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Targeted growling grass frog (*Litoria raniformis*) and golden sun moth (*Synemon plana*) surveys: 76-156 Canterbury Road East, 705-765 & 785-805 Princes Highway, Lara

- Targeted Surveys
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Abbreviations

The following abbreviations have been used:

Austral	Austral Research & Consulting
CBD	Central Business District
CMA	Catchment Management Authority
CoGG	City of Greater Geelong
DCCEEW	Commonwealth's Department of Climate Change, Energy, the Environment and Water
DEECA	Victoria's Department of Energy, Environment and Climate Action
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
FFG Act	Flora and Fauna Guarantee Act 1988
Km	Kilometres
LGA	Local government area
Mg/L	Milligrams per litre
PMST	Protected Matters Search Tool
sp.	Species
VVP	Victorian Volcanic Plain
µS/cm	Microsiemens per centimetre
ºC	Degrees celsius

1. Introduction

Austral Research and Consulting (hereafter referred to as Austral) were contracted by Lara Farms Pty Ltd to undertake targeted growling grass frog (*Litoria raniformis*) and golden sun moth (*Synemon plana*) surveys within an area scheduled for rezoning and development including two road reserves and a small area of Hovells Creek in Lara, Victoria.

The two road reserves are associated with the rezoning of 76 - 156 Canterbury Road East, 705 - 765 Princes Highway and 785 - 805 Princes Highway, Lara, to General Residential and Industrial Zones and subsequent development of the site, and a small section of Hovells Creek is proposed to be the location of an outfall for discharge of run-off from the proposed development.

A vegetation assessment for the study area has been undertaken by Mark Trengrove Ecological Consulting (Mark Trengrove Ecological Services, 2024) and a general fauna assessment was undertaken by Austral (Austral Research and Consulting, 2024). Potential habitat for both growling grass frog and golden sun moth was identified within the study area during the general fauna assessment.

Lara Farms Pty Ltd are seeking to determine the presence/absence, abundance and distribution of golden sun moth within the road reserves and the presence/absence, abundance and distribution of growling grass frog within Hovell's Creek.

2. Study Area

The broader development site (Figure 1) is located approximately 13 kilometres (km) north of Geelong central business district (CBD). The areas of impact include the road reserves parallel to the development site boundaries along Rennie Street (west verge) and Canterbury Road East (south verge), and a small section of the western bank of Hovells Creek (Figure 1) which is the site of an existing concrete outfall. Given golden sun moth are known to fly up to 200 metres (m) (Department of the Environment, Water, Heritage and Arts, 2009), targeted golden sun moth surveys included the road reserves on both sides of the road.

The study area is intended to be rezoned and developed principally for both employment and residential and there is potential for road widening to occur along Rennie Street and Canterbury Road East. This would require the removal of a currently unknown area of vegetation associated with the road reserves on the development side of the road only (Lara Farms Pty Ltd Pers. Comm.). Full impacts associated with the outfall to Hovells Creeks are largely unknown at this early stage of planning but will include the removal of an unknown area of weedy, non-native vegetation within the riparian zone of Hovells Creek at the site of an existing outfall and rock beaching will be installed for stabilisation around the outfall.

The study area falls within the bounds of the Corangamite Catchment Management Authority (CMA), within the Victorian Volcanic Plain (VVP) bioregion and within the bounds of the City of Greater Geelong (CoGG) local government area (LGA) (Visualising Victoria's Biodiversity, 2024)

Figure 1: Study area between the train line to the west and Rennie Street, Lara (Source: Tract)

3. Methods

3.1. Desktop Assessment

A desktop search was used to compile records for both growling grass frog and golden sun moth in the vicinity of the study area. A comprehensive review of the NatureKit Tool from the Department of Energy, Environment and Climate Action (DEECA) and the Protected Matters Search Tool (PMST) from the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) was attempted by Robertson, a qualified ecologist on 2 December 2024. However, it was not possible to access the PMST website, nor was it accessible on subsequent attempts so a previous review of the PMST from 16 October 2024 for the same site was used. The location, distance from the study area and age of the records were taken into consideration when undertaking the desktop assessment.

3.2. Field Assessment

Targeted growling grass frog and golden sun moth surveys were undertaken by qualified and experienced ecologists in accordance with both the *Survey guidelines for Australia's threatened frogs: Guidelines for detecting frogs listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment, Water, Heritage and the Arts, 2010) and the *Significant impact guidelines for the critically endangered golden sun moth (Synemon plana). Nationally threatened species and ecological communities EPBC Act policy statement 3.12* (Department of the Environment, Water, Heritage and Arts, 2009).

3.2.1. Growling grass frog

Targeted growling grass frog surveys were undertaken on 26 and 27 November and 4 December 2024, when the species was heard calling at a known reference site (Western Treatment Plant). Survey methodologies employed included a combination of call playback, spotlighting and active searching. In-situ water quality parameters including dissolved oxygen (mg/l and %), temperature (°C), specific conductivity (µS/cm), and pH were measured using a YSI pro plus multi-meter.

3.2.2. Golden sun moth

Targeted golden sun moth surveys were undertaken on 4, 9, 12 and 19 of December 2024 when the species was known to be flying at known reference sites.

Surveys were undertaken in conditions when moths are likely to be flying. Specifically,

- Warm to hot days (above 20°C by 10 am);
- Warmest part of the day unless moths persist in flying later in the day;
- Clear or mostly cloud free sky; and,
- Still or relatively still wind conditions during the survey period.

3.3. Limitations

This assessment pertains to the assessed areas described above only.

The ecological databases used in this assessment are comprehensive, however they are unlikely to contain all fauna within, and around the study area. It is important to note that a lack of documented records does not indicate that a species is absent but may reflect a lack of survey effort in the region.

These targeted surveys provide a ‘snapshot’ representation of environmental values within the study area present at that time of year when the surveys were completed. Migratory, cryptic, nocturnal or some seasonal species may not be detected as part of this survey methodology.

Data collected during these targeted surveys and the data reviewed within the databases is considered sufficient to provide an accurate assessment of the ecological values within the study area.

4. Species Ecology

4.1. Golden sun moth

Plate 1: Golden sun moth (State Wide Integrated Flora and Fauna Teams, 2024).

Golden sun moth (*Synemon plana*) are listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and listed as Vulnerable under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act) (Commonwealth Department of Climate Change, Energy, the Environment and Water, 2023a; Department of Energy, Environment and Climate Action, 2023). Golden sun moth are a small diurnal moth (Plate 1), endemic to the temperate grasslands of Australia (O'Dwyer & Attiwill, 2000). The golden sun moth was once widespread throughout the grasslands of south-eastern Australia (O'Dwyer & Attiwill, 1999), however, due to extensive habitat destruction the distribution of the species is heavily reduced and fragmented (Kutt, et al., 2015). The golden sun moth life history consists of two phases, an underground larva that lives in a silk lined burrow and feeds on wallaby-grass (*Rytidosperma* spp.) and spear-grass (*Austrostipa* spp.) (this stage is believed to last two or three years), followed by a breeding adult moth phase that survives from two to five days (Richter, Osborne, Hnatiuk, & Rowel, 2013). More recently Richter et al. (2013) found adult and larval golden sun moth living in and around and possibly consuming the invasive Chilean Needle-grass (*Nassella neesiana*) suggesting they can persist using this grass when native wallaby-grass and spear-grass are absent (Richter, Osborne, Hnatiuk, & Rowel, 2013). During breeding season (October – January) golden sun moth emerge from the ground on the hottest part of dry days, typically flying between 10 am to 2 pm when wind speed is low and cloud cover is minimal (Richter, Osborne, Hnatiuk, & Rowel, 2013). The male moths fly in a zig zag pattern about a meter above the grass searching for females which display their bright colours from inter-tussock spaces (Richter, Osborne, Hnatiuk, & Rowel, 2013).

4.2. Growling grass frog

Plate 2: Growling grass frog (Source: Robertson)

The growling grass frog is listed as Vulnerable under the EPBC Act and listed as Vulnerable under the FFG Act (Commonwealth Department of Climate Change, Energy, the Environment and Water, 2023b) (Department of Energy, Environment and Climate Action, 2023). It is one of the largest frogs in Australia, with records of individuals up to 104 millimetres (mm) in length, with females typically larger than males (Barker, Grigg, & Tyler, 1995; Tyler, Amphibians of South Australia, 1978; Tyler & Barrie, 1996). Growling grass frog are typically olive in colour, to bright emerald green, with irregular gold, brown, black or bronze spotting (Plate 2). Their backs are warty and typically have a pale green mid-dorsal stripe. The eardrum is pronounced and a cream or yellow stripe underlined by a dark brown stripe runs from the nostril, through the eye, above the inner ear and down the sides of the body to the groin (Robinson, 1993). Growling grass frog are coarsy granular and white on the stomach however during the breeding season males may become yellow or dark grey/black under the throat. The species was previously found across most of Victoria however today the species persists only in isolated populations in the greater Melbourne area, Geelong region, in the southwest of Victoria and a number of sites in central Victoria and Gippsland (Commonwealth Department of Climate Change, Energy, the Environment and Water, 2023b). Growling grass frog are typically observed amongst emergent vegetation including Bulrush (*Typha* sp.), Common Reed (*Phragmites australis*) and sedges (*Eleocharis* sp.). Often the species is observed in or at the edges of still or slow-flowing waterbodies such as creeks, lagoons, swamps, lakes, ponds and farm dams. Water temperature when growling grass frog is observed is reported to be between 18 - 25°C (The Department of the Environment, Water, Heritage and the Arts, 2009). Submerged vegetation and algal mats are key habitat for breeding success as they provide egg laying sites, calling stages for males, and food and shelter for tadpoles. Grassland provides habitat for foraging, dispersal and shelter and provides overwintering sites when the species enter a torpid state (Clemann & Gillespie, 2004; Hamer & Organ, 2006).

5. Results and discussion

5.1. Desktop Assessment

5.1.1. Protected Matters Search Tool

5.1.1.1. Growling grass frog

A review of the DCCEEW's PMST database revealed that growling grass frog or habitat for growling grass frog is 'known' to occur within the study area, and within 10 km of the study area (Department of Climate Change, Energy, the Environment and Water, 2024).

5.1.1.2. Golden sun moth

A review of the DCCEEW's PMST database revealed that golden sun moth or habitat for golden sun moth is 'known' to occur within the study area, and within 10 km of the study area (Department of Climate Change, Energy, the Environment and Water, 2024).

5.1.2. NatureKit Tool

5.1.2.1. Growling grass frog

A review of DEECA's NatureKit Tool revealed that one record for growling grass frog from 1989 occurs approximately 3 km northeast of the study area (Department of Energy, Environment and Climate Action, 2024). A high density of records occurs approximately 8.5 km to the east of the study area south of Avalon airport (Department of Energy, Environment and Climate Action, 2024). This site is a known reference site and known to support a large breeding population of growling grass frog. A number of records for growling grass frog have also been recorded in Cowies Creek, Geelong, which is approximately 8.8 km southwest of the study area (Department of Energy, Environment and Climate Action, 2024). The presence of a source population 8.5 km to the east and another population 8.8 km to the southwest indicates that growling grass frog are prevalent and active within the broader region and there is potential for the species to utilise the study area as either breeding, or dispersal habitat.

5.1.2.2. Golden sun moth

A review of DEECA's NatureKit Tool revealed that two records for the species occur approximately 4.7 km to the northwest of the study area, with the most recent record occurring in 2017 (Department of Energy, Environment and Climate Action, 2024). A high number of records occur approximately 7 km north, northwest of the study area and a very high number of records occur approximately 3.2 km southeast of the study area (Department of Energy, Environment and Climate Action, 2024). The number and age of records of golden sun moth within a close proximity to the study area shows that the species are prevalent across the broader landscape where suitable habitat remains and the species may be present within the study area.

5.2. Field Assessment

5.2.1. Habitat Assessment

5.2.1.1. Growling grass frog

Habitat was assessed at the outfall site, and immediately upstream and downstream. Water quality was recorded using a YSI probe to check for electrical conductivity (salinity).

The creek was flowing slowly at the time of the assessment. A weir with culverts was located immediately upstream of the outfall and poses a barrier to fish passage. Downstream the waters quickly become saline as they approach the mouth of Hovells Creek, Limeburners Bay and Port Phillip Bay (Western Shoreline) and Bellarine Peninsula (Ramsar site number 18). Specific conductivity at the outfall site was recorded as 3547 µS/cm which can be considered fresh and suitable for growling grass frog (Hammer, 1986) (Table 2). The water was visibly turbid at the time of the survey and the creek supported dense stands of common reed (*Phragmites australis*) (Plate 3; Plate 4). The sides of the creek channel appeared quite steep, and the water appeared deep. Overstorey and midstorey riparian vegetation was absent, whilst the groundcover was weedy pasture grasses and scattered *Juncus* sp.

The fresh water, slow flowing nature of the waterway and abundant vegetation in the form of common reed indicate that habitat at the site is suitable for supporting growling grass frog or for providing a dispersal corridor for the species.

Plate 3: Hovells Creek at the outfall site. Looking upstream.

Plate 4: Hovells Creek at the outfall site. Looking downstream.

5.2.1.2. Golden sun moth

5.2.1.2.1. Rennie Street

The road reserve on Rennie Street was walked and assessed for habitat characteristics for a range of species. The road reserve supported a variety of non-native, weedy grass species and was subject to

regular disturbance such as slashing of grass, vehicular traffic, plus littering and dumping (Plate 5). The road reserve can be considered isolated as the northern (development) side is bounded by the road on one side and intensive cropping on the other. Small areas of native wallaby-grass (*Rytidosperma* sp.) (Plate 6) were present as was Chilean needle grass (*Nassella neesiana*), both of which are strongly associated with golden sun moth.

Plate 5: Rennie Street road reserve

Plate 6: Wallaby-grass within the Rennie Street road reserve

5.2.1.2.1.1. Canterbury Road East

The road reserve supported a variety of non-native, weedy grass species and was subject to regular disturbance such as slashing of grass, vehicular traffic, plus littering and dumping (Plate 7).

The road reserve on the development side of the road can be considered isolated due to heavy cropping to the west (development) side and the road to the east which likely forms a barrier between the assessed road reserve and potential fauna habitat which occurs in private property on the eastern side of the road.

Native grasses, such as wallaby-grass, were absent from the area however exotic Chilean needle grass, was prevalent and is strongly associated with golden sun moth.

Plate 7: The western road reserve on Canterbury Road East.

5.2.2. Targeted Surveys

5.2.2.1. Growling grass frog

Targeted growling grass frog surveys were undertaken by qualified and experienced ecologists on 26 and 27 November, and 4 December 2024 when the species was calling at a known reference site. Call playback was undertaken as was spotlighting and active searching which took the form of parting grass and turning rocks within the riparian zone. Water quality was collected using a YSI pro plus multi-meter.

Despite surveys being undertaken in accordance with the *Survey guidelines for Australia's threatened frogs: Guidelines for detecting frogs listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment, Water, Heritage and the Arts, 2010) growling grass frog **was not** detected within Hovells Creek.

Results of the surveys are provided in Table 1 and the water quality results area shown in Table 2.

Table 1: Results of the targeted growling grass frog surveys

Date	Temperature (°C)	Frog species calling	Growling grass frog calling at reference site (Y/N)
26/11/2024	20.6	No frogs	Y
27/11/2024	18.3	No frogs	Y
4/12/2024	20.0	No frogs	Y

Table 2: Water quality results

Temp (ºC)	Dissolved Oxygen (mg/L)	DO %	Specific Conductivity @25ºC (µS/cm)	Conductivity (µS/cm)	pH
23.0	3.01	35.5	3547	3414	8.29

5.2.2.2. Golden sun moth

Targeted golden sun moth surveys were undertaken on 4, 9, 12 and 19 of December 2024 when the species was known to be flying at known reference sites.

Despite surveys being undertaken in accordance with the *Significant impact guidelines for the critically endangered golden sun moth (Synemon plana). Nationally threatened species and ecological communities EPBC Act policy statement 3.12.* (Department of the Environment, Water, Heritage and Arts, 2009) golden sun moth **was not** detected within the Rennie Street or Canterbury Road East road reserves.

Results of the surveys are provided in Table 3.

Table 3: Results of the targeted golden sun moth surveys

	Survey 1	Survey 2	Survey 3	Survey 4
Date	4/12/2024	9/12/2024	12/12/2024	19/12/2024
Days since rain	1	>2	>2	>2
Flying at reference site	Yes, Cressy	Yes, Avalon	Yes, Avalon	Yes, Avalon
Temperature at start (°C)	20	20	26.5	27.1
Temperature at finish (°C)	21	22	29	29
Wind direction and speed (km.h-1)	0 km h^{-1}	9 $km.h^{-1}$ WSW	22 $km.h^{-1}$ SW	24 $km.h^{-1}$ SE
Percent cloud cover (%)	1	60	5	0
Ground conditions	Dry, cracked	Dry, cracked	Dry, cracked	Dry, cracked

6. Conclusions

Targeted growling grass frog surveys were undertaken at the site of an outfall to Hovells Creek anticipated to have elevated stormwater discharges associated with a proposed development located at 76 - 156 Canterbury Road East, 705 - 765 Princes Highway and 785 - 805 Princes Highway, Lara (Figure 1).

Targeted golden sun moth surveys were undertaken within the Rennie Street and Canterbury Road East Road reserves which run parallel to the development site (Figure 1) and will be subject to impacts associated with road widening related to the development.

Targeted growling grass frog surveys were undertaken in accordance with the *Survey guidelines for Australia's threatened frogs: Guidelines for detecting frogs listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment, Water, Heritage and the Arts, 2010) and targeted golden sun moth surveys were undertaken in accordance with the *Significant impact guidelines for the critically endangered golden sun moth (Synemon plana). Nationally threatened species and ecological communities EPBC Act policy statement 3.12.* (Department of the Environment, Water, Heritage and Arts, 2009).

Despite the presence of appropriate habitat and targeted surveys being undertaken in accordance with the appropriate survey guidelines, **neither growling grass frog, nor golden sun moth were detected within the study area.**

As such, a referral to the Minister for the Environment (the Minister) under the EPBC Act **is not** required with regard to growling grass frog or golden sun moth.

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