

## Flora and Fauna Assessment – Summary of Key Outcomes

A Flora and Fauna Assessment of the proposed development footprint has been undertaken. The results of the assessment indicate that there are a number of ecological values associated with the Site. A range of mitigation measures would be implemented to minimise impacts to native species within the locality.

A total of 26 threatened species and one endangered ecological community (EEC) listed under the New South Wales *Threatened Species Conservation Act 1995* (TSC Act) were considered to have the potential to occur within the development footprint and as such have been assessed. A total of nine threatened species and one EEC listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were considered to have the potential to occur within the development footprint, and as such have been assessed via the Commonwealth Significant Impact Criteria assessment guidelines.

Nine threatened fauna species were observed during field surveys. However, no threatened flora species were observed. Two EECs were found to occur within the development footprint; *White Box – Yellow Box – Blakely's Red Gum Woodland* – referred to as Box Gum Woodland, listed under the TSC Act and *Natural Temperate Grassland of the southern Tablelands of NSW and the ACT* – referred to as Natural Temperate Grasslands, listed under the EPBC Act. The proposed works will involve the clearing of approximately 5.94 hectares (ha) of Box Gum Woodland and 9.07 ha of Natural Temperate Grassland.

Initial survey results suggested that the development footprint and surrounding site (the study area) supported both Natural Temperate Grassland as well as Commonwealth listed Box Gum Woodland. Consequently, the project has been the subject of an EPBC Act Referral.

Following review of the referral, on 11 June 2010, the Project was declared a Controlled Action under the EPBC Act. Consultation with SEWPaC commenced on 16 June, 2010 and supplementary DGRs were issued by DoP on 5 July, 2010 to take into account the EPBC Act referred matters.

Since that time, further survey work has been undertaken across the study area to assess all vegetation formations with a particular emphasis on the EECs and their extent and condition. Results have determined that the Box Gum Woodland within the study area did not adequately meet the Commonwealth criteria for the listing of the Box Gum Woodland EEC, although it was confirmed to meet the criteria relevant to the TSC Act listing of Box Gum Woodland EEC.

The results of the assessment of the Dalton Power Project suggest that it has the potential to adversely impact to the TSC Act listed EEC Box Gum Woodland, but would not result in a significant impact to any other threatened species or populations listed under the TSC Act.

To minimise the potential impact of this Project, detailed recommended mitigation measures would be implemented. These measures include the production of management plans for the construction and operational stages of the project, clearing strategies, habitat replacement plans and rehabilitation and land management strategies. Each of these mitigation measures would be addressed during the construction and operational phases of the Dalton Power Project.

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In addition to these measures, and in order to offset the potential loss of Box Gum Woodland (5.94 ha loss) and Natural Temperate Grassland (9.07 ha loss), AGL proposes to reach agreement with the NSW OEH and SEWPaC the following offsets:

- 77.57 ha of Box Gum Woodland to be managed for environmental purposes in perpetuity within the AGL owned lands adjoining the development footprint, and
- 80.71 ha of Native Temperate Grassland and 24.97 ha of exotic pasture with the potential if managed to become Natural Temperate Grassland to be managed for environmental purposes in perpetuity within the AGL owned lands adjoining the development footprint.

With AGL's commitment to the biodiversity offset strategy and mitigation measures for the Project, it is considered that the overall biodiversity of the local area would be 'maintained or improved' as is required under biodiversity assessment guidelines under Part 3A of the EP&A Act. The offset arrangements are also consistent with the Commonwealth's principles for environmental offsets established under the EPBC Act (Department of Environment and Water Resources, 2007a; Department of Environment and Water Resources, 2007b).

## 13.1 Introduction

This chapter considers the flora and fauna impacts of the Dalton Power Project with regard to Commonwealth and NSW State planning and environmental legislation, including the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the *Environmental Planning and Assessment Act 1979* (EP&A Act), the *Threatened Species Conservation Act 1995* (TSC Act), *Native Vegetation Act 2003* (NV Act), *State Environmental Planning Policy No. 44 Koala Habitat Protection* (SEPP 44) and the *Noxious Weeds Act 1993* (NW Act). The full Flora and Fauna Assessment is presented in **Appendix H** of this Environmental Assessment.

## 13.2 Methodology

The methodology for the Flora and Fauna Assessment included the following elements:

- literature review;
- flora survey;
- fauna survey;
- reporting; and
- consultation.

The assessment and field surveys were conducted generally in accordance with the following guidelines and protocols:

- Threatened Biodiversity and Assessment; Guidelines for Developments and Activities Working Draft (DEC, 2004);
- Guidelines for Threatened Species Assessment (DEC/DPI July 2005);
- BioBanking Assessment Methodology and Credit Calculator Operational Manual (DECC 2008c);
- Random meander surveys (Cropper 1993);
- Office of Environment and Heritage (OEH) Threatened Species Profiles and Recovery Plans;
- NSW Department of Industries and Investment (I&I NSW) Threatened Species Profiles and Recovery Plans; and
- SEWPaC Threatened Species, Profiles and Recovery Plans.

In addition to these protocols and guidelines, an assessment of the suitability of habitats present for both TSC Act and EPBC Act listed species within the Site was made during literature reviews and field surveys. Fauna habitat suitability was based on the level of breeding, nesting, feeding and roosting resources available. Flora habitat suitability was based on the vegetation communities present within

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the local area, geography, topography, land use and potential for seed bank and Site resilience. The development footprint was walked and all significant habitat features, such as fallen timber, hollow bearing trees, stags, or stands of Box Gum Woodland species likely to provide foraging or nesting habitat for threatened fauna species was plotted using a handheld GPS unit.

Habitat assessments are important in determining the potential for listed species to use the Site rather than relying solely on one off surveys that are subject to seasonal and weather limitations and provide a snapshot of ecological assemblages present.

### 13.2.1 Literature Review

A literature review was undertaken to identify threatened species, populations and ecological communities listed under the TSC Act, FM Act and EPBC Act that could be expected to occur within the Site and surrounds, based on suitable habitats present. To this end, the following material was reviewed prior to undertaking field investigations:

- The NSW National Parks and Wildlife Service Atlas of NSW Wildlife online database selected for a 10 km buffer around the Site (NSW National Parks and Wildlife Service 2010).
- A Geographic Information System (GIS) data request was sent to the Spatial Data Programs at the NSW Office of Environment and Heritage (OEH) for all records of threatened species within the Gunning 8728 1:100,000 map sheet on 7 June 2010.
- The Commonwealth EPBC online Protected Matters Search Tool, selected for a 10 km buffer of the Site on 7 June 2010 (Department of Environment, Water, Heritage and the Arts 2010).
- The OEH 'Find by Geographic Region' threatened species, populations and ecological communities online search tool for the Lachlan Catchment Management Authority (CMA) Murrumbateman sub-region (Department of Environment and Climate Change 2010).
- The NSW Department of Industries and Investment 'Threatened fish and marine vegetation – find a species by geographic region' online search tool for the Lachlan CMA (NSW DII 2010).
- The Forest Ecosystem Classification and Mapping for the Southern Comprehensive Regional Assessments (SCRA) Region (Thomas *et al.* 2000) was accessed and descriptions were used as reference points for vegetation community descriptions within the Site.
- Ocean Shores to Desert Dunes: the native vegetation of New South Wales and the ACT. (Keith 2004) was used to as reference material for vegetation community descriptions within the Site.
- The NSW Biometric Database (DECC 2008a) was used as a guide to vegetation communities within the CMA area.

### 13.2.2 Flora Survey

Surveys were targeted towards threatened species identified in the desktop review as potentially occurring on Site, and on habitat suitability assessments conducted during the literature review and field visits. Techniques included vegetation community surveys, flora surveys (including gathering of floristics data), weed assessments and opportunistic observations including identification of potential habitat. Flora surveys were consistent with the guidelines and protocols listed in **Section 13.1**.

Aerial photographs and regional vegetation mapping data available for the Site was studied prior to visiting the Site. Field surveys have been undertaken on the following dates:

- 31 March– 2 April, 2009;
- 22 -23 February, 2010;
- 8 July, 2010;
- 27-30 July, 2010;
- 10-11 February, 2011;
- 21-24 February, 2011;
- 6-7 June, 2011; and
- 20-21 June, 2011.

Survey techniques included vegetation community surveys, flora surveys (including gathering of floristics data), weed assessments and opportunistic observations including identification of potential habitat.

The location of the proposed access road and pipeline easement has changed since the beginning of field investigations. Consequently, field surveys were undertaken in many of the surrounding areas as well as the preferred development footprint. This has at times necessitated multiple field surveys to ensure the entire development footprint has been appropriately and adequately assessed.

The primary objectives of the vegetation mapping survey were to:

- map and describe the vegetation communities present within the development footprint; and
- map and describe the vegetation communities present within the broader AGL Site boundary for use in consideration of offsets.

Data included within the NSW Biometric vegetation community data *Definitions of vegetation types for CMA areas* (DECC 2008a) was used as a guide to vegetation communities that were likely to occur within the locality. This was supplemented by *Ocean Shores to Desert Dunes: the native vegetation of New South Wales and the ACT* (Keith 2004), which was used as reference material for vegetation community descriptions within the Site. Existing vegetation mapping including Keith (2004) and the *Forest Ecosystem Classification and Mapping for the Southern Comprehensive Regional Assessments (SCRA) Region* (Thomas *et al.* 2000) was used as a basis for URS mapping. Vegetation

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community floristics described by URS are a combination of URS mapping, biometric vegetation communities (DECC 2008a) and expert opinion.

Endangered Ecological Community Surveys were undertaken during the field work to determine the EECs present across the development footprint. Mapping of EECs was undertaken during 27 – 30 July, 2010 and in 10 – 11 February, 2011. The primary objectives of the EEC surveys included describing and mapping the extent of vegetation community associations, and to assess the condition according to OEH and SEWPaC threatened ecological community profiles as well as Biobanking assessment methodologies. Initial vegetation mapping was refined during the course of the Project (post EPBC Referral) by URS botanical staff.

Targeted Threatened Flora Species Survey was carried out using random meander surveys (Cropper 1993) to determine the distribution of any threatened flora species, communities and their habitat within the development footprint. Species targeted included all flora species considered likely to occur within the development footprint based on the desktop literature review and the presence of suitable habitat.

### 13.2.3 Fauna Survey

Surveys were targeted towards threatened species identified in the desktop review as potentially occurring on Site, and on habitat assessments conducted during the field visit. Techniques included diurnal bird counts, active reptile searches, funnel traps, walking transects, active searches for flying insects, spotlighting, nocturnal call playback, use of ultrasonic call recording (Anabat) to identify presence of microchiropteran bat species, and opportunistic observations including identification of scats and tracks. Survey effort was concentrated on suitable areas of habitat within the development footprint. Targeted fauna surveys were carried out on 31 March – 2 April 2009, with additional habitat assessments conducted in February 2010. Additional survey was also undertaken on June 6 - 7 and 20 - 21, 2011. Survey techniques were generally consistent with the requirements of *Threatened Biodiversity and Assessment; Guidelines for Developments and Activities Working Draft* (DEC 2004), and *Draft Guidelines for Assessment of Threatened Species for Part 3A Projects* (DEC/DPI, 2005).

Based on the results of the desktop literature review, surveys were performed targeting the Golden Sun Moth (*Synemon plana*). Surveys were undertaken in areas of potential habitat during suitable 10 – 11 February 2011 and 21 – 24 February 2011. Methods were consistent with DEWHA (2009b) *EPBC Act Policy Statement 3.12 - Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (Synemon plana)*, with the exception of survey timing.

Active reptile searches were undertaken on 10 – 11 February 2011 and 21 – 24 February 2011. Active searches included turning rocks and fallen timber within the development footprint. Survey methods for reptiles excluded the use of pitfall traps, due to potential disturbance to threatened species habitat, and potential increased risk of predation from foxes (many of which have been seen on site) as outlined in detail in **Appendix O** of **Appendix H**.

### 13.2.4 Consultation

Following completion of preliminary surveys, consultation was undertaken with stakeholders to ensure that all concerns were addressed and appropriate assessment was conducted for specific issues. The consultation process included one Site meeting with stakeholders and ongoing telephone and email communication.

As a result of initial survey efforts it was thought that the development footprint and surrounding site may support both Natural Temperate Grassland and the Commonwealth listed Box Gum Woodland. Consequently, the Project was the subject of an EPBC Referral (11 May, 2010) to the Minister of the Department of Environment, Water, Heritage and the Arts (DEWHA, now the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC). As a result of the Referral, on 11 June, 2010 the Project was declared a Controlled Action under the EPBC Act. Consultation with SEWPaC commenced on 16 June, 2010 and supplementary DGRs were issued on 5 July, 2010 to take into account the EPBC Act referred matters.

### 13.2.5 Survey Limitations

Survey effort and results were influenced by weather conditions in the months prior to all survey times, as well as the current and previous land uses in the area. Fauna surveys tended to focus on the proposed area of works, and did not encompass areas outside the area of proposed works. To ensure consideration of the full range of species that could potentially be expected to occur on Site, a habitat assessment was conducted to ensure the majority of species that may be impacted by the proposal were considered. Even so, it is possible that some species that utilise the Site on a periodic or seasonal basis were not likely to use the Site during the survey period. Also, as fauna species are mobile and transient by nature it is possible that not all species (resident or transitory) were assessed during the survey period. In addition, some threatened flora species flower according to a range of seasonal conditions such as after rainfall, including annual, ephemeral or cryptic species, such as orchids. The habitat assessments conducted for the Site allows for identification of suitable habitat for all such species.

Further, the absence of previous surveys in the area was likely to have resulted in a lower than required number of target species to be surveyed during field survey periods. Consequently, the full list of species 'known or predicted' to occur within the CMA-subregion was assessed to ensure that the occurrence of as full a species complement as possible was addressed as part of the assessment process.

Field surveys were limited in some areas by physical constraints such as steep gullies, rocky access preventing vehicular access, fence lines and access to private property. Additionally, time and scope of works posed constraints to the duration and type of surveys that were able to be conducted. Project timing also limited the seasons during which works were undertaken.

As outlined in **Appendix H**, the initial survey was undertaken following a period of prolonged drought and long-term grazing of grassland vegetation within the development footprint. Biotic conditions on site were severely degraded, with little to no grassland present in areas that had been grazed. The little grassland vegetative material that was present was severely desiccated and had been subject to grazing.

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Many areas that presented as grassland in later survey periods, initially presented as bare earth paddocks covered in sheep droppings. The second vegetation survey took place following periods of rainfall, and after stock was removed across much of the proposed footprint. Significant improvement in biotic, and therefore vegetation, conditions was apparent during these surveys, with large tracts of grassland in reasonable condition then presenting on site.

Final vegetation surveys were undertaken in the months following heavy and prolonged rain events, and after several months of stock exclusion. Improvement in vegetation condition was obvious throughout the Site, with large areas of grassland present. Recovery was evident in understorey diversity, and in vegetation condition i.e. vegetation was no longer desiccated or grazed and soil condition had improved.

Changes in the abiotic and biotic conditions on site since surveys commenced has resulted in significant changes to the vegetation communities on site, and has demonstrated the resilience of the Site's vegetation communities given appropriate management regimes and more benign climatic conditions.

### 13.3 Results of Assessment

#### 13.3.1 Literature Review

##### *Flora*

The results of the online OEH Atlas of NSW Wildlife database search show no records of any threatened flora species within 10 km of the Site since 1980. The GIS request to the Spatial Data Programs department of the NSW OEH indicated that no records of threatened flora species exist within 10 km of the Site.

The Commonwealth EPBC Online Protected Matters Database search tool noted that three flora species and two threatened ecological communities are "likely to occur within area". In addition, two threatened ecological communities are also noted as "likely to occur within area".

The OEH 'Find by Geographic Region' threatened species, populations and ecological communities online search tool for the Lachlan Catchment Management Authority (CMA) Murrumbateman sub-region indicated that 3 flora species and two endangered ecological communities are known or predicted to occur within the sub-region.

The I&I NSW 'Find threatened fish or marine vegetation by region' online search tool for the Lachlan CMA indicates that one endangered ecological community is predicted to occur within the CMA.

### Fauna

The results of the online OEH Atlas of NSW Wildlife database search show no records of any threatened fauna species within 10 km of the Site since 1980. The GIS request to the Spatial Data Programs department of the NSW OEH provided records for five threatened fauna species within 10 km of the Site.

The Commonwealth EPBC Online Protected Matters Database search tool indicated that 11 threatened species or their habitat may occur within 10 km of the Site, including four birds, one frog, one insect, one mammal, two ray-finned fish and two reptiles.

The OEH 'Find by Geographic Region' threatened species, populations and ecological communities online search tool for the Lachlan Catchment Management Authority (CMA) Murrumbateman sub-region indicated that 31 threatened fauna species are known or predicted to occur within the sub-region.

The I&I NSW 'Find threatened fish or marine vegetation by region' online search tool for the Lachlan CMA indicates that five threatened species and one endangered population are predicted to occur within the CMA.

Following the determination of this project as a controlled action, Supplementary Director-General's Requirements (Supplementary DGRs) were issued (**Appendix A**). These Supplementary DGRs specify species for consideration within the survey process. Species listed in the Supplementary DGRs requiring assessment include:

- Golden Sun Moth (*Synemon Plana*);
- Grassland Earless Dragon (*Tympanocryptus pinguicollis*);
- Pink-tailed Worm-lizard (*Aprasia parapulchella*); and
- Striped Legless Lizard (*Delma impar*).

Based on the results of the desktop literature review it was concluded that the Grassland Earless Dragon was not likely to occur within the study area. The current distribution of the species is restricted to areas defined within the *National Recovery Plan for the Grassland Earless Dragon Tympanocryptis pinguicollis*, all of which occur within or south of the Australian Capital Territory, and much further to the south than the proposed Site. Given the current range of the species, it is considered unlikely that the species occurs within the Dalton locality and hence, this species has not been considered further within this report.

### 13.3.2 Field Survey

#### Flora

One hundred and thirty six flora species were identified during URS quadrat surveys that focussed on the development footprint. No threatened flora species were identified during field surveys conducted within the development footprint.

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Vegetation communities recorded within the Site including their conservation significance, are summarised in **Table 13-1** and discussed below. The distribution of vegetation communities within the Site is shown in **Figure 13-1**.

Of the vegetation communities identified on Site, two are endangered ecological communities;

- Natural Temperate Grassland, listed as an EEC under the EPBC Act; and
- Box Gum Woodland, listed as an EEC under the TSC Act.

Habitat assessments were conducted across the Site to evaluate habitat quality and assess the potential for threatened species not observed during the field surveys to occur on Site.

Five declared noxious weeds for Upper Lachlan Shire Council were recorded on Site, discussed in detail in **Appendix H**.

**Table 13-1 Vegetation communities recorded within AGL owned lands**

Vegetation Community	EPBC Act Status	TSC Act Status	Total Area Mapped (Hectares)
Grey Box over Exotic Pasture	Not Listed	Not Listed	6.20
Red Stringybark over Exotic Pasture	Not Listed	Not Listed	0.49
Box Gum Woodland	N/A*	Endangered Ecological Community	147.24
Natural Temperate Grassland	Endangered Ecological Community	Not Listed	92.58
Exotic Pasture	Not Listed	Not Listed	258.72
Disturbed Shrubland	Not Listed	Not Listed	2.19
<b>Total</b>			<b>507.42</b>

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



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### Fauna

A total of 107 fauna species, comprising 69 birds, 19 reptiles and 19 mammals were recorded during the field surveys.

The majority of fauna species identified were common species for the area. Six bird species listed as threatened, and one species listed as migratory was recorded during field surveys conducted within the Site, as detailed below.

The following were recorded during field surveys conducted within the Site:

- Gang Gang Cockatoo (*Callocephalon fimbriatum*);
- Speckled Warbler (*Pyrrholaemus saggitatus*);
- Brown Treecreeper (*Climacteris picumnus victoriae*);
- Diamond Firetail (*Stagonopleura guttata*);
- Flame Robin (*Petroica phoenicea*);
- Little Eagle (*Hieraaetus morphnoides*);
- Varied Sittella (*Daphoenositta chrysoptera*);
- Scarlet Robin (*Petroica boodang*); and
- White-fronted Chat (*Epthianura albifrons*).

One Commonwealth listed migratory species, under the EPBC Act was recorded during field surveys:

- Rainbow Bee-eater (*Merops ornatus*).

Two Gang Gang Cockatoos were observed foraging in Box Gum Woodland along the existing access track to the west of the Site. The Brown Treecreeper, Speckled Warbler, Diamond Firetail, Scarlet Robin and Flame Robin were observed opportunistically. The Little Eagle was observed opportunistically flying overhead, and was not seen to return to the study area or use any habitat features within the Site. A small flock of Varied Sittellas were observed outside of the development footprint but still within AGL owned land. A moderate sized flock of White-fronted Chats were observed foraging on property outside of, but immediately adjacent to AGL owned land.

No evidence of koalas or koala habitat was recorded during the field surveys. SEPP 44 defines 'potential koala habitat' as 'an area of native vegetation where the trees of the types listed in Schedule 2, constitute at least 15 % of the total number of trees in the upper or lower strata of the tree component'. No trees listed in Schedule 2 were recorded during the field surveys of the Site; hence no areas qualify as potential koala habitat. Core koala habitat, is defined as 'an area of land with a resident breeding population of koalas, evidenced by attributes such as breeding females and recent sightings and historical records of a population'. No evidence of koala activity was recorded during field surveys and there are no recent records of koalas within 10 km of the Site.

No endangered terrestrial populations of any threatened fauna species were found to occur within the development footprint.

Habitat suitability assessments were conducted across the Site to evaluate habitat quality and assess the potential for threatened species not observed during the field surveys to occur on Site. Habitat values recorded include:

- structural and floristic diversity of vegetation layers, particularly presence or absence of mid-storey (shrubs and juvenile canopy species) and/or presence of native tussock grasses;
- presence and quantity of litter layer and fallen dead timber;
- shelter, breeding, roosting and nesting resources available;
- presence of hollows;
- exfoliated bark, feed trees and shrubs;
- connectivity;
- presence of rocky outcrops or partially buried rocks; and
- size of remnant communities.

The habitat suitability assessment undertaken during field surveys conducted within the Site informed the detailed habitat table included as **Appendix F** in **Appendix H**.

Minimal aquatic habitat is present within the development footprint. Although the Lachlan River is to the north of the Site, it is extremely degraded, with limited fringing vegetation and at the time of the field surveys, no water flows, instead being restricted to a series of shallow sandy pools.

Water resources within the development footprint are restricted to several farm dams, which appear to be quite shallow and up to 10 m<sup>2</sup> in size. Most dams observed had a small amount of fringing vegetation, with growth of sedges and occasional macrophytes, and were in close proximity to Box Gum Woodland Vegetation. However, all water bodies in the study area provide potential foraging habitat for microbats, given the proximity to intact woodland and hollow-bearing trees.

The site contains a number of sensitive receptors which could be impacted by changes to surface and groundwater flows, including:

- rivers and creeks;
- ephemeral drainage lines; and
- farm dams which may provide important aquatic habitat within the degraded and dry local environment.

All project works would aim to limit the amount of increased sedimentation and/or run-off that results from proposed actions, and as outlined in **Appendix H**, all water way crossings to be designed and constructed in accordance with the I&I NSW Policy and Guidelines for *Fish Friendly Waterway Crossings* and *Why Do Fish Need to Cross the Road?* (Fairfull. and Witheridge, 2003; NSW DPI, 2004).

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### 13.3.3 Threatening Processes

A 'key threatening process' (KTP) is defined under the TSC Act as 'a threatening process specified in Schedule 3' of the Act. A 'threatening process' is defined as 'a process that threatens, or may have the capability to threaten the survival or evolutionary development of species, populations or ecological communities'. Evidence of the following KTPs was recorded during the survey:

- competition and grazing by the feral European rabbit;
- competition from feral honeybees;
- invasion of native plant communities by exotic perennial grasses; and
- predation by the European red fox.

### 13.3.4 Critical Habitat

The NSW National Parks and Wildlife Service is responsible for the identification of critical habitat within NSW. Critical habitat is an area of land that is crucial to the survival of a particular threatened species, populations or ecological communities. These areas are declared and listed on a register of critical habitats managed by the OEH.

There are no areas of recommended or declared critical habitat listed on the register of Critical Habitat kept by the Director-General, OEH or I&I NSW that are relevant to the development footprint or the surrounding locality.

## 13.4 Assessment of Potential Impacts

### 13.4.1 Overview

The results of the habitat assessments (Appendix E and F of **Appendix H**) indicate that four threatened flora species, 23 threatened fauna species and two endangered ecological communities listed under the TSC Act and/or EPBC Act have either been recorded or are considered as likely to occur within the development footprint, based on habitats present. Accordingly, assessments pursuant to section 5A of the EP&A Act (the NSW assessment of significance) and Commonwealth significant impact criteria assessments for these species were undertaken and are included as Appendix K and L of **Appendix H**.

### 13.4.2 Threatened Flora

The results of the online database searches indicate that seven threatened flora species have the potential to occur within the Site. Following the habitat suitability assessment it has been determined that the development footprint has the potential to support four of these species, however no threatened flora species were identified during field surveys. An Assessment of the Significance and Significant Impact Criteria assessments of the proposed development on these threatened species

has been undertaken. The NSW and Commonwealth assessment outcomes concur that the proposed development would not have a significant impact on any threatened flora species (see **Appendices K and L of Appendix H** for detailed assessments of significance and significant impact criteria assessments).

### 13.4.3 Threatened Fauna

Of the total 42 threatened fauna species listed in Appendix F of **Appendix H** that have the potential to occur on the development footprint according to the results of the various online database searches, the development footprint provides suitable habitat for 23 of these species. Of the 23 potentially present species, targeted survey has been undertaken for all species during appropriate survey times, with the exception of the Golden Sun Moth.

Due to project constraints the survey effort for Golden Sun Moth was undertaken outside the optimal survey period. Consequently, it is recommended that further surveys be undertaken prior to construction, and within the optimal survey period for this species. It has been recommended that surveys targeting this species be undertaken in December (Friends of Grasslands, pers. comm. February 2011), however the optimal survey period for this species is during the flying season which is the period between late October – early January (DEWHA 2009b). It should be noted that an Assessment of Significance, as well as a Significant Impact Criteria assessment have been undertaken for this species, both of which concluded there would not be a significant impact. In addition to these assessments, field surveys were undertaken on site by qualified botanists. Although a key grass species *Austrodanthonia* is present over much of the site within the Native Temperate Grassland community, areas where this grassland species dominates are limited in extent, grassland within the plant footprint, gas pipeline, communications tower, hut footprint, services and access track are particularly deficient in required species (DEWHA 2010g). Therefore, while it is considered unlikely that the Golden Sun Moth would occur within these key areas on site, due to a lack of preferred *Austrodanthonia* species, it is recommended that surveys for this species are undertaken during the optimal survey period.

As the Golden Sun Moth is listed under both the EPBC Act and TSC Act, AGL will be notified immediately should the species be identified on site during pre-clearing surveys. SEWPaC and OEH will then be advised of any records by AGL.

Assessment of the significance of the potential impact of the Project on these threatened species (in the form of NSW Assessments of Significance and Commonwealth significant impact criteria assessments), have been prepared (Appendix K and L of **Appendix H**). These assessments concluded that the Project would not have a significant impact on any threatened fauna species, including the Golden Sun Moth.

### 13.4.4 Threatened Populations

No listed threatened populations were identified through the desktop review process nor were any identified during field surveys conducted within the Site.

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### 13.4.5 Endangered Ecological Communities

Two endangered ecological communities were found to occur within the development footprint;

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

Approximately 5.94 ha of Box Gum Woodland and 9.07 ha of Natural Temperate Grassland would be cleared as a result of the proposal. An assessment of significance of the proposed development has been undertaken for Box Gum Woodland (Appendix K of **Appendix H**) and a significant impact criteria assessment for Natural Temperate Grassland (Appendix L of **Appendix H**). The assessment concluded that the Project would not have a significant impact on any endangered ecological community as listed under the TSC Act. The results of the significant impact criteria assessment for Natural Temperate Grassland conclude that the Project would have a significant impact on the community. Consequently, a referral to the Minister has been prepared and submitted.

**Table 13-2** summarises the vegetation that would be impacted by the proposed works.

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Table 13-2 Vegetation Communities Affected by the proposed works

Vegetation Community	EPBC Act Status	TSC Act Status	Total Area Mapped within AGL Owned Land	Total Area to be Cleared
Grey Box over Exotic Pasture	Not Listed	Not Listed	6.20	0.00
Red Stringybark over Exotic Pasture	Not Listed	Not Listed	0.49	0.00
Exotic Pasture	Not Listed	Not Listed	258.75	15.23
Box Gum Woodland	N/A*	Endangered Community Ecological	147.24	5.94
Natural Temperate Grassland	Endangered Ecological Community	Not Listed	92.58	9.07
Disturbed Shrubland	Not Listed	Not Listed	2.19	2.19
<b>Total</b>			<b>507.43</b>	<b>32.43</b>

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

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### 13.4.6 Threatening Processes

The Project may potentially cause an increase in the following key threatening processes:

- bushrock removal;
- clearing of native vegetation;
- competition and grazing by the feral European rabbit;
- competition from feral honeybees;
- invasion of native plant communities by exotic perennial grasses;
- loss of hollow bearing trees;
- predation by the European red fox;
- removal of dead wood and dead trees; and.
- alteration to the natural flow regimes of rivers, streams, floodplains & wetlands

### 13.5 Indirect and Operational Impacts

A range of indirect and operational impacts could be expected as a result of the proposed works, including:

- artificial lighting;
- roads and access;
- groundwater and hydrology;
- edge effects and habitat fragmentation; and
- long term impacts.

These impacts are discussed in detail in **Appendix H**.

Provided the mitigation measures outlined in **Appendix H** are adopted, any impacts resulting from the proposed action are unlikely to be detrimental to the biodiversity values of the local area. Further mitigation measures are likely to ameliorate many of the flora and fauna associated impacts.

### 13.6 Biodiversity Maintenance and Improvement

**Appendix H** identifies a range of measures that would be employed in order to avoid, mitigate and offset impacts on biodiversity values associated with the Project. This has been structured according to the principles stated in the DEC (2005) guidelines for Part 3A biodiversity assessments.

### 13.6.1 Impact Avoidance

Impacts on biodiversity have been avoided where possible, through the following means:

- delineating the proposed development footprint as far as possible to comprise cleared areas, aiming to avoid native vegetation; and
- the development footprint comprises highly modified vegetation and habitats, and is dominated by areas of grassland.

In addition, Golden Sun Moth surveys will be undertaken in Spring by a qualified biologist prior to determination.

### 13.6.2 Impact Mitigation

Mitigation and environmental management measures are recommended to mitigate some of the impacts that may result of from the proposed action. The following mitigation measures (detailed in Section 7.2 of **Appendix H** and summarised in **Section 13.6**) aim to reduce the potential impact on biodiversity within the local area:

- Construction Environmental Management Plan;
- Operational Environmental Management Plan;
- Flora and Fauna Management Plan;
- Vegetation Clearing Strategy;
- Pre-clearing Survey Strategy;
- Two-stage Clearing Strategy;
- Habitat Replacement Strategy;
- Habitat Corridor and Connectivity Plan;
- Groundcover Clearance Strategy;
- Site Management Plan;
- Grazing Management Plan;
- Edge Effects Strategy;
- Sediment and Erosion Control Plan;
- Weed and Pest Management Plan; and
- Complementary Planting and Rehabilitation Plan.

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### 13.6.3 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 biodiversity offset is proposed, along with resources for its management in perpetuity. Management arrangements for the offset site, located on land already under AGL ownership, will be confirmed through discussions between AGL, OEH and SEWPaC so as to ensure that biodiversity values are 'maintained or improved'. This offset would 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 would be managed so that the condition of the relevant EECs are improved, and to ensure that the overall vegetation condition within the AGL owned land is maintained, taking into consideration the following abiotic and biotic factors:

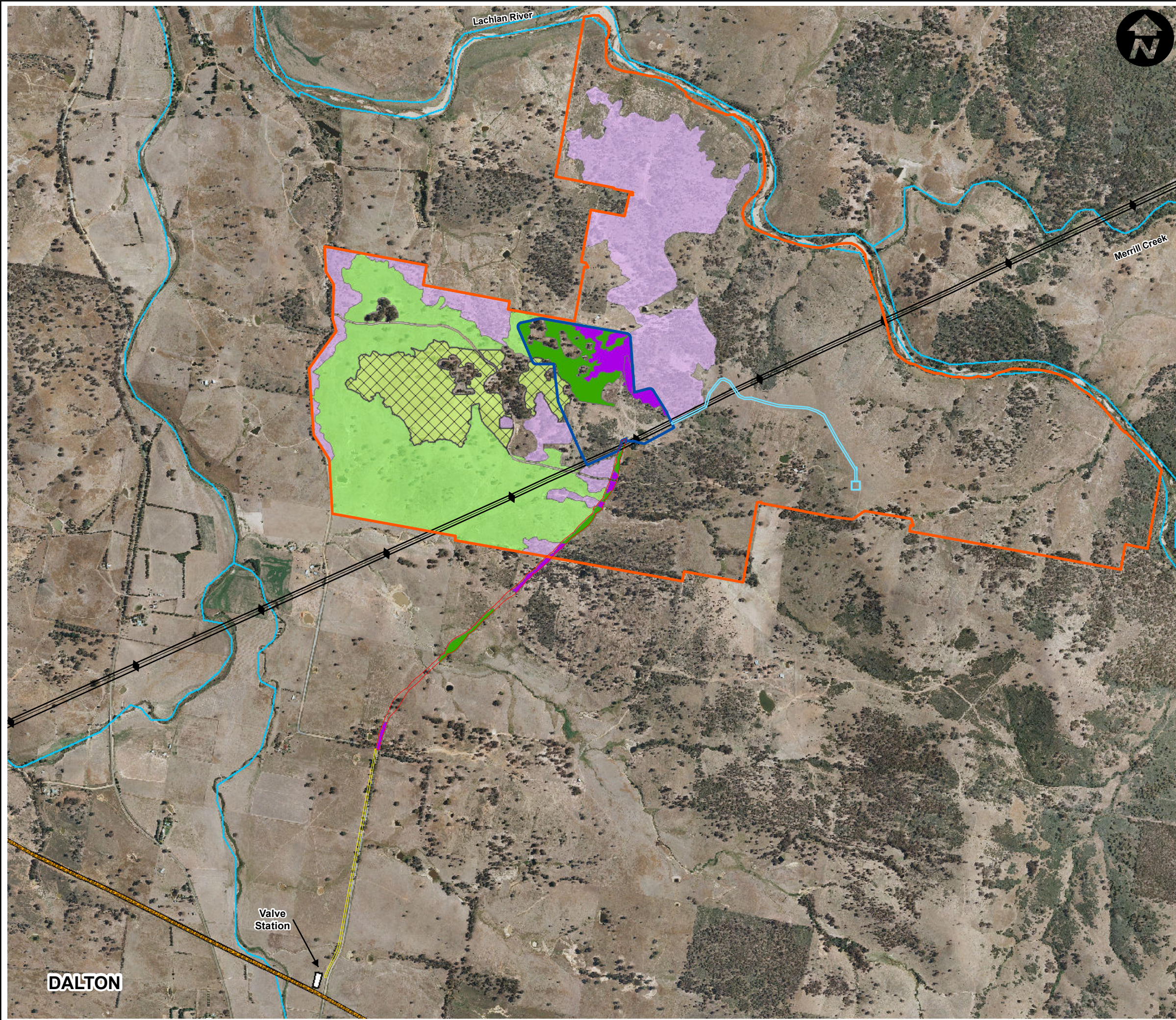
- habitat connectivity and condition;
- habitat resources such as existing hollow bearing trees, rocky outcrops, fallen timber, recruitment trees that would develop hollows in the future;
- vegetation patch size;
- species diversity and cover; and
- the condition of abiotic elements within the community (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 would take 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 associated with this Project is a result of the removal of vegetation classified as one of two EECs. These are Natural Temperate Grassland (9.07 ha), and Box Gum Woodland (5.94 ha). In addition, there would 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 proposes to set aside and maintain land in areas adjacent to the development footprint for conservation. The proposed offset area is located on AGL owned land and is shown in **Figure 13-2**.

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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^
  - Box-Gum Woodland\*
- EEC's for Offset (URS):**
  - Natural Temperate Grassland^
  - Box-Gum Woodland\*
  - Potential Natural Temperate Grassland
- \* TSC Listed Community
- ^ EBPC Listed Community

01

Kilometres

Source: Aerial Image from AGL

Drawn:AO/SB	Approved: KT	Date: 16/06/2011
Job No.: 43177661	File No.: 43177661.044.mxd	
Client		
AGL		
Project		
DALTON POWER PROJECT		
Title		
URS VEGETATION MAPPING OFFSETS		
Figure: 13-2		

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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**).

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 33 hollow-bearing trees which were found to support  $\geq 55$  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 38 small, 17 medium and no large hollows) (**Appendix O** of **Appendix H**).

The key threatened species identified (or assumed present) on site that are dependent on hollow-bearing tree resources, include the following:

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

**Table 13-3** outlines the characteristics of tree hollows used by the key threatened species identified for the site. The data demonstrate that the broad range of tree hollow characteristics required by each species have been provided in the offset area. 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 13-3 Characteristics of tree hollow types 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 victoriana</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, the proposed 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 nest boxes can influence the patterns of occupancy by different species (Gibbons and Lindenmayer 2003), it is recommended that nest boxes be designed in alignment with those measurements specified in **Table 13-3**, in order to meet the specific habitat requirements of key threatened species.

The proposed offset site would involve the permanent conservation of existing native vegetation including Natural Temperate Grassland and Box Gum Woodland and the associated habitat features that provide habitat for such 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, 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, if appropriately managed, would meet the definition of the EEC Natural Temperate Grassland (**Figure 13-2**). Management initiatives for this area 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 Project is summarised in **Table 13.4**.

**Table 13-4 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 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 of **Appendix H**, along with the proposed offset described above, would compensate for the loss of vegetation associated with the proposal and would result in a net improvement in biodiversity values within the Site in the long term. Hence the current proposal 'maintains or improves' biodiversity values. Consequently, the Project should not produce any negative cumulative impacts with respect to flora and fauna.

### 13.6.4 Proposed Offset Area

The proposed offset area totals approximately 183.25 ha and is shown in **Figure 13-2**. A decision will be made following the determination of the Project in relation to the precise, and most appropriate, long-term conservation mechanism for the offset area. The proposed offset area reflects the values of the native biodiversity of the development footprint. It 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. With appropriate management, these the biodiversity values of these areas would be improved, and provide important additions to EEC communities in a long term conservation management regime.

The key features of the offset site include:

- 158.28 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, 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.

**Table 13-5** summarises the potential offset Site suggested by AGL to offset the proposed action.

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Table 13-5 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	25.82	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 (hectares)</b>			<b>265.64</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.

### 13.6.5 Management of Offset Site

The management of the conservation area would be confirmed and agreed through discussions between AGL, OEH and SEWPaC. These discussions would also confirm the proposed management actions outlined in **Section 7.3.2** of **Appendix H**. Full details of the proposed management regime would be included in a management plan that would be prepared in consultation with OEH and, if required, SEWPaC.

Approximate costs for some aspects of offset site management have been provided by AGL, with estimates that 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. Detailed costing of the proposed management measures would be determined following development of a detailed management plan for the offset site.

## 13.7 Summary of Mitigation Measures

**Table 13-6** below and **Appendix H**, Flora and Fauna Assessment present both a summary and a range of detailed mitigation measures relating to flora and fauna.

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Table 13-6 Summary of Mitigation Measures

Mitigation Measure	Implementation		
	Design	Construction	Operation
A Flora and Fauna Management Plan (FFMP) would be developed and implemented as part of the CEMP and include measures for the minimisation or avoidance of impacts on threatened as well as common native flora and fauna.		✓	
A Vegetation Clearing Strategy for the development footprint would be developed and implemented to ensure clearing only occurs where necessary.		✓	
A Pre Clearing Survey Strategy would be developed and implemented to detail pre-clearance ecology surveys to be undertaken within all areas planned for vegetation clearance. Surveys would be carried out by qualified ecologists prior to all clearing activities. Surveys would target potentially present threatened flora and fauna and threatened fauna species habitat. OEH/SEWPaC would be consulted regarding requirements for further action.		✓	
A Two-Stage Clearing Strategy would be developed and implemented for areas identified as containing habitat trees (trees with hollows and other habitat features such as nests, drays etc).		✓	
A Habitat Replacement Strategy would be developed and implemented to provide effective delivery of replacement habitat in the adjoining proposed offset area in order to compensate for all EPBC Act vegetation habitat removed. 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.		✓	
A Habitat Corridor and Connectivity Plan would be developed and implemented with the objective that any planned remediation works would aim to increase the value of the Site in regards to connectivity with other remnants in the landscape, through the revegetation of habitat corridors within the offset area.		✓	✓
<p>The Site Management Plan would include commitment to:</p> <ul style="list-style-type: none"> <li>• Maintain low vehicle speed limits on Site and in the surrounding locality to reduce fauna road fatalities;</li> <li>• Restrict all vehicular and personnel entry into retained vegetation through exclusion fencing, signage, locating access roads and paths to avoid habitat damage;</li> <li>• Educate workers as to the appearance and location of all threatened species and ecological communities as well as noxious weeds present or likely to be present within the Site, and mark their locations onto site plans;</li> <li>• Employ down-lights and motion sensor lighting in order to reduce light spill and the associated secondary impact on nocturnal fauna species potentially using the adjoining vegetation. All lighting should be directed inwards so as to minimise any spill outside the areas of activity; and</li> <li>• Areas identified for clearing should be clearly marked prior to construction using highly visible flagging tape or spray paint to prevent unnecessary clearing</li> </ul>		✓	✓

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Mitigation Measure	Implementation		
	Design	Construction	Operation
A Grazing Management Plan would be developed and implemented to exclude grazing by cattle and sheep to improve the habitat value and floristic diversity of retained vegetation.		✓	✓
An Edge Effect Strategy would be developed to manage and reduce possible edge effects and fragmentation from the Project.		✓	✓
All water way crossings would be designed and constructed in accordance with the I&I NSW Policy and Guidelines for Fish Friendly Waterway Crossings and Why Do Fish Need to Cross the Road? (Fairfull, S. and Witheridge, 2003 and NSW DPI, 2004) and DWE's Guidelines for Controlled Activities – Watercourse Crossings (DWE, February, 2008).	✓	✓	
A Weed and Pest Management plan would be developed and implemented.		✓	✓
A Complementary Planting and Rehabilitation Plan would be developed and implemented. This would include strategies to utilise plant species to replicate Box Gum Woodland and Natural Temperate Grassland floristic composition. Planting of local provenance seed, propagules, or saplings would be undertaken where possible and utilise best practice bush regeneration techniques.			✓
AGL would implement a Biodiversity Offset Strategy (in consultation with OEH and SEWPaC) to compensate for clearing associated with the Project and in line with the requirements of the offsetting policies of those bodies to provide management the offset area for environmental purposes in perpetuity.			✓
Golden Sun Moth surveys will be undertaken in Spring by a qualified biologist prior to determination.	✓		

In particular the FFMP mentioned above in **Table 13-6** would also need to address the potential impacts and mitigation measures for each EPBC Act and TSC Act listed threatened species that have been identified, or are considered as having the potential to occur within the Project Area. **Table 13-7** below outlines all such species and the associated impacts and mitigation measures.

Table 13-7 Potential impacts &amp; mitigation measures for Matters of NES

Matters of National Environmental Significance (NES)		EPBC Act Status*	TSC Act Status*	Potential Impacts	Mitigation Measures
Common Name	Scientific Name				
<b>Flora</b>					
Button Wrinklewort	<i>Rutidosia leptorrhynchoidea</i>	E	E	<ul style="list-style-type: none"> <li>Potential habitat loss due to infrastructure development; and</li> <li>Weed invasion.</li> </ul>	<ul style="list-style-type: none"> <li>Protect areas of known habitat;</li> <li>Undertake weed control on site;</li> <li>Ensure appropriate fire regimes;</li> <li>Perform pre-clearing surveys prior to construction; and</li> <li>Avoid undertaking ploughing in area.</li> </ul>
Yass Daisy	<i>Ammobium craspedioides</i>	V	V	<ul style="list-style-type: none"> <li>Loss of potential habitat due to land clearing;</li> <li>Destruction of plants by rabbits; and</li> <li>Weed invasion.</li> </ul>	<ul style="list-style-type: none"> <li>Protect areas of known habitat;</li> <li>Perform pre-clearing surveys prior to construction;</li> <li>Implement feral animal control (especially rabbit control); and</li> <li>Undertake weed control on site.</li> </ul>
Hoary Sunray	<i>Leucochrysum albicans</i> var. <i>tricolor</i>	E	-	<ul style="list-style-type: none"> <li>Potential habitat loss due to infrastructure development; and</li> <li>Weed invasion.</li> </ul>	<ul style="list-style-type: none"> <li>Protect areas of known habitat;</li> <li>Perform pre-clearing surveys prior to construction; and</li> <li>Undertake weed control on site.</li> </ul>
Silky Swainson-pea	<i>Swainsona sericea</i>	-	V	<ul style="list-style-type: none"> <li>Potential habitat loss due to land clearing and development; and</li> <li>Weed invasion.</li> </ul>	<ul style="list-style-type: none"> <li>Protect areas of known habitat;</li> <li>Perform pre-clearing surveys prior to construction; and</li> <li>Undertake weed control on site.</li> </ul>
<b>Mammals</b>					
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	-	V	<ul style="list-style-type: none"> <li>Loss &amp; fragmentation of potential habitat;</li> <li>Loss of hollow-bearing trees;</li> <li>Disturbance to potential roost &amp; breeding sites;</li> <li>Poisoning from application of pesticides in area; and</li> <li>Injury from barb-wired fences.</li> </ul>	<ul style="list-style-type: none"> <li>Retain areas of known habitat e.g. understorey and midstorey shrubs;</li> <li>Conserve hollow-bearing trees;</li> </ul>

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Matters of National Environmental Significance (NES)		EPBC Act Status*	TSC Act Status*	Potential Impacts	Mitigation Measures
Common Name	Scientific Name				
Squirrel Glider	<i>Petaurus norfolcensis</i>	-	V		<ul style="list-style-type: none"> <li>Protect roost and den sites from disturbance;</li> <li>Minimise the use of pesticides in the area; and</li> <li>Avoid using barb-wired fences on site</li> </ul>
Spotted-tail Quoll	<i>Dasyurus maculates</i>	E	V	<ul style="list-style-type: none"> <li>Clearing &amp; fragmentation of native vegetation</li> <li>Feral species impacts (e.g. foxes); and</li> <li>Increased road mortality.</li> </ul>	<ul style="list-style-type: none"> <li>Protect areas of known or potential habitat where possible, e.g. latrine sites; hollow logs, rocky outcrops and riparian vegetation</li> <li>Implement feral animal control (especially cats and foxes); and</li> <li>Limit vehicle speeds in and around site.</li> </ul>
<b>Reptiles</b>					
Grassland Earless Dragon	<i>Tympanocryptis pinguicolla</i>	E	E	<ul style="list-style-type: none"> <li>Potential habitat loss and fragmentation;</li> <li>Bush-rock removal;</li> <li>Altered irrigation;</li> <li>Weed invasion; and</li> <li>Feral species impacts (e.g. rabbits).</li> </ul>	<ul style="list-style-type: none"> <li>Protect areas of known habitat;</li> <li>Conserve rocks and rocky outcrops wherever possible;</li> <li>Maintain natural-historic irrigation on site;</li> <li>Undertake weed control on site; and</li> <li>Implement feral species control (especially targeting rabbits).</li> </ul>
Pink-tailed Worm Lizard	<i>Aprasia parapulchella</i>	V	V	<ul style="list-style-type: none"> <li>Potential habitat loss &amp; fragmentation;</li> <li>Bush-rock removal;</li> <li>Feral species impacts (e.g. rabbits)</li> <li>Weed invasion; and</li> <li>Inappropriate replanting strategies (e.g. replanting tree species within grassland areas), resulting in reduction of potential habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Protect areas of known habitat;</li> <li>Conserve rocks and rocky outcrops;</li> <li>Implement feral animal control (especially rabbit control); and</li> <li>Undertake weed control on site.</li> <li>Ensure appropriate replanting in all rehabilitation works; and</li> <li>Implement feral animal control (especially rabbit control); and</li> <li>Undertake weed control on site.</li> </ul>

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Matters of National Environmental Significance (NES)		EPBC Act Status*	TSC Act Status*	Potential Impacts	Mitigation Measures
Common Name	Scientific Name				
Striped Legless Lizard	<i>Delma impar</i>	V	V	<ul style="list-style-type: none"> <li>Loss of potential habitat;</li> <li>Feral species impacts (e.g. cats, dogs, foxes); and</li> <li>Weed invasion.</li> </ul>	<ul style="list-style-type: none"> <li>Protect areas of known habitat;</li> <li>Implement feral animal control (especially targeting cats, dogs, foxes);</li> <li>Conserve rocks and rocky outcrops;</li> <li>Conduct construction activities outside of warmer months where possible; and</li> <li>Undertake weed control on site.</li> </ul>
<b>Parrots</b>					
Swift Parrot	<i>Lathamus discolor</i>	E	E	<ul style="list-style-type: none"> <li>Clearing &amp; fragmentation of potential habitat in wintering range;</li> <li>Feral species impacts (mainly competition for nectar resources)</li> </ul>	<ul style="list-style-type: none"> <li>Protect areas of potential habitat where possible;</li> <li>Implement feral animal control (especially targeting species such as the introduced Feral Bumblebee); and</li> <li>Rehabilitation works to include flowering Eucalypt species suitable for use by this species where possible.</li> </ul>
Superb Parrot	<i>Polytelis swainsonii</i>	V	V	<ul style="list-style-type: none"> <li>Clearing, degradation &amp; fragmentation of potential habitat;</li> <li>Potential hydrological changes;</li> <li>Loss of hollow bearing trees</li> <li>Feral species impacts (mainly competition for nest sites);</li> <li>Use of insecticide sprays resulting in poisoning; and</li> <li>Loss of potential recruitment trees (those trees that will form hollows over time).</li> </ul>	<ul style="list-style-type: none"> <li>Protect areas of known or potential habitat where possible;</li> <li>Maintain natural hydrological regimes;</li> <li>Conserve hollow-bearing trees where possible;</li> <li>Implement feral animal control targeting species such as the Indian Myna &amp; feral honey bee; and</li> <li>Revegetation to include species suitable for use by the species such as Box Gum Woodland canopy species.</li> </ul>
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	-	V	<ul style="list-style-type: none"> <li>Clearing &amp; fragmentation of potential habitat;</li> <li>Loss of hollow-bearing trees; and</li> <li>Feral species impacts</li> </ul>	<ul style="list-style-type: none"> <li>Retain areas of known or potential habitat where possible;</li> <li>Conserve hollow-bearing trees where possible; and</li> <li>Implement feral animal control targeting cats, foxes and the feral honeybee.</li> </ul>
Turquoise Parrot	<i>Noephema pulchella</i>	-	V		
Little Lorikeet	<i>Glossopsitta pusilla</i>	-	V		

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Matters of National Environmental Significance (NES)		EPBC Act Statust*	TSC Act Status*	Potential Impacts	Mitigation Measures
Common Name	Scientific Name				
Woodland Birds					
Brown Treecreeper	<i>Climacteris picumnus</i>	-	V	<ul style="list-style-type: none"><li>Clearing &amp; fragmentation of potential habitat, including remnant woodland;</li><li>Loss of hollow-bearing trees;</li><li>Removal of habitat resources (e.g. stags, course woody debris and ground litter); and</li><li>Feral species impacts (especially nest predation); and</li><li>Weed invasion.</li></ul>	<ul style="list-style-type: none"><li>Retain areas of known or potential habitat such as remnant vegetation and paddock trees where possible;</li><li>Undertake revegetation or regeneration works to enhance habitat connectivity post construction; and</li><li>Conserve hollow-bearing trees and other habitat resources such as stags, ground litter and source woody debris where possible.</li><li>Fencing of known or potetial habitat adjacent to the development footprint to protect natural features;</li><li>Implement feral animal control, targeting cats, foxes, black rats; and</li><li>Undertake weed control on site</li></ul>
Hooded Robin	<i>Melanodryas cucullata</i>	-	V		
Speckled Warbler	<i>Chthonicola sagittatus</i>	-	V		
Varied Sittella	<i>Daphoenositta chrysoptera</i>	-	V		
Diamond Firetail	<i>Stagonopleura guttata</i>	-	V		
Flame Robin	<i>Petroica phoenicea</i>	-	V		
Scarlet Robin	<i>Petroica boodang</i>	-	V		
Birds of prey					
Spotted Harrier	<i>Circus assimilis</i>	-	V	<ul style="list-style-type: none"><li>Clearing, degradation and disturbance of potential habitat;</li><li>Secondary poisoning from rodenticides and rabbit baiting</li></ul>	<ul style="list-style-type: none"><li>Retain areas of known or potential habitat, especially those areas likely to be used for nesting or foraging activities; and</li><li>Rehabilitate areas of potential habitat following completion.</li></ul>
Little Eagle	<i>Hieraaetus morphnoides</i>	-	V		
Owls					
Barking Owl	<i>Ninox connivens</i>	-	V	<ul style="list-style-type: none"><li>Loss, fragmentation and degradation of potential habitat;</li><li>Loss of hollow-bearing trees;</li><li>Disturbance to potential nest sites</li><li>Removal of potential habitat resources (e.g. stags and course woody debris);</li><li>Secondary poisoning from pest control activities; and</li><li>Feral species impacts (especially fledgling predation).</li></ul>	<ul style="list-style-type: none"><li>Retain areas of potential habitat where possible;</li><li>Conserve hollow-bearing trees where possible;</li><li>Retain buffer around known nest sites (≥ 200 m) if any found within Project site;</li><li>Protect riparian vegetation to preserve potential roosting areas;</li><li>Retain habitat resources e.g. course woody debris, stags and hollow bearing trees; and</li><li>Implement feral animal control (especially cats, dogs and foxes).</li></ul>
Powerful Owl	<i>Ninox strenua</i>	-	V		

Insects					
Golden Sun Moth (GSM)	<i>Synemon plana</i>	CE	E	<ul style="list-style-type: none"> <li>• Loss &amp; degradation of Wallaby-grass dominated grassy woodlands;</li> <li>• Soil disturbance at potential Golden Sun Moth sites;</li> <li>• Impacts resulting from landscaping works such as mowing and slashing;</li> <li>• Use of glyphosate-herbicide; and</li> <li>• Planting of trees in grasslands resulting in reduction of potential habitat areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Retain potential habitat (grassland areas) where possible;</li> <li>• Conduct activities outside of Golden Sun Moth breeding season where possible;</li> <li>• Design fences to allow passage of Golden Sun Moth;</li> <li>• Undertake weed control on site;</li> <li>• Implement a biomass management program on site;</li> <li>• Fence habitat on 3 sides; and</li> <li>• Implement feral animal control (especially rabbits).</li> </ul>

\* CE - Critically Endangered, E - Endangered, V - Vulnerable