26th April 2019

Paul Guest

**Bush Blocks Pty Ltd**

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**Proposed Offset Site for Golden Sun Moth (*Synemon plana*):**
**5066 Western Highway, Beaufort, Victoria (Lot 4A PS727373)**

## 1. INTRODUCTION

Ecocentric Environmental Consulting (hereafter Ecocentric) working with two independent ecologists, Rob Gration of EcoAerial and Neil Marriot, were commissioned by Paul Guest in October 2018 to assess the status of Golden Sun Moth (*Synemon plana*) at 5066 Western Highway, Beaufort, Victoria (hereafter the property). This letter report summarises the findings of the survey efforts, and provides an assessment of the property's suitability for use as a Commonwealth *Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)* (EPBC Act) Offset Site for Golden Sun Moth. Golden Sun Moth is listed as Critically Endangered under the EPBC Act.

The property covers approximately 250 hectares, and is made up of four parcels (one in the east, one in the northwest, one in the southwest, and one being a narrow parcel that runs along the boundaries between all three). The property lies entirely within a Farming Zone, with a number of overlays applicable to different parts of the property. A Bushfire Management Overlay applies within the northern and western treed parts of the property, and on the periphery of the property in the east and the south, adjacent to other treed areas. A Public Acquisition Overlay runs the length of the property in its south, associated with the adjacent Western Highway. A Restructure Overlay applies to the property's northern and western parcels. Additionally, Areas of Aboriginal Cultural Heritage Sensitivity lie within the Public Acquisition Overlay part of the property, and the entire property lies within a Designated Bushfire Prone Area.

The northwest and southwest parcels are predominantly covered by indigenous forest, with some cleared but regenerating areas. The eastern parcel has been used for sheep grazing, and is characterised as native pasture with scattered patches of remnant forest and a farmhouse.

Figure 1 identifies the property and the overlays.

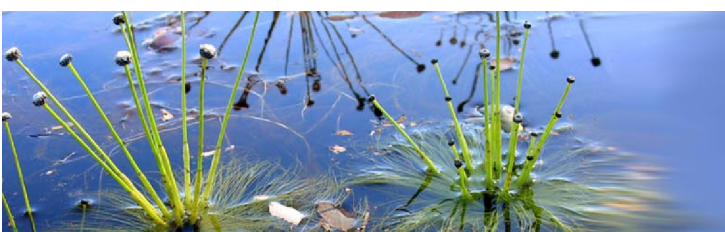
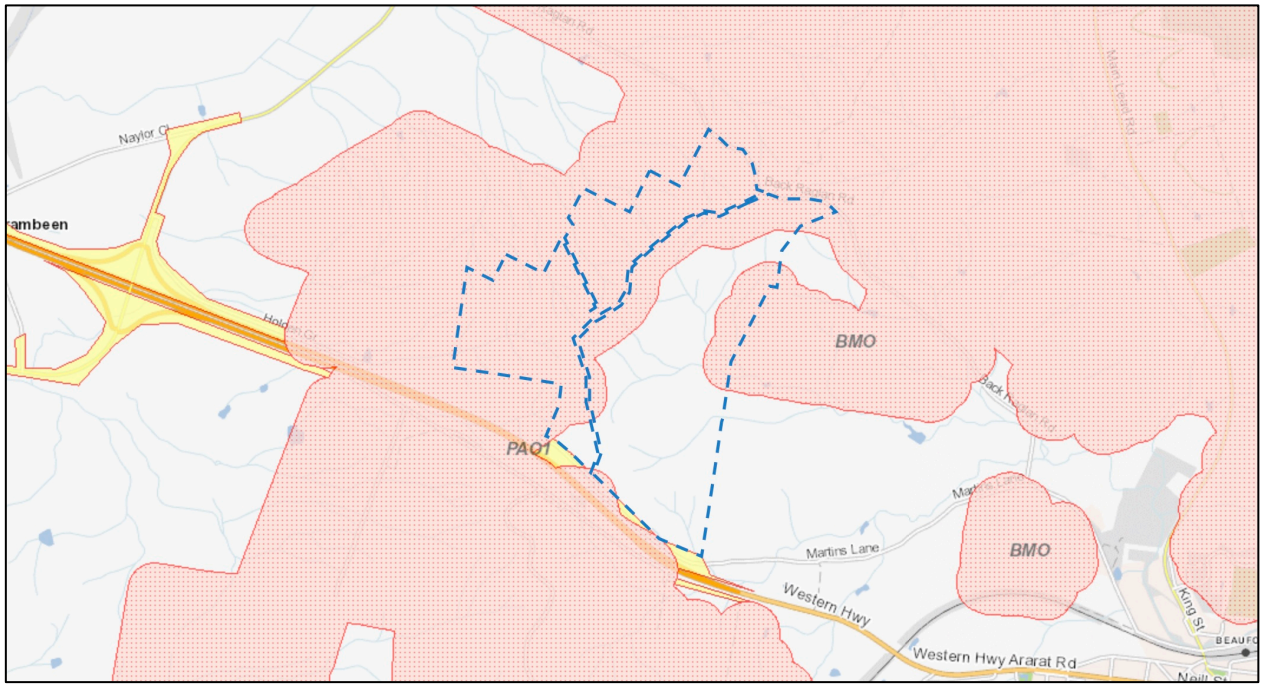


**Figure 1. Property and overlays**




## 2. METHODS

A desktop review of the property and surrounds was undertaken as the first component of this assessment. This involved the establishment of a GIS with aerial data for the positive identification of native vegetation within the property. Maps of the property's indicative pre-1750 Ecological Vegetation Classes (EVCs), likely patches of remnant EVCs, and a map of the bioregion were generated on-line and were referred to during the assessment. An aerial photograph of the site was generated from NearMap, and overlaid with property cadastre data from www.land.vic.gov.au.

Existing datasets, modelling and mapping for the property that were reviewed included the following:

- *NatureKit* interactive maps classifying extant and pre-disturbance EVCs, Bioregion, Location Risk and Strategic Biodiversity Values (SBVs) within the property and surrounds (DELWP 2019[1]; Victorian Open Data Directory 2019[2]);
- EVC benchmarks (DELWP 2019[3]);
- Zoning and overlay context (*Vic*Plan 2019[4]) and the Pyrenees Shire Council Planning Scheme (Planning Schemes on-line 2019[5]);
- Aerial imagery to determine habitat extents and linkages (NearMap 2019[6]);
- Relevant legislation, government policy and strategies (DELWP 2019[7]); and
- Publicly available geospatial datasets.

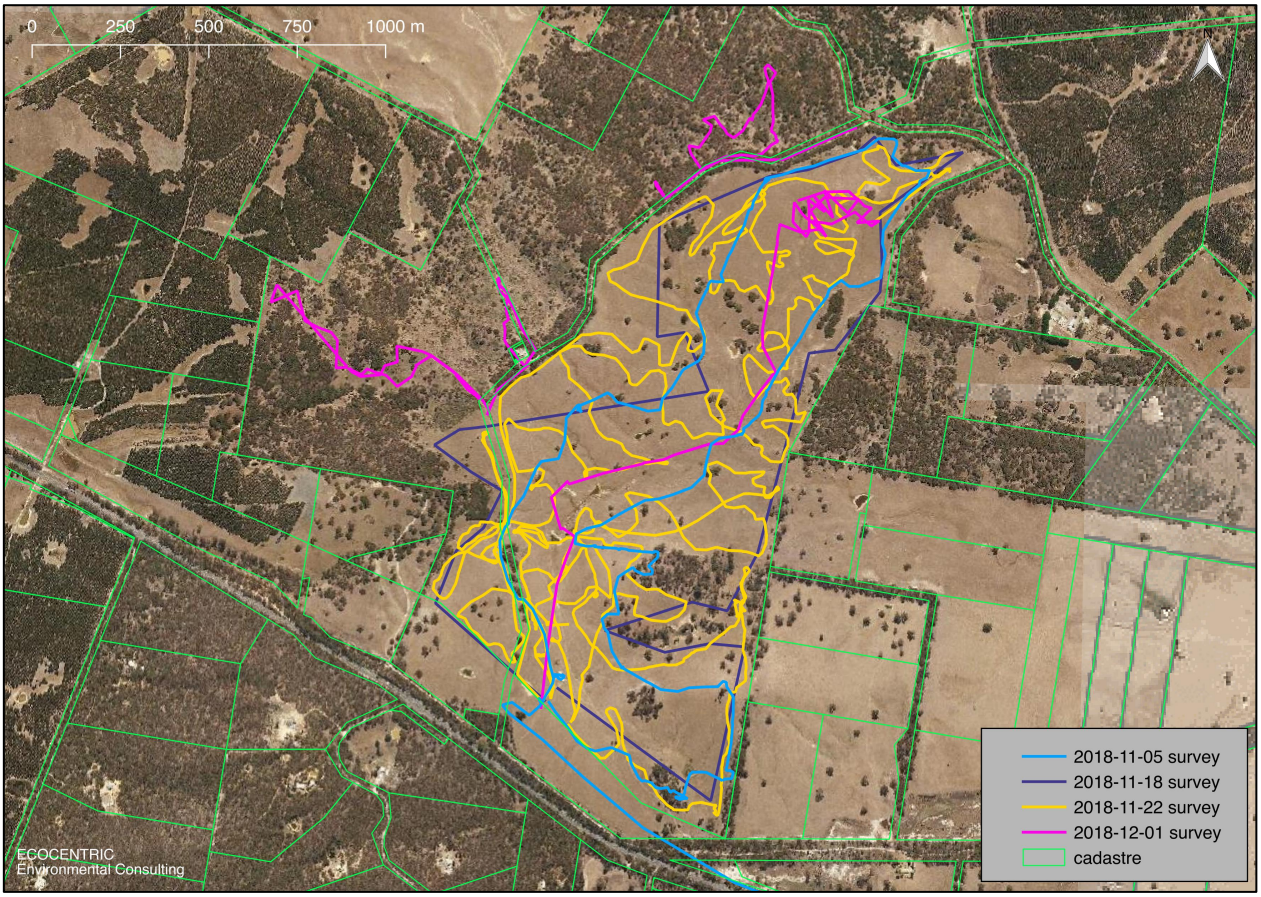
[1] http://maps.biodiversity.vic.gov.au/viewer/?viewer=NatureKit
[2] https://www.data.vic.gov.au
[3] https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks
[4] https://mapshare.maps.vic.gov.au/vicplan/
[5] http://planningschemes.dpcd.vic.gov.au
[6] http://maps.nearmap.com
[7] http://planningschemes.dpcd.vic.gov.au

A targeted survey for Golden Sun Moth was conducted across the property by the three independent ecologists on separate days. The program was timed within the flight period for the species, which generally occurs between October and January in the western Victoria region. Site surveys were conducted on warm (over 25°C), still afternoons, on days that Golden Sun Moth activity had already been recorded in the region (as notified via ECAV's (Ecological Consultants Association of Victoria's) Golden Sun Moth flight notification system).

The property was assessed on multiple dates by qualified and experienced ecologists with extensive first-hand experience with Golden Sun Moth. Transects were conducted across the whole property, using hand-held GPS units to track progress and check site coverage (see Figure 2 for a map of the transects). The ecologists actively searched for males in flight, and for both males and females at ground level, throughout the transects. Areas of suitable habitat, comprising of indigenous graminoids (in particular Wallaby grasses (*Rytidosperma* spp.) with inter-tussock space and an open or absent canopy, were targeted. All sightings of Golden Sun Moth and/or threatened flora or fauna were recorded and transposed to the GIS.

This survey methodology meets the survey guidelines as outlined in Table 2 of the *Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (*Synemon plana*)* (DEWHA 2009).

**Figure 2. Survey transects**



# 3. RESULTS

## 3.1. GOLDEN SUN MOTH

The Golden Sun Moth has two discrete life stages: the larval stage, which is spent underground and lasts for two to three years; and the adult stage, which is very brief, typically lasting only one to four days. Little is known about the reproductive life cycle of the Golden Sun Moth, however, it is generally accepted that the females deposit fertilised eggs at the base of suitable host graminoids, wherein hatched larvae burrow into plant and root material until pupation. It is thought that the larvae feed on the root systems of native grasses, and more recent evidence suggests that they may also be sustained by the root systems of exotic grasses also. The larvae pupate underground into adult moths and emerge to breed between mid-October and early January in the western Victoria region; emergence varies between seasons depending on weather conditions. Disturbance to the population during any stage of Golden Sun Moth development is likely to disrupt the life cycle of the species (DEWHA 2009).

Golden Sun Moth is Critically Endangered under the EPBC Act 1999 (Cwlth), listed for protection under Victoria's FFG Act 1988 (Vic), and as Critically Endangered under DELWP's *Advisory List of Threatened Invertebrate Fauna in Victoria*[8].

## 3.2. ON SITE HABITAT

Golden Sun Moth were recorded across the property within two classes of habitat: open, native pasture to the east of the property; and also within timbered areas where there is an open / absent canopy and grassy understorey. These habitat areas are described below and can be clearly seen in the aerial mapping provided in Attachment 1 at the end of this report.

### 3.2.1. Native pasture (eastern sector)

The property's open, native pasture areas were found to provide high quality habitat for Golden Sun Moth. Open pasture areas offer a good cover (60% - 85% cover) of indigenous graminoids with open-spaces available within inter-tussock areas. Species commonly found in the groundstorey include Wallaby Grasses (*Rytidosperma* spp.; in particular *R. setaceum*, *R. pallidum*, *R. racemosum* and *R. caespitosum*) and Weeping Grass (*Microlaena stipoides* var. *stipoides*), with scattered Common Tussock-grass (*Poa labillardierei* var. *labillardierei*), Mat-rush (*Lomandra filiformis* subsp. *coriacea* and *L. filiformis* subsp. *filiformis*), Sheep's Burr (*Acaena echinata*), Grey Tussock-grass (*Poa sieberiana* var. *sieberiana*), Summer Chocolate Lilly (*Arthropodium* sp. 3) and Flax-lily (*Dianella longifolia* var. *longifolia* and *D. revoluta* var. *revoluta*) also common.

Weed cover within the open pasture area is low, however, this will require on-going maintenance (sheep grazing and slashing) to maintain suitable Golden Sun Moth habitat conditions. On-going grazing will also serve to retain inter-tussock spacings wherein female Golden Sun Moth were observed flash-displaying their brightly coloured hindwings during the flight period.

The Golden Sun Moth record sites within this portion of the property are clearly indicated in Attachment 1 at the end of this report.

### 3.2.2. Open woodlands (northwest and southwest sectors)

The northwest and southwest portion of the property is dominated by areas of Heathy Dry Forest Ecological Vegetation Class (EVC 20) which is regenerating from a clearance event (the site was cleared around twenty years ago). The cleared but regenerating parts of the forested areas provide an open, grassy understorey structure offering suitable habitat for Golden Sun Moth. The species was recorded wherever the forest canopy was absent or

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8 https://www.environment.vic.gov.au/__data/assets/pdf_file/0016/50452/Advisory_List_of_Threatened_Invertebrate_Fauna_2009_FINAL_Sept_2009.pdf

sparse, within sites that offered an open cover of indigenous graminoids with inter-tussock spaces available between plants.

Golden Sun Moth habitat areas within these locations is comprised of an open, grassy groundstorey dominated (up to 60% cover) by *Rytidosperma pallidum,* with scattered Mat-rush (*Lomandra filiformis* subsp. *coriacea* and *L. filiformis* subsp. *filiformis*), Grey Tussock-grass (*Poa sieberiana* var. *sieberiana*), Summer Chocolate Lilly (*Arthropodium* sp. 3) and Flax-lily (*Dianella longifolia* var. *longifolia* and *D. revoluta* var. *revoluta*) are also common. These areas were also observed to have a regenerating understorey of Wattle (*Acacia acinacea*, *A. paradoxa*, *A. genistifolia* and *A. pycnantha*) and Bush-pea (*Pultenaea scabra* and *P. humilis*).

Weed cover within the open forest area is low, however, this site will require on-going maintenance (sheep grazing) to maintain suitable Golden Sun Moth habitat conditions. On-going sheep grazing will also serve to maintain an open / absent canopy structure and reduce regeneration of shrubs within the understorey.

The Golden Sun Moth record sites within this portion of the property are clearly indicated in Attachment 1 at the end of this report.

### 3.3. GOLDEN SUN MOTH RECORDS

The Golden Sun Moth targeted surveys, conducted between the 5th November, and 1st December, 2018, confirmed the presence of Golden Sun Moth on site within both the open, native pasture and the open, forest areas. Survey dates and records of Golden Sun Moth across the property are provided below in Table 1, and record locations are shown in Attachment 1 at the end of this report.

Table 1. Golden Sun Moth survey results

| Date | Ecologist | Temp. | Wind speed | Cloud cover | # days since rain | # Golden Sun Moth records |
|---|---|---|---|---|---|---|
| 2018-11-05 | Ecocentric | 32C | Light breeze | 20% | 3 days | 400+ |
| 2018-11-18 | EcoAerial | 25C | Light breeze | 5% | 4 days | 312+ |
| 2018-11-22 | Marriot | 10C | Light breeze | 20% | showers | 257 |
| 2018-12-01 | EcoAerial | 28C | Light breeze | 5% | >7 days | 191 |

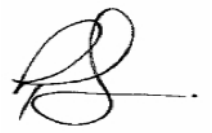
## CONCLUSION

The positive identification of Golden Sun Moth across the property within both the open, native pasture and the open, forest areas identifies these sites as good quality habitat for the species. Furthermore, given the high numbers of Golden Sun Moths recorded in the surveys, it is considered likely that more surveys, conducted at appropriate times and in appropriate weather conditions, would record the presence of Golden Sun Moths in more locations across the site. The presence of relatively weed free, diverse grassy understorey habitat with open inter-tussock spacing between graminoids also suggests that, with on-going maintenance, this property will continue to support a healthy, regionally significant population of the species.

Given Ecocentric's experience with the establishment of Offset Sites of this nature, we foresee no impediments for the use of this property as an Offset Site under the EPBC Act for the mitigation of permitted impacts to Golden Sun Moth and Golden Sun Moth habitat in Victoria.

We propose therefore that the area identified in Attachment 1 as Golden Sun Moth habitat (red hatching) be appropriately covenanted and listed as an EPBC Offset Site in accordance with the Federal Department of Environment and Energy *Environmental Offsets Policy*[9].

Sincerely,

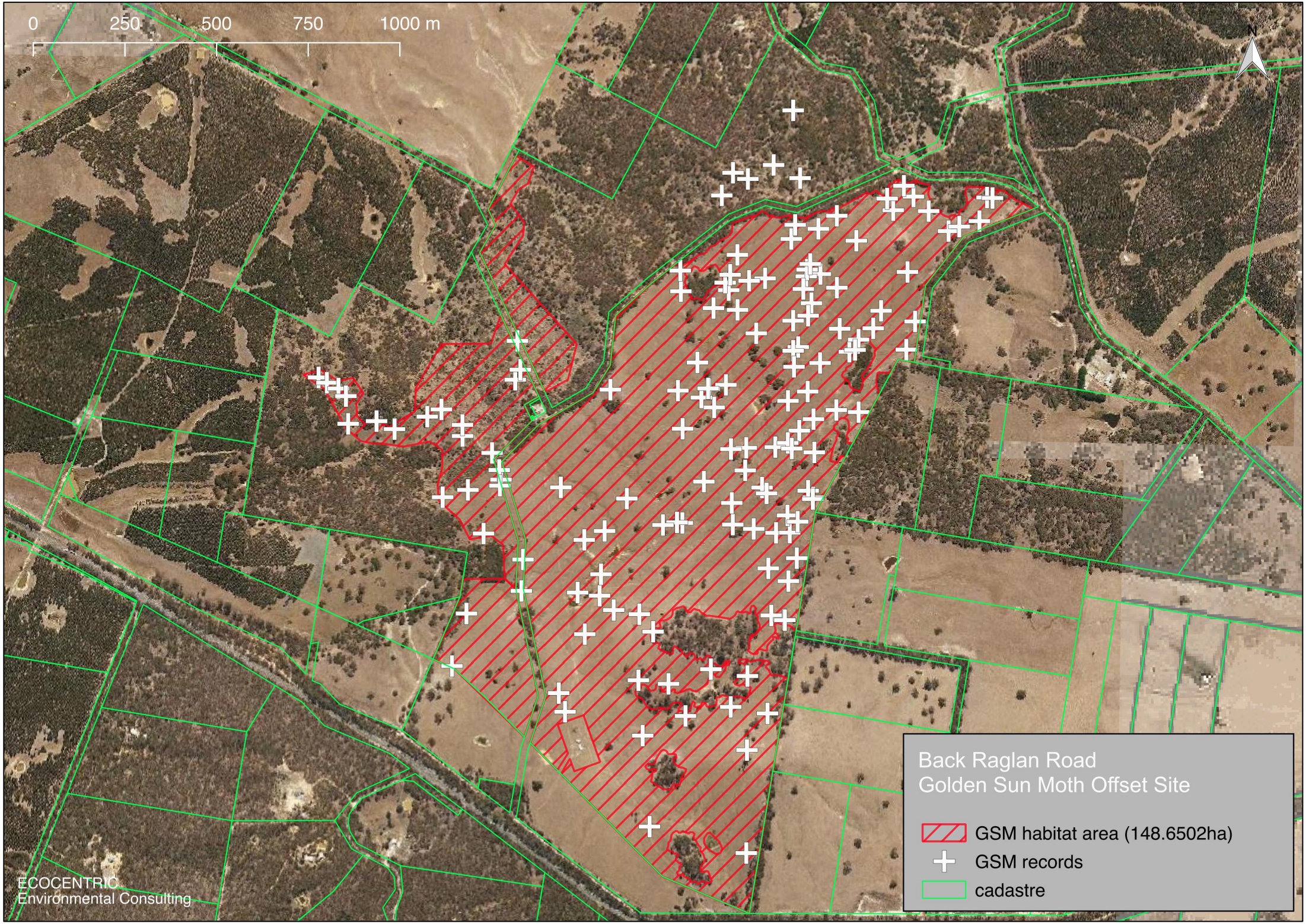


**PETER GANNON**
**Ecocentric Environmental Consulting**

## ATTACHMENTS

Attachment 1: Proposed Golden Sun Moth EPBC Act Offset Site

[9] https://www.environment.gov.au/system/files/resources/12630bb4-2c10-4c8e-815f-2d7862bf87e7/files/offsets-policy_2.pdf


0
250
500
750
1000 m
N
Back Raglan Road
Golden Sun Moth Offset Site
GSM habitat area (148.6502ha)
GSM records
cadastre
ECOCENTRIC
Environmental Consulting