eastern Blue-tongue
<i>Trichosurus vulpecula</i>	Common Brushtail Possum
<i>Varanus varius</i>	Lace Monitor
<i>Vespadelus darlingtoni</i>	Large Forest Bat
<i>Vespadelus vulturnus</i>	Little Forest Bat
<i>Vombatus ursinus</i>	Common Wombat (scat only)
<i>Vulpes vulpes</i>	European Red Fox
<i>Zosterops lateralis</i>	Silver Eye

\* = Listed as Vulnerable under the TSC Act.

^ = Listed as Migratory under the EPBC Act

# = Species observed on property adjacent to AGL land

## Appendix J Anabat Survey Results

Lauren Branson  
3/116 Miller Street  
North Sydney 2060  
13<sup>th</sup> May 2009

## 1. Background

### 1.1 Site

Location: Dalton

Development footprint: 25 ha

Vegetation communities: Yellow box (*Eucalyptus meliodora*), Grey box (*E. moluccana*) and blakeley's red gum (*E. blakelyi*) woodland intergrading with and red stringy bark (*E. macrorhyncha*) and yellow box woodland.

### 1.2 Reference Library

Calls were identified using a library consisting of 287 reference calls from the local area, Bat Calls of New South Wales – Region based guide to echolocation calls of microchiropteran bats (Pennay, Law, Reinhold 2004), and 805 calls from within NSW. Calls identified by Lauren Branson were randomly verified by Ray Williams of Ecotone Consulting.

### 1.3 Survey effort and identification rate summary

A total of 3264 call sequences were recorded over two nights at four sites. Of these 65 (2%) were identified to species level (possible, probable or confident) and 24 (0.7%) were identified to genus level (possible, probable or confident) (see **Table 1**).

## 2. Bat Calls

**Table 1.** Bat call analysis

Species	AUAU	CHGO	CHMO	NYsp	RHME	VEDA	VEVU	Number of passes
<b>Detector</b>								
<b>03079</b>	C							
<b>03079</b>		Pr						1

03079								1
03079				Pr				9
03079							Pr	29
03101	C							4
03101	Pr							4
03101				Pr				4
03101		Po						2
03101							Pr	148
03230			C					45
03230	C							2
03230		Pr						5
03230				C				11
03230					Pr			2
03230						Po		1
03230							Pr	2
03230		Po						25
03230			Pr					44

## Species Codes

AUAU – *Austronomus australis*

CHGO – *Chalinolobus gouldii*

CHMO – *Chalinolobus morio*

NYsp – *Nyctophilus* sp.

RHME – *Rhinolophus megaohyllus*

VEDA – *Vespadelus darlingtoni*

VEVU – *Vespadelus vulturnus*

## Analysis Codes

C = Certain

Po = Possible

Pr = Probable

## Appendix K Assessments of Significance

## Appendix K

### K.1 Flora

#### K.1.1 Yass Daisy (*Ammobium craspedioides*); Hoary Sunray (*Leucochrysum albicans* var. *tricolor*) and Button Wrinklewort (*Rutidosia leptorrhynchoides*)

- a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

***Ammobium craspedioides*** is a rosette-forming perennial. The species flowers in spring, with the flower heads forming hemispherical buttons, surrounded at the base by papery leaf-like structures (bracts). The solitary flower heads are borne on unbranched stems to 60 cm tall; the stems are sparsely leafed, and edged with narrow "wings". Rosettes die off after fruiting. Species propagation is through seed dispersal mechanisms such as wind, rain and flood events. The proposal is considered unlikely to interfere with propagation methods such as rain and flood events, and will not impact upon wind dispersal mechanisms, unless vegetation containing the species is cleared.

***Leucochrysum albicans* var. *tricolor*** is an erect but low perennial woolly herb with woody rootstock that reaches 45 cm in height. The species flowers in spring and summer, with the flower head an everlasting daisy either white or yellow in colour. Species propagation is through seed dispersal mechanisms such as wind, rain and flood events. The proposal is considered unlikely to interfere with propagation methods such as rain and flood events, and will not impact upon wind dispersal mechanisms, unless vegetation containing the species is cleared.

***Rutidosia leptorrhynchoides*** is a perennial, multi-stemmed herb, sometimes with narrow basal leaves and with leafy flower stems to 35 cm tall. Basal leaves are to 3.5 cm long and 1.5 mm wide. Flower-heads are bright yellow, slightly domed and button-like, to 2 cm wide. Flower-heads are produced at the ends of the stems in summer, and are surrounded at their bases by a cup of broad, overlapping, smooth bracts with light papery edges. Species is thought to be insect pollinated. The proposal is unlikely to impact upon pollination of this species, nor will it result in increased levels of grazing, to which this species is susceptible.

The influence of fire on *Ammobium craspedioides* and *Leucochrysum albicans* var. *tricolor* is unknown, while *Rutidosia leptorrhynchoides* has been observed flourishing in the years following a fire. The proposal is considered unlikely to alter (or increase) existing fire regimes in the study area. Any potential fragmentation associated with the proposal is unlikely to directly interfere with the species dispersal mechanisms.

Indirect impacts upon these species will be minimal, on the presumption that there are no populations within the area of proposed works. Direct impacts upon any populations that have not been identified must also be considered. These species were not identified during any of the field surveys.

It is considered unlikely that a viable population of *L. albicans* var. *tricolor*, *A. craspedioides* or *Rutidosia leptorrhynchoides* would be placed at risk of extinction by the proposal.

- b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

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Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act.

**c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- I. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- II. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

**d) In relation to the habitat of a threatened species, population or ecological community:**

- I. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- II. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- III. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

Populations of *A. craspedioides* are largely confined to the Yass region, within the Crookwell, Murrumbateman and Upper Slopes sub-regions of the Lachlan Catchment Management Region. The species is found from near Crookwell on the Southern Tablelands to near Wagga Wagga on the South Western Slopes. According to BioNet (2009) there are 52 recordings of the species within these known areas. Clearing vegetation, some of which is consistent with *A. craspedioides* habitat is not considered likely to further fragment or isolate the habitat of this species. The vegetation to be removed has been assessed for *A. craspedioides* presence and no plants were detected.

Populations of *L. albicans* var. *tricolor* have been recorded from the Central and Southern Tablelands, as well as the Central West Slopes regions in NSW, as well as in Victoria, Tasmania and Queensland. The species is noted to be widespread, although uncommon within NSW. The species is listed under the EPBC Act which notes that '*species or species habitat likely to occur within area*'. There are no records of the species on BioNet, nor is the species listed under the TSC Act. The relative significance of the study area in regards to known population viability is considered to be low given that no known records occur within the proposed development footprint, study area or locality. Clearing vegetation, some of which is consistent with *L. albicans* var. *tricolor* habitat is not considered likely to further fragment or isolate the habitat of this species. The vegetation to be removed has been assessed for *L. albicans* var. *tricolor* presence and no plants were detected.



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Populations of *R. leptorrhynchoides* have not been recorded within the same LGA as the study area, with the nearest records being more than 45km from the site within the ACT. The species is noted to be widespread, although uncommon within NSW. Clearing vegetation, some of which is consistent with *R. leptorrhynchoides* habitat is not considered likely to further fragment or isolate the habitat of this species. The vegetation to be removed has been assessed for *R. leptorrhynchoides* presence and no plants were detected.

**e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area.

**f) Whether the action proposed is consistent with the objectives of a recovery plan or threat abatement plan**

There are currently no recovery or threat abatement plans for either of these species.

However, DECCW has identified 10 priority actions to help recover *A. craspedioides* in NSW, of which the following are relevant to the proposed works;

- Do not undertake road works, pasture modification or other changes in land use that may affect populations.
- Undertake weed control in and adjacent to populations, taking care to spray or dig out only target weeds.
- Mark sites and potential habitat onto maps (of the farm, shire, region, etc) used for planning (e.g. road works, residential and infrastructure developments, remnant protection, rehabilitation).
- Search for new populations in potential habitat.

No known populations exist within the Site. Assuming mitigation measures including pre-clearing surveys are undertaken during spring to confirm that no populations occur within with the Site, it is considered that the proposed works are consistent with the recommended priority actions.

There are no recovery actions listed for *L. albicans* var. *tricolor*, however the actions outlined for *A. craspedioides* should also provide suitable protection for this species.

DECCW has identified 19 priority actions to help recover *R. leptorrhynchoides* in NSW, of which the following are relevant to the proposed works;

- Mark sites and potential habitat onto maps (of the farm, shire, region, etc) used for planning (e.g. road works, residential and infrastructure developments, remnant protection, rehabilitation).
- Search for new populations in potential habitat.

Potential habitat for this species occurs within areas of Natural Temperate Grasslands and with secondary grasslands associated with Box Gum Woodland. Provided the recommended mitigation measures are implemented, the works will be consistent with DECCW recovery actions.

**g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of a key threatening process.**

Primary threats to *A. craspedioides* include: agricultural developments, intensification of grazing regimes, invasion of weeds, road works (particularly widening or re-routing) and inappropriate mowing or slashing in the cemetery sites where the species occurs.

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The following KTPs listed under the TSC Act may threaten the species and are considered relevant to the proposal:

Clearing of native vegetation – the proposal will involve clearing native vegetation, some of which may provide potential habitat for the species

Invasion of native plant communities by exotic perennial grasses – the understorey of the majority of Box Gum Woodland within the development footprint is largely degraded, with a dominance of exotic pasture species. Grazing pressure has resulted in these species remaining relatively controlled, however if grazing pressure is reduced or removed as a result of the proposed action, there is the potential for invasion by exotic perennial grasses in the future. Natural Temperate Grassland vegetation varies in the intensity of weed invasion, however generally shows strong resilience and ability to naturally regenerate when pressures such as grazing are removed.

Primary threats to *L. albicans* var. *tricolor* are not listed; however it should be assumed that the species is prone to the same threats listed for *A. craspedioides*.

Primary threats to *R. leptorrhynchoides* include: residential and agricultural developments, intensification of grazing regimes, weed invasion and resulting habitat loss and degradation, increased competition from other native species due to changes in the surrounding environment and land uses and general habitat loss and degradation. The KTPs listed above are also relevant for this species.

### Conclusion

The proposal would have the following impacts on *A. craspedioides*, *L. albicans* var. *tricolor* and *R. leptorrhynchoides*:

- clearing of vegetation which may provide potential habitat for the species; and
- potential slight increase in the impact of some KTPs

The proposal is considered **not likely** to result in a significant impact on *A. craspedioides*, *L. albicans* var. *tricolor* and *R. leptorrhynchoides* as:

- these species were not detected during the field survey, and it is unlikely that any individuals or populations are likely to be removed by the proposal;
- the habitat to be impacted by the proposal is not considered to be important for the long term survival of these species in the locality; and
- impacts to the lifecycle of these species are considered unlikely to result from the proposal.

**A Species Impact Statement is not required.**

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### K.1.2 Silky Swainson-pea (*Swainsona sericea*)

- a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

*Swainsona sericea* is a prostrate or erect perennial, growing to 10 cm tall. The species flowers in spring, with purple pea-shaped flowers up to 11 mm long, in groups of up to 8 flowers, on a stem to 10 cm tall. Following flowering, hairy pods develop. Species propagation is through seed dispersal mechanisms such as wind, rain and flood events. The proposal is considered unlikely to interfere with propagation methods such as rain and flood events, and will not impact upon wind dispersal mechanisms, unless vegetation containing the species is cleared.

Fragmentation associated with the proposal is unlikely to directly interfere with the species dispersal mechanisms.

The species is known to regenerate from seed post fire. The proposal is considered unlikely to alter (or increase) existing fire regimes in the study area given the pre-existing levels of fragmentation (in the form of power line easements, tracks, roads etc).

Indirect impacts upon the species will hence be minimal, on the presumption that there are no populations within the area of proposed works. Direct impacts upon any populations that have not been identified must also be considered. The species was not identified during any of the field surveys.

It is considered unlikely that a viable population of *S. sericea* would be placed at risk of extinction by the proposal.

- b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act.

- c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**
- I. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
  - II. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

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### **d) In relation to the habitat of a threatened species, population or ecological community:**

- I. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- II. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- III. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

Populations of *S. sericea* have been recorded from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains. There is one isolated record from the far north-west of NSW. The species is primarily found on the Monaro. Also found in South Australia, Victoria and Queensland. Within NSW, the species is found within the Central West, Lachlan, Murray, Murrumbidgee, Northern Rivers, Southern Rivers and Western Catchment Management Regions. According to BioNet (2009) there are 218 recordings of the species within these known areas.

The Site is located within the Lachlan CMA, within the Murrumbateman subregion, where the species is known to be restricted to the southern half of the subregion. The species has not been recorded within the Site. The species distribution within the region is restricted to areas south of Queanbeyan to the south of the study area, at least 50 km from the Site, to the north of Cowra, approximately 100km north of the Site, and several hundred kilometres to the west of the Site.

The species lacks representation within protected reserves, however the relative significance of the Site in regards to known population viability is considered to be low given that no known records occur within the proposed development footprint, study area or locality.

Based on the above argument, the proposal is considered unlikely to result in reduced capacity for long term sustainability of the species within the locality, or in a significant impact on potential habitat for the species.

### **e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area.

### **f) Whether the action proposed is consistent with the objectives of a recovery plan or threat abatement plan**

There are currently no recovery or threat abatement plans for *S. sericea*. However, DECCW suggests several actions to help recover the species in NSW, of which the following are relevant to the proposed works;

- Mark sites and potential habitat onto maps (of the farm, shire, region, etc) used for planning (e.g. road works, residential and infrastructure developments, remnant protection, rehabilitation).
- Search for new populations in potential habitat.

Potential habitat for *S. sericea* exists within much of the Site, and this should be incorporated into the CEMP and OEMP. No known populations occur within the locality of the proposed development

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footprint. Assuming recommended mitigation measures are adopted, the proposed works are not inconsistent with the recommended actions for recovery.

**g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of a key threatening process.**

Primary threats to *S. sericea* include: loss and degradation of habitat and/or populations for residential and agricultural developments; loss and degradation of habitat and/or populations by intensification of grazing regimes; loss and degradation of habitat and/or populations by invasion of weeds and loss and degradation of habitat and/or populations from road works (particularly widening or re-routing).

The following KTPs listed under the TSC Act may threaten *S. sericea* and are considered relevant to the proposal:

Clearing of native vegetation – the proposal will involve clearing native vegetation, some of which may provide potential habitat for the species.

Invasion of native plant communities by exotic perennial grasses – the understorey of the majority of Box Gum Woodland within the development footprint is largely degraded, with a dominance of exotic pasture species. Grazing pressure has resulted in these species remaining relatively controlled, however if grazing pressure is reduced or removed as a result of the proposed action, there is the potential for invasion by exotic perennial grasses in the future.

### Conclusion

The proposal would have the following impacts on *S. sericea*:

- clearing of vegetation, including native vegetation and exotic pastureland, which may provide potential habitat for the species; and
- increase in the impact of some KTPs

The proposal is considered is likely **not likely** to result in a significant impact on *S. sericea* as:

- The species was not detected during the field survey, and it is unlikely that any individuals or populations are likely to be removed by the proposal;
- The habitat to be impacted by the proposal is not considered to be important for the long term survival of the species in the locality; and
- Impacts to the lifecycle of the species are considered unlikely to result from the proposal.

**A Species Impact Statement is not required.**

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### K.2 Endangered Ecological Communities

#### K.2.1 White Box-Yellow Box-Blakely's Red Gum Woodland (Box Gum Woodland)

- a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Not applicable, this factor refers to vulnerable species listed in Part 1 of Schedule 2 of the TSC Act, endangered species listed in Part 1 of Schedule 1 of the TSC Act, critically endangered species listed in Part 1 of Schedule 1A of the TSC Act, vulnerable species listed in Part 1 of Schedule 5 of the FM Act, endangered species listed in Part 1 of Schedule 4 of the FM Act and critically endangered species listed in Part 1 of Schedule 4A of the FM Act.

- b) **In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act.

- c) **In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- i. **Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

Box Gum Woodland is found from the Queensland border to the Victorian border, primarily along the band of NSW referred to as the 'wheat and sheep belt'. It occurs in the tablelands and western slopes of NSW. Box Gum Woodland occurs throughout the locality, in varying conditions. The proposed actions are unlikely to adversely impact upon the extent of the EEC such that the local occurrence is likely to be placed at risk of extinction. While the proposal will involve clearing some vegetation that is consistent with the EEC, this is likely to merely further fragment small areas of remnant degraded vegetation, without limiting its extent.

- ii. **Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

The proposed facility will require the removal of both canopy and ground cover vegetation within the development footprint. At present, the EEC exists largely as fragmented and degraded remnants within the Site and surrounding landscape. The canopy species composition does not appear to be impacted by existing fragmentation, and the composition of the understorey appears to be influenced strongly by surrounding land uses, with a dominant presence of agricultural and pasture species. The composition of the EEC will not be adversely modified by the proposed works such that its local occurrence will be placed at risk of extinction.

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### **d) In relation to the habitat of a threatened species, population or ecological community:**

#### **I. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and**

The proposal will require the clearing of vegetation that is consistent with the Box Gum Woodland EEC. The area to be cleared does not represent a significant portion of the EEC within the total area of AGL owned lands, or within the wider locality. Given the proposed offset and recommended mitigation measures, it is considered that the removal of this EEC does not represent a significant reduction in extent.

#### **II. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

Box Gum Woodland within the vicinity of the development footprint has been cleared and become degraded as a result of agricultural development and pressures in the past. Very few areas cover extensive tracts of land, and much of the community occurs as isolated and fragmented remnants. The proposed action will involve an amount of clearing of the community; however it is unlikely that this will result in a significant increase in the fragmentation or isolation from other remnants.

#### **III. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

The habitat to be removed, modified, fragmented and/or isolated has a low importance to the long term survival of the ecological community in the locality. The EEC occurs throughout the locality and elsewhere within the Site and the amount of clearing associated with the proposed actions is unlikely to significantly impact the long term survival of the community within the locality. The EEC does however provide important potential habitat for a number of threatened species that are predicted or known to occur within the study area.

### **e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area.

### **f) Whether the action proposed is consistent with the objectives of a recovery plan or threat abatement plan**

There is currently no recovery plan for Box Gum Woodland however 28 priority actions have been identified by DECCW to assist in the recovery of this community within NSW. Of these, eight are relevant to the current proposal:

- Undertake control of rabbits, hares, foxes, pigs and goats (using methods that do not disturb the native plants and animals of the remnant).
- Leave fallen timber on the ground.
- Encourage regeneration by fencing remnants, controlling stock grazing and undertaking supplementary planting, if necessary.
- Erect on-site markers to alert maintenance staff to the presence of a high quality remnant or population of a threatened species.



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- Undertake weed control (taking care to spray or dig out only target species).
- Protect all sites from further clearing and disturbance.
- Ensure remnants remain connected or linked to each other; in cases where remnants have lost connective links, re-establish them by revegetating sites to act as stepping stones for fauna, and flora (pollen and seed dispersal).
- Mark remnants onto maps (of the farm, shire, region, etc) and use to plan activities (e.g. remnant protection, rehabilitation or road, rail and infrastructure maintenance work). On-site markers can alert maintenance staff to the presence of a threatened species.

Control of feral species within the Site should be undertaken to reduce the impact of grazing on remaining areas of this community within the Site, to limit degradation outside of the development footprint. Although the proposed development will require the removal of fallen timber within the development footprint, all timber removed from this area should be placed into adjacent areas to provide additional habitat for native species.

Regeneration of this community in areas outside of the development footprint should be encouraged as a mitigation measure, using any means necessary, such as replanting, fencing and stock exclusion to allow natural regeneration. Weed control should be undertaken in remnants outside of the development footprint within other areas of the Site to increase the condition of remnant Box Gum Woodland within the Site.

The proposed development will require the removal of vegetation that is consistent with Box Gum Woodland from the development footprint. This is unavoidable, and the footprint has been positioned to impact upon the smallest amount of vegetation possible, whilst still meeting other development requirements. Vegetation within the Site is highly fragmented, with expanses of bare earth between remnants in some cases. Mitigation measures should aim to ensure connectivity values are increased through replanting and regeneration programs elsewhere on the Site.

Mitigation measures should include the fencing of any remnant areas of Box Gum Woodland to ensure no disturbance occurs during construction of the proposed facilities. At the same time, all workers should be made aware of the location of the EEC within the Site, and this information should also be incorporated into the OEMP and CEMP.

**g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of a key threatening process.**

Primary threats to the EEC include: clearing, degradation and fragmentation of remnants, grazing pressure, soil degradation, weed invasion, feral animal invasion resulting in loss or alteration to habitat, firewood collection and removal of woody debris.

The following KTPs listed under the TSC Act may threaten Box Gum Woodland and are considered relevant to the proposal:

- Clearing of native vegetation – the proposal will involve clearing Box Gum Woodland mapped within the footprint.
- Invasion of native plant communities by exotic perennial grasses – the understorey of the majority of Box Gum Woodland within the development footprint is largely degraded, with a dominance of exotic pasture species. Grazing pressure has resulted in these species remaining relatively controlled, however if grazing pressure is reduced or removed as a result of the proposed action, there is the potential for invasion by exotic perennial grasses in the future.

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### Conclusion

The proposal would have the following impacts on Box Gum Woodland;

- Removal of native vegetation that is consistent with Box Gum Woodland; and
- Increase in the impact of some KTPs

The proposal is considered **not likely** to result in a significant impact on the Box Gum Woodland EEC as:

- The habitat to be impacted by the proposal is not considered to be important for the long term survival of the community in the locality; and
- Impacts to the lifecycle of the species are considered unlikely to result from the proposal.

**A Species Impact Statement is not required.**

### K.2.2 Natural Temperate Grassland of the Southern Tablelands (NSW and ACT) (Natural Temperate Grassland)

- a) In the case of an endangered ecological species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Not applicable, this factor refers to vulnerable species listed in Part 1 of Schedule 2 of the TSC Act, endangered species listed in Part 1 of Schedule 1 of the TSC Act, critically endangered species listed in Part 1 of Schedule 1A of the TSC Act, vulnerable species listed in Part 1 of Schedule 5 of the FM Act, endangered species listed in Part 1 of Schedule 4 of the FM Act and critically endangered species listed in Part 1 of Schedule 4A of the FM Act.

- b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act.

- c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- i. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

Natural Temperate Grassland is a naturally treeless or sparsely-treed community, in which the most obvious components are various species of native grasses. The EEC occurs within the Southern Tablelands of NSW (an area bounded by the Snowy Mountains and Brindabella Range in the south-west, coastal ranges and escarpments to the east, extending north to the Abercrombie River, with a north-western boundary extending from Burrinjuck Dam to Boorowa, then east to the Lachlan River and north to Wyangala Dam). The community is contained within the South Eastern Highlands bioregion and within an altitude range of between 560 and 1200 metres. The proposed actions are

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unlikely to adversely impact upon the extent of the EEC such that the local occurrence is likely to be placed at risk of extinction. While the proposal will involve clearing of vegetation that is consistent with the EEC, this will only result in a small amount of fragmentation and loss of vegetation, without limiting its extent.

### **II. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

The proposed action will require the permanent removal of the community within the proposed footprint and access track. At present, the EEC exists in a somewhat fragmented form; however appears to dominate much of the surrounding agricultural land. The composition appears to be influenced strongly by surrounding land uses, with the presence of agricultural and exotic pasture species common. The community also appears to be very quick to recover from disturbances such as grazing; with regeneration of native species observed between site visits following the removal of stock from the plant footprint. The composition of the EEC will not be adversely modified by the proposed works such that its local occurrence will be placed at risk of extinction.

#### **d) In relation to the habitat of a threatened species, population or ecological community:**

##### **I. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and**

The proposal will remove vegetation that is consistent with the EEC from within the development footprint. This represents a small reduction of the EEC mapped within the Site. Given that much of the surrounding land is comprised of vegetation of very similar structure and diversity, the proposed action will not have a significant impact on the habitat of any threatened species associated with the community, nor will it have a significant impact on the EEC, such that it is placed at risk of extinction.

##### **II. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

Natural Temperate Grassland within the study area has been extensively impacted by agricultural activities. The community covers large areas of the Site, interspersed with areas of exotic grassland. The proposed action will involve clearing vegetation that is consistent with this community; however it is unlikely that this will result in a significant increase in the fragmentation or isolation of the EEC.

##### **III. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

The habitat to be removed, modified, fragmented and/or isolated has a low importance to the long term survival of the ecological community in the locality. The EEC occurs throughout the locality, and the amount of clearing associated with the proposed actions is unlikely to significantly impact the long term survival of the species within the area. The EEC does however provide important potential habitat for a number of threatened species that are predicted or known to occur within the study area.

#### **e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

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Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area.

### **f) Whether the action proposed is consistent with the objectives of a recovery plan or threat abatement plan**

There is currently no recovery plan for Natural Temperate Grasslands; however 18 priority actions have been identified by DECCW to assist in the recovery of this community within NSW. Of these, the following are relevant to the current proposal:

- If burning a remnant, do not burn entire remnant at one time; practice patch burning to affect no more than 5% of remnant at any one time; allow perpetually unburnt sections to act as refuges.
- Prevent changes to the site's surface and sub-surface soil drainage.
- Do not collect rocks from remnants.
- Do not plant species that are not native to this community into remnants; if planting locally-indigenous tree species, do not plant in densities that exceed 10% crown cover.
- Manage stock to reduce grazing pressure in high quality remnants (i.e. those with high flora diversity or fauna habitat).
- Modified remnants have a capacity for natural or assisted rehabilitation; an essential for rehabilitation is to reduce grazing pressure; native plant diversity can then be enhanced by one or more of the following methods: allowing natural dispersal of seeds from outside the site; activation of the site's soil seed bank (particular disturbance regimes may be applied); or the deliberate introduction of locally-indigenous species.
- Erect on-site markers to alert maintenance staff to the presence of a high quality remnant or population of a threatened species.
- Prevent physical compaction of the soil by people, stock and vehicles.
- Undertake weed control (taking care to spray or dig out only target species).
- Ensure remnants remain connected or linked to each other; in cases where remnants have lost connective links, re-establish them by rehabilitation of sites to act as stepping stones for fauna, and flora (pollen and seed dispersal).
- Mark remnants onto maps (of the farm, shire, region, etc) and use maps to plan activities (e.g. remnant protection, rehabilitation or road, rail and infrastructure maintenance work).

If all of these actions are incorporated into mitigation measures, this community will not be significantly impacted by the proposed development actions.

### **g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of a key threatening process.**

Primary threats to the EEC include:

- Invasion of remnants by non-native plant species, including noxious weeds, pasture species and environmental weeds, including garden escapees, olives and pines.
- Deliberate plant introductions, in particular, the addition of legumes, grasses, shrubs and trees (no plantings of native species that are not found in grassland, particularly trees and shrubs but also herbaceous species).
- Clearing, degradation and fragmentation of remnants for agricultural, forestry, infrastructure and residential development.

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- Continuous heavy grazing and trampling of remnants by grazing stock, resulting in losses of plant species (simplification of the groundlayer), erosion and other soil changes, including increased nutrient status.
- Application of intense defoliation regimes, in particular, too frequent burning or slashing.
- Invasion of remnants by feral animals resulting in the degradation of the community and loss of fauna species.
- Disturbance and clearance of remnants during road, rail and infrastructure maintenance and upgrades.
- Physical compaction of the soil, by people, stock and vehicles.
- Chemical changes to the soil by the application of fertilisers and lime, or from run-on of nutrients from adjacent sites
- Altered soil moisture conditions, including modified drainage (wetter sites become more prone to weed invasion).
- Salinity and the associated remediation for salinity (i.e. exclusion of stock and tree planting).

The following KTPs listed under the TSC Act may threaten Natural Temperate Grassland (TSC Act) and are considered relevant to the proposal:

- Clearing of native vegetation – the proposal will involve clearing 10.51 ha of Natural Temperate Grassland mapped within the footprint.
- Invasion of native plant communities by exotic perennial grasses – the understorey of much of the Site is largely degraded, with a dominance of exotic pasture species. Management actions should ensure that areas of Natural Temperate Grassland are protected from invasion of exotic species in the future.

### Conclusion

The proposal would have the following impacts on Natural Temperate Grassland;

- Clearing of vegetation that is consistent with Natural Temperate Grassland; and
- increase in the impact of some KTPs

The proposed action will result in a negative impact to the Natural Temperate Grassland EEC. Mitigation measures are provided in **Section 7** to minimise the potential impact, and a Commonwealth Significant Impact Criteria Assessment has been completed for this EEC.

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### K.3 Fauna

#### K.3.1 Reptiles – Pink-tailed Worm Lizard *Aprasia parapulchella* and Striped Legless Lizard *Delma impar*

- a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

The **Pink-tailed Worm Lizard** inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. The species is commonly found beneath small, partially-embedded rocks and it appears to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites. The species feeds on the larvae and eggs of the ants with which it shares its burrows, and it is thought that this species lays 2 eggs inside the ant nests during summer; the young first appear in March.

The **Striped Legless Lizard** is found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component, they have also been found in secondary grassland near Natural Temperate Grassland and occasionally in open Box Gum Woodland. Preferred habitat is chosen where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass *Themeda australis*, spear-grasses *Austrostipa* spp. and poa tussocks *Poa* spp., and occasionally wallaby grasses *Austrodanthonia* spp. The Striped Legless Lizard is sometimes present in modified grasslands with a significant content of exotic grasses, or surface rocks, which they use for shelter. The species actively hunts for spiders, crickets, moth larvae and cockroaches, and will lay two papery eggs in early summer. In winter the species goes below ground or under rocks or logs.

The Pink-tailed Worm Lizard is predicted to occur within the Murrumbateman subregion within the Lachlan CMA; however the Striped Legless Lizard is not known to occur within the CMA. This makes its presence on site unlikely, however due to the presence of suitable habitat, and prediction of occurrence by the EPBC online protected matters search tool, the species may occur on Site. Neither of these species was observed within the Site during field surveys.

Given the lack of records of the species within the locality and the availability of potential habitat within the region that will not be impacted by the proposal, it is unlikely that the proposal would result in the life cycle of the species being altered such that a viable local population of the species is likely to be placed at risk of extinction. However, to minimise impacts on these species, pre-clearing surveys are strongly recommended.

- b) **In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act.

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**c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- I. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- II. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

**d) In relation to the habitat of a threatened species, population or ecological community:**

- I. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- II. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- III. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

Suitable habitat features such as grassy overstorey interspersed with embedded rock and rocky outcrops occur within the footprint of the proposed works, however, specific mitigation measures should be followed to ensure that disturbance to any rock features is minimal.

Employing the recommended mitigation measures should ensure that any unavoidable removal of rock or boulder features would be carried out in a way to minimise the potential impact on the provision of shelter and foraging habitat. It has been recommended that a reptilian specialist be present when construction works are to be carried out where the movement of boulders may be required.

Given that more suitable habitat is present in the surrounding areas, it is considered unlikely that the proposed works would greatly affect any significant habitat area of the species such that populations of these species become fragmented or isolated.

Given the presence of suitable habitat elsewhere within the Site and locality, the lack of previous records within the area and provided the mitigation measures are adopted, the importance of the habitat to be removed to the long term survival of these species is considered to be low.

**e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area.



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### f) Whether the action proposed is consistent with the objectives of a recovery plan or threat abatement plan

There is currently no recovery or threat abatement plans for the Pink-tailed Worm Lizard, however DECCW have identified a number of priority actions to assist with the recovery of this species in NSW. Actions relevant to the current project include:

#### Pink-tailed Worm Lizard:

- Undertake feral animal control.
- Apply fire regimes that maintain structure and floristic diversity (e.g. patch burning).
- Search for the species in suitable habitat in areas that are proposed for development or management actions, and mark sites onto maps or plans.
- Do not allow heavy, prolonged grazing on habitat.
- Do not plant trees and shrubs into habitat.
- Control invasions of weeds and pasture species (but be wary of the impact of herbicide use in habitat); where possible use methods that directly target weeds, such as spot spraying and hand removal.
- Protect natural grassland remnants within the known distribution of the species.
- Mark sites and potential habitat onto maps used for planning hazard reduction burns.

A recovery plan has been developed for the Striped Legless Lizard (Smith & Robertson, 1999).

#### Striped Legless Lizard:

- Determine the distribution of potential *Delma impar* habitat.
- Determine the current distribution and abundance of *D. impar* in Victoria, New South Wales, the Australian Capital Territory and South Australia.

Provided mitigation measures are adhered to, the proposed action will meet the requirements of the recovery actions outlined above.

The national threat abatement plans for the European Fox and Feral Cat are relevant for this species. Vegetation clearing required by the proposal will result in habitat fragmentation and increased edge effects within the study area. As a result the proposed works are not entirely consistent with the objectives of these plans.

### g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of a key threatening process.

Threats to the Pink-tailed Worm Lizard and Striped Legless Lizard in NSW include the following:

#### Pink-tailed Worm Lizard:

- Habitat loss and fragmentation as land is cleared for residential, agricultural and industrial developments.
- Removal of rocks, which are a vital habitat element.
- Heavy grazing and trampling by stock and rabbits, causing habitat degradation through root damage, prevention of seedling establishment and erosion.
- Invasion of habitat by weeds or escaped pasture species that degrade habitat.
- Habitat degradation through slashing for hazard reduction, ploughing and rock removal.
- Modification of habitat through tree-planting in native grasslands.

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- Changed fire regimes that result in changes to vegetation structure and composition.

### Striped Legless Lizard:

- Habitat loss and fragmentation as land is cleared for, or impacted by, residential and rural lifestyle subdivision, agricultural and industrial developments.
- Collection of bush rock and rock removal for pasture management purposes.
- Habitat degradation through slashing or ploughing.
- Heavy grazing and trampling by stock, causing habitat degradation through root damage, prevention of seedling establishment and erosion. Rabbits can also contribute to overgrazing.
- Invasion of habitat by weeds or escaped pasture species that degrade habitat.
- Changed fire regimes that result in changes to vegetation structure and composition.
- Feral animals and domestic cats and dogs from neighbouring properties.
- Modification of habitat through tree planting in natural grasslands or adjacent to them (e.g. windings from trees planted as wind breaks).

The following KTPs listed on the TSC Act may threaten the Pink-tailed Worm Lizard, Border thick-tailed Gecko and Striped Legless Lizard and are considered relevant to the proposal:

- Bushrock Removal - Construction of the proposed facility will require the removal of some bushrock. The removal of natural embedded or outcrop rock could cause the fragmentation or loss of habitat for the species.
- Invasion of native plant communities by exotic perennial grasses - Clearing of vegetation for the proposed works will increase edge effects including the potential for invasion by exotic grasses.
- Removal of dead wood and dead trees - The removal of dead wood and dead trees for the proposed works could reduce the quality of foraging habitat for the Pink-tailed Worm Lizard.

### Conclusion

The proposal would have the following impacts on the Pink-tailed Worm Lizard and Striped Legless Lizard;

- Clearing of vegetation, some of which is consistent with potential habitat for these species; and
- increase in the impact of some KTPs

The proposal is considered **not likely** to result in a significant impact on a local population of the Pink-tailed Worm Lizard or Striped Legless Lizard as;

- the species has not been recorded in the locality or within 10km of the study area;
- neither of the species was located during field surveys conducted within the study area, despite targeted searches by an experienced herpetologist (**Appendix O**);
- the potential habitat to be impacted is not considered to be important for the long term survival of the species in the locality;
- impacts to the lifecycle of the species or fragmentation of a population is not likely within the locality; and
- the proposal will not have an adverse effect on critical habitat.

**A Species Impact Statement is not required.**

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### K.3.2 Parrots – Gang-gang Cockatoo *Callocephalon fimbriatum*; Turquoise Parrot *Neophema pulchella*, Superb Parrot *Polytelis swainsonii*, Swift Parrot *Lathamus discolor* and Little Lorikeet *Glossopsitta pusilla*

- a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The **Gang-gang Cockatoo** is found in mountain forests and woodlands, favouring heavily timbered and mature wet sclerophyll forests. In winter the species moves to lower altitudes in drier more open woodlands, particularly mature box-ironbark assemblages.

Two Gang-gang Cockatoos were observed foraging in Box Gum Woodland along the existing access track to the west of the Site. Prior to this sighting, the closest records of this species to the Site are approximately 20 km to the south of the Site, and are more than 10 years old.

The **Superb Parrot** occurs in open eucalypt and riverine woodlands. Birds nest in the hollows of large trees, mainly in tall riparian River Red Gum *Eucalyptus cameldulensis*, or Box Gum Woodland communities. They have also been recorded nesting in isolated paddock trees. The species is predominately grainivorous foraging on the seeds of grasses and shrubs opportunistically they will also forage on fruits, nectar, berries and flowers. The nearest records of this species are at least 20 km from the Site, and span several decades.

Potential nesting hollows required by the Superb Parrot were identified within the area of proposed works, the study area and wider region given the presence of mature hollow-bearing Yellow Box trees (occurring as both isolated paddock trees and/or within remnant woodland patches). The study area is located approximately 15km from Yass, which is considered to be the southern limit of the species known breeding distribution. Therefore there is moderate potential for this species to use the breeding resources within the Site.

URS recommends a spring survey within the footprint of the works prior to construction to determine whether the species use the site.

If parrots are not recorded breeding during the seasonal surveys it is unlikely that the proposed works will have any impact on the lifecycle of the species.

If parrots are recorded breeding on site during spring surveys DECCW should be advised and the appropriate assessment undertaken.

The **Turquoise Parrot** occurs within the foothills of the Great Dividing Range, in open eucalypt woodlands and forests that have a grassy or sparsely shrubby understorey. Eggs are laid in hollows in trees, tree stumps, or even fence posts. The species feeds on the seeds of native and introduced grasses and other herbs, including weeds. The species prefers to feed on the ground in the shade of a tree, where it will be tolerant of a reasonable amount of disturbance. If flushed they fly into the canopy then return to the ground once the perceived danger has passed.

The Turquoise Parrot favours open grassy woodland with dead trees near permanent water. It is also known to forage in coastal heaths and disturbed areas dominated by exotic pasture grasses and weeds, or orchards. The species generally occurs as a resident within an area; however some seasonal movement may occur. The species inhabits the edges of eucalypt woodland, often in areas adjacent to clearings, ridges and creeks within farmland, where it is typically seen in pairs, or

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sometimes small groups, thought to be family groups. Occasional sightings of flocks of up to 30 individuals have been reported. The nearest record of this species is approximately 50 km to the south of the Site.

The **Swift Parrot** is a small parrot about 25 cm long. The species breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes.

On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Inland Grey Box *E. microcarpa*, Grey Box *E. moluccana* and Blackbutt *E. pilularis*. The species will return to sites seasonally, depending on food availability. They nest in hollows within mature trees.

There are no records of the Swift Parrot within the Upper Lachlan LGA (NSW Wildlife Atlas), with the nearest records more than 50km from the Site.

The **Little Lorikeet** is a small bright green parrot up to 19 cm and weighing up to 40 grams. It is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and 'locally nomadic' movements are suspected of breeding pairs.

There are no records of the Little Lorikeet within 10km of the study area (NSW Wildlife Atlas) nor are there any records within the wider Upper Lachlan LGA area.

The proposed action will involve the removal of several hollow-bearing trees as well as clearing of Natural Temperate Grassland and exotic pasture within the footprint. Provided mitigation measures are adhered to and pre-clearing surveys are undertaken to ensure no roost trees are to be removed, the proposed action is highly unlikely to have an adverse effect on any of these species such that a viable local population is placed at risk of extinction.

- b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act.

- c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**
- i. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

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- ii. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

**d) In relation to the habitat of a threatened species, population or ecological community:**

- i. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

Box Gum Woodland vegetation within the Site provides potential roosting and foraging habitat for these species, in addition to areas of exotic pasture and Natural Temperate Grassland. Extensive areas of these communities occur outside of the development footprint, and are of a similar or higher condition than the vegetation present within the footprint. The proposed action will require the clearing of Box Gum Woodland and Natural Temperate Grassland. Given the larger areas of these communities outside of the footprint, the extent to which potential habitat will be removed as a result of the proposed action is considered to be minimal.

Vegetation within the Site and surrounds exists in a highly fragmented state at present, dominated by grazing land. The proposal will contribute to fragmentation of vegetation via the clearing of vegetation to allow construction of the facility. Given the highly mobile nature of these species, it is unlikely that the proposed action would result in unsustainable levels of fragmentation.

Woodland communities are the dominant native vegetation type within the study area and locality; subsequently there are large areas of potential habitat for the listed bird species within the region. Given the mobile nature of these bird species and the existing level of habitat fragmentation within the study area the distribution of threatened parrots is highly unlikely to be affected by the works associated with the proposed transmission line.

Given the presence of extensive suitable habitat for these species outside of the development footprint, and the small amount of vegetation to be cleared as a result of the proposed action, the importance of the habitat to be removed is considered to be low. The proposed action will not have an impact on the long-term survival of these species within the locality.

Indirect impacts on these communities could arise from the clearing required for the current proposal. These impacts are likely to be dominated by processes associated with increased edge effects. Given the existing level of habitat fragmentation these edge effects are unlikely to have a significant impact on vegetation communities within the study area (provided mitigation measures are adhered to) and thus are considered unlikely to impact on breeding or foraging habitat for threatened parrots.

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### e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area.

### f) Whether the action proposed is consistent with the objectives of a recovery plan or threat abatement plan

A recovery plan has been developed for the Swift Parrot; *Swift Parrot Recovery Plan 2001-2005* (Swift Parrot Recovery Team, 2000). This plan outlines recovery objectives for the species, of which the following are relevant to the current project:

- Identify the extent and quality of foraging habitat
- Manage swift parrot habitat at a landscape scale
- Reduce the incidence of collisions

There are currently no recovery plans for the other listed parrots included within this AOS; however DECCW have identified a number of priority actions to help recover these species in NSW. The following recovery actions are relevant to the proposed works;

#### Gang-gang Cockatoo:

- Provide input to National Park and local bushfire mgt. plans to minimise impacts of fire on critical resources.
- Investigate the impacts of wildfire and hazard reduction burns on foraging and nesting resources.
- Identify important nesting habitat on public lands.

#### Superb Parrot:

- Retain and protect woodland remnants.
- Retain and protect hollow-bearing trees.
- Remove feral bee colonies from hollows in Superb Parrot habitat, or report them to NPWS officers.

#### Turquoise Parrot:

- Undertake fox and feral cat control programs in key habitat areas.
- Retain areas of open woodland with grassy under-storey and adjoining grassland.
- Protect hollow-bearing trees for nest sites. Younger mature trees should also be retained to provide replacements for the older trees when they eventually die and fall over.
- Protect sites where Turquoise Parrots forage and nest from heavy, prolonged grazing.

#### Little Lorikeet

- Retain breeding and food resources – limit vegetation clearance.
- Retain roadside hollow-bearing trees.
- Encourage recruitment of future hollow-bearing trees through stock exclusion.
- Reduce competition for hollows from feral honeybees.

The proposed action is not entirely consistent with all of these recovery actions, as some clearing of woodland remnants and hollow-bearing trees is required. However the proposed action is unlikely to alter the existing fire regime within the Site, and only a small proportion of all woodland and hollow-bearing trees from within the Site will be cleared. Removal of potential habitat will be constrained to areas of low importance to the long-term survival of these species.

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Assuming mitigation measures are adopted, the proposed works are unlikely to significantly contradict the majority of proposed recovery actions for these species.

**g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of a key threatening process**

Primary threats to these species include:

**Gang-gang Cockatoo:**

- Clearing of vegetation and degradation of habitat leading to a reduction in the abundance of optimal foraging and roosting habitat.
- Loss of selected nesting trees through clearing and frequent fire, posing a threat to continued successful breeding.

**Superb Parrot:**

- Removal of hollow bearing trees.
- Clearing of woodland remnants.
- Poor regeneration of nesting trees and food resources.
- Loss of hollows to feral bees and native and exotic hollow-nesting birds.

**Turquoise Parrot:**

- Clearing of grassy-woodland and open forest habitat.
- Loss of hollow-bearing trees.
- Degradation of habitat through heavy grazing, firewood collection and establishment of exotic pastures.
- Predation by foxes and cats.

**Swift Parrot:**

- Loss of habitat through clearing for agriculture, urban and industrial development.
- Collisions with wire netting fences, windows and cars, during the breeding season and winter migration (especially where such obstacles are in close proximity to suitable habitat).

**Little Lorikeet**

- Loss of breeding sites and food resources due to land clearing.
- Loss of nest trees from road side verges.
- Loss of Box Gum Woodland,
- Reduction in recruitment of smooth barked trees due to over-grazing of saplings by livestock.

The following KTPs listed under the TSC Act may threaten the Gang-gang Cockatoo, Superb Parrot, Turquoise Parrot, Swift Parrot and Little Lorikeet and are considered relevant to the proposal:

Competition and grazing by the feral European rabbit – high numbers of rabbits were observed within the Site during field surveys. With clearing of exotic pastureland within the development footprint, there will be increased competition for grass species in other areas of the Site.

Competition from feral honeybees – Construction and maintenance of the proposed transmission line will require the removal of hollow bearing trees, increasing competition for remaining hollows. Feral honey bees seen in one location within the Site, on the edge of the footprint.



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- Clearing of native vegetation – the proposal will involve clearing native vegetation, some of which may provide potential habitat for these species

Loss of hollow-bearing trees – Construction of the proposed facility will require the removal of some hollow bearing trees.

Removal of dead wood and dead trees – Construction of the proposed facility will require the removal of some dead wood and dead trees. The removal of dead wood and dead trees for the proposed works could reduce the availability of nesting habitat for threatened Parrots.

### Conclusion

The proposal would have the following impacts on threatened parrots within the study area;

- clearing of native vegetation, some of which may provide potential habitat for these species; and
- increase in the impact of some KTPs

The proposal is considered **not likely** to result in a significant impact on local populations of threatened parrots as:

- the habitat to be impacted by the proposal is not considered to be important for the long term survival of most of the species in the locality;
- nest boxes will be used to compensate the loss of hollows;
- impacts to the lifecycle of these species or fragmentation of a population is not considered likely within the study area; and
- the proposal will not have any impact on critical habitat for these species.

**A Species Impact Statement is not required.**

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### K.3.3 Woodland Birds – Brown Treecreeper *Climacteris picumnus victoriae*; Hooded Robin *Melanodryas cucullata cucullata*; Speckled Warbler *Pyrrholaemus sagittatus*; Varied Sittella *Daphoenositta chrysoptera*; Diamond Firetail *Stagonopleura guttata*; White-fronted Chat *Epthianura albifrons*; Flame Robin *Petroica phoenicea* and Scarlet Robin *Petroica boodang*

- a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The **Brown Treecreeper** mainly inhabits woodlands dominated by stringybarks or other rough barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. Fallen timber is an important habitat component for foraging. When foraging in trees and on the ground they peck and probe for insects, mostly ants, amongst the litter, tussocks and fallen timber and along trunks and lateral branches. Up to 80% of the diet is comprised on ants, with the remaining percentage made up of other invertebrates and nectar from Mugga Ironbark and paperbarks. Hollow in dead or live trees and stumps are essential for nesting. This species was observed opportunistically during field surveys. This species was not observed during any of the diurnal surveys within the development footprint. The Brown Treecreeper is thought to be a sedentary species, considered to be resident in many locations throughout its range, and present year round. The Brown Treecreeper was observed on site.

The **Diamond Firetail** is found in grassy eucalypt woodlands. It also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. The Diamond Firetail feeds exclusively on the ground, grass and herb seeds, leaves, and insects. Birds roost in dense shrubs or in small nests built especially for roosting. The Diamond Firetail was observed on site.

**Hooded Robins** are a sedentary species found in open woodlands often in or near clearings or open areas. Territories range from 10 ha during the breeding season to 30 ha in the non-breeding season. The Hooded Robin requires large (>100ha) structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. Past and present grazing regimes have the ability to strongly influence habitat suitability for the species.

The **Speckled Warbler** uses a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist. The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees. Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding. The rounded, domed, roughly built nest of dry grass and strips of bark is located directly on the ground camouflaged amongst grass tussocks, dense litter and fallen branches. They forage on the ground and in the understorey for arthropods and seeds. Speckled Warblers often join mixed species feeding flocks in winter, with other species such as Yellow-rumped, Buff-rumped, Brown and Striated Thornbills. This species was observed opportunistically during field surveys. This species was observed within the site.

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The **Varied Sittella** is a small (10 cm) songbird with a sharp, slightly upturned bill, short tail, barred undertail, and yellow eyes and feet. Varied Sittellas are much more active and acrobatic among branches than the larger treecreepers. The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. It inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy. It builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years. This species was observed on site, outside of the development footprint.

The **Flame Robin** is a small robin that reaches 14 cm in length. It is endemic to south east Australia, and ranges from near the Queensland border to south east South Australia and also in Tasmania. The species breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes and prefers clearings or areas with open understoreys. This species was observed on site, within the development footprint.

The **Scarlet Robin** is a small robin that reaches 13 cm in length. It lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. This species was observed on site, within the development footprint.

The **White-fronted Chat** is an endemic Australian passerine that can reach up to 12cm in length. It is broadly distributed across the southern-half of Australia, found mostly in areas with temperate to arid climatic conditions. It may also be present, very rarely, within sub-tropical climates and generally occupies foothills and lowlands up to 1000m above sea level. It occurs in mostly the southern part of NSW in association with open damp habitats and samphire saltmarshes along the coast, and near waterways in low vegetation, or on crops in the west of the state. White-fronted chats are insectivores and feed predominantly on beetles and flies, often in local flocks (around 20 birds) during the winter period. This species was not observed within the project footprint but was observed on farmland adjacent to AGL owned land.

Each of these species has the potential to occur within the Site, or has been observed either within the greater AGL owned lands, or within the development footprint. Provided mitigation measures are adhered to, with particular emphasis on pre-clearing surveys targeting the Speckled Warbler, Diamond Firetail, Flame Robin, Brown Treecreeper and White-fronted Chat, and given the potential for these species to use a range of woodland habitats and modified landscapes including farmland edges and the availability of habitat within the locality, it is unlikely that the proposed actions would have an adverse affect upon their lifecycle such that a viable local population be placed at risk of extinction.

- b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act.

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**c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- I. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- II. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

**d) In relation to the habitat of a threatened species, population or ecological community:**

- i. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

The proposed action requires the clearing of native vegetation, some of which may provide potential habitat for these species. There are large amounts of habitat resources that will be cleared for the proposal elsewhere within the Site and wider locality, and, given the mobile nature of the listed woodland bird species, and their ability to move to other areas following disturbance, it is unlikely that the proposed action would constitute a significant impact upon these species. Vegetation within the study area exists within a highly fragmented landscape dominated by grazing land. The proposal will result in a minor increase to fragmentation.

Woodland and grassland communities are the dominant native vegetation type within the Site and locality. Subsequently there are large areas of potential habitat for the listed woodland bird species within the region, in vegetation that will not be affected by the proposal. Given the mobile nature of these bird species and the existing level of habitat fragmentation within the study area the distribution of woodland bird species is highly unlikely to be affected by the works associated within the proposed footprint. There is a large amount of similar potential habitat for these species within the locality that would not be impacted by the proposal so any impact based on reduction or fragmentation of habitat is unlikely to be significant.

Indirect impacts on these communities could arise from the clearing of the proposed footprint. These impacts are likely to be dominated by processes associated with increased edge effects. Given the existing level of habitat fragmentation these edge effects are unlikely to have a significant impact on woodland communities within the study area and thus are considered unlikely to impact on breeding or foraging habitat for threatened woodland birds.

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### **e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area.

### **f) Whether the action proposed is consistent with the objectives of a recovery plan or threat abatement plan**

There are currently no recovery or threat abatement plans for any of these species. However, DECCW has identified a number of priority actions to help recover these species in NSW, of which the following are relevant to the proposed works;

#### **Brown Treecreeper:**

- Do not allow further loss of dead standing or fallen timber from firewood collection or on-farm practices such as 'tidying up'; do not allow removal of hollow-bearing dead or living trees and stumps on private and public lands.
- Fencing of known habitat to protect natural features and to allow natural regeneration.
- Increase remnant size and connectivity.

#### **Diamond Firetail:**

- Search for the species in suitable habitat in areas that are proposed for development or management actions.
- Retain dead timber on the ground in open woodland areas.
- Reduce heavy grazing by domestic stock in areas of known or potential habitat, to enable flowering and subsequent seeding of grasses and forbs that this species requires.
- Retain and protect woodland, open forest, grassland and mallee habitat from clearing, fragmentation and disturbance; areas of 200 hectares or greater within woody vegetation are particularly significant, though this species also uses treeless grasslands in the Southern Tablelands.
- Expand and reconnect smaller fragments of habitat, by fencing and encouraging natural regeneration or applying revegetation techniques where regeneration fails.
- Ensure remnant populations remain connected or linked to each other; in cases where remnants have lost connective links, re-establish links by revegetating sites to act as stepping stones for dispersal.
- Mark sites onto maps or plans.

#### **Hooded Robin:**

- Retain dead timber on the ground in open woodland areas.
- Fence habitat to protect from long-term, intense grazing.
- Increase the size of existing remnants, by planting trees and establishing buffer zones of unmodified, uncultivated pasture around woodland remnants.

#### **Speckled Warbler:**

- Undertake fox and feral cat control programs.
- NPWS should be consulted when planning development to minimise impact on populations.
- Retain dead timber on the ground in open woodland areas.
- Retain existing vegetation along roadsides, in paddocks and remnant stands of native trees.

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- Fence suitable woodland habitats, particularly those with unimproved pasture and an intact native ground plant layer.
- Increase the size of existing remnants, planting trees and establishing buffer zones of unimproved uncultivated pasture around woodland remnants.

### Varied Sittella

- Retain high quality habitat remnants
- Limit isolation of habitat remnants
- Ensure patch size is not reduced
- Encourage habitat complexity and species diversity
- Retain habitat features such as canopy cover, shrub cover, round cover, fallen timber and leaf litter.

### Flame Robin

- Retain existing forest, woodland and remnant grassland vegetation, including paddock trees.
- Retain dead timber on the ground in open forest and woodland areas.
- Enhance potential habitat through regeneration by reducing the intensity and duration of grazing.
- Fence remnants to protect from long-term, intense grazing.
- Increase the size of existing remnants, by planting trees and establishing buffer zones of unmodified, uncultivated pasture around woodland remnants.

### Scarlet Robin

- Retain existing forest, woodland and remnant grassland vegetation, including paddock trees.
- Retain dead timber on the ground in open forest and woodland areas.
- Enhance potential habitat through regeneration by reducing the intensity and duration of grazing.
- Fence remnants to protect from long-term, intense grazing.
- Increase the size of existing remnants, by planting trees and establishing buffer zones of unmodified, uncultivated pasture around woodland remnants.

### White-fronted Chat

- Further surveys to identify key populations around the state
- Consideration of appropriate flow regimes

The current proposal is consistent with most of these priority actions as species searches have been conducted within the proposed development footprint, all dead timber removed from within the easement will be retained in adjacent woodlands and where possible woodland vegetation will be retained.

Any areas not directly impacted by the proposed action will be managed as per the EOMP and CEMP, with mitigation measures outlined in **Section 7** to be included in these plans.

In addition to this an appropriate offset will be identified and enhanced through management agreements to protect habitat for these species in perpetuity.

### **g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of a key threatening process**

Primary threats to these species include:

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### **Brown Treecreeper:**

- Fragmentation of woodland and forest remnants which isolates populations and causes local extinctions.
- Ongoing degradation of habitat, particularly the loss of tree hollows and fallen timber from firewood collection and overgrazing.
- Lack of regeneration of eucalypt overstorey in woodland due to overgrazing and too-frequent fires.
- Loss of ground litter from compaction and overgrazing.

### **Diamond Firetail:**

- Clearing and fragmentation of woodland, open forest, grassland and mallee habitat for agriculture and residential development, and firewood collection.
- Poor regeneration of open forest and woodland habitats.
- Invasion of weeds, resulting in the loss of important food plants.
- Modification and destruction of ground- and shrub layers within habitat through: removal of native plants, litter and fallen timber; introduction of exotic pasture grasses; heavy grazing and compaction by stock; and frequent fire.
- Risk of local extinction due to small, isolated populations.

### **Hooded Robin:**

- Clearing of woodlands, resulting in loss and fragmentation of habitat.
- Modification and destruction of ground habitat through heavy grazing and compaction by stock, removal of litter and fallen timber, introduction of exotic pasture grasses and frequent fire.

### **Speckled Warbler:**

- Due to the fragmented nature of the populations and their small size the species is susceptible to catastrophic events and localised extinction.
- Clearance of remnant grassy woodland habitat for paddock management reasons and for firewood.
- Poor regeneration of grassy woodland habitats.
- Modification and destruction of ground habitat through removal of litter and fallen timber, introduction of exotic pasture grasses, heavy grazing and compaction by stock and frequent fire.
- Nest failure due to predation by native and non-native birds, cats, dogs and foxes particularly in fragmented and degraded habitats.

### **Varied Sittella**

- Habitat degradation through small-scale clearing for fence lines and road verges, including loss of hollow-bearing trees
- Rural tree decline,
- Loss of paddock trees and connectivity,

### **Flame Robin**

- Clearing and degradation of breeding habitat.
- Degradation of wintering habitat.
- Degradation and simplification of habitat by overgrazing and removal of standing dead timber, logs and coarse woody debris.



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### Scarlet Robin.

- Habitat modification due to overgrazing.
- Reduction of size of remnant patches.
- Reduction of the native ground cover in favour of exotic grasses.
- Loss of nest sites, food sources and foraging sites, such as standing dead timber, logs and coarse woody debris from depletion by grazing, firewood collection and 'tidying up' of rough pasture.
- Isolation of patches of habitat, particularly where these patches are smaller than 30 ha, and in landscapes where clearing has been heavy or where remnants are surrounded by cropping or stock grazing.

### White-fronted Chat

- Alteration of flow regimes

KTPs listed under the TSC Act that may threaten these species and are considered relevant to the proposal include:

- Invasion of native plant communities by exotic perennial grasses – construction and maintenance of the proposed facility will increase the edge effects including potential weed invasion. As exotic grasses replace native grasses, the density and structure of the understorey vegetation can change, resulting in loss of foraging habitat for these species.
- Competition and grazing by the feral European rabbit – Clearing of land to allow the proposed development will result in decreased areas of habitat for the large populations of rabbits present within the Site. This is likely to increase competition for resources in other areas of the Site.
- Predation by the European Red Fox – Clearing for the proposed development will increase the movement of red foxes throughout the region. These species are all potential prey for red foxes.
- Clearing of native vegetation – the proposal will involve clearing native vegetation, which may provide potential habitat for these species.
- Removal of dead wood and dead trees – the proposal will require the removal of fallen and standing timber from within the development footprint.

### Conclusion

The proposal would have the following impacts on threatened woodland bird species;

- Clearing of native vegetation, some of which may provide potential habitat for these species
- Increase in the impact of some KTPs

The proposal is considered **not likely** to result in a significant impact on local populations of threatened woodland birds because:

- The habitat to be impacted by the proposal is not considered to be important for the long term survival of the species in the locality;
- Impacts to the lifecycle of these species or fragmentation of a population is not considered likely within the study area; and
- The proposal will not have any impact on critical habitat for these species.
- Significant potential habitat areas are to be provided as part of the recommended biodiversity offset outlined in **Section 7**.

**A Species Impact Statement is not required.**

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### K.3.4 Spotted-tailed Quoll *Dasyurus maculates maculatus*

- a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

The Spotted-tailed Quoll is about the size of a domestic cat, from which it differs most obviously in its shorter legs and pointed face. The average weight of an adult male is about 3500 grams and an adult female about 2000 grams. It has rich-rust to dark-brown fur above, with irregular white spots on the back and tail, and a pale belly. The spotted tail distinguishes it from all other Australian mammals; including other quoll species.

Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites. The species is largely nocturnal, although will hunt during the day. It spends most of the time on the ground, although is also an excellent climber and may raid possum and glider dens and prey on roosting birds. The species has a variety of prey, including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits and insects. Females occupy home ranges up to about 750 hectares and males up to 3500 hectares and usually traverse their ranges along densely vegetated creeklines.

The study area and greater locality supports a number of tree hollows, fallen logs and some rocky outcrops towards the eastern end of the Riverview property and west of the Holmes property, which may provide suitable habitat for the species. Tree hollows and fallen logs both occur within the footprint of the proposed works. The study area also has the potential to provide foraging/ hunting habitat for the species given its opportunistic and non-specific foraging habits, and the presence of suitable habitat for prey species (rabbits, possums, rats etc.) within the remnant woodland patches. Substantial survey effort was undertaken to target this threatened species, as per SEWPaC guidelines (SEWPaC 2011h), outlined in **Section 4.2.2**, however, this species was not recorded on site.

The proposed works will occur within previously disturbed farmland areas and will only involve the removal of a small portion of vegetation with potential habitat resources. Extensive rocky outcrop and escapements occur throughout the wider region. The works are unlikely to have a significant impact on this species in terms of reducing available denning habitat given the species large home ranges and the availability of more suitable denning habitat in the wider region.

Potential foraging habitat that will be impacted by the proposal would only represent a small portion of any individual's home range and the larger tracts of vegetation in the wider locality are more likely to provide greater habitat resources for the species, such as hollow logs and a greater diversity of prey.

Given that only minimal potential den habitat would be disturbed by the proposed works, and occurrence of more diverse foraging habitat within the surrounding region, it is considered that the proposed works will not have an adverse effect on the life cycle of this species such that a viable local population of the species is likely to be placed at risk of extinction.

- b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**

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Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act.

**c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- I. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- II. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

**d) In relation to the habitat of a threatened species, population or ecological community:**

- i. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

The proposed action will require the removal of vegetation which may constitute potential habitat for this species, including Box Gum Woodland, Natural Temperate Grassland and exotic pasture. This vegetation will be permanently cleared to allow for the proposed works.

Vegetation within the Site exists in a largely fragmented and degraded state at present. Clearing associated with the proposed works will result in an increased amount of edge effect, and will slightly increase the existing level of fragmentation within the Site.

Given the presence of numerous potential areas of habitat outside of the development footprint, the large home range of the species, and its highly mobile nature, and provided mitigation measures such as pre-clearing surveys are undertaken, the importance of the habitat for the species is considered to be low.

**e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area.

**f) Whether the action proposed is consistent with the objectives of a recovery plan or threat abatement plan**

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There are currently no recovery plans for the Spotted-tailed Quoll; however DECCW has identified a number of priority actions to help recover the species in NSW, of which the following are relevant to the current project:

- Undertake cat and fox control using poison-baiting techniques least likely to affect quolls.
- Consult with DECCW if any poison baiting is to be conducted in and immediately adjacent to areas where Spotted-tailed Quolls are known or likely to occur.
- Retain and protect large, forested areas with hollow logs and rocky outcrops, particularly areas with thick understorey or dense vegetation along drainage lines.

The proposed action is not inconsistent with these actions, as the development will require the clearing of highly fragmented and largely cleared land, not large forested areas with dense understorey vegetation or drainage lines. Some rocky outcrops and hollow logs will be removed from within the development footprint, however in line with mitigation measures outlined in **Section 7** these will be placed in adjacent areas.

**g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of a key threatening process**

Primary threats to this species include:

- Loss, fragmentation and degradation of habitat.
- Accidental poisoning during wild dog and fox control programs. Deliberate poisoning, shooting and trapping may also be an issue.
- Competition with introduced predators such as cats and foxes.

KTPs listed under the TSC Act that may threaten this species and are considered relevant to the proposal include:

- Predation by the European Red Fox – Clearing for the proposed development will increase the movement of red foxes throughout the region. These species are potential prey for red foxes.
- Clearing of native vegetation – the proposal will involve clearing native vegetation, some of which may provide potential habitat for this species.
- Removal of dead wood and dead trees – the proposal will require the removal of fallen and standing timber from within the development footprint.
- Loss of hollow-bearing trees – the proposal would require the removal of several hollow-bearing trees from within the development footprint.

The areas where native vegetation will be removed within the footprint of the works are areas which have already been previously cleared and disturbed for farming practices. Given the abundance of more suitable, less modified habitat in the surrounding region and the large home range of this species, it is considered that the removal of a small amount of potential foraging and denning habitat associated with the proposed works does not constitute a threatening process for this species.

### Conclusion

The proposal would have the following impacts on the species;

- Clearing of native vegetation, some of which may provide potential habitat for the species; and
- Increase in the impact of some KTPs

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The proposal is considered **not likely** to result in a significant impact on local populations of the Spotted-tailed Quoll as:

- The habitat to be impacted by the proposal is not considered to be important for the long term survival of the species in the locality;
- The species was not found to occur within the Project Area, despite meeting SEWPaC (2011h) survey guideline recommended survey effort;
- Impacts to the lifecycle of these species or fragmentation of a population is not considered likely within the study area; and
- The proposal will not have any impact on critical habitat for these species.

**A Species Impact Statement is not required.**

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### K.3.5 Birds of Prey – Spotted Harrier *Circus assimilis* and Little Eagle *Hieraaetus morphnoides*

- a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

The **Spotted Harrier** is a medium-sized, slender bird of prey having an owl-like facial ruff that creates the appearance of a short, broad head, and long bare yellow legs. The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. The species occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. It preys on terrestrial mammals, birds, reptiles, occasionally insects and rarely carrion.

The **Little Eagle** is a medium-sized bird of prey that occurs in two colour forms: either pale brown with an obscure underwing pattern, or dark brown on the upperparts and pale underneath, with a rusty head and a distinctive underwing pattern of rufous leading edge, pale 'M' marking and black-barred wingtips. The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. The species occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. The species nests in tall living trees within a remnant patch, and prey on birds, reptiles and mammals, and occasionally large insects and carrion. The little eagle was observed flying over the Site once during field surveys, however no breeding sites were observed.

The proposed works will involve the removal of a small portion of potential roosting/nesting habitat in the form of hollow-bearing trees. It is recommended prior to the construction phase that two-stage clearing be implemented and that a qualified ecologist be present during the clearing of hollow-bearing trees to reduce the chance of fauna mortality. It is also recommended after the construction phase that appropriate nest boxes be installed in remaining mature canopy trees in adjacent remnant patches.

The removal of potential roosting habitat within the footprint of the proposed works is unlikely to have a significant impact on local populations of these species if the aforementioned mitigation measures are adopted.

Given the above, the life cycle of these species are not likely to be disrupted by the proposed works to the point that a viable population is placed at risk of extinction.

- b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act.

- c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

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- I. **Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- II. **Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

**d) In relation to the habitat of a threatened species, population or ecological community:**

- i. **The extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- ii. **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- iii. **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

The development footprint is located within an area that is already modified due to past and present farming practices. It is possible that these species use the study area and wider region for foraging and roosting given the presence of hollow-bearing mature canopy trees and a supply of small mammals such as rabbits.

The proposed works are not likely to impact on the species' target prey species. The loss of a small portion of hollow-bearing trees that provide potential roost habitat is not likely to significantly affect the species in the long term if mitigation measures are adopted. No breeding areas were observed during field surveys.

Further fragmentation of the remnant vegetation within the study area is unlikely to affect local populations given the mobility and foraging ecology of these species.

**e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area.

**f) Whether the action proposed is consistent with the objectives of a recovery plan or threat abatement plan**

There are currently no recovery plans for these species; however DECCW has identified a number of priority actions to help recover the species in NSW, of which the following are relevant to the current project:

### **Spotted Harrier**



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- Protect areas of habitat from overgrazing.
- Protect areas of habitat from development.
- Retain and protect nesting and foraging habitat

### Little Eagle

- Buffer habitat areas from the impacts of other activities.
- Protect known populations and areas of potential habitat from clearing, fragmentation or disturbance.
- Rehabilitate known and potential habitat.
- Retain and protect nesting and foraging habitat

The proposed action is not consistent with all of these recovery actions, as there will be some removal of potential habitat trees from within the development footprint. However, given the lack of previous records of either of these species within 10km of the study area, and provided all recommended mitigation measures are implemented, the proposed works will not pose a serious threat to any viable local populations of these species.

**g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of a key threatening process**

Primary threats to these species that are relevant to the current project include:

### Little Eagle

- Clearing and degradation of foraging and breeding habitat
- Secondary poisoning from rabbit baiting.

### Spotted Harrier

- Clearing and degradation of foraging and breeding habitat, particularly that which affects prey densities.
- Secondary poisoning from rabbit baiting.
- Secondary poisoning from rodenticides.

KTPs listed under the TSC Act that may threaten these species and are considered relevant to the proposal include:

- Clearing of native vegetation – the proposal will involve clearing native vegetation, some of which may provide potential habitat for the species.
- Removal of dead wood and dead trees – the proposal will require the removal of fallen and standing timber from within the development footprint.
- Loss of hollow-bearing trees – the proposal would require the removal of several hollow-bearing trees from within the development footprint.

The areas where native vegetation will be removed within the footprint of the works are areas which have already been previously cleared and disturbed for farming practices. Given the abundance of more suitable, less modified habitat in the surrounding region and the mobile nature of these species, it is considered that the removal of a small amount of potential roosting habitat associated with the proposed development footprint does not constitute a threatening process for these species.

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### **Conclusion**

The proposal would have the following impacts on these species;

- Clearing of native vegetation, some of which may provide potential habitat for the species; and
- Increase in the impact of some KTPs

The proposal is considered **not likely** to result in a significant impact on local populations of these species as:

- The habitat to be impacted by the proposal is not considered to be important for the long term survival of the species in the locality;
- Impacts to the lifecycle of these species or fragmentation of a population is not considered likely within the study area; and
- The proposal will not have any impact on critical habitat for these species.

**A Species Impact Statement is not required.**

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### K.3.6 Eastern False Pipistrelle *Falsistrellus tasmaniensis*

- a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

The Eastern False Pipistrelle is relatively large with a head-body length of about 65 mm. It weighs up to 28 grams. The species prefers moist habitats, with trees taller than 20 m. They generally roost in eucalypt hollows, but have also been found under loose bark on trees or in buildings. The species hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. The species is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania.

The Eastern False Pipistrelle has previously been recorded within 25 km of the study area. Tree hollows, trees with loose bark and man-made structures such as sheds may provide roosting habitat for the species within the vicinity. It is possible that the species may use the portions of the study area as a fly zone whilst foraging at night for insects. The proposed works are not likely to impact on the species fly zone.

The proposed works will involve the remove a small portion of potential roosting/nesting habitat in the form of hollow-bearing and loose-barked canopy trees. It is recommended prior to the construction phase that two-stage clearing be implemented and that a qualified ecologist be present during the clearing of hollow-bearing and loose-barked trees to reduce fauna mortality. It is also recommended after the construction phase that appropriate nest boxes be installed in remaining mature canopy trees in adjacent remnant patches.

The removal of potential roosting habitat within the footprint of the proposed works is unlikely to have a significant impact on local populations of these species if the aforementioned mitigation measures are adopted.

Given the above, the life cycle of this species is not likely to be disrupted by the proposed works to the point that a viable population is placed at risk of extinction.

- b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act.

- c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**
- I. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
  - II. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

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Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

**d) In relation to the habitat of a threatened species, population or ecological community:**

- i. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

The development footprint is located within an area that is already modified due to past and present farming practices. It is possible that this species use the study area and wider region for foraging and roosting given the presence of hollow-bearing and loose barked mature canopy trees and a diverse insect supply.

The proposed works are not likely to impact on the species fly zone areas for foraging. The loss of a small portion of hollow-bearing and loose barked mature canopy trees that provide potential roost habitat is not likely to significantly affect the species in the long term if mitigation measures are adopted.

Further fragmentation of the remnant vegetation within the study area is unlikely to affect local populations given the mobility and foraging ecology of this species.

**e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area.

**f) Whether the action proposed is consistent with the objectives of a recovery plan or threat abatement plan**

There are currently no recovery plans for the species; however DECCW has identified a number of priority actions to help recover the species in NSW, of which the following are relevant to the current project:

- Minimise the use of pesticides within or adjacent to areas where insectivorous bats occur.
- Protect roost sites from disturbance.

The proposed action is consistent with these recovery actions. No pesticides are thought to be needed within the Site, and if they do become necessary, the potential impact upon all insectivorous species should be addressed within the OEMP.

No known roost sites exist within the development footprint. A pre-clearing survey as outlined in **Section 7** should be undertaken prior to the start of construction to ensure no impacts to any species that may be using the area.

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### **g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of a key threatening process**

Primary threats to this species include:

- Disturbance to winter roosting and breeding sites.
- Loss of trees for foraging and hollow-bearing trees for roosting.
- Application of pesticides in or adjacent to foraging areas.

KTPs listed under the TSC Act that may threaten this species and are considered relevant to the proposal include:

- Predation by the European Red Fox – Clearing for the proposed development will increase the movement of red foxes throughout the region. These species are potential prey for red foxes.
- Clearing of native vegetation – the proposal will involve clearing native vegetation, some of which may provide potential habitat for the species.
- Removal of dead wood and dead trees – the proposal will require the removal of fallen and standing timber from within the development footprint.
- Loss of hollow-bearing trees – the proposal would require the removal of several hollow-bearing trees from within the development footprint.

The areas where native vegetation will be removed within the footprint of the works are areas which have already been previously cleared and disturbed for farming practices. Given the abundance of more suitable, less modified habitat in the surrounding region and the mobile nature of this species, it is considered that the removal of a small amount of potential foraging and roosting habitat associated with the proposed works does not constitute a threatening process for this species.

### **Conclusion**

The proposal would have the following impacts on the species;

- Clearing of native vegetation, some of which may provide potential habitat for the species; and
- Increase in the impact of some KTPs

The proposal is considered **not likely** to result in a significant impact on local populations of the Eastern False Pipistrelle as:

- The habitat to be impacted by the proposal is not considered to be important for the long term survival of the species in the locality;
- Impacts to the lifecycle of these species or fragmentation of a population is not considered likely within the study area; and
- The proposal will not have any impact on critical habitat for this species.

**A Species Impact Statement is not required.**

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### K.3.7 Owls - Barking Owl *Ninox connivens* and Powerful Owl *Ninox strenua*

- a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

The **Barking Owl** inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting. During the day they roost along creek lines, usually in tall understorey trees with dense foliage such as *Acacia* and *Casuarina* species, or the dense clumps of canopy leaves in large Eucalypts. They feed on a variety of prey, with invertebrates predominant for most of the year, and birds and mammals such as smaller gliders, possums, rodents and rabbits becoming important during the breeding season.

The Barking Owl lives alone or in pairs and territories can range from 30 to 200 hectares. The species is not migratory. Three eggs are laid in nests in hollows of large, old eucalypts including River Red Gum *Eucalyptus camaldulensis*, White Box *E. albens*, Red Box *E. polyanthemos* and Blakely's Red Gum *E. blakelyi*. Breeding occurs during late winter and early spring.

The **Powerful Owl** inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but is forage in fragmented landscapes. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation dominated by species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angorophora floribunda*, Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species. The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider. There may be marked regional differences in the prey taken by Powerful Owls. As most prey species require hollows and a shrub layer, these are important habitat components for the owl.

Pairs of Powerful Owls are believed to have high fidelity to a small number of hollow-bearing nest trees and will defend a large home range of 400-1450 ha. Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. During the breeding season, the male Powerful Owl roosts in a "grove" of up to 20-30 trees, situated within 100-200 metres of the nest tree where the female shelters.

It is not considered likely that a local population of either of these threatened species would be put at risk of extinction as a result of the proposed action. There are no historical records of either of these species within the vicinity of the Site. Furthermore, nocturnal call playback surveys targeting the Barking Owl and Powerful Owl failed to detect either species on site. The proposal is likely to maintain the ecotonal and disturbed nature of the immediate locality. Additionally, available woodlands elsewhere within the Site and in the surrounding area have high quality habitat with mature hollow-bearing trees and intact vegetation structure. These woodlands would provide better quality nesting and foraging habitat for these species. Thus it is considered unlikely that the proposed works will cause significant adverse effects on the aforementioned species lifecycles.

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- b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act.

- c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**
- i. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
  - ii. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

- d) In relation to the habitat of a threatened species, population or ecological community:**
- i. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
  - ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
  - iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

Potential habitat for these species occurs within the development footprint in the form of large hollow bearing trees and stags. Additional habitat for these species occurs all over the Site; hence the proposed action will only require the clearing of a small proportion of habitat from within the wider area.

These species are ambush predators and will sit quietly for a length of time so as to detect their prey. Ecotonal habitat, such as a cleared area the edges of the woodland remnants, will initially be utilised by these species, however in the long term the prey productivity of such areas reduces, and hence these areas are utilised less frequently over time. Some prey species such as rodents and rabbits are also known to still use the development footprint.

Given that the majority of the habitat within the development footprint is highly modified, additional indirect impacts as a result of the proposal are considered insignificant. Any indirect impacts are not likely to cause significant impacts on farmland or riparian vegetation communities within the study area, and thus are considered unlikely to impact on breeding or foraging habitat for the owl species.



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Vegetation within the study area exists within a highly fragmented landscape dominated by cropping and grazing land. The proposal will contribute slightly to fragmentation of vegetation areas surrounding the proposed footprint.

Open farm landscapes surrounded by woodland remnants are the dominant vegetation communities within the study area and locality, subsequently there are large areas of potential foraging habitat for both owl species within the region. Movement or distribution of these species is highly unlikely to be affected by the works associated with the proposed footprint given the species mobile nature and known use of ecotonal disturbed environments for hunting.

Given the current fragmented state of the on-site foraging habitat, the proposal will not constitute the removal or modification of core habitat for these species. It is therefore unlikely that the proposal will reduce the viability of local populations of the Powerful Owl or the Barking Owl within the region.

**e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area.

**f) Whether the action proposed is consistent with the objectives of a recovery plan or threat abatement plan**

There are currently no approved recovery or threat abatement plans for the individual species the Powerful Owl, however an approved recovery plan has been developed for this and other species under the title 'Large Forest Owls' (DEC 2006). A draft recovery plan has been developed for the Barking Owl (NSW National Parks and Wildlife Service 2003).

The draft recovery plan for the Barking Owl lists five specific actions to help to ensure the continued sustainability of the NSW populations of Barking Owls. They are:

1. Increase understanding of the biology, ecology and management of the Barking Owl;
2. Increase education and awareness of and involvement in the conservation of the Barking Owl and its habitat in NSW;
3. Undertake threat abatement and mitigation;
4. Gain efficiencies through links with other conservation plans and conservation groups; and
5. Provide organisational support (NSW National Parks and Wildlife Service 2003).

Actions of relevance to the proposed actions identified within the draft recovery plan are:

- Undertake threat abatement and mitigation
  - Protect known Barking Owl nest sites and surrounding habitat
  - Assist with the protection of Barking Owl habitat from disturbance due to developments and activities
  - Incorporate the consideration of Barking Owl habitat and potential habitat as a high priority in the assessment of property for reserve establishment

The proposed action is not entirely consistent with the recommendations for recovery of the Barking Owl. The proposed action will involve the clearing of potential habitat for this species; however no known nest sites will be impacted by the action.

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The approved recovery plan for large forest owls lists the primary objective as being to “*ensure that viable populations of the three species continue in the wild in NSW in each region where they presently occur*” (DEC 2006).

Specific recovery objectives and actions have been developed in order to achieve this, of which the following are relevant to the current project:

- Manage and protect habitat off reserves and state forests - Ensure the impacts on large forest owls and their habitats are adequately assessed during planning and environmental assessment processes. Forest clearing and fragmentation is recognised as the greatest ongoing threat to the three large forest owls in NSW. Clearing permanently removes foraging and breeding habitat affecting all age classes of owls. This threat is greatest on private lands subject to ongoing development pressures. Strategic land use planning and local assessment of clearing and development applications and their impacts on large forest owls on these lands therefore needs to be adequately informed and mitigated.
- Minimise further loss and fragmentation of habitat by protection and more informed management of significant owl habitat (including protection of individual nest sites).

Further to these recovery actions outlined in draft and approved recovery plans for these species, additional recovery actions have been outlined on the species profile pages of the DECCW websites (DEC 2005);

- Barking Owl:
  - Apply mosaic pattern hazard reduction techniques to ensure the same areas are not burned too frequently.
  - Retain standing dead trees.
  - Retain woodland and open forest remnants, especially those containing hollow-bearing trees.
  - Retain and enhance vegetation along watercourses and surrounding areas to protect roosting areas and habitat for prey.
  - Retain a buffer of native vegetation at least 200 metres radius around known nest sites.
  - Fence habitat remnants and protect from heavy grazing.
- Powerful Owl:
  - Apply low-intensity, mosaic pattern fuel reduction regimes.
  - Searches for the species should be conducted in suitable habitat in proposed development areas and proposed forest harvesting compartments.
  - Retain at least a 200 metre buffer of native vegetation around known nesting sites.
  - Retain large stands of native vegetation, especially those containing hollow-bearing trees.
  - Protect riparian vegetation to preserve roosting areas.
  - Protect hollow-bearing trees for nest sites. Younger recruitment trees should also be retained to replace older trees in the long-term.
  - Minimise visits to nests and other disturbances, including surveys using call playback, when owls are breeding.
  - Assess the importance of the site to the species' survival. Include the linkages the site provides for the species between ecological resources across the broader landscape.

The proposed action is generally consistent with the recovery strategies for these species, except in the area to be cleared. A small amount of vegetation will be cleared and is likely to be permanently modified as a result of the proposed actions. This area to be cleared is not considered as important

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habitat for these species as extensive areas of suitable habitat occur elsewhere in the study area and locality. No disturbance is expected to occur outside of the surface disturbance area, hence there would likely be no indirect impacts on the species.

No roost sites are known to occur within the study area, however if they are identified during pre-construction surveys all efforts will be made to limit the impact on any species.

The national threat abatement plans for the European Fox and Feral Cat are relevant for these species. Vegetation clearing as a result of the proposal will result in further habitat fragmentation and increased edge effects within the study area. As a result the proposed works are not entirely consistent with the objectives of these plans.

**g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of a key threatening process**

Primary threats to the **Barking Owl** in NSW include the following:

- Clearing and degradation of habitat, mostly through cultivation, intense grazing and the establishment of exotic pastures.
- Inappropriate forest harvesting practices that have changed forest structure and removed old growth hollow-bearing trees.
- Firewood harvesting resulting in the removal of old trees.
- Too-frequent fire which causes degradation of understorey vegetation which provides habitat and foraging substrate for prey species.

Threats to the **Powerful Owl** in NSW include the following:

- historical loss and fragmentation of suitable forest and woodland habitat from land clearing for residential and agricultural development,
- inappropriate forest harvesting practices that have changed forest structure and removed old growth hollow-bearing trees. Loss of hollow-bearing trees reduces the availability of suitable nest sites and prey habitat,
- the species can be extremely sensitive to disturbance around the nest site, particularly during pre-laying, laying and downy chick stages. Disturbance during the breeding period may affect breeding success,
- high frequency hazard reduction burning may also reduce the longevity of individuals by affecting prey availability,
- road kills, secondary poisoning,
- predation of fledglings by foxes, dogs and cats.

Key Threatening Processes listed under the TSC Act and relevant to the proposal that may impact on potential habitat for the owl species include:

- Clearing of native vegetation – the proposal will involve clearing native vegetation, some of which may provide potential habitat for the species.
- Removal of dead wood and dead trees - the removal of standing dead trees with hollows as a result of the proposal will reduce potential nesting habitat for the species.
- Loss of hollow-bearing trees - the removal of hollow-bearing trees for the proposed works may represent the loss of nesting/ den/ roosting habitat for these species and their prey.

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The proposal may exacerbate some of the key threatening process for these species given that it will require the removal of some potential nesting and foraging habitat and increase the fragmentation and edge effect impacts within the area.

### **Conclusion**

The proposal would have the following impacts on the Barking Owl and Powerful Owl;

- Clearing of native vegetation, some of which may provide potential habitat for the species;
- Increase in the impact of some KTPs

The proposal is considered **not likely** to result in a significant impact on a local population of the Barking Owl or Powerful Owl as:

- No individuals are likely to be removed by the proposal; and
- No breeding sites have been recorded within the Site.

**A Species Impact Statement is not required.**

## Appendix K

### K.3.8 Squirrel Glider *Petaurus norfolcensis*

- a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Adult Squirrel Gliders have a head and body length of about 20 cm. The species inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas, and nest in bowl-shaped, leaf lined nests in tree hollows. They prefer mixed species stands with a shrub or Acacia midstorey. The species lives in family groups of a single adult male one or more adult females and offspring. The species require abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.

The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Suitable foraging and den/nesting habitat occur within the study area within the mature Box Gum Woodland remnants. Both hollow-bearing trees and dead stags were identified within the development footprint. However, Squirrel Gliders were not recorded on site - following nocturnal call playback surveys targeting the species.

The removal of mature vegetation will be restricted to the footprint area. It is unlikely that the removal of this vegetation will restrict the use of surrounding remnants given that squirrel gliders can glide up to 70m from a height of 15 m and are known to use isolated and patch habitats to supplement home ranges (Van der Ree & Bennet 2003; Van der Ree *et al.* 2003). Given the mobility of the species, the presence of suitable habitat in remnants adjacent to the proposed footprint and the greater region, it is unlikely that the species is purely dependant upon habitat and/or resources within the Site.

Given the above, the life cycle of this species is not likely to be disrupted by the proposed works to the point that a viable population would be placed at risk of extinction.

The proposed works will involve the removal of a small portion of potential roosting/nesting habitat in the form of hollow-bearing and loose-barked canopy trees. It is recommended prior to the construction phase that two-stage clearing be implemented and that a qualified ecologist be present during the clearing of hollow-bearing and loose-barked trees to reduce fauna mortality. It is also recommended after the construction phase that appropriate nest boxes be installed in remaining mature canopy trees in adjacent remnant patches.

The removal of potential roosting habitat within the footprint of the proposed works is unlikely to have a significant impact on local populations of these species if the aforementioned mitigation measures are adopted.

Given the above, the life cycle of this species is not likely to be disrupted by the proposed works to the point that a viable population is placed at risk of extinction.

- b) **In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**

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Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act.

- c) **In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**
- I. **Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
  - II. **Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

- d) **In relation to the habitat of a threatened species, population or ecological community:**
- i. **The extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
  - ii. **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
  - iii. **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

The development footprint, Site and wider region provide foraging, nesting and denning habitat for the squirrel glider. Habitat within the Site exists within a fragmented landscape dominated by grazing.

The proposed works will require the removal of a small portion of mature trees and dead stags as well as potential feed trees. Given the fragmented nature of vegetation within the Site and the edge location (in regards to occurrence of vegetation over the study area and wider region) for the proposed development footprint, the area provides low quality habitat for this species.

Clearing associated with the proposed works is not considered to significantly fragment or reduce the availability of habitat for the Squirrel Glider within the locality. Larger areas of high quality habitat and connective corridors are found outside the development footprint.

- e) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area.

- f) **Whether the action proposed is consistent with the objectives of a recovery plan or threat abatement plan**

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There are currently no recovery plans for the species; however DECCW has identified a number of priority actions to help recover the species in NSW, of which the following are relevant to the current project:

- Retain den trees and recruitment trees (future hollow-bearing trees).
- Replace top one or two strands of barbed wire on fences with regular wire in and adjacent to habitat.
- Retain and protect areas of habitat, particularly mature or old growth forest containing hollow-bearing trees and sap-feeding trees.
- In urban and rural areas retain and rehabilitate habitat to maintain or increase the total area of habitat available, reduce edge effects, minimise foraging distances and increase the types of resources available.

The proposed works are generally consistent with these strategies, as removal of habitat will be constrained to areas of low quality habitat given the fragmented and edge location of the area. It is however noted that the species will still use such environments when more suitable habitats are not available. As such it is recommended that two-stage clearing is implemented and that a qualified ecologist is present for the removal of potential habitat trees to reduce fauna mortality. It is also recommended that after the construction phase several mitigation measures be implemented, including;

- The installation of glider poles if all mature trees within the 60 m width are removed, to enable the continued movement of the species through local woodland remnants and creeklines; and
- The installation of appropriate nest boxes in remaining mature canopy trees in adjacent remnant patches to the footprint of proposed works.

Should the recommended mitigation measures (outlined in **Section 7**) be implemented, the proposed works will be consistent with these recovery actions and there will not be an impact upon the species.

**g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of a key threatening process**

Primary threats to the Squirrel Glider in NSW include the following:

- Loss and fragmentation of habitat.
- Loss of hollow-bearing trees.
- Loss of flowering understorey and midstorey shrubs in forests.
- Individuals can get caught in barbed wire fences while gliding.

Key Threatening Processes listed under the TSC Act and relevant to the proposal that may impact on potential habitat for the Squirrel Glider include:

- Clearing of native vegetation – the proposal will involve clearing native vegetation, some of which may provide potential habitat for the species.
- Removal of dead wood and dead trees - the removal of standing dead trees with hollows as a result of the proposal will reduce potential nesting habitat for the species.
- Loss of hollow-bearing trees - the removal of hollow-bearing trees for the proposed works may represent the loss of nesting/den/roosting habitat for these species.

The proposal may exacerbate some of the key threatening process for these species given that it will require the removal of some potential nesting and foraging habitat and increase the fragmentation and edge effect impacts within the area.

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### Conclusion

The proposal would have the following impacts on the Squirrel Glider;

- Clearing of native vegetation, some of which may provide potential habitat for the species;
- Increase in the impact of some KTPs

The proposal is considered **not likely** to result in a significant impact on a local population of the Squirrel Glider as:

- No individuals are likely to be removed by the proposal;
- No breeding sites have been recorded within the Site;
- Significant habitat resources exist elsewhere within the study area and within the greater locality.

**A Species Impact Statement is not required.**



## Appendix K

### K.3.9 Golden Sun Moth - *Synemon plana*

- a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

The Golden Sun Moth is a medium-sized, day-flying (diurnal) moth. NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut. The species occurs in Natural Temperate Grasslands and Box Gum Woodlands in which ground layer is dominated minimum of 40% of *Austrodanthonia* spp (*Austrodanthonia carphoides*, *A. auriculata*, *A. setacea*, *A. eriantha*) (DEWHA (2010g) and advice provided by Alistair Cockburn, Rainer Reywinkle and Geoff Robertson of Friends of Grasslands (pers comm February 2011)). Habitat may also contain other grass species such as spear-grasses *Austrostipa* spp. and Kangaroo Grass *Themeda australis*. Following surveys within the Box Gum Woodland and Native Temperate Grassland communities *Austrodanthonia* species were found to be sparsely present across the site. In fact the only *Austrodanthonia* sp found on site from the above required list was *Austrodanthonia setacea*. It is important to note that grassland within the; plant footprint, gas pipeline, communications tower, hut footprint, services and access track lacks diversity of native grasses, generally, and is particularly deficient in *Austrodanthonia* species, which in turn limits potential habitat for Golden Sun Moth.

Potential habitat occurs within the study area, however the removal of such vegetation will be restricted to the footprint area and gas pipeline/access road. It is unlikely that the removal of this vegetation will restrict the use of surrounding remnants or significantly affect the lifecycle of the species such that a local population is placed at risk of extinction. Given the presence of suitable habitat in remnants adjacent to the proposed footprint and the greater region, and lack of sightings of the species during targeted field surveys, it is unlikely that the species is dependant upon habitat and/or resources within the Site.

This species is considered unlikely to recolonise an area once it has been excluded from an area. Given the intense previous land use within the proposed footprint, it is considered unlikely that the species has survived within the site. As such, it is considered that the species is largely unlikely to occur within the area of proposed works, however has been the subject of an AOS to ensure adequate and full assessment.

Given the above, the life cycle of this species is not likely to be disrupted by the proposed works to the point that a viable population is placed at risk of extinction.

- b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**

Not applicable, this factor refers to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act.

- c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- I. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

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### **II. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Not applicable, this factor relates to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act and the critically endangered communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act.

#### **d) In relation to the habitat of a threatened species, population or ecological community:**

- i. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

The development footprint, Site and wider region provide habitat for the Golden Sun Moth. Habitat within the Site exists within a fragmented landscape dominated by grassland recently subjected to extensive and intensive grazing practices.

The proposed works will require the removal of an area of vegetation that constitutes potential habitat for this species, considering the presence of tussock grass species. Given the fragmented nature of vegetation within the Site, the historical use for intensive grazing activities and the edge location (in regards to occurrence of vegetation over the study area and wider region) for the proposed development footprint, the area provides low quality potential habitat for this species.

Clearing associated with the proposed works is not considered likely to significantly fragment or reduce the availability of habitat for the Golden Sun Moth within the locality. Larger areas of high quality habitat and connective corridors are found outside the development footprint.

#### **e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area.

#### **f) Whether the action proposed is consistent with the objectives of a recovery plan or threat abatement plan**

There are currently no recovery plans for the species; however DECCW has identified a number of priority actions to help recover the species in NSW, of which the following are relevant to the current project:

- Search for the species in suitable habitat in areas that are proposed for development or management actions.
- Do not change management of sites where species exists unless changes are likely to be beneficial.
- Retain and protect natural grassland remnants within the known distribution of the species.

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- Control invasions of weeds and pasture species (but be wary of the impact of herbicide use in habitat): where possible use methods that directly target weeds such as spot spraying and hand removal.
- Where Kangaroo Grass threatens to out-compete wallaby grasses in previously grazed or mown sites, consider re-introducing an appropriate biomass control method.
- Ensure remnant populations remain connected or linked to each other; in cases where remnants have lost connective links, re-establish links by revegetating sites to act as stepping stones for dispersal.
- Mark known sites onto maps and plans.

The proposed works are not inconsistent with these recommendations, assuming recommended mitigation measures are adopted, and given the lack of sightings of this species despite targeted field surveys. Should the recommended mitigation measures (outlined in **Section 7**) be implemented, the proposed works will be consistent with these recovery actions and there will not be an impact upon the species.

### **g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of a key threatening process**

Primary threats to the Golden Sun Moth in NSW include the following:

- Loss and degradation of habitat by urban, residential, infrastructure and agricultural development.
- Modifications to agricultural practices (e.g. fertiliser application, ploughing and inappropriate grazing).
- Overstocking that results in modification of soil structure through compaction, increased nutrient loads, and promotion of weeds.
- Invasion of habitat by weeds, particularly exotic pasture species (e.g. *Phalaris aquatica*, *Paspalum dilatatum* and *Avena* spp.).
- Colonisation of wallaby grass grassland habitat by dense Kangaroo Grass tussocks.
- Fragmentation and small size of remnants

Key Threatening Processes listed under the TSC Act and relevant to the proposal that may impact on potential habitat for the Squirrel Glider include:

- Clearing of native vegetation – the proposal will involve clearing of native vegetation, some of which may provide potential habitat for the species.
- Invasion of native plant communities by exotic perennial grasses.

The proposal has the potential to increase some of the key threatening process for this species given that it will require the removal of some potential habitat and increase the fragmentation and edge effect impacts within the area. Provided recommended mitigation measures are adopted, and given that this species was not found within the site, despite targeted surveys, it is considered unlikely that the proposed works would result in a significant increase to any KTP.

## Conclusion

The proposal would have the following impacts on the Golden Sun Moth;

- Clearing of native vegetation, some of which may provide potential habitat for the species;
- Increase in the impact of some KTPs

The proposal is considered **not likely** to result in a significant impact on a local population of the Golden Sun Moth as:

- No individuals are likely to be removed by the proposal;

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- No breeding sites have been recorded within the Site despite targeted surveys;
- Significant habitat resources exist elsewhere within the study area and within the greater locality.

**A Species Impact Statement is not required.**

## **Appendix L Commonwealth Significant Impact Criteria Assessments**

L

## Appendix L

### L.1 Significant Impact Criteria Assessment: *Ammobium craspedioides* (Yass Daisy) - Vulnerable listed species under Environmental Protection and Biodiversity Conservation Act, 1999

#### L.1.1 Introduction

*Ammobium craspedioides* is a rosette-forming perennial herb within the Family Asteraceae that bears single-flowerheaded stems in spring. Rosettes die off after fruiting. *Ammobium craspedioides* is known from localities in NSW near Crookwell, on the southern tablelands to near Wagga Wagga, on the south western slopes. *Ammobium craspedioides* occurs in dry forest, Box Gum Woodland and secondary grassland derived from clearing of these communities. It grows in association with a large range of eucalypts.

#### L.1.2 Significant Impact Criteria

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

a) *lead to a long-term decrease in the size of an important population of a species*

The proposed action will result in the clearing of potential habitat for *Ammobium craspedioides*, in the form of Box Gum Woodland, exotic pasture, and Natural Temperate Grasslands. The clearing of this vegetation will not result in an overall decrease in the size of any known populations of *Ammobium craspedioides*, as this species was not found within any areas that will be subject to disturbance as part of the proposed action, despite targeted searches. Additionally, there are no declared important populations of this species.

b) *reduce the area of occupancy of an important population*

*Ammobium craspedioides* is known to occur within the localities in NSW near Crookwell on the southern tablelands to near Wagga Wagga, on the south western slopes. Most populations occur in the Yass District, at Lake Burrinjuck, Bookham, Rye Park and Dalton. A small population exists in Livingstone National Park, about 30 km south of Wagga Wagga. Other populations are found in Bigga, north of Crookwell and Tumut. A sizeable population of a few hundred plants was also found to exist on private property near McCullums Creek. The species is known to occur within the Murrumbidgee and Lachlan CMAs (Threatened Species Scientific Committee 2008).

Given the relatively wide distribution of this species, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as the potential habitat to be cleared is not on the edge of the species known range, nor are there any declared important populations of this species. Additionally, given the lack of records within close proximity to the study area (the nearest records are approximately 15km to the west near Blakney Creek, dated 1988 – 1999 (DECCW 2010)) and the lack of sightings during all field surveys of the proposed development site, it is considered unlikely that the proposed action will reduce the area of occupancy of an important population of *Ammobium craspedioides*.

c) *fragment an existing important population into two or more populations*

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The proposed action will involve the permanent clearing of vegetation including Box Gum Woodland, exotic pasture and Natural Temperate Grasslands. *Ammobium craspedioides* was not found to occur within the proposed development site, despite targeted surveys, however extensive potential habitat for this species occurs throughout the entire AGL-owned Dalton. As such, the proposed works are considered unlikely to fragment any existing known populations into two or more separate populations.

*d) adversely affect habitat critical to the survival of a species*

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area. To date, no critical habitat has been declared for this species.

*e) disrupt the breeding cycle of an important population*

The proposed action will require the clearing of vegetation (including Box Gum Woodland, exotic pasture and Natural Temperate Grassland). Given the lack of known occurrences of *Ammobium craspedioides* within the development footprint and within the greater AGL-owned site despite numerous vegetation surveys, and lack of declared important populations, it is considered unlikely that the proposed action will result in the disruption to the breeding cycle of an important population of *Ammobium craspedioides*.

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

The proposed action will result in of potential habitat for this species. The proposed action will not impact on any known populations of this species, and will not clear any habitat associated with known populations. Given the lack of records of this species despite targeted field surveys within the development footprint, and assuming mitigation measures are adopted, it is considered unlikely that the proposed works would result in modification, destruction, removal, isolation or reduction in the quality or availability of habitat for this species such that it is likely to decline.

Biodiversity offsets provided by AGL to offset the impacts on the vegetation to be cleared will include extensive areas of Natural Temperate Grasslands and Box Gum Woodland. This offset will involve management actions such as restriction of grazing and implementation of weed control activities. Overall, this is likely to result in an increase in the availability of land (and potential habitat) that is not subject to (at times) intense grazing, and will ensure a large tract of land that is suitable habitat for this species (amongst others) is conserved in perpetuity.

*g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat*

Weeds of particular concern that can threaten *Ammobium craspedioides* include *Nassella trichotoma* (Serrated Tussock), *Onopordum acanthium* (Scotch Thistle) and *Hypericum perforatum* (St John's Wort) (Threatened Species Scientific Committee 2008).

The proposed action will involve the clearing of vegetation. Provided recommended mitigation measures aimed at land management and landscaping activities within the AGL owned site and offset area are implemented (namely that weed infestations are appropriately controlled), the proposed action will not result in any invasive species that are harmful to *Ammobium craspedioides* becoming established in the species' habitat. Given that only potential habitat for the species exists within the site (not known habitat), with no known records of the species within the AGL-owned site, the proposed action will not result in a significant impact to *Ammobium craspedioides*.

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### *h) introduce disease that may cause the species to decline, or*

It is highly unlikely that the proposed action will result in the introduction of any disease that may cause *Ammobium craspedioides* to decline. There is no mention in the relevant literature of any potential disease-based threats to this species, rather invasion by exotic species and overgrazing are more likely to result in a decline to the species (DEC 2005a; Threatened Species Scientific Committee 2008). As such, it is considered unlikely that any works associated with the proposed action will introduce disease that may cause the species to decline.

### *i) interfere substantially with the recovery of the species.*

The proposed works will not impact on any known populations or individuals of the species either directly or indirectly, as no known occurrences of the species exist within the development footprint. The offset to be provided (comprising potential habitat for this species in the form of Natural Temperate Grassland and Box Gum Woodland) as part of project approval for the proposed action will result in the permanent conservation of a substantial area of potential habitat for this species, without the impacts of inappropriate grazing or land management actions. This, combined with the lack of likely impacts on the species suggests that the proposed action will not interfere substantially with the recovery of *Ammobium craspedioides*.

***As such, the impact of the proposed works on the vulnerably listed, *Ammobium craspedioides* would not be significant; hence there is no need to refer the action to the Minister of SEWPaC.***



## Appendix L

### L.2 Significant Impact Criteria Assessment: *Leucochrysum albicans* var. *tricolor* (Hoary Sunray) - Endangered listed species under Environmental Protection and Biodiversity Conservation Act, 1999

#### L.2.1 Introduction

*Leucochrysum albicans* var. *tricolor* is a perennial herb with a stout, erect, woody rootstock in the Family Asteraceae. The species flowers in spring and summer and is generally found in grassy woodland, also in grassland on the Monaro. Large numbers of this species have been known to colonise disturbed sites. The species is uncommon although widespread within the southern tablelands, and also occurs in Victoria, Tasmania, Queensland and on the slopes and plains of NSW (Eddy *et al.*, 1998 pp. 94).

#### L.2.2 Significant Impact Criteria

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

a) *lead to a long-term decrease in the size of a population*

The proposed action will result in the clearing of potential habitat for *Leucochrysum albicans* var. *tricolor*, in the form of Box Gum Woodland, exotic pasture and Natural Temperate Grasslands. The clearing of this vegetation will not result in an overall decrease in the size of any known populations of *Leucochrysum albicans* var. *tricolor*, as this species was not found within any areas that will be subject to disturbance as part of the proposed action, despite targeted surveys.

b) *reduce the area of occupancy of the species*

*Leucochrysum albicans* var. *tricolor* is known to occur in the southern tablelands of NSW, as well as various locations in Victoria, Tasmania, Queensland and on the slopes and plains of NSW.

Given the relatively wide distribution of this species, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as the potential habitat to be cleared is not on the edge of the species known range. Additionally, given the lack of records within close proximity to the study area (the nearest records are approximately 10km to the north west of the study area, dated 1986 (DECCW 2010)) and the lack of sightings during all field surveys of the proposed development site, it is considered unlikely that the proposed action will reduce the area of occupancy of an important population of *Leucochrysum albicans* var. *tricolor*.

c) *fragment an existing population into two or more populations*

The proposed action will involve the permanent clearing of vegetation including Box Gum Woodland, exotic pasture and Natural Temperate Grasslands. *Leucochrysum albicans* var. *tricolor* was not found to occur within the proposed development site, however extensive potential habitat for this species occurs throughout the entire AGL owned Dalton site. Assuming recommended mitigation measures are adopted, it is considered unlikely that the proposed works would fragment any existing known populations into two or more separate populations, as there are no known populations of this species within the area of proposed works.

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### d) *adversely affect habitat critical to the survival of a species*

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area. To date, no critical habitat has been declared for this species.

### e) *disrupt the breeding cycle of a population*

This species is wind dispersed and does not rely on a soil borne seed bank for germination of seedlings. It is thought that insects are the most likely pollination vector for this species (Tasmanian Department of Primary Industries, Parks, Water and Environment 2003). Given the lack of reliance on soil seed bank by this species, and the lack of likely impacts of the proposed works on insect pollinators, it is considered unlikely that the proposed works would disrupt the breeding cycle of a population of this species.

The proposed action will require the clearing and development of vegetation (including Box Gum Woodland, exotic pasture and Natural Temperate Grassland). Given the lack of known occurrences of *Leucochrysum albicans* var. *tricolor* within the development footprint and within the greater AGL owned site (despite numerous vegetation surveys), it is considered unlikely that the proposed action will result in the disruption to the breeding cycle of an important population of *Leucochrysum albicans* var. *tricolor*, as no populations of this species were found to occur within the development site.

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

The proposed action will result in the clearing of potential habitat for this species (comprising Box Gum Woodland, exotic pasture and Natural Temperate Grassland). The proposed action will not impact on any known populations of this species, and will not clear any habitat associated with known populations.

Biodiversity offsets provided by AGL to offset the impacts on the vegetation to be cleared will include extensive areas of Natural Temperate Grasslands and Box Gum Woodland. This offset will involve management actions such as restriction of grazing and implementation of weed control activities. Overall, this is likely to result in an increase in the availability of land (and potential habitat) that will not be subject to intense grazing (since, at present, large areas of the AGL-owned site experiences some level of grazing pressure), and will ensure a large tract of land that is suitable habitat for this species (amongst others) is conserved in perpetuity.

Although this species is thought to be unpalatable to stock (Tasmanian Department of Primary Industries, Parks, Water and Environment 2003) (hence negating the need for total stock exclusion areas to ensure its conservation), improved land management activities associated with an offset site incorporating Box Gum Woodland and Natural Temperate Grassland are likely to result in reduced competition from exotic species, hence allowing greater opportunity for other species, such as *Leucochrysum albicans* var. *tricolor* to become established in the future. It is suggested that the species responds favorably to some levels of disturbance, which may result in new populations of the species being found once construction activities are completed and areas that are disturbed experience colonisation of vegetation at the completion of development.

### g) *result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat*

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The proposed action will involve the clearing of vegetation. Provided recommended mitigation measures aimed at land management and landscaping activities within the AGL-owned site are implemented (namely that weed infestations are appropriately controlled), the proposed action will not result in any invasive species that are harmful to *Leucochrysum albicans* var. *tricolor* becoming established in the species' habitat. Given that only potential habitat for the species exists within the site (not known habitat), with no known records of the species within the AGL-owned site, the proposed action is unlikely to result in a significant impact to *Leucochrysum albicans* var. *tricolor*.

*h) introduce disease that may cause the species to decline, or*

It is unlikely that the proposed action will result in the introduction of any disease that may cause *Leucochrysum albicans* var. *tricolor* to decline. There is no mention in the relevant literature of any potential disease-based threats to this species, rather loss of habitat due to pasture improvement and cropping is noted as being a key threat to the species (Tasmanian Department of Primary Industries, Parks, Water and Environment 2003). As such, it is considered unlikely that any works associated with the proposed action will introduce disease that may cause the species to decline.

*i) interfere with the recovery of the species.*

The proposed works will not impact on any known populations or individuals of the species either directly or indirectly, as no known occurrences of *Leucochrysum albicans* var. *tricolor* exist within the development footprint. The offset to be provided (comprising potential habitat for this species in the form of Natural Temperate Grassland and Box Gum Woodland) as part of project approval for the proposed action will result in the permanent conservation of a substantial area of potential habitat for this species, and will be managed to encourage the germination and establishment of many native species. This, combined with the lack of likely impacts on the species suggests that the proposed action will not interfere substantially with the recovery of *Leucochrysum albicans* var. *tricolor*.

The species is wind dispersed and does not rely on the soil seed bank for germination. This can result in relatively widely dispersed patches of the species within an area. Removal of competing species such as vigorous perennial grasses (either through controlled grazing or other disturbance) are noted as being quite useful for the species, as it allows the species to germinate and colonise an area. (Tasmanian Department of Primary Industries, Parks, Water and Environment 2003)

***As such, the impact of the proposed works on the endangered listed, *Leucochrysum albicans* var. *tricolor* would not be significant; hence there is no need to refer the action to the Minister of SEWPaC.***

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### L.3 Significant Impact Criteria Assessment: *Rutidosia leptorrhynchoidea* (Button Wrinklewort) – Endangered listed species under Environmental Protection and Biodiversity Conservation Act, 1999

#### L.3.1 Introduction

*Rutidosia leptorrhynchoidea* is a perennial, multi-stemmed herb in the Family Asteraceae, with upright, linear, lanceolate basal leaves and leafy ascending flower stems to 35 cm tall. Flowering occurs from October to March, peaking in November and December. The species occurs in three areas within south-east Australia: the Southern Tablelands of NSW and ACT, the Gippsland Plains in eastern Victoria and the volcanic plains of western Victoria. Known populations exist at Michelago, Queanbeyan, Canberra and Goulburn. In the ACT and NSW, *Rutidosia leptorrhynchoidea* occurs in Box Gum woodland, secondary grassland derived from Box Gum woodland or in natural temperate grassland; and often in the ecotone between the two communities (DEWHA 2010a)

#### L.3.2 Significant Impact Criteria

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

a) *lead to a long-term decrease in the size of a population*

The proposed action will result in the clearing of potential habitat for *Rutidosia leptorrhynchoidea*, in the form of Box Gum Woodland, exotic pasture and Natural Temperate Grasslands. The clearing of this vegetation will not result in an overall decrease in the size of any known populations of *Rutidosia leptorrhynchoidea* as this species was not found within any areas that will be subject to disturbance as part of the proposed action.

b) *reduce the area of occupancy of the species*

*Rutidosia leptorrhynchoidea* is known to occur in three populations; in the southern tablelands of NSW and the ACT, the Gippsland Plains in eastern Victoria and the volcanic plains of western Victoria.

Given the relatively wide distribution of this species, the proposed action is not considered likely to reduce the overall area of occupancy of an important population as the potential habitat to be cleared is not on the edge of the species known range. Additionally, given the lack of records within close proximity to the study area (the nearest records are more than 50km to the south of the study area, in the ACT (DECCW 2010)) and the lack of sightings during all field surveys of the proposed development site, it is considered unlikely that the proposed action will reduce the area of occupancy of an important population of *Rutidosia leptorrhynchoidea*.

c) *fragment an existing population into two or more populations*

The proposed action will involve the clearing of vegetation including Box Gum Woodland, exotic pasture and Natural Temperate Grasslands. *Rutidosia leptorrhynchoidea* was not found to occur within the proposed development site, despite targeted field surveys, however extensive potential habitat for this species occurs throughout the entire AGL owned Dalton site. As such, the proposed works are considered unlikely to fragment any existing known populations into two or more separate populations.

d) *adversely affect habitat critical to the survival of a species*

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Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area. To date, no critical habitat has been declared for this species.

*e) disrupt the breeding cycle of a population*

*Rutidosia leptorrhynchoidea* is thought to live for up to 15 years and prefers areas where there is less competition from other plants (either due to shallow soils or the shading effect of woodland trees). This species also has the ability to colonise disturbed areas (e.g. vehicle tracks, bulldozer scrapings, following fire and areas of soil erosion). *Rutidosia leptorrhynchoidea* plants have regenerative buds at the surface of the soil but not below, so plants do not have the ability to resprout from underground structures. The stems usually die back in late summer or autumn and new basal leaves are evident by early winter.

*Rutidosia leptorrhynchoidea* does not flower until the second year of its life, and does not self-pollinate. Scarab beetles, flies and moths visit flowers and seed set (by pollinators) may be limited where populations are sparse or large. Seed is dispersed close to the parent plant and appears to remain viable for at least 12 years. Small populations (< 30 plants) produce significantly fewer seeds per head than large populations (500+ plants), however seed germinability does not appear to differ with population size. Recruitment may be limited in sites with cold microclimates or by deep shading in dense, unburnt grasslands.

Given that insects are the pollinators for this species, and the lack of likely impacts of the proposed works on insect pollinators, it is considered unlikely that the proposed works would disrupt the breeding cycle of a population of this species.

The proposed action will require the clearing of vegetation (including Box Gum Woodland, exotic pasture and Natural Temperate Grassland). Given the lack of known occurrences of *Rutidosia leptorrhynchoidea* within the development footprint and within the greater AGL owned site (despite numerous vegetation surveys), it is considered unlikely that the proposed action will result in the disruption to the breeding cycle of an important population of *Rutidosia leptorrhynchoidea*, as no populations of this species were found to occur within the development site.

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

The proposed action will result in the clearing of potential habitat for this species (comprising Box Gum Woodland, exotic pasture and Natural Temperate Grassland). The proposed action will not impact on any known populations of *Rutidosia leptorrhynchoidea*, and will not clear any habitat associated with known populations.

Biodiversity offsets provided by AGL to offset the impacts on the vegetation to be cleared will include extensive areas of Natural Temperate Grasslands and Box Gum Woodland. This offset will involve management actions such as restriction of grazing and implementation of weed control activities. Overall, this is likely to result in an increase in the availability of land (and potential habitat) that will not be subject to intense grazing (since, at present, large areas of the AGL-owned site experiences some level of grazing pressure), and will ensure a large tract of land that is suitable habitat for this species (amongst others) is conserved in perpetuity.

*Rutidosia leptorrhynchoidea* is palatable by stock and is hence often destroyed by prolonged grazing exposure. With the introduction of appropriately managed conservation areas associated with the proposed offset (incorporating Box Gum Woodland and Natural Temperate Grassland), there is likely to be reduced competition from exotic species and a reduction in grazing pressure within the offset

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site, hence allowing greater opportunity for other species, such as *Rutidosia leptorrhynchoidea* to become established in the future. It is suggested that the species responds favorably to some levels of disturbance, which may result in new populations of the species being found once construction activities are completed and areas that are disturbed experience colonisation by vegetation at the completion of development

g) *result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat*

DEWHA (2010a) notes that weeds that threaten *Rutidosia leptorrhynchoidea* include grasses: *Phalaris* spp., *Paspalum* spp., Cocksfoot (*Dactylis glomerata*), African Lovegrass (*Eragrostis curvula*), Chilean Needlegrass (*Nassella neesiana*) and Serrated Tussock (*N. trichotoma*), and some woody weeds: Sweet Briar (*Rosa rubiginosa*) and Firethorn (*Pyracantha crenulata*). Weed invasion reduces inter-tussock spaces, thus limiting recruitment potential.

The proposed action will involve the clearing of native vegetation. Provided recommended mitigation measures aimed at land management and landscaping activities within the AGL-owned site are implemented (namely that weed infestations are appropriately controlled), the proposed action will not result in any invasive species that are harmful to *Rutidosia leptorrhynchoidea* becoming established in the species' habitat. Given that only potential habitat for the species exists within the site (not known habitat), with no known records of the species within 50km of the AGL-owned site, the proposed action is unlikely to result in a significant impact to *Rutidosia leptorrhynchoidea*.

h) *introduce disease that may cause the species to decline, or*

It is unlikely that the proposed action will result in the introduction of any disease that may cause *Rutidosia leptorrhynchoidea* to decline. There is no mention in the relevant literature of any potential disease-based threats to this species, rather loss of habitat, overgrazing, inappropriate fire regimes, population isolation and inbreeding, weed infestation and the application of superphosphate; mowing and ploughing are noted as being a key threat to the species (DEWHA 2010a). As such, it is considered unlikely that any works associated with the proposed action will introduce disease that may cause the species to decline.

i) *interfere with the recovery of the species.*

The proposed works will not impact on any known populations or individuals of the species either directly or indirectly, as no known occurrences of *Rutidosia leptorrhynchoidea* exist within the development footprint. The offset to be provided (comprising potential habitat for this species in the form of Natural Temperate Grassland and Box Gum Woodland) as part of project approval will result in the permanent conservation of a substantial area of potential habitat for this species, and will be managed to encourage the germination and establishment of many native species. This, combined with the lack of likely impacts on the species suggests that the proposed action will not interfere substantially with the recovery of *Rutidosia leptorrhynchoidea*.

The species is germinated by insect pollinators and is thought to exist within the soil seed bank for up to 12 years. Removal of competing species such as vigorous perennial grasses and pasture weeds, and reduction or cessation of grazing may result in significant recruitment (DEWHA 2010a).

**As such, the impact of the proposed works on the endangered listed *Rutidosia leptorrhynchoidea* would not be significant; hence there is no need to refer the action to the Minister of SEWPaC.**



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### **L.4 Significant Impact Criteria Assessment: Pink-tailed Worm-lizard (*Aprasia parapulchella*) - Vulnerable listed species under Environmental Protection and Biodiversity Conservation Act, 1999**

#### **L.4.1 Introduction**

The Pink-tailed Worm-lizard is a worm-like reptile. Specimens grow to about 25 cm in length. In NSW, The Pink-tailed Worm Lizard is only known from the Central and Southern Tablelands, and the South Western Slopes. There is a concentration of populations in the Canberra/Queanbeyan Region. Other populations have been recorded near Cooma, Yass, Bathurst, Albury and West Wyalong. This species is also found in the ACT. The species inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass (*Themeda australis*) with rocky outcrops or scattered, partially-buried rocks (DEC 2005b).

#### **L.4.2 Significant Impact Criteria**

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

*a) lead to a long-term decrease in the size of an important population of a species*

The proposed action will result in the clearing of potential habitat for the Pink-tailed Worm-lizard in the form of Box Gum Woodland, exotic pasture and Natural Temperate Grasslands. The clearing of this vegetation will not result in an overall decrease in the size of any known populations of the Pink-tailed Worm-lizard. The majority of records for this species are more than 50km to the south of the project site, centred in the Queanbeyan area. One record for this species exist to the north west of the site, however this record is also more than 50km from the site (DECCW 2010). Given the large distances between the project site and known records of this species, it is unlikely that the proposed works will lead to a long-term decrease in the size of an important population, as no known populations exist within the area of proposed works. Additionally, given the lack of declared important populations of this species (DEWHA 2010b), it is considered unlikely that the proposed works would have a significant impact on an important population of the species.

*b) reduce the area of occupancy of an important population*

The Pink-tailed Worm-lizard is known from four sites in eastern Australia: near Canberra in the ACT, Tarcutta and Bathurst in NSW, and near Bendigo in Victoria. In the Canberra region the species is widespread but patchily distributed along the Murrumbidgee and Molonglo Rivers and adjacent hill slopes. Major populations in the ACT occur at Mount Taylor, the lower Molonglo River corridor and Woodstock, Stony Creek, Bullen Range and Gingerline reserves in the Murrumbidgee River Corridor. The populations in NSW are restricted to one small site near Bathurst and two small hills in farmland near Tarcutta. One of the occupied hills near Tarcutta has been partially destroyed by the realignment of the Hume Highway (DEWHA 2010). Additional records suggest that other populations have been recorded near Cooma, Yass, Bathurst, Albury and West Wyalong (DEC 2005b).

DEC (2005b) notes that the species is predicted (not known) to occur within the Murrumbateman sub-region of the Lachlan CMA, however it is restricted to west of Dalton. Given the information available on the known distribution and population locations of this species, the proposed action is not considered likely to reduce the overall area of occupancy of an important population, as no known

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populations occur within the area of proposed works. Additionally, given the lack of records within close proximity to the study area (the nearest records are approximately 50km to the south and 50km to the north west (DECCW 2010)), and lack of declared important populations (DEWHA 2010b), it is considered unlikely that the proposed action will reduce the area of occupancy of an important population of the Pink-tailed Worm-lizard.

*c) fragment an existing important population into two or more populations*

The proposed action will involve the clearing of vegetation including Box Gum Woodland, exotic pasture and Natural Temperate Grasslands. The Pink-tailed Worm-lizard was not found to occur within the proposed development site, despite targeted surveys for this species. As such, the proposed works are considered unlikely to fragment any existing known populations into two or more separate populations; rather the proposed will require the removal of a small area of potential habitat from within the larger site area.

*d) adversely affect habitat critical to the survival of a species*

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area. To date, no critical habitat has been declared for this species.

*e) disrupt the breeding cycle of an important population*

The proposed action will require the clearing of vegetation (including Box Gum Woodland, exotic pasture and Natural Temperate Grassland). Given the lack of known occurrences of the Pink-tailed Worm-lizard within the development footprint and within the greater AGL-owned site and region (DECCW 2010), it is considered unlikely that the proposed action will result in the disruption to the breeding cycle of an important population of the Pink-tailed Worm-lizard.

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

The proposed action will result in the clearing of potential habitat for this species (comprising Box Gum Woodland, exotic pasture and Natural Temperate Grassland). The proposed action will not impact on any known populations of this species, and will not clear any habitat associated with known populations.

Biodiversity offsets will be provided by AGL to offset the impacts on the vegetation and habitats to be cleared. The offset will include extensive areas of Natural Temperate Grasslands and Box Gum Woodland. The offset will entail management actions such as restriction of grazing and implementation of weed control activities. Overall, this is likely to result in an increase in the availability of land (and potential habitat) that is suitable habitat for this species (amongst others) that will be conserved in perpetuity. At present, much of the AGL owned site is subject to influences (such as grazing pressure, inappropriate weed control and high numbers of feral species such as foxes and rabbits) that are likely to limit the habitat potential for this species. It would be recommended that the offset involve the implementation of feral animal control programs, weed control that was sympathetic to native flora and fauna, and reduced grazing pressure, which would likely see an increase in species such as *Themeda australis*.

The creation of an area that would present good quality habitat for this species as part of the offset agreement would mean that the proposed action would not result in an overall decrease in the



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availability or quality of habitat for this species, and would be very unlikely to result in a decline in the species.

*g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat*

The proposed action will involve the clearing of vegetation and disturbance and or removal of potential habitat features including rocky outcrops. Provided recommended mitigation measures aimed at land management and landscaping activities within the AGL owned site are implemented (namely that weed infestations are appropriately controlled), the proposed action will not result in any invasive species that are harmful to the Pink-tailed Worm-lizard becoming established in the species' habitat. Given that only potential habitat for the species exists within the site (not known habitat), with no known records of the species within the AGL owned site, the proposed action will not result in a significant impact to the Pink-tailed Worm-lizard.

This species is noted as sometimes occurring in areas of grassland that do not have any native species present. As such, it is unlikely that the establishment of invasive species of tussock grass would result in any significant impact to the species.

*h) introduce disease that may cause the species to decline, or*

It is unlikely that the proposed action will result in the introduction of any disease that may cause the Pink-tailed Worm-lizard to decline. There is no mention in the relevant literature of any potential disease-based threats to this species (DEC 2005b; DEWHA 2010b). Rather, threats are noted to include habitat loss, removal of rocks, heavy grazing, habitat degradation through slashing, hazard reduction burning, ploughing and rock removal, modification of habitat through tree-planting in native grasslands, and changed fire regimes (DEC 2005b).

As such, it is considered unlikely that any works associated with the proposed action will introduce disease that may cause the species to decline.

*i) interfere substantially with the recovery of the species.*

The proposed works will not impact on any known populations or individuals of the species either directly or indirectly, as no known occurrences of the species exist within the development footprint. The offset to be provided (comprising potential habitat for this species in the form of Natural Temperate Grassland and Box Gum Woodland) as part of project approval will result in the permanent conservation of a substantial area of potential habitat for this species, without the impacts of inappropriate grazing or land management actions. This, combined with the lack of likely impacts on the species suggests that the proposed action will not interfere substantially with the recovery of the Pink-tailed Worm-lizard.

***As such, the impact of the proposed works on the vulnerably listed, Pink-tailed Worm-lizard would not be significant; hence there is no need to refer the action to the Minister of SEWPaC.***

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### **L.5 Significant Impact Criteria Assessment: Striped Legless Lizard (*Delma impar*) - Vulnerable listed species under *Environmental Protection and Biodiversity Conservation Act, 1999***

#### **L.5.1 Introduction**

The Striped Legless Lizard is a pale-grey lizard up to 30 cm in length, with a maximum snout-vent length of about 12 cm. It was formerly distributed throughout temperate lowland grasslands in the ACT, the south-western slopes and southern tablelands of NSW, central and southern Victoria, and the south-eastern corner of South Australia. The distribution of the species has declined, with many known sites no longer supporting populations. In NSW, the species occurs at sites near Goulburn, Yass, Queanbeyan, Cooma and Tumut areas.

The Striped Legless Lizard is a grassland specialist. Until recently, this species was thought to inhabit only native grasslands dominated by species, however, the species is now known to occur in some areas dominated by introduced species. All occupied sites have a grassy ground cover, often with a mixture of native and exotic perennial and annual species.

Striped Legless Lizards shelter in grass tussocks, thick ground cover, soil cracks, under rocks, spider burrows, and under ground debris such as timber. The majority of sites in Victoria and NSW occur on cracking clay soils with some surface rock. These features are rare at sites in the ACT, where Striped Legless Lizards commonly use grass tussocks and burrows for shelter.

The species is found mainly in Natural Temperate Grassland and in secondary grassland near Natural Temperate Grassland and occasionally in open Box Gum Woodland.

#### **L.5.2 Significant Impact Criteria**

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

*a) lead to a long-term decrease in the size of an important population of a species*

The proposed action will result in the clearing of potential habitat for the Striped Legless Lizard in the form of Box Gum Woodland, exotic pasture and Natural Temperate Grasslands. The clearing of this vegetation will not result in an overall decrease in the size of any known populations of the Striped Legless Lizard. The nearest records of this species are approximately 50km to the east of the project site (dated 1997), and 30km to the west of the site (also dated 1997) (DECCW 2010). Given the large distances between the project site and known records of this species, it is unlikely that the proposed works will lead to a long-term decrease in the size of an important population, as no known populations exist within the area of proposed works. Additionally, DEWHA (2010c) lists important populations for this species, none of which are relevant to the current project.

*b) reduce the area of occupancy of an important population*

The Striped Legless Lizard is known to occur in the Southern Tablelands, the South West Slopes and possibly on the Riverina in NSW. Populations are known in the Goulburn, Yass, Queanbeyan, Cooma and Tumut areas. The species also occurs in the ACT, Victoria and south-eastern South Australia. The species is known to occur within the Hawkesbury/Nepean, Murray, Murrumbidgee and Southern

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Rivers CMAs, and is not known to occur within the Lachlan CMA, in which the study area falls (DEC 2005c)

DEWHA (2010c) notes that important populations include those populations with large numbers of individuals, some of which are known from Iramoo Wildlife Reserve, near Melbourne, with at least 600 individuals, Dashwood (Victoria) which was estimated to have 220 individuals, and the Keilor Plains, west of Melbourne. These populations are considered important for the species' long-term survival and recovery. No important populations are listed for the study area (DEWHA 2010c).

Given the information available on the known distribution and population locations of this species, the proposed action is not considered likely to reduce the overall area of occupancy of an important population, as no known populations occur within the area of proposed works. Additionally, given the lack of records within close proximity to the study area, it is considered unlikely that the proposed action will reduce the area of occupancy of an important population of the Striped Legless Lizard.

*c) fragment an existing important population into two or more populations*

The proposed action will involve the clearing of vegetation including Box Gum Woodland and Natural Temperate Grasslands. The Striped Legless Lizard was not found to occur within the proposed development site, despite the presence of potential habitat for this species throughout the entire AGL owned Dalton site. As such, the proposed works are considered unlikely to fragment any existing known populations into two or more separate populations; rather the proposed will require the removal of a small area of potential habitat from within the larger site area.

*d) adversely affect habitat critical to the survival of a species*

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area. To date, no critical habitat has been declared for this species.

*e) disrupt the breeding cycle of an important population*

The proposed action will require the clearing of vegetation (including Box Gum Woodland, exotic pasture and Natural Temperate Grassland). No declared important populations of this species are relevant to the current project (DEWHA 2010c). Given the lack of known occurrences of the Striped Legless Lizard within the development footprint and within the greater AGL owned site and region (DECCW 2010), it is considered unlikely that the proposed action will result in the disruption to the breeding cycle of an important population of the Striped Legless Lizard.

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

The proposed action will result in the clearing of potential habitat for this species (comprising Box Gum Woodland, exotic pasture and Natural Temperate Grassland). The proposed action will not impact on any known populations of this species, and will not clear any habitat associated with known populations.

Biodiversity offsets will be provided by AGL to offset the impacts on the vegetation and habitats to be cleared. The offset will include extensive areas of Natural Temperate Grasslands and Box Gum Woodland. The offset will entail management actions such as restriction of grazing and implementation of weed control activities. Overall, this is likely to result in an increase in the availability of land (and potential habitat) that is suitable habitat for this species (amongst others) that will be

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conserved in perpetuity. At present, much of the AGL-owned site is subject to influences (such as grazing pressure, inappropriate weed control and high numbers of feral species such as foxes and rabbits) that are likely to limit the habitat potential for this species. It would be recommended that the offset involve the implementation of feral animal control programs, weed control that was sympathetic to native flora and fauna, and reduced grazing pressure, which would likely see an increase in species such as *Themeda australis*.

The creation of an area that would present good quality habitat for this species as part of the offset agreement would mean that the proposed action would not result in a decrease in the availability or quality of habitat for this species, and would be very unlikely to result in a decline in the species.

*g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat*

The proposed action will involve the clearing of vegetation. Provided recommended mitigation measures aimed at land management and landscaping activities within the AGL owned site are implemented (namely that weed infestations are appropriately controlled), the proposed action will not result in any invasive species that are harmful to the Striped Legless Lizard becoming established in the species' habitat. Given that only potential habitat for the species exists within the site (not known habitat), with no known records of the species within the AGL-owned site, the proposed action will not result in a significant impact to the Striped Legless Lizard.

This species is noted as sometimes occurring in areas of grassland that are dominated by exotic species. As such, it is unlikely that the establishment of invasive species of tussock grass would result in any significant impact to the species.

*h) introduce disease that may cause the species to decline, or*

It is unlikely that the proposed action will result in the introduction of any disease that may cause the Striped Legless Lizard to decline. There is no mention in the relevant literature of any potential disease-based threats to this species (DEC 2005c; DEWHA 2010c). Rather, threats are noted to include habitat loss, fire and predation (DEWHA 2010c).

As such, it is considered unlikely that any works associated with the proposed action will introduce disease that may cause the species to decline.

*i) interfere substantially with the recovery of the species.*

A National Recovery Plan has been developed for the species (Smith and Robertson, 1999), which outlines a series of recovery actions for the species, of which the following are relevant for the current project:

- Determine the distribution of potential *D. impar* habitat.
- Determine the current distribution and abundance of *D. impar* in Victoria, New South Wales, the Australian Capital Territory and South Australia.
- Determine the habitat use and ecological requirements of *D. impar*.

Given the survey effort of the current project, the proposed action has largely complied with the outlined recovery actions for this species.

The proposed works will not impact on any known populations or individuals of the species either directly or indirectly, as no known occurrences of the species exist within the development footprint. The offset to be provided (comprising potential habitat for this species in the form of Natural

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Temperate Grassland and Box Gum Woodland) as part of project approval will result in the permanent conservation of a substantial area of potential habitat for this species, without the impacts of inappropriate grazing or land management actions. This, combined with the lack of likely impacts on the species suggests that the proposed action will not interfere substantially with the recovery of the Striped Legless Lizard.

***As such, the impact of the proposed works on the vulnerably listed Striped Legless Lizard would not be significant; hence there is no need to refer the action to the Minister of SEWPaC.***

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### L.6 Significant Impact Criteria Assessment: Swift Parrot (*Lathamus discolor*) – Endangered listed species under Environmental Protection and Biodiversity Conservation Act, 1999

#### L.6.1 Introduction

The Swift Parrot is a small parrot about 25 cm long and is endemic to south-eastern Australia. It breeds only in Tasmania, and migrates to the box-ironbark forests and woodlands of Victoria, NSW and southern Queensland in mainland Australia in autumn. During winter the parrots are semi-nomadic, foraging in flowering eucalypts mainly in Victoria and NSW. Small numbers of swift parrots are occasionally recorded in the ACT, south-east South Australia and southern Queensland.

Until recently it was believed that in New South Wales, swift parrots forage mostly in the western slopes region along the inland slopes of the Great Dividing Range but are patchily distributed along the north and south coasts including the Sydney region. However, evidence is gathering that the forests on the coastal plains from southern to northern NSW are also extremely important. There are also records from the ACT in the Canberra area and the Namadgi National Park.

The Swift Parrot inhabits dry sclerophyll eucalypt forests and woodlands and occasionally occurs in wet sclerophyll forests

On the western slopes of New South Wales, Mugga Ironbark and Grey Box are preferred. A variety of grassy woodland vegetation types are also used in these areas, including Box Gum Woodland on the NSW tablelands (DEWHA 2010d).

#### L.6.2 Significant Impact Criteria

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

*a) lead to a long-term decrease in the size of a population*

The proposed action will result in the clearing of potential habitat for the Swift Parrot, in the form of Box Gum Woodland, exotic pasture and Natural Temperate Grassland. The clearing of this vegetation will not result in an overall decrease in the size of any known populations of the Swift Parrot as this species was not found within any areas that will be subject to disturbance as part of the proposed action.

The Swift Parrot is noted as exhibiting very high site fidelity, returning to sites that have previously been used on a cyclic basis, dependant on the availability of foraging resources. As such, the species is unlikely to be recorded at the same site every year. For example, Swift Parrots have been recorded every 2-3 years in the Hunter Employment Zone, near Cessnock, depending on flowering events that provide suitable foraging resources for the species (DEWHA 2010d).

Given the species likelihood of returning to a site on a semi-regular basis, the lack of known records of this species suggests that there is unlikely to be a population of Swift Parrots that are dependant on any habitat within the study area. The nearest records are more than 50km to the south and to the north west of the site (DECCW 2010)

*b) reduce the area of occupancy of the species*

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The Swift Parrot is not noted as occurring within the Murrumbateman sub-region of the Lachlan CMA (DEC 2005d). The species is known to occur from South Australia and Victoria, through NSW to southern Queensland. Given the lack of records within 50km of the site (DECCW 2010) and the presumption that the species will not occur within the CMA sub-region (DEC 2005d) the proposed action is not considered likely to reduce the overall area of occupancy of the species.

*c) fragment an existing population into two or more populations*

The proposed action will involve the clearing of vegetation that forms potential habitat for the species. The nearest records of the Swift Parrot are more than 50km from the site, and the species was not found to occur within the proposed development site, and is not predicted to occur within the CMA sub-region. As such, despite extensive potential habitat for this species throughout the entire AGL owned Dalton site, the proposed works are considered unlikely to fragment any existing known populations into two or more separate populations.

*d) adversely affect habitat critical to the survival of a species*

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area. To date, no critical habitat has been declared for this species.

*e) disrupt the breeding cycle of a population*

Breeding success for the species is strongly correlated with the intensity and extent of flowering of Tasmanian Blue Gums. In years of poor flowering, there appears to be little breeding. Breeding occurs in Tasmania and the species is limited in extent by the availability of breeding habitat (DEWHA 2010d).

The species breeds in Tasmania and returns to the Australian mainland in winter and are semi-nomadic, seeking out flowering eucalypts for foraging mainly in Victoria and NSW. Small numbers of Swift Parrots are occasionally recorded in the ACT, south-east South Australia and southern Queensland. The species is noted as having a degree of site fidelity, often returning every few years to the same foraging areas (DEWHA 2010d).

Given the lack of records within 50km of the site (DECCW 2010), and the fact that the species breeds in Tasmania, the proposed action would be unlikely to have an impact on the breeding cycle of any population, nor would it be likely to result in a reduction of foraging or winter habitat.

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

The proposed action will result in the permanent clearing of approximately 29.66ha of potential habitat for this species. The proposed action will not impact on any known populations of the Swift Parrot, and will not clear any habitat associated with known populations.

Although the proposed works will require the clearing of potential habitat, much of the vegetation to be removed is regrowth (thus quite small) or very old, and is unlikely to experience profuse flowering events. DEWHA (2010d) states that “*selective exclusion of small and very large trees is likely due to their less frequent and less intense flowering when compared to medium-large trees*”. Given the lack of records of the Swift Parrot within the locality and the presence of non-ideal foraging habitat, it is considered unlikely that the proposed works will result in the destruction, removal, isolation or reduction in the availability or quality of habitat such that the species is likely to decline.



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- g) *result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat*

DEWHA (2010d) lists current threats to the species as being fragmentation and loss of wintering and breeding habitats, decline of nest site availability, competition from other species and death from collision.

Loss of nest hollows and fragmentation of winter habitat (namely all habitat on the Australian mainland) is a significant threat to the species, and is increasing in severity. Habitat is commonly lost through clearing for development, agriculture and forestry operations. With loss of nest hollows, the Swift Parrot is faced with increased competition from other hollow-nesting birds, such as the Common Starling (*Sturnus vulgaris*) (DEWHA 2010d).

Throughout the winter range of the Swift Parrot, increasing fragmentation of box-ironbark habitat has seen an increase in the abundance and range of the aggressive and invasive (but native) Noisy Miner (*Manorina melanocephala*). Noisy Miners could potentially be a threat to Swift Parrots as they are known to aggressively defend territories and exclude other nectarivorous birds from sources of nectar (DEWHA 2010d).

The AGL owned site is dominated by large numbers of the common woodland birds the Noisy Miner (*Manorina melanocephala*) and the Australian Magpie (*Gymnorhina tibicen*). With such a dominance of these species present within the site, it is unlikely that the Swift Parrot would be able to successfully compete with such aggressive species, thus reducing the likelihood of the Swift Parrot being reliant upon the site for any form of habitat. Additionally, numerous foxes have been observed within the AGL-owned site during every field survey. It is likely that given the chance, foxes would hunt and prey upon the Swift Parrot.

Given the existing dominance of the Noisy Miner and the Australian Magpie within the site, and the presence of numerous foxes, it is considered unlikely that the proposed works would result in any additional invasive species becoming established. Given the dominance of the Noisy Miner and the Australian Magpie, and the large numbers of foxes observed, it is considered that the proposed site is not likely to be suitable habitat for the Swift Parrot.

- h) *introduce disease that may cause the species to decline, or*

Beak and feather disease is an infectious disease affecting parrots, caused by the beak and feather disease circovirus. This common disease is capable of causing very high death rates in nestlings, and the potential effects of the disease on parrot populations vary from inconsequential to devastating, depending on environmental conditions, and the general health and immunity of the parrots. The beak and feather disease virus can be introduced to endangered populations of parrots via the movements of common species carrying the disease. Lesions suggestive of the virus have been reported in the Swift Parrot (DEWHA 2010d).

It is considered unlikely that the proposed action would result in an increase of common avian species within the site. As has been previously discussed, the site is already dominated by the aggressive Noisy Miner and Australian Magpie. As such, there is limited opportunity for any other species to utilise the site or the habitats present. Given the existing presence of these species, it is considered unlikely that the proposed action would result in the introduction of disease (namely beak and feather disease) to the area.

- i) *interfere with the recovery of the species.*

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The proposed works will not impact on any known populations or individuals of the species either directly or indirectly, as no known records of the Swift Parrot exist within 50km the development footprint. The offset to be provided (comprising potential habitat for this species in the form of Box Gum Woodland) as part of project approval will result in the permanent conservation of a substantial area of potential habitat for this species, and will be managed to encourage the establishment of many native species (including threatened species). This, combined with the lack of likely impacts on the species suggests that the proposed action will not interfere substantially with the recovery of the Swift Parrot.

The proposed action is not inconsistent with the recovery plan for the Swift Parrot (Swift Parrot Recovery Team 2001), which outlines six recovery actions for the species:

- Action 1. Identify the Extent and Quality of Foraging Habitat
- Action 2. Manage Swift Parrot Habitat at a Landscape Scale
- Action 3. Reduce the Incidence of Collisions
- Action 4. Population and Habitat Monitoring
- Action 5. Community Education and Information
- Action 6. Manage the Recovery Process through a Recovery Team

Given the lack of known records of this species within 50km of the site, and the less than ideal habitat within the area of proposed works, it is considered unlikely that the proposed works will impact on Swift Parrot habitat; hence they will not interfere with the recovery of the species.

***As such, the impact of the proposed works on the vulnerably listed, Swift Parrot would not be significant; hence there is no need to refer the action to the Minister of SEWPaC.***

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### L.7 Significant Impact Criteria Assessment: Superb Parrot (*Polytelis swainsonii*) - Vulnerable listed species under *Environmental Protection and Biodiversity Conservation Act, 1999*

#### L.7.1 Introduction

The Superb Parrot is a distinctive large, bright grass-green parrot with a long, narrow tail and sharply back-angled wings in flight. The Superb Parrot occurs only in south-eastern Australia, and is found in NSW and northern Victoria, where it occurs on the inland slopes of the Great Divide and on adjacent plains, especially along the major river-systems; vagrants have also been recorded in southern Queensland.

In NSW, it mostly occurs west of the Great Divide, where it mainly inhabits the Riverina, the south-west Slopes and the Southern Tablelands: west to Mathoura, Boorooban, Goolgowi, and east to Canberra, Yass and Cowra. Its range extends north to around Narrabri and Wee Waa in the north-west Plain Region, from a line joining Coonabarabran and Narrabri, and extending at least as far west as Tottenham and Quambone, with occasional records further west.

The Superb Parrot mainly inhabits forests and woodlands dominated by eucalypts, especially River Red Gums (*Eucalyptus camaldulensis*) and box eucalypts such as Yellow Box (*Eucalyptus melliodora*) or Grey Box (*E. microcarpa*). The species also seasonally occurs in box-pine (*Callitris*) and Boree (*Acacia pendula*) woodlands (DEWHA 2010e).

#### L.7.2 Significant Impact Criteria

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

*a) lead to a long-term decrease in the size of an important population of a species*

The proposed action will result in the clearing of potential habitat for the Superb Parrot in the form of Box Gum Woodland, exotic pasture and Natural Temperate Grassland. The clearing of this vegetation will not result in an overall decrease in the size of any known populations of the Superb Parrot. There is one record of this species more than 20km to the east (dated 1980), with a large number of records more than 20km to the west, north west and south west of the site (DECCW 2010). Given the large distances between the project site and known records of this species, it is unlikely that the proposed works will lead to a long-term decrease in the size of an important population, as no known populations exist within the area of proposed works.

*b) reduce the area of occupancy of an important population*

The Superb Parrot occurs only in south-east Australia, in NSW and northern Victoria, where it occurs on the inland slopes of the Great Divide and on adjacent plains, especially along the major river-systems; vagrants have also been recorded in southern Queensland.

In NSW, it mostly occurs west of the Great Divide, where it mainly inhabits the Riverina, the South-west Slope and Southern Tableland Regions: west to Mathoura, Boorooban, Goolgowi, and east to Canberra, Yass and Cowra. Its range extends north to around Narrabri and Wee Waa in the North-west Plain Region, from a line joining Coonabarabran and Narrabri, and extending at least as far west as Tottenham and Quambone, with occasional records further west.

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The breeding range of the Superb Parrot is divided into three main areas: along the Murray and Edward Rivers; along the Murrumbidgee River; and in a triangle bounded by Molong, Yass and Young (DEWHA 2010e).

Given the known breeding range is to the west of the site, it is considered highly unlikely that the proposed action would result in a reduction in the area of occupancy of an important population, as no known populations occur within the area of proposed works. Additionally, given the lack of records within close proximity to the study area, it is considered unlikely that the proposed action will reduce the area of occupancy of an important population of the Superb Parrot.

*c) fragment an existing important population into two or more populations*

The proposed action will involve the clearing of potential habitat for the Superb Parrot. It is important to consider that this 'potential habitat' falls outside the known breeding range of the species, hence is unlikely to be used for anything other than occasional foraging.

When making local foraging movements, Superb Parrots usually move along wooded corridors, seldom crossing extensive open areas (DEWHA 2010e). Given the lack of records within 20km of the site, and the fragmented nature of vegetation within and around the site, it is unlikely that a population of the species uses the site. As such, the proposed works are considered unlikely to fragment any existing known populations into two or more separate populations; rather the proposed will require the removal of a small area of potential habitat from within the larger site area, however it is considered unlikely that the species would utilise the site to any great extent, meaning that the proposed action would not have a significant impact upon the Superb Parrot.

*d) adversely affect habitat critical to the survival of a species*

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area. To date, no critical habitat has been declared for this species.

*e) disrupt the breeding cycle of an important population*

The breeding range of the Superb Parrot is divided into three main areas: along the Murray and Edward Rivers; along the Murrumbidgee River; and in a triangle bounded by Molong, Yass and Young.

The Superb Parrot breeds between September and January, with eggs being laid in a hollow branch or a hole in the trunk of a large tree, usually a eucalypt, especially in River Red Gums and Blakely's Red Gum, but also other species including Yellow Box, Grey Box, Apple Box, White Box, Inland Red Box and Red Box. Nest sites are always within 10 km of areas of suitable foraging habitat, and in the South-west Slope Region, breeding and foraging habitats may coincide. Nest trees are usually near a watercourse (in the Riverina, rivers were, on average, 25.8 m away), and may be living and healthy, or dead trees. In the South-west Slope Regions the majority of nests (70%) were made in Blakely's Red Gums that were either dead or were affected by dieback.

The Superb Parrot uses a number of habitats for different activities. They breed in either River Red Gum forests and woodlands or box woodlands. In the South-west Slope Region of NSW, Superb Parrots breed in Box Gum forests and woodlands dominated by River Red Gum, Blakely's Red Gum, Apple Box (*E. bridgesiana*), Grey Box, White Box (*E. albens*) and Red Box. In the South-west Slope Region, the species forages in Box Gum woodlands dominated by White Box, Yellow Box and Blakely's Red Gum, and also in crops of wheat (*Triticum aestivum*) or oats (*Avena sativa*). Outside the

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breeding season, some Superb Parrots forage in scattered Boree woodlands or box-pine woodlands between the Murrumbidgee and Murray Rivers. Because the Superb Parrots often use different habitats for different activities, the timing of their occurrence in each habitat may vary with the time of year. Between mid-January and early April, Superb Parrots do not use the River Red Gum breeding habitats on the Edward and Murrumbidgee Rivers, and their whereabouts at this time is unknown (Webster 1988). Between April and August, they inhabit forests and woodlands dominated by River Red Gum, Box Gum, White Cypress Pine (*Callitris glaucophylla*) and Boree (DEWHA 2010e).

The proposed action will require the clearing of vegetation. Given the lack of known occurrences of the Superb Parrot within the development footprint and within the greater AGL owned site and region (DECCW 2010), it is considered unlikely that the proposed action will result in the disruption to the breeding cycle of an important population of the Superb Parrot.

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

The proposed action will result in the clearing of potential habitat for this species. The proposed action will not impact on any known populations of this species, and will not clear any habitat associated with known populations.

Biodiversity offsets will be provided by AGL to offset the impacts on the vegetation and habitats to be cleared. The offset will include extensive areas Box Gum Woodland. The offset will entail management actions such as restriction of grazing and implementation of weed control activities, and will ensure the conservation of a number of hollow-bearing trees and potential foraging sites for the species. Overall, the proposed action is considered unlikely to result in the modification, destruction, removal, isolation or reduction in quality or availability of habitat such that the Superb Parrot is likely to decline.

*g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat*

DEWHA (2010e) lists current threats to the species as habitat clearing and degradation, grazing, hydrological changes, competition for nest sites, poisoning and beak and feather disease, and to a lesser degree, collision with cars and illegal trapping.

Competition for hollows is noted as likely to be a limiting factor for the species (DEWHA 2010e). Introduced species such as Common Starling (*Sturnus vulgaris*), Common Myna (*Acridotheres tristis*) and Honey Bees (*Apis mellifera*) compete with Superb Parrots for nest hollows, and native competitors, such as the Galah (*Eolophus roseicapilla*), Long-billed Corella (*Cacatua tenuirostris*) and Little Corella (*C. sanguinea*) have greatly increased their populations in recent years, leading to increased competition for a declining number of nest hollows.

The AGL owned site is dominated by large numbers of the common woodland birds the Noisy Miner (*Manorina melanocephala*), Galah (*Eolophus roseicapilla*) and the Australian Magpie (*Gymnorhina tibicen*). With such a dominance of these species present within the site, it is unlikely that the Swift Parrot would be able to successfully compete with such aggressive and dominant species, thus reducing the likelihood of the Superb Parrot using the site for any form of habitat. Additionally, numerous foxes have been observed within the AGL-owned site during every field survey. It is likely that given the chance, foxes would hunt and prey upon the Superb Parrot.

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Given the existing dominance of the Noisy Miner and the Australian Magpie within the site, and the presence of numerous foxes, it is considered unlikely that the proposed works would result in any additional invasive species becoming established – it is likely that all threatening invasive species that could establish in Superb Parrot habitat are already present. Given the dominance of the Noisy Miner and the Australian Magpie, and the large numbers of foxes observed, it is considered that the proposed site is not likely to be suitable habitat for the Superb Parrot.

*h) introduce disease that may cause the species to decline, or*

Beak and feather disease is an infectious disease affecting parrots, caused by the beak and feather disease circovirus. This common disease is capable of causing very high death rates in nestlings, and the potential effects of the disease on parrot populations vary from inconsequential to devastating, depending on environmental conditions, and the general health and immunity of the parrots. The beak and feather disease virus can be introduced to endangered populations of parrots via the movements of common species carrying the disease. Lesions suggestive of the virus have been reported in the Superb Parrot (DEWHA 2010e).

It is considered unlikely that the proposed action would result in an increase of common avian species within the site. As has been previously discussed, the site is already dominated by the aggressive Noisy Miner and Australian Magpie. As such, there is limited opportunity for any other species to utilise the site or the habitats present. Given the existing presence of these species, it is considered unlikely that the proposed action would result in the introduction of disease (namely beak and feather disease) to the area – if anything, it is a possibility that given the presence of various common species on site, that the disease may already exist in the locality.

*i) interfere substantially with the recovery of the species.*

The proposed works will not impact on any known populations or individuals of the species either directly or indirectly, as no known records of the Superb Parrot exist within 20km the development footprint. The offset to be provided (comprising potential habitat for this species in the form of Box Gum Woodland) as part of project approval will result in the permanent conservation of a substantial area of potential habitat for this species, and will be managed to encourage the establishment of many native species. This, combined with the lack of likely impacts on the species suggests that the proposed action will not interfere substantially with the recovery of the Superb Parrot.

Given the lack of known records of this species within 20km of the site, and the less than ideal habitat within the area of proposed works (namely extensive or continuous wooded vegetation comprising Box Gum Woodland and River Red Gum Woodland within 10km of each other (DEHWA 2010e)), it is considered unlikely that the proposed works will impact on Superb Parrot habitat, hence they will not interfere with the recovery of the species.

***As such, the impact of the proposed works on the vulnerably listed Superb Parrot would not be significant; hence there is no need to refer the action to the Minister of SEWPaC.***



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### L.8 Significant Impact Criteria Assessment: Spotted-tail Quoll (*Dasyurus maculatus maculatus*) (SE mainland population) – Endangered listed species under Environmental Protection and Biodiversity Conservation Act, 1999

#### L.8.1 Introduction

The Spotted-tail Quoll is a nocturnal, cat-sized, carnivorous marsupial with reddish-brown fur, about the same size as a domestic cat. It was once previously widely distributed from south-east Queensland, eastern NSW, Victoria, south-east South Australia and Tasmania. In NSW, records of the species are generally confined to within 200 km of the coast and range from the Queensland border to Kosciuszko National Park. Known populations locations include: the Hunter Valley, Taree, Port Macquarie and Coffs Harbour through to the gorges and escarpments of the New England Tableland; the south of the state, namely Kosciuszko National Park and coastal national parks; isolated records near Hay; and several disjunct populations between the Border Ranges and the Blue Mountains/Illawarra area (DEWHA 2010f).

The Spotted-tail Quoll has a preference for mature wet forest habitat, especially in areas with rainfall 600 mm/year. Unlogged forest or forest that has been less disturbed by timber harvesting is also preferable. This subspecies has been recorded from a wide range of habitats, including: temperate and subtropical rainforests in mountain areas; wet sclerophyll forest; lowland forests; open and closed eucalypt woodlands; inland riparian and River Red Gum (*Eucalyptus camaldulensis*) forests; dry 'rainshadow' woodland; sub-alpine woodlands; coastal heathlands; and occasional sightings from open country, grazing lands, rocky outcrops and other treeless areas. Habitat requirements include suitable den sites such as hollow logs, tree hollows, rock outcrops or caves. Individuals also require an abundance of food, such as birds and small mammals, and large areas of relatively intact vegetation through which to forage (DEWHA 2010f).

The species has very large home ranges, with females occupying home ranges of up to 750 hectares and males up to 3500 hectares. They usually traverse their ranges along densely vegetated creeklines (DEC 2005e).

#### L.8.2 Significant Impact Criteria

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

a) *lead to a long-term decrease in the size of a population*

The proposed action will result in the clearing of potential habitat for the Spotted-tail Quoll, in the form of Box Gum Woodland, exotic pasture and Natural Temperate Grassland. The clearing of this vegetation will not result in an overall decrease in the size of any known populations of the Spotted-tail Quoll as this species was not found within any areas that will be subject to disturbance as part of the proposed action, nor are there any known records within approximately 20km of the site (DECCW 2010). Furthermore, this species was not recorded on site after substantial survey effort was undertaken to target this threatened species, as per SEWPaC guidelines (SEWPaC 2011h), detailed in **Section 4.2.2**.



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The species is noted as having a very large home range, and as traversing their range along densely vegetated creeklines (DEC 2005e; DEWHA 2010f). Given the lack of densely vegetated creeklines, and lack of records within close proximity to the site, it is considered unlikely that the Spotted-tail Quoll occurs within the site. Considering the species ability to travel large distances, it is possible that the species may travel across the site on occasion, however there is limited habitat potential within the AGL owned site boundary for this species. There are few areas of continuous mature vegetation, and only scattered records of the species in the locality (DECCW 2010).

Given the low likelihood of the species using the proposed development site for denning purposes, with no sign of Spotted-tail Quoll use in the area during field surveys, limited den habitat and highly fragmented vegetation, and provided recommended mitigation measures re implemented, it is considered unlikely that the proposed action would lead to a long term decrease in the size of a population of the species.

### *b) reduce the area of occupancy of the species*

The species has a very wide distribution within NSW, ranging from the Queensland border to Kosciuszko National Park. Known populations locations include: the Hunter Valley, Taree, Port Macquarie and Coffs Harbour through to the gorges and escarpments of the New England Tableland; the south of the state, namely Kosciuszko National Park and coastal national parks; isolated records near Hay; and several disjunct populations between the Border Ranges and the Blue Mountains/Illawarra area (DEWHA 2010f).

The proposed action is not considered likely to reduce the overall area of occupancy of the species, as the proposed works are not on the edge of the species known range, nor are they in the vicinity of any known populations.

### *c) fragment an existing population into two or more populations*

The proposed action will involve the clearing of vegetation (Box Gum Woodland, exotic pasture and Natural Temperate Grassland) that forms potential habitat for the species. The nearest records of the Spotted-tail Quoll are more than 20km from the site, and the species was not found to occur within the proposed development site.

This species has the potential to occur within such a wide range of vegetation and landscape types that it is impossible to entirely rule out its occurrence within the locality, however given the low-quality habitat potential within the area of proposed works, the lack of nearby records, and the species naturally large home range, the proposed works are considered unlikely to fragment any existing known populations into two or more separate populations. The proposed works will not entail the removal of vegetation that is likely to form part of a habitat corridor for this species, and is not likely to disrupt the species movements within the locality.

### *d) adversely affect habitat critical to the survival of a species*

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area. To date, no critical habitat has been declared for this species.

### *e) disrupt the breeding cycle of a population*

The Spotted-tail Quoll occupies a large home range, with the occurrences of males and the location of their home ranges thought to be linked to their need to find suitable females with which to mate.

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Breeding is known to occur during June to August, with the female then responsible for rearing the young in a den site (DEWHA 2010f).

Given the lack of records of the species within close proximity to the site, and the landscape that will be impacted by the proposed works, it is considered unlikely that the Spotted-tail Quoll would be impacted in any way by the proposed action.

The only habitat features that the species may use within the site would be hollow-bearing trees or fallen timber – there are no caves or rocky outcrops large enough to provide any denning habitat within the area of proposed works. Thus, provided the recommended mitigation measures are implemented, and pre-clearing surveys of potential habitat are undertaken and vegetation is cleared using the two-stage approach, it is considered unlikely that the proposed works would impact upon the breeding cycle of a population.

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

The proposed action will result in the clearing of potential habitat (Box Gum Woodland, exotic pasture and Natural Temperate Grassland) for this species. The proposed action will not impact on any known populations of the Spotted-tail Quoll, and will not clear any habitat associated with known populations.

Although the proposed works will require the clearing of potential habitat, much of the vegetation to be removed is fragmented, and lacks suitable corridors to allow the Spotted-tail Quoll to traverse the area. The proposed works will entail the development of facilities that will result in a very small reduction of potential habitat for this species, however given the species has a very large home range, and given the existing low likelihood of the species using the area of proposed works, it is considered unlikely that the proposed works would result in the modification, destruction, removal, isolation or reduction in the availability or quality of habitat to the extent that the Spotted-tail Quoll would decline.

*g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat*

DEWHA (2010f) lists current threats to the species as being loss and degradation of habitat, predation by foxes, dogs and dingos, fire, direct killing by landowners, road mortality, poisoning by cane toads and 1080 baiting.

The AGL-owned site is characterised by a large number of foxes, with numerous individuals seen on each field survey. There is also the high potential that species such as dogs are present within the locality, given the nearby farms.

Given the existence of high numbers of foxes within the site at present, it is considered unlikely that the proposed works would be likely to result in an increase to their numbers. Additionally, the low likelihood of the Spotted-tail Quoll utilising the site means that the proposed works are unlikely to result in invasive species that are harmful to the Spotted-tail Quoll becoming established in the species habitat.

The site also experiences high numbers of Rabbits, however it is considered unlikely that any increase in this species would result in a negative impact to the Spotted-tail Quoll.

*h) introduce disease that may cause the species to decline, or*

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DEWHA (2010f) lists current threats to the species as being loss and degradation of habitat, predation by foxes, dogs and dingos, fire, direct killing by landowners, road mortality, poisoning by cane toads and 1080 baiting. There is no mention of diseases that may cause the Spotted-tail Quoll to decline.

As such, it is considered unlikely that the proposed action would result in the introduction of disease that may cause the species to decline.

*i) interfere with the recovery of the species.*

Recovery actions have been developed by various State departments to aid in the recovery of the Spotted-tail Quoll. Of these, the following are relevant to the proposed action:

- Undertake cat and fox control using poison-baiting techniques least likely to affect quolls.
- Consult with DEC if any poison baiting is to be conducted in and immediately adjacent to areas where Spotted-tailed Quolls are known or likely to occur.
- Retain and protect large, forested areas with hollow logs and rocky outcrops, particularly areas with thick understorey or dense vegetation along drainage lines.
- The proposed works will not impact on any known populations of the species, and provided recommended mitigation measures are implemented (namely any 1080 baiting to be carried out on site should be done in a manner designed to minimise the potential exposure of native species to toxins), the proposed action will not interfere with the recovery of the species in any manner.

The offset to be provided (comprising potential habitat for this species in the form of Box Gum Woodland and Natural Temperate Grassland) as part of project approval will result in the permanent conservation of a substantial area of potential habitat for this species, and will be managed to encourage the establishment of many native species (including threatened species). This, combined with the lack of likely impacts on the species suggests that the proposed action will not interfere substantially with the recovery of the Spotted-tail Quoll.

***As such, the impact of the proposed works on the endangered listed Spotted-tail Quoll would not be significant; hence there is no need to refer the action to the Minister of SEWPaC.***

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### L.9 Significant Impact Criteria Assessment: Golden Sun Moth (*Synemon plana*) – Critically Endangered listed species under Environmental Protection and Biodiversity Conservation Act, 1999

#### L.9.1 Introduction

The Golden Sun Moth is a medium-sized, day-flying moth. The species is currently known from 125 extant sites (post-1990) across its range (DEWHA 2010g). Forty-eight sites occur in NSW. The NSW and ACT populations generally occur at elevations between 480 m and 720 m. (DEWHA 2010g).

Suitable habitat includes Natural Temperate Grasslands, and open grassy woodlands where the ground layer is dominated by wallaby grass (*Austrodanthonia* spp.). While previous studies suggested that the species prefers grasslands which have greater than 40% coverage of wallaby grass over a given area, more recent studies show a broader tolerance for other species compositions, including degraded grasslands dominated by exotic Chilean Needlegrass (*Nassella neesiana*). Sites supporting Golden Sun Moth populations have generally been subject to light grazing (DEWHA 2010g).

The Golden Sun Moth has been shown to have a preference for Short Wallaby Grass (*Austrodanthonia carphoides*), Bristly-Wallaby Grass (*A. setacea*), Wallaby Grass (*A. eriantha*), Lobed Wallaby Grass (*A. auriculata*) and Clustered Wallaby Grass (*A. racemosa*) (DEWHA 2010g).

The Golden Sun Moth has been recorded from the following ecological communities:

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands (Critically Endangered under the EPBC Act)
- Natural Temperate Grassland of the Southern Tablelands (ACT/NSW) (Endangered under the EPBC Act)
- Murray Valley Grasslands of the Riverina Bioregion (Nominated for listing under the EPBC Act)
- Western (Basalt) Plains Natural Temperate Grasslands (Nominated for listing under the EPBC Act).

#### L.9.2 Significant Impact Criteria

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

a) *lead to a long-term decrease in the size of a population*

The proposed action will result in the clearing of potential habitat for the Golden Sun Moth, in the form of Box Gum Woodland, exotic pasture and Natural Temperate Grassland. The clearing of this vegetation will not result in an overall decrease in the size of any known populations of the Golden Sun Moth as this species was not found within any areas that will be subject to disturbance as part of the proposed action, nor are there any known records within approximately 16km to the south-west of Dalton, the nearest colony of GSM to the development site is Coolalie (Bango) (DEWHA, 2010g).

NSW populations are known in the following areas: Binalong, Blackburn, Coolalie, Davis, Derrigullen, Eady's, Glenothian, Gocup, Gounyan, Grace's Flat, Harry's Creek, Jeir Ck, Lagoon, Lambs, Merryville, Nanima, Rye Park, Silverdale, Tarengo, Wargeila, Warroo, Washpen and Wolverhampton (DEWHA 2010g). The proposed development site does not occur within close proximity to any of these known

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population locations. Golden Sun Moth adult males will not fly more than 100 m away from suitable habitat. Populations separated by distances greater than 200 m can be considered effectively isolated, and sites from which the species has gone extinct are highly unlikely to be recolonised. Given the lack of known populations, and the condition of habitat within the area of proposed works, it is considered unlikely that a population of the Golden Sun Moth occurs within the development site, however specific mitigation measures are recommended for the species.

While the species is known to utilise areas that are prone to “light grazing” (DEWHA 2010g), the site has undergone very intensive grazing in the past, with the majority of grass species being almost entirely removed from site. A reduction in grazing pressure and favourable growing conditions (namely rain) in recent times has allowed regeneration of many understorey species. As such, it is considered unlikely that the site would still support a population of the species; hence the proposed action would be unlikely to lead to a long-term decrease in the size of a population.

### *b) reduce the area of occupancy of the species*

NSW populations are known in the following areas: Binalong, Blackburn, Coolalie, Davis, Derringullen, Eady's, Glenothian, Gocup, Gounyan, Grace's Flat, Harry's Creek, Jeir Ck, Lagoon, Lambs, Merryville, Nanima, Rye Park, Silverdale, Tarengo, Wargeila, Warroo, Washpen and Wolverhampton (DEWHA 2010g).

The Golden Sun Moth's NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut (DEC 2005f), an area which is likely to encompass the study area. DEWHA (2010g) recommends employing the precautionary principle is employed if survey effort does not meet the recommended survey criteria in DEWHA (2009b). As such, it is considered that the proposed development site contains potential habitat for the species. However, given the lack of nearby sightings (DECCW 2010), the known population locations (given survey efforts outlined by DEWHA (2010g)), and the low likelihood of the site to support a population (given historical disturbance/grazing pressures and the species being unlikely to recolonise a site), it is considered unlikely that the proposed action will reduce the occupancy of the species, however specific mitigation measures are recommended for this species.

### *c) fragment an existing population into two or more populations*

The proposed action will involve the clearing of vegetation (Box Gum Woodland, exotic pasture and Natural Temperate Grassland) that forms potential habitat for the species. The nearest records of the Golden Sun Moth are more than 60km from the site (DECCW 2010), and the species was not found to occur within the proposed development site. However given the current survey effort, and the likely lack of records within DECCW (2010), it is considered that the area of proposed works does constitute potential habitat for this species. As such, specific mitigation measures are recommended for this species to ensure adequate assessment prior to construction.

It is however, considered unlikely that the proposed works would result in the fragmentation of an existing population into two or more populations, given the lack of preferred habitat within the area of proposed works (neither community is dominated by Wallaby Grasses / *Austrodanthonia* species), and the historical intense grazing pressure that the proposed development site has been subject to.

It is considered unlikely that the species would occur within the development footprint, given the lack of sightings during field surveys, the lack of known populations in the area (DEWHA 2010g), and the condition and species dominance in the area of proposed works.

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### d) *adversely affect habitat critical to the survival of a species*

Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area. To date, no critical habitat has been declared for this species.

### e) *disrupt the breeding cycle of a population*

The proposed works are considered unlikely to impact on any populations of the Golden Sun Moth, as discussed previously, due to lack of known populations within the area of proposed works, the lack of Wallaby Grass (*Austrodanthonia* species) dominated grassland or understorey vegetation, and the lack of nearby records.

As such, given the species is not inclined to travel more than 100 – 200m from suitable habitat, it is considered unlikely that the species will traverse the proposed development footprint. Additionally, considering the species is unlikely to recolonise or settle in a site, there is little chance of the species occurring in the area of proposed works. As such, the proposed works are unlikely to disrupt the breeding cycle of a population of the Golden Sun Moth.

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

The proposed action will result in the clearing of potential habitat (Box Gum Woodland, exotic pasture and Natural Temperate Grassland) for this species. The proposed action will not impact on any known populations of the Golden Sun Moth, and will not clear any habitat associated with known populations. However according to DEWHA (2010g) and advice provided by Alistair Cockburn, Rainer Reywinkle and Geoff Robertson of Friends of Grasslands (pers comm February 2011), suitable habitat should be dominated by the following grass species

- *Austrodanthonia carphoides*;
- *Austrodanthonia auriculata*;
- *Austrodanthonia setacea*;
- *Austrodanthonia eriantha*;
- *Themeda australis*; and
- *Austrostipa* spp.

Following surveys within the Native Temperate Grassland community *Austrodanthonia* species were found to be sparsely present across the site. In fact the only *Austrodanthonia* sp found on site from the above required list was *Austrodanthonia setacea*. It is important to note that grassland within the; plant footprint, gas pipeline, communications tower, hut footprint, services and access track lacks diversity of native grasses, generally, and is particularly deficient in *Austrodanthonia* species, which in turn limits potential habitat for Golden Sun Moth.

Although the proposed works will require the clearing of potential habitat, much of the vegetation to be removed is fragmented, and lacks suitable corridors (namely areas dominated by Wallaby Grass (*Austrodanthonia* species) or Chilean Needlegrass (*Nassella neesiana*)) to allow the Golden Sun Moth to traverse the area. The vegetation within the plant footprint, gas pipeline, communications tower, hut footprint, services and access track is particularly deficient in *Austrodanthonia* species, reducing the potential for the species to occur within the area.



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The proposed works will entail the development of facilities that will result in a very small reduction of potential habitat for this species. Given the existing low likelihood of the species using the area of proposed works, it is considered unlikely that the proposed works would result in the modification, destruction, removal, isolation or reduction in the availability or quality of habitat to the extent that the Golden Sun Moth would decline.

*g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat*

DEWHA (2010g) lists current threats to the species as being the loss and degradation of Wallaby Grass-dominated Natural Temperate grasslands within the species historical range; the loss and degradation of open grassy woodlands where the ground layer is dominated by Wallaby Grass; soil disturbance at extant Golden Sun Moth sites; the species' limited dispersal ability; and predation.

Wallaby Grasses are readily out-competed by exotic plants, such as *Phalaris* and *Paspalum* or weeds like Serrated Tussock (*Nassella trichotoma*), thereby reducing habitat for the Golden Sun Moth. In the ACT, the following perennial and highly invasive weed species are of particular concern and are all the subject of weed control activities by land management agencies: African Lovegrass (*Eragrostis curvula*), Serrated Tussock (*Nassella trichotoma*), Chilean Needlegrass (*Nassella neesiana*) and St Johns Wort (*Hypericum perforatum*). However, there have been occurrences of the species being found in a positive association with Chilean Needlegrass (*Nassella neesiana*).

The AGL owned site is characterised by a range of vegetation conditions, with several tracts of high quality vegetation, as well as other degraded and fragmented areas. The development footprint lacks areas of grassland that are dominated by Wallaby Grass, and the majority of Box Gum Woodland within the development footprint also lacks an understorey that is dominated by Wallaby Grass. As such, clearing of this vegetation is unlikely to impact upon the species habitat.

The presence of sheep within specific areas of the site appears to be correlated to weed infestations, with a dominance of exotic grass and herbaceous species typically found in areas that have been subject to recent or intensive grazing. Additionally, areas that have been subject to grazing appear to have a dominance of exotic or pasture grass species in the understorey.

The proposed works would be likely to limit the grazing potential of certain areas of the site, with limitations on where livestock were allowed for safety reasons. Similarly, the proposed offset would incorporate a large area of Box Gum Woodland and Natural Temperate Grassland, and would be managed to ensure the conservation of this vegetation to provide habitat for a range of native species, including the Golden Sun Moth. Additionally, landscaping and site management works would ensure that any invasive species infestations were suitably dealt with.

There is the potential that disturbance associated with the proposed action may increase the potential for exotic weed infestation and establishment within the site, hence a reduction in any areas of Wallaby Grass. However, the site should be managed to ensure that all exotic weed infestations are controlled and suppressed,

Given the low likelihood of the species using the potential habitat within the development footprint, and provided recommended mitigation measures are implemented (namely weed control activities are undertaken to ensure that no exotic species are able to establish within the habitat of this critically endangered species), it is considered unlikely that the proposed action would result in an invasive species becoming established within the species habitat.



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### *h) introduce disease that may cause the species to decline, or*

DEWHA (2010g) lists current threats to the species as being the loss and degradation of Wallaby Grass-dominated Natural Temperate grasslands within the species historical range; the loss and degradation of open grassy woodlands where the ground layer is dominated by Wallaby Grass; soil disturbance at extant Golden Sun Moth sites; the species' limited dispersal ability; and predation. There is no mention of diseases that may cause the Golden Sun Moth to decline.

As such, it is considered unlikely that the proposed action would result in the introduction of disease that may cause the species to decline.

### *i) interfere with the recovery of the species.*

Priority actions have been developed by DECCW to aid in the recovery of the Golden Sun Moth (DEC 2005f). Of these, the following are relevant to the proposed action:

- Search for the species in suitable habitat in areas that are proposed for development or management actions.
- Do not destroy habitat and surrounding areas by ploughing and do not allow heavy, prolonged grazing on habitat.
- Retain and protect natural grassland remnants within the known distribution of the species.
- Control invasions of weeds and pasture species (but be wary of the impact of herbicide use in habitat): where possible use methods that directly target weeds such as spot spraying and hand removal.
- Where Kangaroo Grass threatens to out-compete wallaby grasses in previously grazed or mown sites, consider re-introducing an appropriate biomass control method.

The proposed works will not impact on any known populations of the species, and provided recommended mitigation measures are implemented, the proposed action will not interfere with the recovery of the species.

The offset to be provided (comprising potential habitat for this species in the form of Box Gum Woodland and Natural Temperate Grassland) as part of project approval will result in the permanent conservation of a substantial area of potential habitat for this species, and will be managed to encourage the establishment of many native species (including threatened species). Management actions associated with the offset site will include grazing management and revegetation activities sympathetic to threatened species. This, combined with the lack of likely impacts on the species suggests that the proposed action will not interfere substantially with the recovery of the Golden Sun Moth.

***As such, the impact of the proposed works on the critically endangered listed Golden Sun Moth would not be significant; hence there is no need to refer the action to the Minister of SEWPaC.***

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### **L.10 Significant Impact Criteria Assessment: Natural Temperate Grassland (Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory) – Endangered Ecological Community listed under Environmental Protection and Biodiversity Conservation Act, 1999**

#### **L.10.1 Introduction**

Natural Temperate Grassland is grassy vegetation dominated by moderately tall (25–50 cm) to tall (50–100 cm), dense to open tussock grasses in the genera *Austrodanthonia*, *Austrostipa*, *Bothriochloa*, *Poa* and *Themeda*. Up to 70% of all plant species may be forbs (i.e. herbaceous, non-grassy/non-grass-like plants). The community may be treeless or contain up to 10% cover of trees, shrubs or sedges. It occurs within the geographical region of the Southern Tablelands of NSW and the ACT at altitudes between 560 metres in central and northern parts of its distribution and 1200 metres in the south, in valleys influenced by cold air drainage and in broad plains (DEWHA 2010h).

Natural Temperate Grassland occurs on ridges, crests, hillsides, undulating plains, valleys and lower slopes, creeks, drainage lines and river flats. Prior to European settlement, natural Natural Temperate Grassland is believed to have been distributed across the Southern Tablelands of NSW and lowland areas of the ACT. It is mostly bounded by the Snowy Mountains and the Brindabella Range in the south-west and the Kybayan Range, Budawang Range and coastal escarpments in the east. The Abercrombie River, Wyangala Dam, Booroowa and Burrinjuck Dam correspond approximately with its north and north-western boundary (DEWHA 2010h).

The present distribution generally corresponds with the Monaro, Murrumbateman, Bungonia and Crookwell subregions of the South Eastern Highlands bioregion (DEWHA 2010h). Remnants of natural temperate grassland are known to be located in various sub-regions of the Hawkesbury/Nepean, Lachlan, Murrumbidgee and Southern Rivers Catchment Management Regions of NSW (DEC 2005g).

#### **L.10.2 Significant Impact Criteria**

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

*a) reduce the extent of an ecological community*

Prior to European settlement, Natural Temperate Grassland is believed to have been distributed across the Southern Tablelands of NSW and lowland areas of the ACT. It is mostly bounded by the Snowy Mountains and the Brindabella Range in the south-west and the Kybayan Range, Budawang Range and coastal escarpments in the east. The Abercrombie River, Wyangala Dam, Booroowa and Burrinjuck Dam correspond approximately with its north and north-western boundary (DEWHA 2010h).

The present distribution generally corresponds with the Monaro, Murrumbateman, Bungonia and Crookwell subregions of the South Eastern Highlands bioregion (DEWHA 2010h).

Natural Temperate Grassland within the development footprint appears to exist within areas that have not been exposed to intense grazing pressure. The condition of the community varies across the site, with greater species diversity in areas of Natural Temperate Grassland outside of the development footprint.

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The proposed action will require the clearing of Natural Temperate Grassland from within the development footprint. While this will not reduce the range of the community, as the works are not on the edge of the communities range, it will result in the clearing of a small amount of the community.

Overall, the proposed action will result in the clearing of Natural Temperate Grassland from within the development footprint, which may be a small reduction in the overall extent of the community within the locality. However, the proposed offset site associated with this project will ensure the permanent conservation of a large area of Natural Temperate Grassland, and will be managed to ensure that the community is maintained to a high condition.

*b) fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines*

The proposed action will require the clearing of Natural Temperate Grassland from within a disturbed and fragmented rural landscape. The vegetation to be cleared is of a moderately low condition, with low species diversity and a general lack of herbs and forbs commonly associated with the Natural Temperate Grassland community. The development footprint is characterised by areas of vegetation that have been exposed to heavy grazing pressure in the past, as well as other areas that have not been grazed as intensely. This has resulted in an existing mosaic of conditions within the site.

The proposed gas pipeline and access road will slightly increase the fragmentation of a patch of Natural Temperate Grassland that is already partly fragmented by a road and agricultural grazing activities.

The Natural Temperate Grassland that will be cleared as part of the proposed action is of a lower condition to that which will be conserved as part of the offset associated with this project.

It is considered unlikely that the proposed action will significantly fragment the community such that the community declines or experiences a significantly negative impact, however there will be a small permanent reduction in the connectivity and size of the community within the area of proposed works.

*c) adversely affect habitat critical to the survival of an ecological community*

No Critical habitat is listed on the register of Critical Habitat kept by the Director-General, DECCW or I&I NSW within the project area. To date, no critical habitat has been declared for this community.

The *National Recovery Plan for Natural Temperate Grassland of the Southern Tablelands (NSW and ACT)* (Environment ACT 2005) includes the following statement:

*“Of the NTG–ST [Natural Temperate Grasslands – Southern Tablelands] ecological community that existed in the Southern Tablelands at the time of European settlement, probably less than three percent retains a moderate to high level of ecological integrity. Other areas exist in lower condition states and may have the capacity to rehabilitate naturally under appropriate management. Such sites have varying conservation value related to their species composition and position in the landscape as potential buffers to higher quality sites. The NTG–ST remnants are highly fragmented. Given the small amount remaining, all sites that meet the definition of the community should be considered to be habitat critical to the survival of the NTG–ST ecological community. However, there will be a need to rank sites according to their conservation value as a basis for setting priorities in establishing formal and informal protection arrangements.*

*Actions related to Objectives 1–3 of this Recovery Plan provide the basis for consistent assessment and classification of the conservation value of NTG–ST sites. This assessment will allow the Recovery*

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Team to identify key sites for protection and conservation management. These sites maintain both the grassland community and component species, some of which are also threatened. The following criteria should be used to assign priorities for protection:

- moderate to high botanical significance rating based on native plant species diversity;
- high faunal habitat rating;
- presence of one or more listed threatened species;
- potential for natural rehabilitation and enhancement of habitat;
- size and shape which allows the site to be buffered from surrounding land uses;
- connectivity with other areas of native vegetation (including non-grassland communities), allowing for gene flow;
- regional representation and replication of floristic associations, species and habitat; and
- relatively low weediness – either density or presence of particular invasive species.” (Environment ACT 2005)

As such, while there will be an adverse affect to an area that may be considered critical to the survival of the community (namely the clearing of a small area of this community) (Environment ACT 2005), the area is considered to be of low priority based on the following factors:

- moderate to high botanical significance rating based on native plant species diversity;

The vegetation to be cleared does not have high species diversity, and falls below benchmark for the community within the Lachlan CMA biometric vegetation descriptions (benchmark vegetation is 14 for native plant species richness, and the Natural Temperate Grassland within the area to be cleared has an average species richness of 9) (DECC 2008a; DECC 2008b).

- high faunal habitat rating;

The vegetation to be cleared contains a moderate availability of fallen timber, however provides limited potential in terms of species diversity, hence reducing the potential for a range of threatened species to use the area as habitat. The area of proposed works is not dominated by Wallaby Grasses, making it less than idea habitat for species such as the Golden Sun Moth, nor is there an abundance of hollow-bearing trees. There are however, numerous rocky outcrops that would provide suitable habitat for a range of reptile species, however no threatened species were found during targeted threatened species surveys of the area.

- presence of one or more listed threatened species;

No threatened species have been observed in the area of proposed works. Potential habitat for numerous threatened species listed under the EPBC Act exists within the development footprint; however there are no current or historical records of any threatened species within the development footprint, despite targeted surveys.

- potential for natural rehabilitation and enhancement of habitat;

The area of proposed works has the potential to respond to rehabilitation and habitat enhancement, however this would depend on a large reduction in grazing pressure, and potential removal of existing native grass biomass in order to encourage species such as *Themeda australis*, *Bothriochloa macra* and *Austrodanthonia* species to become dominant. At present, species such as this are not dominant species in many areas, potentially due to competition from other native species. Given some assistance with rehabilitation and habitat enhancement, the proposed development site has a moderate to high potential for improvement in condition.

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- size and shape which allows the site to be buffered from surrounding land uses;

The area of proposed works associated with the facility footprint is approximately 26 ha in size, and is a slanted square shape. The area of the gas pipeline easement and access road is a long linear portion of land. The proposed action will result in an overall increase to 'edge effect' and will expose more edges of the community to surrounding land uses. However landscaping and land management associated with the proposed development will ensure that the edge effect is suitably managed, with sympathetic rehabilitation works and appropriate weed control activities.

- connectivity with other areas of native vegetation (including non-grassland communities), allowing for gene flow;

The area of proposed works has some connectivity linkages with surrounding areas of Natural Temperate Grassland and Box Gum Woodland that would allow gene flow. The vegetation to be cleared is considered to be of lower condition than that in the surrounding areas, and the area to be provided as the offset for the proposed works is of a higher condition, with greater value in terms of species diversity and connectivity.

- regional representation and replication of floristic associations, species and habitat; and

The area of proposed works appears to be very similar to many areas of vegetation within the locality; namely it has been exposed to moderate to high levels of grazing pressure and historical disturbance associated with agricultural activities. There are however, many areas within the AGL site boundary and surrounding locality that contain areas of Natural Temperate Grassland with a greater diversity of species and habitats. The area of proposed works has quite a gentle slope, while many other areas within the AGL site boundary are steeper or bounded by fences, steep gullies or creeklines. As such, it is harder for livestock to reach these areas, meaning that they are typically in better condition than the area of proposed works which has been heavily grazed in the past.

- relatively low weediness – either density or presence of particular invasive species.”

The area of proposed works has a moderate level of weediness, thought to be as a result of historical grazing and associated disturbance. Invasive species are limited to pasture, herbaceous and annual species, and are quite dense in patches. The presence of these weeds is likely to have contributed to the overall reduction in species diversity within the development footprint.

Given the analysis of each of the criteria used to ascertain the importance of the area to be cleared on the survival of the community, it is considered that the area of proposed works is at the lower end of the spectrum of importance, due to the low condition of Natural Temperate Grassland in the area to be cleared.

- d) *modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns*

The proposed action will result in the clearing of Natural Temperate Grassland and possible modification of abiotic factors within the development footprint, however there is unlikely to be modification of the abiotic factors outside of the area of proposed works.

The proposed works will entail the clearing and establishment of infrastructure within the development footprint; however works and disturbance will be limited to this area. Mitigation measures will strongly

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recommend that access is strictly limited to areas outside of the development footprint, to minimise the potential for disturbance outside this area.

It is not expected that there would be any impact to the groundwater levels within the site, nor should there be a substantial alteration of surface water drainage patterns, nor any other abiotic feature that is necessary for the community's survival.

*e) cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting*

The proposed works are considered unlikely to cause a substantial change to the species composition within the Natural Temperate Grasslands ecological community. The proposed works will not require regular fauna harvesting, nor is there likely to be a change to the existing fire regime, due to the type of vegetation and fuel loads in the locality.

The proposed works would result in the clearing of Natural Temperate Grasslands that are currently in a fairly poor condition, which often lacks the dominance of characteristic species such as *Bothriochloa macra* or *Austrodanthonia*. The proposed works will see the introduction of land management practices related to landscaping and rehabilitation within areas directly adjacent to the footprint (as a result of recommended mitigation measures), following the completion of works, as well as the establishment of an offset site that will conserve the community in perpetuity. The offset site will entail management actions specifically focussed on the health and condition of Natural Temperate Grasslands and Box Gum Woodland, and will ensure that any changes to the species composition is a positive change, with an increase in species diversity and condition.

*f) cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:*

- assisting invasive species, that are harmful to the listed ecological community, to become established, or
- causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or

The proposed action will require the clearing of Natural Temperate Grassland that is in a somewhat degraded condition, with low species diversity, and a lack of several characteristic species (assumed to be as a result of recent grazing activity). While the proposed action will require the clearing of some of the community, an offset will be provided encompassing a greater area of Natural Temperate Grassland that will be conserved in perpetuity. The area to be provided in the offset is of higher quality than the area to be cleared, and has a higher species diversity and greater likelihood of responding quickly and favourably to management actions such as minor weed control, stock exclusion and sympathetic revegetation activities.

The proposed action is not likely to result in an increase of invasive species that would be likely to outcompete native species, or be harmful to the ecological community, as weed control activities would be implemented as part of the site management actions. Additionally, the site already has a very high number of rabbits present, which may be responsible for grazing on Natural Temperate Grassland species, and it is considered unlikely that the proposed action would result in an increase in rabbits within the site.



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The proposed action is not likely to cause regular mobilisation of fertilisers or herbicides or other chemicals into the ecological community that may kill or inhibit the growth of species within the community. Environmental management of the site will require that appropriate sedimentation and pollution control devices are established on site.

g) *interfere with the recovery of an ecological community.*

A National Recovery Plan for the community has been developed by Environment ACT (2005) and DEWHA (2006). A summary of recovery actions is provided by DEC (2005g), of which the following are relevant to the proposed action:

- Undertake control of rabbits, hares, foxes, pigs and goats (using methods that do not disturb the native plants and animals of the remnant).
- Prevent changes to the site's surface and sub-surface soil drainage.
- Do not collect rocks from remnants.
- Do not plant species that are not native to this community into remnants; if planting locally-indigenous tree species, do not plant in densities that exceed 10% crown cover.
- Manage stock to reduce grazing pressure in high quality remnants (i.e. those with high flora diversity or fauna habitat); time grazing so as not to affect the seeding of sensitive plants, or when fauna species are not vulnerable.
- Modified remnants have a capacity for natural or assisted rehabilitation; an essential for rehabilitation is to reduce grazing pressure; native plant diversity can then be enhanced by one or more of the following methods: allowing natural dispersal of seeds from outside the site; activation of the site's soil seed bank (particular disturbance regimes may be applied); or the deliberate introduction of locally-indigenous species.
- Do not apply fertilisers or lime to natural grasslands.
- Erect on-site markers to alert maintenance staff to the presence of a high quality remnant or populations of a threatened species.
- Prevent physical compaction of the soil by people, stock and vehicles.
- Undertake weed control (taking care to spray or dig out only target species).
- Protect all sites of conservation significance from further clearing and adverse disturbance.
- Ensure remnants remain connected or linked to each other; in cases where remnants have lost connective links, re-establish them by rehabilitation of sites to act as stepping stones for fauna and flora (via pollen and seed dispersal).
- In some highly productive sites and on roadside reserves and in country cemeteries, it may be necessary to apply biomass control measures: do this by using slashing, burning or strategic grazing, and apply only to the extent necessary and during seasons so as not to affect the seeding of sensitive plants, or when fauna species are not vulnerable.
- Mark remnants onto maps (of the farm, shire, region, etc) and use maps to plan activities (e.g. remnant protection, rehabilitation or road, rail and infrastructure maintenance work).

Mitigation measures (including the provision of a suitable offset) will aim to incorporate all of these recovery actions, however the proposed action will require the clearing of a small area of the community. While this is unlikely to interfere with the recovery of the community, as all remnants of this community are considered habitat critical to the survival of the community, this may be considered to have a significant impact on the endangered ecological community Natural Temperate Grassland.



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***As such, the impact of the proposed works on the endangered ecological community Natural Temperate Grassland is considered to be significant; hence the action has been referred to the Minister of SEWPaC.***

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### L.11 Significant Impact Criteria Assessment: Rainbow Bee-eater (*Merops ornatus*)– Marine and Migratory – JAMBA species under Environmental Protection and Biodiversity Conservation Act, 1999)

#### L.11.1 Introduction

*Merops ornatus* (listed Marine and Migratory – JAMBA under the EPBC Act) was observed within the study area during EnviroKey field surveys in February 2011 of the site. This species is distributed across much of mainland Australia, and occurs on several near-shore islands.

#### L.11.1 Significant Impact Criteria

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

1. *substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species*

The proposed works are considered unlikely to substantially modify, destroy or isolate an area of important habitat for the species, given the mobile, migratory nature of this species, the presence of suitable habitat outside of the project footprint, and assuming mitigation measures are adopted. The proposed works are unlikely to result in additional fragmentation at a scale that could impact this species, given its ability to undertake long-distance movements, and its typical habitat, which includes fragmented landscapes (Department of Sustainability, Environment, Water, Population and Communities, 2011). The proposed works are also considered unlikely to alter the fire regime, nutrient cycle or hydrological cycle of the site such that potential habitat for this species is destroyed.

2. *result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or*

The only actual, identified threat to the Rainbow Bee-eater is the introduced Cane Toad (*Bufo marinus*) Department of Sustainability, Environment, Water, Population and Communities (2011). Given the location of the project and the scope of proposed works, it is considered highly unlikely that *Bufo marinus* could become established within the area of proposed works. Additional threats include predation of eggs and young from within nests. Nests are located on the ground, typically in banks such as creek banks, making them vulnerable to predation from species including: foxes, dingoes, feral dogs, goannas, monitors, brown snakes, Australian Magpies, Brown Goshawks and Yellow-footed Antechinus.

3. *seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.*

Populations of *Merops ornatus* in southern Australia breed in southern Australia before migrating north during its lifecycle. It is thought that some birds may return to the same nesting location in following

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years. Given the results of field surveys conducted of the site, with numerous predators observed including foxes and magpies, as well as cats, brown snakes and monitors, it is considered unlikely that the species would successfully use the site as a nesting resource. It is considered highly unlikely that the proposed works would increase disruption to potential nesting or breeding habitat for this species. A small amount of potential foraging habitat may be removed as a result of the proposed works, in the form of grassland and woodland vegetation. However, given the highly mobile nature of the species, its ability to undertake large scale seasonal movements, the presence of suitable habitat outside of the area of proposed works, and assuming mitigation measures are adopted, it is considered unlikely that the Project would have an adverse affect on the habitat of this species

***As such, the impact of the proposed works on Merops ornatus (listed Marine and Migratory – JAMBA under the EPBC Act) would not be significant; hence there is no need to refer the action to the Minister of SEWPaC.***

## Appendix M Director General's Requirements

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Our ref: 10/05760-2

Mr Steve Jackson  
Manager Power Development  
AGL Energy Limited  
Locked Bag 1837  
ST LEONARDS NSW 2065

Dear Mr Jackson

**Proposed Dalton Energy Project, Upper Lachlan Local Government Area (MP 10\_0035)**

The Department has received a project application (MP 10\_0035) by AGL Energy Limited for the development of a gas-fired power station three kilometres north of the township of Dalton in the Upper Lachlan local government area.

I have attached a copy of the Director-General's requirements (DGRs) for the preparation of an Environmental Assessment for the project. These requirements have been prepared following the Planning Focus Meeting held on Thursday 25 March 2010 and in consultation with the relevant government agencies.

It should be noted that the Director-General's requirements have been prepared based on the information provided to date. Under section 75F(3) of the Act, the Director-General may alter or supplement these requirements if necessary and in light of any additional information that may be provided prior to the proponent seeking approval for the Project.

I would appreciate it if you could contact the Department at least two weeks before you propose to submit the Environmental Assessment for the proposal to determine:

- the fees applicable to the application;
- consultation and public exhibition arrangements that will apply;
- options available in publishing the Environmental Assessment via the Internet; and
- number and format (hard-copy or CD-ROM) of the Environmental Assessment that will be required.

Prior to exhibiting the Environmental Assessment, the Department will review the document to determine if it adequately addresses the DGRs. The Department may consult with other relevant government agencies in making this decision. If the Director-General considers that the Environmental Assessment does not adequately address the DGRs, the Director-General may require the Proponent to revise the Environmental Assessment to address the matters notified to the Proponent. Following this review period the Environmental Assessment will be made publicly available for a minimum period of 30 days.

If your proposal includes any actions that could have a significant impact on matters of National Environmental Significance, it will require an additional approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This approval would be in addition to any approvals required under NSW legislation and it is your responsibility to contact the Department of the Environment, Heritage, Water and the Arts to determine if an approval under the EPBC Act is required for your proposal (6274 1111 or <http://www.environment.gov.au>).

If you have any enquiries about these requirements, please contact Ms Ingrid Ilias on the above contact details or Mr Neville Osborne (Manager, Water and Energy) on 9228 6337.

Yours sincerely



19/04/10

Scott Jeffries  
**Director**  
**Infrastructure Projects**  
as delegate for the Director-General

# Director-General's Requirements

## Section 75F of the *Environmental Planning and Assessment Act 1979*

<b>Project</b>	<p>Construction and operation of a gas-fired power station, in stages, with the initial stage comprising between two and four open cycle gas turbines with a capacity of between 250 and 750 megawatts and the ultimate stage comprising a facility with a capacity of up to 1,500 megawatts. The power station is proposed to be operated as a peaking power station which would operate up to 15% of the year. The proposal includes:</p> <ul style="list-style-type: none"> <li>• gas-fired power station facility;</li> <li>• infrastructure within the site including access road, transmission connection and general site infrastructure; and</li> <li>• infrastructure beyond the site including lateral gas pipeline from the Moomba to Sydney Gas pipeline and gas offtake from this pipeline.</li> </ul>
<b>Site</b>	An approximately 500 hectare site located off Walshes Road, approximately three kilometres from the township of Dalton, in the Upper Lachlan Shire local government area (LGA).
<b>Proponent</b>	AGL Energy Limited
<b>Date of Issue</b>	19 April 2010
<b>Date of Expiration</b>	19 April 2012
<b>General Requirements</b>	<p>The Environmental Assessment (EA) must include:</p> <ul style="list-style-type: none"> <li>• an <b>executive summary</b>;</li> <li>• a <b>description of the project</b> including construction, operation and staging. The description should include any required infrastructure such as pipelines and connection to the grid for the operation of the project;</li> <li>• consideration of any <b>relevant statutory provisions</b> including the consistency of the project with the objects of the <i>Environmental Planning and Assessment Act 1979</i>;</li> <li>• consideration of <b>alternatives</b> to the project, including site selection;</li> <li>• an <b>assessment of the environmental impacts</b> of the project with particular focus on the key assessment requirements specified below and proposed mitigation/management measures for residual environmental impacts;</li> <li>• <b>justification</b> for undertaking the project with consideration of the benefits/impacts of the proposal (including community benefits) and proposed management/ mitigation/ monitoring;</li> <li>• a <b>draft Statement of Commitments</b> outlining environmental management, mitigation and monitoring measures; and</li> <li>• <b>certification</b> by the author of the Environmental Assessment that the information contained in the Assessment is neither false nor misleading.</li> </ul>
<b>Key Assessment Requirements</b>	<p>The EA must include an assessment of the following key issues:</p> <ul style="list-style-type: none"> <li>• <b>Strategic Justification</b> - the Environmental Assessment must: <ul style="list-style-type: none"> <li>→ include a strategic assessment of the need, scale, scope, operational mode (e.g. baseload, intermediate, peaking) and location for the project in relation to predicted electricity demand, transmission constraints and the strategic direction of the region and the State in relation to electricity supply, demand and electricity generation technologies;</li> <li>→ include an analysis of site suitability with respect to potential land use conflicts with existing and future land uses taking into account local and strategic land use objectives; and</li> <li>→ describe alternatives considered for the project in particular technology and configuration including fuel source, air emission, water use and options for waste disposal/ beneficial reuse and provide justification for the project demonstrating its benefits at a local and strategic scale in comparison to alternatives considered, including the do nothing option.</li> </ul> </li> <li>• <b>Greenhouse Gases</b> - the Environmental Assessment must include a comprehensive greenhouse gas assessment undertaken in accordance with the methodology specified in the <i>National Greenhouse Accounts (NGA) Factors</i> (latest release) including: <ul style="list-style-type: none"> <li>→ quantification of emissions (in tonnes of carbon dioxide equivalent) in accordance with the <i>Greenhouse Gas Protocol: Corporate Standard</i> (World Council for Sustainable Business Development &amp; World Resources Institute) including: direct emissions (Scope 1), indirect emissions from electricity (Scope 2) and any significant up or down stream emissions (Scope 3) considering all stages of the</li> </ul> </li> </ul>



project (annual emission for each year of the project during construction, operation and decommissioning is required to be provided);

- comparison of predicted emissions intensity and thermal efficiency against best achievable practice and current NSW averages for the activity, and of predicted emissions against total annual national emissions (expressed as a percentage of total national greenhouse gases production per year over the life of the project);
- evaluation of the availability and feasibility of measures to reduce and/ or offset the greenhouse emissions of the project including options for carbon capture and storage. Where current available mitigation technology is not technically or economically feasible, the Environmental Assessment must demonstrate that the proposal will use best available technology, including carbon capture readiness, and identify options for triggers that would require staged implementation of emerging mitigation technologies; and
- evaluation of the project in the light of various carbon emission prices per tonne both with and without proposed mitigation measures.

- **Air Quality** - - the Environmental Assessment must include a comprehensive air quality impact assessment based on dispersion modelling prepared in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DECC, 2005) (Approved Methods) considering worst case operating scenarios and meteorological conditions, representative monitoring and receiver locations and cumulative impacts, as applicable. The Environmental Assessment must address air quality impacts at a local, regional and interregional level and include a plume rise assessment. The assessment must demonstrate that the project would meet the impact assessment criteria in Section 7 of the Approved Methods and the requirements of the *Protection of the Environment Operations (Clean Air) Regulation 2002* for all relevant pollutants based on ground level concentrations at the plant boundary and beyond at all sensitive receptors. The Environmental Assessment must clearly demonstrate that the project has been designed to include the application of Best Available Control Technology (BACT) in relation to air emissions. The assessment must include a framework for the mitigation, management and monitoring of air quality impacts, particularly with respect to sensitive receptors likely to be impacted by cumulative air quality impacts in the local area.
- **Water Quantity and Quality Impacts** The Environmental Assessment must include an assessment of the water quantity and quality impacts of the proposal (i.e. surface and groundwater), with particular reference to the water needs for the life of the project, the proposed source of water, and the implementation of water saving measures (including use of rainwater and runoff from sealed, hardstand and disturbed areas as much as practically possible). In this regard, a water balance must be provided. The Proponent must be able to demonstrate that an adequate and secure water supply is available for the life of the project. The Environmental Assessment must demonstrate that any water crossings are designed in accordance with DWE Guidelines *Controlled Activity Approvals*. The Environmental Assessment must consider the adherence to existing embargo provisions for proposed water use or impact (e.g. Murray Darling Basin Groundwater Embargo – Order 2). The Environmental Assessment must also identify the quantity and quality of wastewater, how this wastewater would be disposed of, and how stormwater would be managed at the site. The Environmental Assessment must reflect a design philosophy of zero water discharge from the site, except for natural surface water flows.
- **Noise Impacts** - the Environmental Assessment must include a comprehensive operational noise impact assessment for the project, prepared in accordance with *NSW Industrial Noise Policy* (EPA, 2000) considering worst case operating scenarios and meteorological conditions, representative monitoring and receiver locations, and cumulative impacts from any adjacent relevant land uses (existing and approved). The assessment must consider the potential for low frequency noise generation, peak noise events with the potential to cause sleep disturbance and the effects of stable atmospheric conditions. The Environmental Assessment must also consider the potential for:
  - construction noise impacts consistent with the *Interim Construction Noise Guidelines* (DECCW, 2009);
  - vibration impacts during construction and operation consistent with *Assessing Vibration: A Technical Guideline* (DECC, 2006); and
  - traffic generated noise during construction and operation consistent with *Environmental Criteria for Road Traffic Noise* (EPA, 1999). The method, data and assumptions used to assess the impact of road haulage on residential properties must be fully documented and justified.The Environmental Assessment must clearly outline the noise mitigation, monitoring

	<p>and management measures the Proponent intends to apply to the project.</p> <ul style="list-style-type: none"> <li>• <b>Flora and Fauna Impacts</b> - the Environmental Assessment must include an assessment of impacts of the project on flora and fauna, prepared in accordance with <i>Guidelines for Threatened Species Assessment</i> (DEC/ DPI, July 2005) and specifically report on the considerations listed in Step 3 and whether it meets each of the key thresholds set out in Step 5. The development will need to avoid any endangered ecological communities and provide an appropriate buffer and asset protection zone. The Environmental Assessment must specifically consider threatened species and communities listed under both State and Commonwealth legislation that have been recorded on the site and surrounding land. The Environmental Assessment must also detail measures to avoid or mitigate impacts on threatened species associated with the siting and construction of any access roads and other infrastructure. This must include the identification of any potentially impacted paddock and fence trees with an assessment of the functioning of this vegetation in terms of habitat and movement of arboreal threatened fauna in the local area;</li> <li>• <b>Indigenous Heritage</b> - the Environmental Assessment must include an assessment of impacts on Aboriginal heritage, in accordance with draft <i>Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation</i> (DEC, 2005). The Environmental Assessment must also include an assessment of the potential for the project to impact on known items of non-Aboriginal heritage significance, and include a management framework for management of any additional heritage items that may be uncovered during construction of the project. The Environmental Assessment needs to clearly demonstrate that effective community consultation with Aboriginal communities has been undertaken in determining and assessing impacts, developing options and making final recommendations for the mitigation of impacts.</li> <li>• <b>Hazards and Risks</b> - the Environmental Assessment must include a screening of potential hazards on site (including new gas supply infrastructure) to determine the potential for off site impacts and any requirement for a Preliminary Hazard Analysis (PHA). The PHA, should potential off-site impacts be identified, must be prepared in accordance with the Department's <i>Hazardous Industry Planning Advisory Paper No. 3</i>, <i>Hazardous Industry Planning Advisory Paper No. 6</i> and <i>Multi-level Risk Assessment</i> and with reference to applicable Australian Standards (including AS2885 Pipelines - Gas and Liquid Petroleum – Operation and Maintenance). Risk impacts associated with the transport of dangerous goods and hazardous materials must be documented with reference to the Department's draft <i>Route Selection</i> guideline.</li> <li>• <b>Visual Impacts</b> – the Environmental Assessment must include an assessment of the visual impact of the project from representative viewing points including residential receivers, settlements and significant public view points and include the mitigation and management of visual amenity impacts on affected receivers. An overview of the effectiveness and reliability of the measures and any residual impacts after the implementation of such measures must also be included.</li> <li>• <b>Traffic and Transport</b> – the Environmental Assessment must include an assessment of the traffic and transport impacts of the project, particularly during the project's construction stage. The assessment must include a discussion of measures that will be implemented to mitigate adverse impacts on the public road network, particularly from the haulage of heavy plant and equipment to the site.</li> <li>• <b>General Environmental Risk Analysis</b> – notwithstanding the above key assessment requirements, the Environmental Assessment must include an environmental risk analysis to identify potential environmental impacts associated with the project (construction and operation), proposed mitigation measures and potentially significant residual environmental impacts after the application of proposed mitigation measures. Where additional key environmental impacts are identified through this environmental risk analysis, an appropriately detailed impact assessment of this additional key environmental impact must be included in the Environmental Assessment.</li> </ul>
<b>Consultation Requirements</b>	<p>You must undertake an appropriate and justified level of consultation with the following parties during the preparation of the Environmental Assessment:</p> <ul style="list-style-type: none"> <li>• NSW Department of Environment, Climate Change and Water including separate consultation with the Office of Water;</li> <li>• Upper Lachlan Shire Council;</li> <li>• NSW Department of Industry and Investment;</li> <li>• Transgrid;</li> <li>• Air Services Australia,</li> <li>• Civil Aviation Authority;</li> <li>• Department of Defence;</li> <li>• Rural Fire Service;</li> <li>• Lachlan Catchment Management Authority; and</li> <li>• the local community including surrounding land owners.</li> </ul>

	<p>The Environmental Assessment must clearly indicate issues raised by stakeholders during consultation, and how those matters have been addressed in the document.</p>
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## Appendix N Supplementary Director General's Requirements



## Planning

Contact: Neville Osborne  
Phone: (02) 9228 6337  
Fax: (02) 9228 6355  
Email: [neville.osborne@planning.nsw.gov.au](mailto:neville.osborne@planning.nsw.gov.au)

Mr Steve Jackson  
Manager Power Development  
AGL Energy Limited  
Locked Bag 1837  
ST LEONARDS NSW 2065

Our ref: 10/05760-2  
Your ref:

Dear Mr Jackson

**Proposed Dalton Energy Project, Upper Lachlan Local Government Area (MP 10\_0035) – Supplement to the Director-General's Requirements**

I refer to the Director-General's requirements issued for the above project on 19<sup>th</sup> April, 2010.

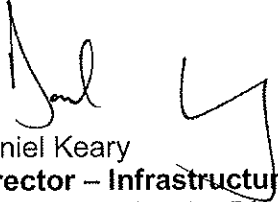
As you are aware, the project was declared a Controlled Action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 11<sup>th</sup> June 2010, for likely impacts on listed threatened species and communities. In accordance with section 75F(3) of the NSW *Environmental Planning & Assessment Act 1979*, I have enclosed the Commonwealth's requirements for the assessment.

I also confirm that the interim administrative procedures in relation to the accredited assessment process will apply to the assessment of this project under the EPBC Act, so that the Department can undertake an environmental impact assessment of the project to satisfy the requirements of both NSW and Commonwealth legislation.

You must ensure that the Environmental Assessment adequately addresses the Director-General's requirements issued on 19<sup>th</sup> April, 2010, and the supplementary requirements attached to this letter.

If you have any enquiries about these requirements, please do not hesitate to contact Neville Osborne on the above contact details.

Yours sincerely

 5/7/10  
Daniel Keary  
**Director – Infrastructure Projects**  
**as delegate for the Director-General**

**Department of the Environment, Water, Heritage and the Arts – requirements for environmental assessment EPBC 2010/5484**

**Section 75F(3) of the *Environmental Planning and Assessment Act 1979***

The Commonwealth Minister for Environment Protection, Heritage and the Arts has declared the AGL gas-fired power station and associated infrastructure project (the proposed construction and operation of a gas-fired power station and associated infrastructure located approximately 3.5 km north of Dalton in New South Wales), to be a controlled action under section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The controlled action is likely to have a significant impact on the EPBC Act listed critically endangered ecological community White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Woodland) and the EPBC Act listed endangered ecological community Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory (NTG).

In accordance with the one-off accredited assessment process for this project, the environmental assessment of the impacts of the controlled action must be assessed under part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Pursuant to section 75F(3) of part 3A of the EP&A Act the Director-General is required to notify the proponent of these requirements.

The assessment should include enough information about the controlled action and its relevant impacts to allow the Commonwealth Minister for Environment Protection, Heritage and the Arts to make an informed decision whether or not to approve the controlled action under the EPBC Act.

The following assessment requirements are to be integrated into the assessment required for part 3A of the EP&A Act. The following matters in the EPBC Act and schedule 4 of the *Environment Protection and Biodiversity Conservation Regulations 2000* should be considered.

**General information**

1. The background of the action, including:

- a. the title of the action;
- b. the full name and postal address of the designated proponent;
- c. a clear outline of the objective of the action;
- d. the location of the action;
- e. the background to the development of the action;
- f. how the action relates to any other actions (of which the proponent should reasonably be aware) that have been, or are being, taken or that have been approved in the region affected by the action;
- g. the current status of the action; and
- h. the consequences of not proceeding with the action.

**Description of the controlled action**

2. A description of the action, including:

- a. all the components of the action;

- b. the precise location of any works to be undertaken, structures to be built or elements of the action that may have relevant impacts;
- c. how the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts;
- d. to the extent reasonably practicable, a description of any feasible alternatives to the controlled action that have been identified through the assessment, and their likely impact, including:
  - i. if relevant, the alternative of taking no action;
  - ii. a comparative description of the impacts of each alternative on the matters protected by the controlling provisions for the action;
  - iii. sufficient detail to clarify why any alternative is preferred to another.

### **A description of the relevant impacts of the controlled action**

3. An assessment of all relevant impacts<sup>1</sup> with reference to the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines Matters of National Environmental Significance (2009)* that the controlled action has, will have or is likely to have on:
  - a. relevant threatened species and/or threatened ecological communities listed under sections 18 and 18A of the EPBC Act, including the Box-Gum Woodland and NTG.
4. Information must include:
  - a. a description of the relevant impacts of the action on matters of national environmental significance;
  - b. a detailed assessment of the nature and extent of the likely short term and long term relevant impacts;
  - c. a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible;
  - d. analysis of the significance of the relevant impacts;
  - e. any technical data and other information used or needed to make a detailed assessment of the relevant impacts.
5. A description of the relevant impacts on the Box-Gum Woodland and NTG should include an analysis of the vegetation condition on the site, as well as the methods by which this was determined. It should also include direct, indirect, cumulative and facilitative impacts on the:
  - a. extent of the Box-Gum Woodland and NTG, including connectivity with other areas of the ecological communities;
  - b. quality or integrity of the Box-gum Woodland and NTG (including, but not limited to, assisting invasive species, that are harmful to the ecological communities, to become established; or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the communities which kill or inhibit the growth of species in the ecological community);
  - c. EPBC Act listed species in, or in any way dependent upon, the Box-Gum Woodland or NTG;
  - d. composition of the Box-Gum Woodland and NTG;

---

<sup>1</sup> The term "relevant impact" is defined in section 82 of the EPBC Act.



- e. habitat present on site critical to the survival of the Box-Gum Woodland and NTG<sup>2</sup>; and
- f. abiotic (non-living) factors (such as water, nutrients or soil) necessary for the Box-Gum Woodland and NTG's survival, for example increasing groundwater levels or making the site wetter, soil disturbance or substantial alteration of surface water drainage patterns.

These impacts should be described for the construction and operation phases of the controlled action.

6. Where there is a potential habitat for EPBC Act listed species, such as the Golden Sun Moth (*Synemon Plana*), Grassland Earless Dragon (*Tympanocryptus pinguicollis*), Pink-tailed Worm-lizard (*Aprasia parapulchella*) or Striped Legless Lizard (*Delma impar*), surveys must be undertaken. These surveys must be timed appropriately and undertaken for a suitable period of time by a qualified person<sup>3</sup>. A subsequent description of the relevant impacts on such EPBC Act listed species should include, inter alia, direct, indirect, cumulative and facilitative impacts on the:
  - a. population of the species at the site;
  - b. area of occupancy of the species;
  - c. habitat critical to the survival of the species;
  - d. breeding cycle of the population; and
  - e. availability or quality of habitat for the species.

### Proposed safeguards and mitigation measures

7. A description of feasible mitigation measures, changes to the controlled action or procedures, which have been proposed by the proponent or suggested in public submissions, and which are intended to prevent or minimise relevant impacts. Information must include:
  - a. a description, and an assessment of the expected or predicted effectiveness of, the mitigation measures;
  - b. any statutory or policy basis for the mitigation measures;
  - c. the cost of the mitigation measures;
  - d. an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing;
  - e. the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program;
  - f. a consolidated list of mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action.

<sup>2</sup> "habitat critical to the survival of a species or ecological community" refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal;
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- to maintain genetic diversity and long term evolutionary development; or
- for the reintroduction of population or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the register of Critical Habitat maintained by the Minister under the EPBC Act.

<sup>3</sup> Where available, species-specific survey guidelines can be obtained on the department's *Species Profile and Threats Database*: <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

### **Offsets**

8. Should any residual impact exist that cannot be mitigated it may be necessary for offset measures to be considered in order to ensure the protection of matters of national environmental significance in perpetuity. If required, the department may negotiate offsets with you during the assessment phase.

### **Other approvals and conditions**

9. Any other requirements for approval or conditions that apply, or that the proponent reasonably believes are likely to apply, to the proposed action. Information must include:
  - a. details of any local or State government planning scheme, or plan or policy under any local or State government planning system that deals with the proposed action, including:
    - i. what environmental assessment of the proposed action has been, or is being, carried out under the scheme, plan or policy; and
    - ii. how the scheme provides for the prevention, minimisation and management of any relevant impacts;
  - b. a description of any approval that has been obtained from a State, Territory or Commonwealth agency or authority (other than an approval under the Act), including any conditions that apply to the action;
  - c. a statement identifying any additional approval that is required;
  - d. a description of the monitoring, enforcement and review procedures that apply, or are proposed to apply, to the action.

### **Economic and social matters**

10. A description of the short-term and long-term social and economic implications and/or impacts of the project.

### **Environmental record of person proposing to take the action**

11. Details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against:
  - a. the proponent; and
  - b. for an action for which a person has applied for a permit, the person making the application.
12. Details of the proponent's environmental policy and planning framework.

### **Information sources**

13. For information given in an environment assessment, the draft must state:
  - a. the source of the information;
  - b. how recent the information is;
  - c. how the reliability of the information was tested; and
  - d. what uncertainties (if any) are in the information.

**Consultation**

14. Any consultation about the action, including:

- a. any consultation that has already taken place;
- b. proposed consultation about relevant impacts of the action;
- c. if there has been consultation about the proposed action — any documented response to, or result of, the consultation.

15. identification of affected parties, including a statement mentioning any communities that may be affected and describing their views.

## Appendix O EnviroKey Target Surveys Supporting Report

O

# **Target Surveys: Striped Legless Lizard, Pink-tailed Worm Lizard and Hollow-bearing trees**

**Proposed Dalton Power Project  
Dalton, N.S.W**



**A report prepared for URS Australia**

**FEBRUARY 2011**

**Report No. ER 0223**

## Citation

EnviroKey (2011) Target Surveys: Striped Legless Lizard, Pink-tailed Worm-lizard and Hollow-bearing trees, Proposed Dalton Power Project. A report prepared by S. Sass of EnviroKey for URS Australia. Report No. ER.0223. Version 2.0. 25<sup>th</sup> February 2011.

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## Disclaimer

The scope of work for this report was defined by time and budgetary constraints and the availability of other reports and data.

**EnviroKey** accept no liability or responsibility for or in respect of any use of or reliance upon this report and its supporting material in whole or in part by any third party. Information in this report is not intended to be a substitute for site specific assessment or legal advice in relation to any matter.

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# 1 INTRODUCTION

EnviroKey were engaged by URS Australia (URS) to undertake a specialist study that will be used to support the Environmental Assessment for the proposed Dalton Power Project to be submitted under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

Despite extensive surveys already completed within the project area by URS, recent discussions between URS, the Department of Environment, Climate Change and Water (DECCW) and Department of Sustainability, Environmental, Water, Population and Communities (SEWP&C) identified that additional survey is still required for some species and habitat features.

## 1.1 SCOPE OF WORKS

URS provided EnviroKey with a scope of works for this study within the *Project Footprint* and the *Gas Pipeline and Access Road*, now referred to as the *study area*. The scope of works is to undertake:

- Survey for Striped Legless Lizard (*Delma impar*) (SLL) guided by the 'Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities' (working draft) (DEC 2004) within the study area.
- Survey for Pink-tailed Worm-lizard (*Aprasia parapuchella*) (PTWL) guided by the 'Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities' (working draft) (DEC 2004) within the study area.
- Opportunistic survey for Golden Sun Moth (*Synemon plana*) (GSM) amongst the grasslands within the study area between 10am and 2pm on cloudless, still days where temperature is above 20 degrees Celsius and when it has not rained for two days prior.
- An assessment of the previously mapped hollow-bearing trees (HBT) within the study area as well as in nearby proposed offset areas. HBT information to be collected must include Diameter at Breast Height (DBH), the amount of small = < 5cm, medium = 5 to 15cm and large = >15cm+ hollows and whether they are branch, trunk or fissures hollows.

## 1.2 OBJECTIVES OF THIS REPORT

Given the scope of works provided by URS, this report will document:

- Detailed descriptions of field survey methods
- Weather conditions during the field survey
- Detailed results of the field survey
- Any limitations to the field survey
- ALL GPS data in spreadsheet form

## 2 METHODOLOGY

A comprehensive field survey was conducted between the 20<sup>th</sup> – 24<sup>th</sup> February 2011 by a suitably qualified and experienced ecologist. The qualifications and experience of this ecologist is provided (Appendix 1).

The field survey was conducted under the authority of current NSW Scientific Licence issued under Clause 23 of the *National Parks and Wildlife Regulation 2002* and section 132C of the *National Parks and Wildlife Act 1974* by the NSW Department of Environment, Climate Change and Water and an Animal Research Authority issued by the Director-General's Animal Care and Ethics Committee (ACEC) of NSW Department of Primary Industries (now Industry and Investment NSW). Survey design was guided with consideration of the 'Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (working draft)' (DEC 2004). The total survey effort completed for this study is summarised (Table 1).

### 2.1 REPTILES

This study has utilised a range of sampling techniques as documented within DEC (2004) combined with using an experienced herpetologist to maximise the potential for detecting reptile fauna. Four methods were used: Funnel trapping, Active hand searches, Walking transects and Opportunistic sightings. Survey effort and timing is considered consistent with those outlined within 'Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (working draft)' (DEC 2004).

#### 2.1.1 **Funnel trapping**

Funnel trapping was chosen as the survey technique for SLL rather than pitfall traps due to their effectiveness in capturing a wide variety of reptile fauna including pygopods (Denny 2005; Garden *et al.* 2007; Sass 2009; Thompson and Thompson 2007), their time efficiency with trap activation and their potential to impact on habitat (Smith and Robertson 1999).

Funnel trapping was completed in areas mapped by URS as Natural Temperate Grassland and Box-Gum Woodland targeting SLL and other terrestrial fauna. Three trap lines were established within these two vegetation communities giving a total of six trap lines. Each trap line comprised a 25m long and 0.23m tall PVC drift fence and six funnel traps (3pr) evenly spaced along the drift fence. Trap lines were activated on the 20<sup>th</sup> February 2011 and deactivated on 24<sup>th</sup> February 2011 giving a survey effort of four nights/five days resulting in a total of 36 trap nights per vegetation community and 72 trap nights in total effort. Funnel traps were checked twice daily in accordance with ACEC approval.

Examples of some of the funnel trapping sites are provided (Figure 1) with spatial locations provided in Appendix 1.

Table 1: Total survey effort during this study.

Survey type	Survey effort
Funnel trapping	6 drift fences each with 3pr of funnel traps activated over 4 nights/5 days. Total trap nights is 72 nights.
Active hand searches	505 rocks in total, at nine locations. Survey effort approximately 8 person hours.
Walking transects	Four 200m transects between 10am and 2pm. Survey effort approximately 8 person hours.
Hollow-bearing tree surveys	Random meanders across the study area and proposed offset areas over 10 person hours.
Golden Sun Moth	Actively searched for during Walking transects and Hollow-bearing tree surveys. A total of 3 days provided suitable searching conditions.
Opportunistic surveys	Onsite for five days, collecting data on reptiles and threatened fauna

### 2.1.2 Active hand searches

Searches of rock outcropping was undertaken across the study area on the 21<sup>st</sup>, 22<sup>nd</sup> and 23rd February 2011 as this method is known to detect the SLL (Dorrough *et al.* 1996; EcologyPartners 2007; Koehler 2004; Smith and Robertson 1999) and the PTWL (Jones 1998; Michael and Herring 2005; NPWS 1999; Osborne and Jones 1995; PB 2007).

Previously mapped areas of rock outcropping completed by URS was visited and extensively searched resulting in nine survey locations. Loose surface and partially embedded rocks were gently lifted and checked for the presence of reptile fauna or signs of their past presence such as sloughs, scats or eggs. The soil was gently raked to detect any SLL or PTWL that are known to refuge just beneath the soil surface. Rocks were then returned to their original position. Searches concluded by 10am daily as this timing offers the highest level of detection while reptiles had not reached their optimum body temperature and would therefore remain sheltered under rocks. A hand-held counter was utilised to enable an accurate count of the total number of rocks searched. Of relevance to PTWL, the number of rocks with small, black ants beneath was also recorded.

Systematic sampling of rock outcrops was not conducted during this study. Rather, a random search of rocks was completed to ensure that some areas of rock outcropping remained undisturbed to minimise potential degradation (Goode *et al.* 2005). Using this method, approximately 80-90% of searchable rocks were deemed to have been searched within a given area.

Searches were also made of fallen timber, leaf litter, fallen bark and anthropogenic matter such as corrugated iron wherever these attributes were observed.

Spatial locations of active hand searches are provided (Appendix 1).

### **2.1.3 Walking transects**

Transects through areas mapped by URS as Natural Temperate Grassland and Box-Gum Woodland were conducted on 21<sup>st</sup>, 22<sup>nd</sup>, 23<sup>rd</sup> and 24<sup>th</sup> February 2010 within the study area. SLL has been previously detected by walking through suitable habitat (Daly *et al.* 2008) and this method is considered appropriate given their diurnal foraging behaviour (Coulson 1990).

On each day, a 200m transect by one person was conducted between 10am and 2pm in search of basking reptiles within grass tussocks. Four transects were completed.

Spatial locations of the start and end point of each walking transects are provided (Appendix 1).

### **2.1.4 Opportunistic sightings**

If any species of reptile was observed outside of the previous three survey methods, the species was recorded as an opportunistic sighting and included within the pooled dataset.

### **2.1.5 Nomenclature**

Nomenclature used during this study follows that of the field guide to the reptiles of NSW (Swan *et al.* 2004) with the exception of recent taxonomic revisions within *Egernia* (Gardner *et al.* 2008), the *Gehyra variegata* complex (Sistrom *et al.* 2009), the 'snake-eyed' skinks (Horner 2007) and the *Lerista* genera (Hutchinson 2008).

## **2.2 GOLDEN SUN MOTH**

While no specific surveys were conducted for GSM, opportunistic surveys were undertaken whenever suitable weather conditions were present. Personnel were onsite between 10am and 2pm each day (considered suitable for detecting GSM) during the survey including the 200m walking transects conducted for SLL and the searches of the study area and proposed offset areas for HBT.

## **2.3 HOLLOW-BEARING TREES**

Searches for hollow-bearing trees (HBT) were conducted by walking and driving transects across the study area and proposed offset areas. Whenever a HBT was encountered, its spatial location using a hand-held global positioning system (GPS) and the attributes of any hollows present was recorded. The attributes recorded were:

- Diameter at breast height (DBH)
- The number of small (<5cm), medium (5-15cm) and large (>15cm) hollows
- The type of hollow (trunk, branch or fissure).



## 2.4 WEATHER CONDITIONS

Weather conditions recorded during the field surveys were considered suitable for the duration of the field survey for the detection of the target species with the exception of GSM. Only the 20<sup>th</sup>, 21<sup>st</sup> and 23<sup>rd</sup> February 2011 was considered suitable. On these dates, the temperatures were warm (above 20 degrees Celsius), no cloud was present and there was either no wind or only a very slight breeze. The closest weather station to the study area is Goulburn approximately 50km east. Given the potential discrepancy of weather variation between the study area and the closest weather station, the Goulburn data is not presented.

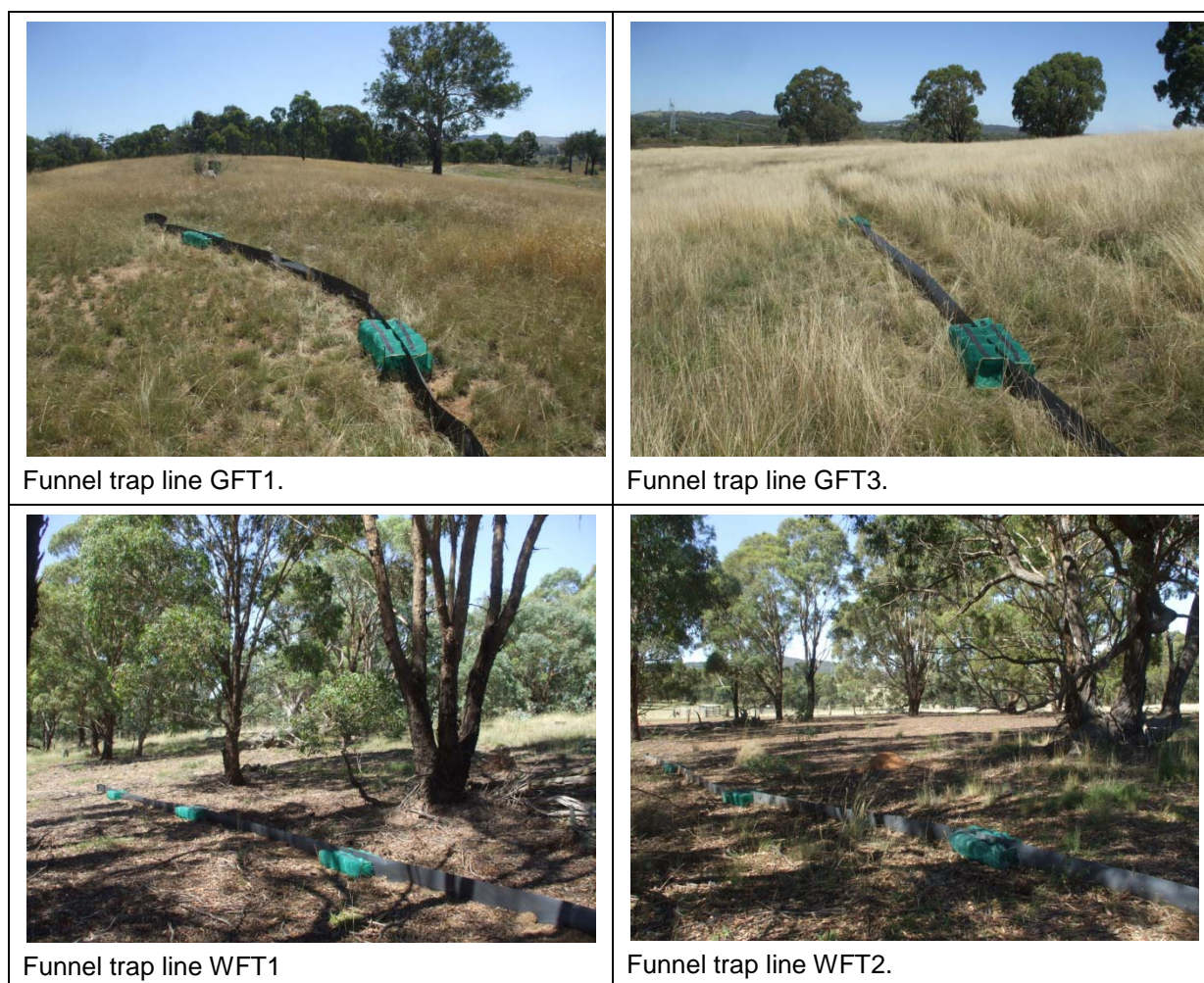


Figure 1: Example of some of the funnel trapping sites established during this study.

## 2.5 OTHER THREATENED AND MIGRATORY FAUNA

Any threatened or migratory fauna species observed during this study was noted, with location and species data provided to URS (Appendix 1).

## 2.6 SPATIAL DATA

At the request of URS, all spatial data collected during this study was provided to them in spreadsheet form for their mapping. This is also detailed in Appendix 1.

## 2.7 LIMITATIONS

This study is consistent with survey methods, effort and timing outlined within the 'Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (working draft)' (DEC 2004). However, a common limitation of many ecological studies is the short period of time in which they are conducted. When combined with a lack of seasonal sampling this can lead to either low detection rates or false absences being reported. This study has increased survey effort above those detailed within the most recent guidelines (DEC 2004) and utilised an experienced herpetologist for the field survey with the aim of reducing that probability.

## 3 RESULTS

### 3.1 REPTILES

By pooling all data from each survey method, a total of 17 species of reptile were detected during this study. These comprised:

- one species of gecko
- one species of legless lizard
- eleven species of skink
- two species of dragon
- one species of goanna
- one species of snake

No SLL, PTWL or any other threatened reptile species were recorded.

A full list of reptile species recorded and their method of detection is provided in Table 2.

Table 2: Reptile species recorded during this study and their method of detection (A=Active hand search, F=funnel trap, W=walking transect, O=opportunistic)

Common name	Scientific name	Method of detection
Marbled gecko	<i>Christinus marmoratus</i>	A
Plain snake-lizard	<i>Delma inornata</i>	A, F
Lace monitor	<i>Varanus varius</i>	O
Jacky lizard	<i>Amphibolorus muricatus</i>	O
Eastern bearded dragon	<i>Pogona barbata</i>	F, O
Eastern three-lined skink	<i>Acritoscincus duperreyi</i>	A
Southern rainbow skink	<i>Carlia tetradactyla</i>	F
Wall lizard	<i>Cryptoblepharus pannosus</i>	W
Robust ctenotus	<i>Ctenotus robustus</i>	F, W
Copper-tailed skink	<i>Ctenotus taeniolatus</i>	A
Tree skink	<i>Egernia striolata</i>	O, W
	<i>Hemiergis decresiensis</i>	A
Grass sun-skink	<i>Lampropholis guichenoti</i>	F
Boulenger's morethia	<i>Morethia boulengeri</i>	F, W, A
Blotched blue-tongue	<i>Tiliqua nigrolutea</i>	W
Eastern blue-tongue	<i>Tiliqua scincoides</i>	O
Eastern brown snake	<i>Pseudonaja textilis</i>	F, O

### **3.1.1      *Striped legless lizard***

No SLL were recorded during this study using funnel trapping, active hand searches or walking transects. Another pygopod was recorded several times during this study (*Delma inornata*). However, *Delma inornata* can be easily distinguished from SLL by the presence of three pre-anal scales rather than 2 in SLL, in the hands of an experienced herpetologist.

### **3.1.2      *Pink-tailed worm-lizard***

No PTWL were recorded during this study. Across the nine survey locations, a total of 505 rocks were searched. While this number is below the 750 rocks postulated in previous study that require searching to determine with high probability presence or absence of PTWL (Jones 1998), the study area does not possess that number of rocks. In addition, previous surveys completed by URS to date have also searched similar numbers of rocks giving both a large quantity of rocks combined with temporal variation. These previous surveys have also not detected PTWL.

Relevant to the life cycle of PTWL, rock searches revealed only a small quantity of black ants beneath. Only 33 rocks were identified where black ants were present, less than 7% of the total rocks surveyed.

## **3.2    GOLDEN SUN MOTH**

No GSM were detected during this study despite two days of suitable conditions.

## **3.3    HOLLOW-BEARING TREES**

A total of 82 HBT were identified during this study. This comprised of 33 HBT within the study area and an additional 49 within proposed offset areas to the west. The spatial location and attributes of each HBT are detailed within Appendix 1.

## **3.4    OTHER THREATENED AND MIGRATORY FAUNA**

Two threatened fauna species and one migratory fauna species was recorded during this study. These being the:

- Diamond Firetail (Vulnerable, TSC Act)
- Flame Robin (Vulnerable, TSC Act)
- Rainbow Bee-eater (Migratory, EPBC Act)

Spatial locations are detailed within Appendix 1.



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## 5 APPENDICES

## APPENDIX 1 – SPATIAL DATA INCLUDING HBT ATTRIBUTES

Dalton URS Survey Locations			
Easting	Northing	Survey Type	Comments
701050	6159766	Funnel Trap Line	GFT1
701271	6159631	Funnel Trap Line	GFT3
701378	6159705	Funnel Trap Line	WFT1
701336	6159825	Funnel Trap Line	WFT2
701171	6159730	Funnel Trap Line	GFT2
700331	6157912	Funnel Trap Line	WFT3
701445	6159724	Active Hand Search	AS1
701431	6159667	Active Hand Search	AS2
701377	6159658	Active Hand Search	AS3
701422	6159314	Active Hand Search	AS4
701457	6159213	Active Hand Search	AS5
701400	6159083	Active Hand Search	AS6
700928	6158603	Active Hand Search	AS7
700700	6158347	Active Hand Search	AS8
701240	6159543	Active Hand Search	AS9
700653	6158332	Walking Transect	Start of WT1
700876	6158549		End of WT1
700985	6159790	Walking Transect	Start of WT2
701202	6159738		End of WT2
701483	6159754	Walking Transect	Start of WT3
701281	6159613		End of WT3
701361	6159428	Walking Transect	Start of WT4
701180	6159585		End of WT4

HBT within Project Footprint	Legend: Small (<5cm), Medium (5-15cm), Large (>15cm), f=fissure, t=trunk, b=branch, DBH=diameter at breast height						
HBT No.	Easting	Northing	DBH (cm)	Small	Med	Large	Comments
50	701325	6159861	60	1t			
51	701387	6159847	90	1t			
52	701481	6159824	95		6b		Stag
53	701515	6159843	100	1b	2t		Stag
54	701449	6159811	80	2b			Stag
55	701444	6159802	95	1f			
56	701437	6159743	70	1b			Stag
57	701445	6159736	75	1b			
58	701466	6159694	65		1t		
59	701479	6159699	50	1t	1t		Stag
60	701443	6159689	30	1t			Stag
61	701338	6159640	110		1b		
62	701338	6159634	125	1f, 2b			
63	701310	6159679	135	1b			
64	701257	6159799	30	1f			Stag
65	701128	6159450	50	1f			Stag
66	701117	6159450	80	1t			
67	701130	6159471	50	1b			
68	701114	6159498	90	2t			
69	701119	6159496	100	1f			
70	701104	6159555	110	1f			
71	701145	6159707	40	2b	1b		Stag
72	701120	6159704	60	3b			Stag
73	701097	6159727	65	2b			Stag
74	701066	6159804	105	1b			
75	701112	6159870	90	1b	1f		
76	701107	6159887	90	1t	1t		
77	701079	6159906	75		1t		
78	701068	6159877	45	1f			Stag
79	700964	6159886	60	1f, 1b			Stag
80	700574	6158254	80	1b			
81	701250	6158862	90	2b	1b		
82	700298	6157918	110		1t		

HBT within Proposed Offset Area	Legend: Small (<5cm), Medium (5-15cm), Large (>15cm), f=fissure, t=trunk, b=branch, DBH=diameter at breast height						
HBT No.	Easting	Northing	DBH (cm)	Small	Med	Large	Comments
1	708444	6159574	70	1f			Stag
2	708411	6159521	70	2b		2b	Stag
3	700054	6159569	60	2f, 1b			Stag
4	700864	6159580	80	1b			
5	700894	6159592	90	2t			
6	700716	6159896	130		1t	2b	Stag
7	700745	6159885	70	1b		1t	Stag
8	700738	6159905	90	3t			Stag
9	700693	6159913	100			1b	
10	700665	6159918	110	2t		2b	Stag
11	700631	6159931	70	2b			Stag
12	700680	6159877	60		2b	1t	Stag
13	700661	6159836	60	3b	2t		Stag
14	700697	6159815	50	4t		3t	Stag
15	700709	6159803	60	4t	2b		Stag
16	700720	6159793	60	3t	2t		Stag
17	700718	6159768	60	2b	2f		Stag
18	700350	6159911	80	1b	1f		
19	700391	6159899	100	1b			
20	701031	6159755	80	2b		1b	Stag
21	701052	6159718	95		1t, 1f		
22	701033	6159684	100	1b			
23	700985	6155600	40	2t			Stag
24	700968	6155790	60	2f			Stag
25	700956	6159569	60	1f	1b		Stag
26	700976	6159602	110	1b			
27	700957	6159624	90	1b			
28	700953	6159657	90	2b			
29	700963	6159688	100			1b	
30	700972	6159704	80	1t	1f		Stag
31	700963	6159717	70	1t			Stag
32	700967	6159729	105	1t			Stag
33	700990	6159723	70	1t			Stag
34	700970	6159763	70	3b			Stag
35	700956	6159752	70	2b			Stag
36	700933	6159755	70	2b			Stag
37	700953	6159316	105		1t		Stag
38	700967	6159424	90	2f			Stag

39	700999	6159428	90		1t, 2b		Stag, Galahs nesting
40	700924	6159589	80	1f			
41	700921	6159604	75	1t			
42	700928	6159640	90			1t	Galahs nesting
43	700926	6159649	80		1b		
44	700929	6159658	75	1b			
45	700910	6159702	100	2b		1b	Stag
46	700899	6159649	90	2f			Stag
47	700881	6159645	60	1t			Stag
48	700878	6159620	80	1b			
49	700855	6159608	100	2b	1b		

#### Dalton Threatened Fauna

Easting	Northing	Species	Comments
700951	6159864	Diamond Firetail	1 adult observed
700956	6159651	Rainbow Bee-eater	1 adult observed
701325	6159861	Flame Robin	1 adult pair observed
699975	6158095	Diamond Firetail	Flock of 13 birds including as many as 6 in juvenile plumage
700037	6159616	Diamond Firetail	1 adult observed

## APPENDIX 2 – QUALIFICATIONS AND EXPERIENCE OF PERSONNEL

Name and Qualifications	Experience
<p><b>Steve Sass</b> B.App.Sci (Env.Sci) (Hons) Principal Ecologist / Herpetologist</p> <p>Certified Environmental Practitioner, EIANZ</p> <p>Practicing Member, Ecological Consultants Association of Australia</p> <p>Member, Australian Society of Herpetologists</p>	<p>Steve is a highly experienced Ecologist and Herpetologist, having undertaken hundreds of ecological surveys, Threatened Species Assessments and provided specialist advice on frogs and reptiles across eastern and central Australia for more than 10 years. He is well published across the scientific literature including documenting species range extensions, habitat requirements, conservation management and ecological knowledge. His practical expertise extends across the widest range of projects including landscape scale biodiversity surveys and flora and fauna impact assessments in sensitive areas such as Silverton Wind Farm, Australia's largest Wind Farm with 600 turbines (~30,000 hectares) near Broken Hill in far western New South Wales. Steve was the Senior Author and Project Manager for the Biodiversity Assessment and led the ecological team in completing the on-ground surveys, vegetation mapping and target surveys for threatened species which included three threatened reptile species and an endangered reptile population.</p> <p>Steve has extensive experience with infrastructure projects across Australia having provided specialist herpetofauna survey and assessment for a variety of projects including the Hume Highway duplication project, a 380km optic fibre cable in Western Australia, a 650km gas pipeline from Queensland to Newcastle and the Silverton, Nimmitabel, Yass Valley and Gullen Range Wind Farms in NSW.</p> <p>Steve has an extensive scientific background having published dozens of manuscripts in peer-reviewed journals. He is an Adjunct Associate of the Ecology and Biodiversity Group within the Institute for Land, Water and Society (ILWS), a leading research group at Charles Sturt University and he is accredited as a Certified Environmental Practitioner by the Environmental Institute of Australia and New Zealand.</p>



## Appendix P URS Hollow Bearing Tree Inventory

## Appendix P

URS Hollow Bearing Tree Inventory							
HBT within Project Footprint	Legend: Small(<5cm), Medium (5-15cm), Large (>15cm), f=fissure, t=trunk, b=branch, DBH=diameter at breast height						
HBT No.	Easting	Northing	DBH (cm)	Small	Medium	Large	Comments
A1	701637	6159296	60	2b	1b	-	Stag – dead <i>E. macro</i>
A2	701552	6159311	80	3b			Stag – dead <i>E. melliodora</i>
A3	701571	6159238	80	5b	2b	-	Stag – standing
A4	701414	6159221	20	1t	1t	-	Stag – dead
K1	702561	6159163	60	2b	-	-	Stag
K2	701950	6159638	90	1t	-	-	<i>E. Blakely</i>



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