



# Solar Choice CAFGA Solar Farm

ENVIRONMENTAL STUDY

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# 1 INTRODUCTION

## 1.1 BACKGROUND

### Proposed site location

Solar Choice and Solar Fields are collaborating on a proposed solar farm, to be located on cleared land owned by the Mt. Majura Winery which is situated at Majura in the Australian Capital Territory. The proposed site comprises land currently designated as Rural Block 666 Majura (RB 666).

It is understood that the site consists of improved pasture, which is dominated by exotic grass and some weed species. The vegetation at the site can be classified as 'exotic pasture' as described in the Majura Parkway Final Environmental Impact Statement (EIS) – Revision 2 which was prepared by the Snowy Mountains Engineering Corporation (SMEC) in 2009. The site is currently being used for grazing.

The Majura Parkway road alignment and easement, scheduled to commence construction in 2013, will intersect RB 666 and cause RB 666 to be re-designated into three blocks. These are currently designated as "Approved Rural Block: 706" (24.37ha) to the west of the Parkway, "Approved Rural Block: 707" (3.85ha) and "Approved Rural Block: 708" (9.9ha) to the east (ACT PLA, ACTMAPi, 2013).

The proposed location of the solar farm is within Approved Rural Blocks 707 (RB 707) and 708 (RB 708) only. These two blocks will effectively be made road islands between the proposed Majura Parkway and the existing Majura Road.

## 1.2 SCOPE OF THIS STUDY

This study represents a desktop review which relies primarily on information published in the Majura Parkway Final EIS, (herein referred to as the Majura Parkway EIS). This information has been cross referenced where appropriate, to ensure the accuracy and integrity of the recommendations provided. It is understood that this study report is to form part of the supporting documentation that will accompany a works approval application that is to be submitted to the National Capital Authority.

This study focuses only on two matters of environmental significance namely, listed threatened species/ecological communities and Aboriginal heritage items/places since it is considered that such matters could inhabit or be found within or adjacent to RB 707 and RB 708.

The listed threatened species considered in this study are as follows:

- Flora:
  - Tarengo Leek Orchid (*Prasophyllum petilum*)
  - Baeuerlen's Gentiana (*Gentiana baeuerlenii*)
  - Button Wrinklewort (*Rutidosis leptorrhynchoides*)
  - Small Purple Pea (*Swainsona recta*)
  - Canberra Spider Orchid (*Arachnorchis actensis*)
  - Hoary Sunray (*Leucochrysum albicans* var. *tricolor*)
  - Austral Toadflax (*Thesium australe*)

- Fauna:
  - Golden Sun Moth (*Synemon plana*)
  - Perunga Grasshopper (*Perunga ochracea*)
  - Yellow-spotted Tree Frog (*Litoria castanea*)
  - Growling Grass Frog (*Litoria raniformis*)
  - Grassland Earless Dragon (*Typanocryptis pinguicolla*)
  - Striped Legless Lizard (*Delmar impar*)
  - Pink-tailed Worm-lizard (*Aprasia parapulchella*)
  - Brown Treecreeper (*Climacteris picumnus*)
  - Hooded Robin (*Melanodryas cucullata*)
  - Varied Sitella (*Daphoenositta chrysoptera*)
  - Painted Honeyeater (*Grantiella picta*)
  - Superb Parrot (*Polytelis swainsonii*)
  - Swift Parrot (*Lathamus discolor*)
  - Regent Honeyeater (*Xanthomyza Phrygia*)
  - Australian Painted Snipe (*Rostratula australis*)
  - White-winged Triller (*Lalage sueurlii*)
  - Spotted-tailed Quoll (*Dasyurus maculates*)
  - Grey-headed Flying-fox (*Pteropus poliocephalus*)

## 2 STUDY FINDINGS

### 2.1 THREATENED SPECIES

#### 2.1.1 Threatened flora

The Majura Parkway EIS identified several threatened flora species listed under the *Nature Conservation Act 1980* (NC Act) and/or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that have been recorded previously within the ACT, in proximity to the study area or in similar habitat in the vicinity. However, none of these species were recorded during targeted surveys within the proposed Majura Parkway alignment, including within the section that transects the Majura Vineyard property. Further, a habitat assessment for such species was undertaken as part of the EIA and it was determined that the proposed Majura Parkway site did not provide suitable habitat for the listed threatened flora species.

Information about the relevant threatened flora species is listed below together with an indication into the likelihood of their occurrence within RB 707 and RB 708:

- **Tarengo Leek Orchid** (*Prasophyllum petilum*)

This species occurs on relatively fertile soil in grassy woodland or natural grassland. Further, it is known from only one site within the ACT (Hall Cemetery) (ACT Government, 2005a).

The Majura Parkway EIS concluded that this species was unlikely to occur within the Majura Parkway alignment.

The proposed solar farm site is not considered natural grassland, and given that the species is known from only one site within the ACT, this species is not likely to occur within RB 707 or 708.

- **Baeuerlen's Gentiana** (*Gentiana baeuerlenii*)

This species has been recorded previously in one location within the ACT. It occurs in the inter-tussock space of moist tussock grassland and sedgeland (*Poa labillardieri* and *Carex gaudichaudii*) associated with ground water, possibly a spring-fed area. The area is probably secondary grassland or a relict grassland opening once surrounded by open woodland. The site is on the lower slopes of a broad valley, above a river and lower valley floor (ACT Government, 1997a)

The Majura Parkway EIS concluded that this species was unlikely to occur within the Majura Parkway alignment.

Baeuerlen's Gentiana is unlikely to occur within RB 707 or 708 given that the sites do not contain moist tussock grassland associated with groundwater. Further, the species has only been recorded in one location within the ACT.

- **Button Wrinklewort** (*Rutidosis leptorrhynchoides*)

This species has a disjunct distribution and is known from 10 populations within the ACT. Populations are often restricted to small, scattered refugia that have escaped grazing and ploughing (ACT Government, 2006b).

The Majura Parkway EIS concluded that this species was unlikely to occur within the Majura Parkway alignment.

Given the history of grazing and ploughing within RB 707 and RB 708, and the dominance of exotic grasses, the Button Wrinklewort is unlikely to occur within the proposed solar farm site.

- **Small Purple Pea** (*Swainsona recta*)

This species is found in open woodland with a native grassy understorey dominated by Kangaroo Grass (*Themeda triandra*), Poa Tussock (*Poa sieberiana* var. *sieberiana*) or Speargrass (ACT Government, 2005b).

The Majura Parkway EIS concluded that this species was unlikely to occur within the Majura Parkway alignment.

RB 707 and RB 708 are dominated by exotic species, and therefore the Small Purple Pea is unlikely to occur within the site of the proposed solar farm.

- **Canberra Spider Orchid** (*Arachnorchis actensis*)

This species is known from two separate populations on the lower western slopes of Mt Ainslie and Mt Majura. It has also been located in the Majura Valley. However, this plant grows in transitional vegetation zones between open grassy woodland (dominated by *Eucalyptus blekelyi*, *E. Melliodora* and *E. Pauciflora*) and dry sclerophyll forest (dominated by *Eucalyptus rossii*) (ACT Government, 2006c).

The Majura Parkway EIS concluded that this species was unlikely to occur within the Majura Parkway alignment.

It is unlikely to occur within RB 707 or RB 708 due to the absence of suitable habitat.

- **Hoary Sunray** (*Leucochrysum albicans* var. *tricolor*)

In NSW and ACT, this species occurs in grasslands, grassy areas in woodlands and dry open forests and modified habitats, on a variety of soil types including clays, clay loams, stony and gravelly soil. Associated species are varied, but commonly include Kangaroo Grass and Wallaby Grasses (Sinclair, S. J., 2010).

The targeted surveys performed for the Majura Parkway EIS within the Majura Parkway alignment did not detect the species. The EIS concluded that this species was unlikely to occur within the Majura Parkway alignment.

It is understood that the commonly associated native grasses such as Kangaroo Grass and Wallaby Grass are not found within RB 707 and RB 708. It is therefore unlikely that the Hoary Sunray occurs within the site of the proposed solar farm.

- **Austral Toadflax** (*Thesium australe*)

This species occurs in grassland or grassy woodland. Often found in association with Kangaroo Grass (*Themeda australis*).

The Majura Parkway EIS concluded that this species was unlikely to occur within the Majura Parkway alignment.

It is considered unlikely that the Austral Toadflax would occur within RB 707 or RB 708 given the absence of the associated species Kangaroo Grass. Further, damp areas suitable as habitat are absent from the site of the proposed solar farm.

### 2.1.2 Threatened fauna

The Majura Parkway EIS identified a number of threatened fauna species listed under the NC Act and/or EPBC Act which have been recorded within the locality of the study area or in similar habitat.

Information about the relevant threatened fauna species is listed below together with an indication into the likelihood of their occurrence within RB 707 and RB 708:

#### Invertebrates

- **Golden Sun Moth** (*Synemon plana*)

The golden sun moth has been recorded in native grasslands and grassy woodlands containing wallaby grass (*Austrodanthonia* spp.), speargrass (*Aurolstipa* spp.), and *Bothriochloa*, as well as in degraded grasslands dominated by the exotic Chilean needlegrass (*Nassella nessiana*), a weed of national significance. The golden sun moth currently occurs in two threatened ecological communities listed under the EPBC Act – the ‘Natural Temperate Grassland of the Victorian Volcanic Plain’ and the ‘Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory’. Golden sun moths appear to favour slightly sloping, north facing sites with minimal shading. Areas of bare or sparsely covered ground between grass tussocks (inter-tussock space) are thought to be important in helping males locate females. Larvae feed on the roots of native, and more recently, exotic grasses (DEWHA, 2009a).

Surveys conducted for the Majura Parkway EIS in 2008 indicate that there is a Golden Sun Moth habitat approximately 4 kilometres south of the proposed solar farm site, however no other Golden Sun Moth habitat was identified during surveys within the rest of the Majura Parkway alignment survey area.

The proposed solar farm site is dominated by exotic grasses and weeds, with a small patch of native speargrass (*Aurolstipa* spp.) occurring along the drainage line running through the middle of the site. Chilean needlegrass was observed during surveys conducted for the Majura Parkway EIS at the southern end of the road alignment however its presence within RB 707 and RB 708 is unknown.

It is considered that the Golden Sun Moth may potentially occur within RB 707 and/or RB 708, given the presence of some suitable habitat including speargrass. Further, the blocks are completely cleared of trees (with the exception of one eucalypt) providing little to no shading which is a favourable habitat characteristic. The site may be suitable for larvae feeding, given that it has recently been shown to feed on the roots of exotic grasses.

It is recommended that a more detailed assessment be carried out within RB 707 and RB 708 prior to construction, to identify the presence or absence of the Golden Sun Moth, and to identify if the area is a breeding habitat for the species.

- **Perunga Grasshopper** (*Perunga ochracea*)

Key habitat for the Perunga Grasshopper appears to be natural temperate grassland dominated by wallaby, kangaroo and speargrasses with forb food plants located in the inter-tussock spaces. Grass tussocks are used also to escape predators. It may also occur in open woodland areas with a grassy understorey, including the endangered Yellow Box–Red Gum Grassy Woodland community (ACT Government, 2006e).

It is deemed that the Perunga Grasshopper is unlikely to occur within the site of the proposed solar farm, due to the absence of suitable habitat.

## Reptiles and Amphibians

- **Yellow-spotted Tree Frog (*Litoria castanea*)**

The southern population has a restricted distribution between Canberra, ACT, and Bombala, NSW, on the Southern Tablelands at altitudes between 700 and 800 m. The Yellow-spotted Bell Frog occupies habitats including farm dams. The species was also found in ponds or slow moving streams with overhanging grassy banks in the absence of reed beds. The Yellow-spotted Bell Frog was found to overwinter in the hollow centres of rotting logs and in the earth surrounding the roots of uprooted trees (DSEWPC, 2013a).

The immediate study area contains no permanent waterbodies, and there are only a few small farm dams present within 200 metres of the site which are not likely to have tall reeds present. Further, the study area occurs below 700m elevation. Therefore, it is considered unlikely that the species would occur within the proposed solar farm site.

- **Growling Grass Frog (*Litoria raniformis*)**

The species is dependent on a matrix of aquatic and terrestrial habitat for breeding, foraging, shelter and dispersal, and typically occurs in landscapes with both permanent and seasonally flooded water bodies. Permanent or seasonally flooded water bodies are used for breeding. Breeding usually occurs in still or slow moving water. Aquatic vegetation provides microhabitats for foraging and shelter for both frogs and tadpoles. Loss or degradation of aquatic habitat and/or disruption to hydrological regimes can lead to population declines and local extinctions. Adult frogs move across open ground (for example grasslands) to access local foraging resources and breeding sites. Terrestrial vegetation, fallen logs and ground debris surrounding water bodies provide essential shelter and hibernation (over-wintering) sites for adult frogs (DEWHA, 2009b).

The study area contains no permanent water bodies or seasonally flooded waterbodies. Although there are several small farm dams present within several hundred metres of the study site, they are unlikely to provide suitable aquatic vegetation required for foraging and shelter. It is considered unlikely that the Growling Grass Frog would occur within the site of the proposed solar farm site.

- **Grassland Earless Dragon (*Typanocryptis pinguicolla*)**

The preferred habitat (in the ACT region) appears to be naturally treeless areas that still support a perennial grass cover of predominately native species such as wallaby grasses (*Austrodanthonia* spp.), spear grasses (*Austrostipa* spp.) and *Poa* spp. Slightly open habitat with shorter tussocks of *Danthonia* spp. as well as a substantial, but not complete, cover of taller grasses is preferred (DSEWPC, 2011). In the ACT region, it is found only in a small number of sites with suitable native grassland habitat located in the Majura and Jerrabomberra valleys and one adjacent location near Queanbeyan in NSW.

The proposed solar farm site is dominated by exotic grasses and weeds, containing only a small patch of native speargrass. The study site is therefore not considered to contain adequate suitable native grassland to provide habitat for the Grassland Earless Dragon. It is therefore unlikely that the Grassland Earless Dragon would occur within the site of the proposed solar farm.

- **Striped Legless Lizard (*Delmar impar*)**

This species is 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. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass *Themeda australis*, Speargrasses *Austrostipa* spp. and poa tussocks *Poa* spp., and occasionally Wallaby grasses *Austrodanthonia* spp. It is sometimes present in modified grasslands with a significant content of exotic grasses (NSW OEH, 2013).

It appears that while *D. impar* are restricted to grasslands and may occur in woodland, they are not restricted to native or primary grassland. They have also been found in several secondary grassland sites (i.e. sites which were not historically grassland, but which have been cleared for grazing or agriculture). The presence of a relatively dense and continuous structure, rather than the floristic composition of the grasslands, may be important in influencing the persistence of *D. impar*. (Warwick et al, 1999).

While the species is not known to occur within the study site, the proposed solar farm site is considered to represent suitable habitat for the species due to the presence of exotic grassland, and the small patch of speargrass along the drainage line. It is recommended that more detailed studies be carried out to assess the potential occurrence of this species within the RB 707 and RB 708, prior to construction of the proposed solar farm.

- **Pink-tailed Worm-lizard (*Aprasia parapulchella*)**

Pink-tailed Worm-lizards are most commonly found sheltering under small rocks (15–60 cm basal area) shallowly embedded in the soil (2–5 cm). Some individuals have been found under larger rocks embedded up to 30 cm deep. Rocks are used for thermoregulation, with lizards preferring rocks that receive direct sunlight. Individuals may be faithful to the same rock for long periods of time. The lizards utilise ant burrows underneath the rocks, possibly retreating deep into burrows in hot, dry weather.

The Pink-tailed Worm-lizard occurs in primary and secondary grassland, grassy woodland and woodland communities including mallee, and box-ironbark forest. Microhabitat attributes, such as rockiness and the presence of ground-layer species (especially native grasses) also varies, but could be the principal determinants of its occurrence.

Most sites where Pink-tailed Worm-lizard occurs are characterised by the cover of predominantly native grasses; Kangaroo Grass (*Themeda australis*) is a key botanical indicator of suitable habitat in the ACT, along with Red-leg Grass (*Bothriochloa macra*) and *Lomandra filiformis*. Sites in NSW sites, while not dominated by Kangaroo Grass, can still be described as native grassland. The presence of other plant species, including spear grasses (*Austrostipa* spp.), weeds and River Tussock (*Poa labillardieri*), decreases the likelihood of presence (DSEWPC, 2013b).

It is considered unlikely that the Pink-tailed Worm-lizard would occur within RB 707 or RB 708. The site is not dominated by native grasses, but rather by exotic grasses and weeds. Presence of weeds decreases the likelihood of the presence of the Pink-tailed Worm-lizard. Further, there are no rocky outcrops within the site indicating an absence of suitable habitat for the species.

## Avifauna

- **Brown Treecreeper** (*Climacteris picumnus*)

In the ACT, *C. picumnus* is found in dry woodlands and open forest below 1,000 metres. *C. picumnus* frequents drier forests and woodlands, but also paddocks and grasslands where there are sufficient logs, stumps and dead trees nearby. In the ACT, the species prefers relatively undisturbed woodland and dry open forest where the native understorey, especially grasses, has been preserved (Taylor and COG 1992 in ACT Government 1999b). It is rarely seen in urban areas (ACT Government 1999b).

The study site is cleared (with the exception of one tree) and contains no logs, stumps or dead trees. The dominance of exotic vegetation and weeds within the site indicates that the site would not be a preferred habitat location, considering there are areas of woodland and grassland in proximity to the study site which contain good cover of native grasses.

The species may potentially occur within RB 707 and RB 708 for foraging purposes. The species forages both on the ground and in live trees feeding on a variety of invertebrate prey (ACT Government 1999b). The Eucalypt within RB 707 and the grassland may represent foraging habitat for the species.

- **Hooded Robin** (*Melanodryas cucullata*)

*M. cucullata* occupies drier eucalypt forest, woodland and scrub, grasses and low shrubs, as well as cleared paddocks with regrowth or stumps. It uses stumps, posts or fallen timber from which to locate prey on the ground. *M. cucullata* avoids dense forests and urban areas and is not observed in suburban gardens in Canberra. In the ACT region, it is found in woodland, often with scattered Yellow Box Eucalyptus melliodora or Blakely's Red Gum E. blakelyi, with long grass and low shrubs, or fallen logs (ACT Government, 1999c).

Critical habitat features required by *M. cucullata* include:

- large trees for protective cover;
- areas of grass that support insects and other invertebrates on which the species feeds;
- perching sites within these grassy areas; and
- trees (either standing or fallen) to provide sites for nesting.

The distribution of *M. cucullata* in the ACT is restricted to habitats that contain a mixture of woodland and native grassland away from urban areas (ACT Government, 1999c).

The Hooded Robin could potentially occur within RB 707 or RB 708. The cleared grassland may represent suitable foraging habitat and the eucalypt may represent potential roosting/nesting/foraging habitat for the species.

- **Varied Sitella** (*Daphoenositta chrysoptera*)

It is a climbing species which actively hunts for invertebrate prey on tree trunks, branches, crevices and under bark. It is highly social, forming breeding groups of 5-7 and gathering in large winter flocks. Members of the flock cooperate in breeding, although one female usually does most of the building incubating. The nest is a deep, well-camouflaged cup of bark and lichen bound with cobwebs, usually situated in an upright, thin (usually dead) fork, 5–20 metres above ground. Critical habitat features include:

- large living and dead trees, particularly rough-barked eucalypts, which are essential for foraging, roosting and nesting sites; and
- relatively well-treed habitats (rather than sparsely treed habitats) (ACT Government, 2005c).

It is considered that the species may occur within RB 707 or RB 708, given the presence of a large eucalypt tree which may provide suitable foraging/roosting / nesting habitat.

- **Painted Honeyeater** (*Grantiella picta*)

*G. picta* frequents eucalypt forests and woodlands, particularly those that are infested heavily with mistletoes. It may be found in acacia woodlands, and paperbarks and casuarinas along watercourses (Blakers et al. 1984; Schodde and Tidemann 1986; Pizzey and Knight 1997 in ACT Government, 1999d). It is also seen in treed farmland and gardens (Pizzey and Knight 1997 in ACT Government, 1999d). In the ACT, the species has historically been associated with River Oak along river systems, especially the Murrumbidgee River, where River Oak is host to the mistletoe *Amyema cambagei* habitats (L. Conole pers. comm.) (ACT Government, 1999d).

*G. picta* is arboreal, foraging on mistletoes, particularly *Amyema* spp., mainly in upper canopies of trees. It feeds almost exclusively on mistletoe *Amyema* spp. berries (Blakers et al. 1984; Schodde and Tidemann 1986 in ACT Government, 1999d), but will also eat nectar from mistletoe flowers, as well as insects (Chisholm 1936; Frith 1969; Blakers et al. 1984; Longmore 1991 in ACT Government 1999d).

The Painted Honeyeater may potentially occur within RB 707 given the presence of a large eucalypt that may provide suitable roosting/nesting habitat. It is unlikely to be found foraging within the study areas due to the absence of suitable foraging resources.

- **Superb Parrot** (*Polytelis swainsonii*)

In the NSW south-west slopes breeding region, including the Yarrowlumla Shire to the north of the ACT border, *P. swainsonii* nests in eucalypt woodlands, both riverine (including River Red Gum *Eucalyptus camaldulensis*), and the Box/Gum woodlands (Yellow Box *E. melliodora*, Blakely's Red Gum *E. blakelyi*, Apple Box *E. bridgesiana*, Grey Box *E. microcarpa*, White Box *E. albens* and Red Box *E. polyanthemus*) away from the watercourses (Webster and Ahern 1992 in ACT Government, 1999e). Birds here may travel up to 10 km from nests to foraging areas (Webster 1988; Garnett 1992a in ACT Government, 1999e) although at some sites, including those north of Canberra, the nesting and foraging areas coincide and the birds move very little distance at all during breeding (Webster and Ahern 1992; Martin 1996; Davey 1997 in ACT Government, 1999e). In the ACT region, the Yellow Box/Red Gum Grassy Woodlands form the major habitat of the species, with *E. blakelyi* being the main source of nesting hollows, and the woodland understorey being the main feeding habitat (Davey 1997 in ACT Government, 1999e).

The superb Parrot is known to breed within the Box Gum Grassy Woodlands within the locality of the study area. The species may occur within the study sites, particularly RB 707 given the presence of a large eucalypt tree which may provide suitable foraging/roosting/nesting habitat.

- **Swift Parrot** (*Lathamus discolor*)

The species breeds only in Tasmania where it nests only in hollows in mature and senescent eucalypts. It migrates north to mainland Australia over winter, following abundances of flowering eucalypts and lerps as they occur. Small numbers of the species are recorded intermittently in the

ACT. The species inhabits mainly dry open eucalypt forests and woodlands, usually box-ironbark communities and also Yellow Box–Red Gum woodland.

Critical local habitat features include:

- winter flowering eucalypts; and
- eucalypts carrying lerps.

In the ACT, the species is likely to occur anywhere below 700 m. ACT records of the species over the last 25 years are mainly from inner Canberra suburbs, Gungahlin and Hall (ACT Government, 2005d).

The species may occur within the study sites, particularly RB 707 given the presence of a large eucalypt tree which may provide suitable foraging/roosting/nesting habitat.

- **Regent Honeyeater** (*Xanthomyza Phrygia*)

The species generally inhabits drier temperate woodlands and open forests, including forest edges, wooded farmland and sometimes urban areas with mature eucalypts. It is found mainly in a few areas north of the Great Divide in Victoria, and along the western slopes and plains of NSW and the ACT. The ACT region lies at the maximum altitudinal limit of the distribution of the species. In this region the species appears to have a preference for Yellow Box–Red Gum Grassy Woodland along the lower slopes of Mounts Ainslie and Majura, extending through Mulligans Flat Nature Reserve to the Sutton and Lake George areas. Critical habitat features include large, heavily flowering eucalypts on fertile soils (ACT Government, 2005e).

The Regent Honeyeater may potentially occur within the site, particularly RB 707 given the presence of a large eucalypt tree which may provide suitable habitat for foraging/roosting/nesting.

- **Australian Painted Snipe** (*Rostratula australis*)

The Australian Painted Snipe is usually found in shallow inland wetlands, either freshwater or brackish, that are either permanently or temporarily filled. It is a cryptic bird that is hard to see and often overlooked. 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 (DEH, 2003).

The Australian Painted Snipe may fly over the site of the proposed solar farm however it is unlikely to be found foraging, roosting or nesting within the site due to the absence of suitable habitat.

- **White-winged Triller** (*Lalage sueurlii*)

In the Canberra region the species is an uncommon, breeding, summer migrant, and numbers vary from year to year. In the local area the species is found in and around grassy woodland areas including Yellow Box–Red Gum, Apple Box, Candlebark, or less commonly, Snowgum woodlands. Records of the species are widespread, but most records are from Hall, Mulligans Flat, Gorooyaroo, the Pinnacle, Campbell Park and the Gigerline–Tharwa area (ACT Government, 2005f). Critical habitat features for this species include:

- large living and dead trees which are essential for perching, roosting and nesting sites, and for foraging; and
- foraging areas of grass and fallen timber that support insects and other invertebrates on which the species feeds (ACT Government, 2005f).

The species eats insects, including winged termites, ants, grasshoppers and caterpillars, and feeds both on the ground and in the air.

The White-winged Triller may potentially occur within the site of the proposed solar farm, particularly RB 707 given the presence of a large eucalypt which may provide suitable foraging/perching/roosting/nesting habitat.

## Mammals

- **Spotted-tailed Quoll** (*Dasyurus maculates*)

The Spotted-tailed Quoll is recorded from a wide range of forested habitats, including rainforests, wet sclerophyll forest, lowland forests, River Red Gum forests, dry 'rainshadow' woodland, sub-alpine woodlands, coastal heathlands and inland riparian forests (Edger and Belcher 1995; Green and Scarborough 1990; Jones and Rose 1996; Mansergh 1995 in ACT Government, 2005g). The species appears to favour areas with a relatively complex understorey, often in association with complex rock formations, hollow-bearing trees, rocky escarpment and/or fallen logs or burrows for den sites (ACT Government, 2005g).

Given the absence of preferred habitat (forested areas with a complex understorey with complex rock formations) onsite, and the absence of records of this species within the locality, it is considered unlikely to occur within RB 707 and RB 708 however it could pass through the site of the proposed solar farm.

- **Grey-headed Flying-fox** (*Pteropus poliocephalus*)

The Grey-headed Flying-fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, *Melaleuca* swamps and *Banksia* woodlands. It also feeds on commercial fruit crops and on introduced tree species in urban areas. The primary food source is blossom from *Eucalyptus* and related genera but in some areas it also utilises a wide range of rainforest fruits (Eby 1998 in DSEWPC, 2013f).

The study site contains no suitable foraging resources for the species (rainforests, open forests, woodlands), and no known roosting or breeding camps are known within the area. Therefore it is considered unlikely that the Grey-headed Flying-fox would occur within the proposed solar farm site. No further assessment is required.

## 2.2 ENDANGERED ECOLOGICAL COMMUNITIES

The Majura Parkway EIS identified two endangered ecological communities within the Majura Parkway alignment area. These include:

- Natural Temperate Grasslands of the Southern Tablelands of NSW and ACT;
- White Box-Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

The Majura Park EIS states that “Further north along the alignment in Lot 13 (approximate chainage 2250 - 3500) are previously cultivated paddocks that are dominated by exotic species such as Saffron Thistle (*Carthamus lanatus*), Scotch Thistle (*Onopordum acanthium*), Mustard Weed (*Rapistrum rugosum*) African Peppergrass (*Lepidium africanum*) and Barley Grass (*Hordeum leporinum*). Similar vegetation also occurs further north in the alignment in the Mount Majura Vineyards (approximate chainage 9500 to northern end of alignment on western side).” The report also states “These exotic grasslands meet the description of ‘Exotic Pasture’ as described in ACT Government (2005), and not Natural Temperate Grassland”.

The proposed location of the solar farm is within cleared and unused land classified as ‘Exotic Pasture’, therefore the proposed solar farm site is not considered to contain Natural Temperate Grasslands of the Southern Tablelands of NSW and ACT. Furthermore, the proposed site is not within any White Box-Yellow Box- Blakely’s Red Gum Grassy Woodland and Derived Native Grassland.

## 2.3 ABORIGINAL HERITAGE

As part of the Majura Parkway Environmental Impact Assessment, SMEC engaged Cultural Heritage Management Australia (CHMA) to conduct a detailed Cultural Heritage Investigation for the proposed Majura Parkway. This desktop review considers Aboriginal heritage sites identified within RB 708 and RB 708.

### MV 167: A previously identified Aboriginal site with isolated artefacts or small artefact scatters

MV 167 is located approximately 150m west of Majura Road. The site is located on the spine of the gentle lower slopes of a narrow spur line. This spur runs from west to east down from the Majura Range, with the slope gradient being approximately 1-2° in the test pitting location. The spine of the spur is approximately 90m wide (north-south) (CHMA, 2009).

Ten test pits were excavated around MV 167. Twenty four Aboriginal Artefacts were recovered from these pits. An additional seven artefacts were recovered from a 100m section of track in the vicinity of the area described at MV167.

The results of the survey and test pitting program in this area demonstrates the presence of moderate density surface and sub-surface artefact deposits that have been subject to a moderate to high level of prior disturbance associated with farming activity. The initial indications are that the higher artefact densities are concentrated along the central southern portion of the spine of the spur line.

Although these deposits have been subject to prior disturbance associated with farming practices, they do have the research potential to provide an insight into occupation patterns in the Majura Valley. The Registered Aboriginal Organisations have stated the site is of some cultural value to the local Aboriginal community.

The Archaeological report provided to SMEC by CHMA (2009) indicates that the site has a significance rating of moderate, on the basis of the following significance ratings:

- It is highly valued by the community or a cultural group for reasons of strong or special religious, spiritual, cultural, educational or social associations
- It is significant to the ACT because of its importance as part of local Aboriginal tradition
- It is a rare or unique example of Previously identified Aboriginal sites: with Potential Archaeological Deposits (PADs)
- It has provided, or is likely to provide, information that will contribute significantly to a wider understanding of the natural or cultural history of the ACT because of its use or

potential use as a research site or object, teaching site or object, type locality or benchmark site

The report concludes that site MV167 has low conservation value, and given the past level of impacts, and limited research potential, this site does not warrant active conservation.

The report recommended that a detailed archaeological salvage program be implemented at the MV 167 site location (and an adjacent site MV 169, not within RB 708):

*“The scope and methodology of the salvage excavation to be implemented at each site will need to be ratified with the Heritage Unit. As a guide it is recommended that a series of three 4m x 1m trenches be excavated within the bounds of each site area. Each trench should be divided into 1m x 1m pits, with each pit being excavated in 10cm spits down to a minimum depth of 30cm or the level where culturally sterile soils are encountered. The excavated soils from the trenches will be sieved through 3mm mesh sieves (dry or wet sieved depending on soil composition). Any artefacts or archaeological materials (bone, shell, charcoal etc) will be collected, photographed, recorded and placed in bags with unique identification codes. A soil profile should be recorded for each excavated test pit, and soil samples taken for pH testing. Any artefact material obtained through test pitting will be analysed, catalogued and then submitted to the ACT Heritage Unit for archiving. Appropriate mitigation strategies should be developed for these two sites pending the findings of the sub-surface investigations.*

*The purpose of the salvage excavation program will be to more accurately document the extent and nature of artefact deposits associated with these two sites, in order to facilitate a more accurate interpretation of the two sites.*

*On the completion of the salvage excavation program a summary report should be prepared that documents the findings of the salvage excavation program at both sites. This report should act as an addendum to the main archaeological report prepared for the Majura Parkway project” (CHMA, 2009)*

### **MV 166 and PAD: A previously identified Aboriginal sites with Potential Archaeological Deposits (PADs)**

MV 166 is located approximately 150m west of Majura Road. The site is adjacent to RB 707, within the Majura Parkway road alignment. However, an associated PAD was identified that extends into both RB 707 and RB 708. A series of 10 test pits were excavated within the MV 166 and PAD area, and a total of four artefacts were recovered. In addition to the test pitting program, a salvage collection was undertaken of a small artefact scatter previously identified by Navin Officer (2006). The site is described as comprising a low density scatter of artefacts across the spur line. An inspection of this area resulted in the re-location and collection of two artefacts. The artefacts were all both identified along a 15m section of a 3m wide graded vehicle track, between grid references E699804 N6098880 and E699804 N6098893.

The results of the survey and test pitting program in this area demonstrates the presence of low density surface and sub-surface artefact deposits that have been subject to a moderate to high level of prior disturbance associated with farming activity. On this basis, the Archaeological investigations report recommended that there are no further archaeological requirements for the MV166 and PAD site, and that Heritage Council endorsement be sought to destroy the site.

The Archaeological report concludes that the site MV166 and PAD has a Low significance rating on the basis of the following significance ratings:

- It is highly valued by the community or a cultural group for reasons of strong or special religious, spiritual, cultural, educational or social associations
- It is significant to the ACT because of its importance as part of local Aboriginal tradition
- It is a rare or unique example of Previously identified Aboriginal sites: with Potential Archaeological Deposits (PADs)
- It has provided, or is likely to provide, information that will contribute significantly to a wider understanding of the natural or cultural history of the ACT because of its use or potential use as a research site or object, teaching site or object, type locality or benchmark site

The Archaeological report concludes that site MV166 and PAD has a Low conservation value, and given the past level of impacts, and limited research potential, this site does not warrant active conservation.

## 3 CONCLUSION

### 3.1 THREATENED SPECIES

No threatened flora species identified within the Majura Parkway EIS are considered likely to occur within RB 707 or RB 708. With respect to threatened fauna, it is considered that the Golden Sun Moth and the Striped Legless Lizard may potentially occur within RB 707 and/or RB 708. As a consequence, it is recommended that a more detailed assessment be carried out within RB 707 and RB 708 prior to construction, to identify the presence or absence of both of these species.

### 3.2 THREATENED ECOLOGICAL COMMUNITIES

There are no threatened ecological communities within RB 707 or RB 708.

### 3.3 ABORIGINAL HERITAGE

It is concluded that there are two Aboriginal heritage features of significance within RB 707 and RB 708 that are of concern and these are summarised below:

- **MV 166 and PAD:**
  - Scope of works: 10 test pits excavated and salvage operation implementation
  - Results of investigation: 4 artefacts recovered test pits and 2 surface artefacts re-located and salvage collected
  - Significance rating: Low
  - Management recommendation: Salvage program implemented. Test pitting shows low density artefact scatter present. No further actions required. Heritage Council endorsement should be sought to destroy the site
  
- **MV 167:**
  - Scope of works: 10 test pits excavated. Salvage operation implemented
  - Results of investigations: 24 artefacts recovered from test pits. 7 surface artefacts re-located and salvage collected
  - Significance rating: Moderate
  - Management recommendation: Detailed archaeological salvage excavation program to be implemented

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