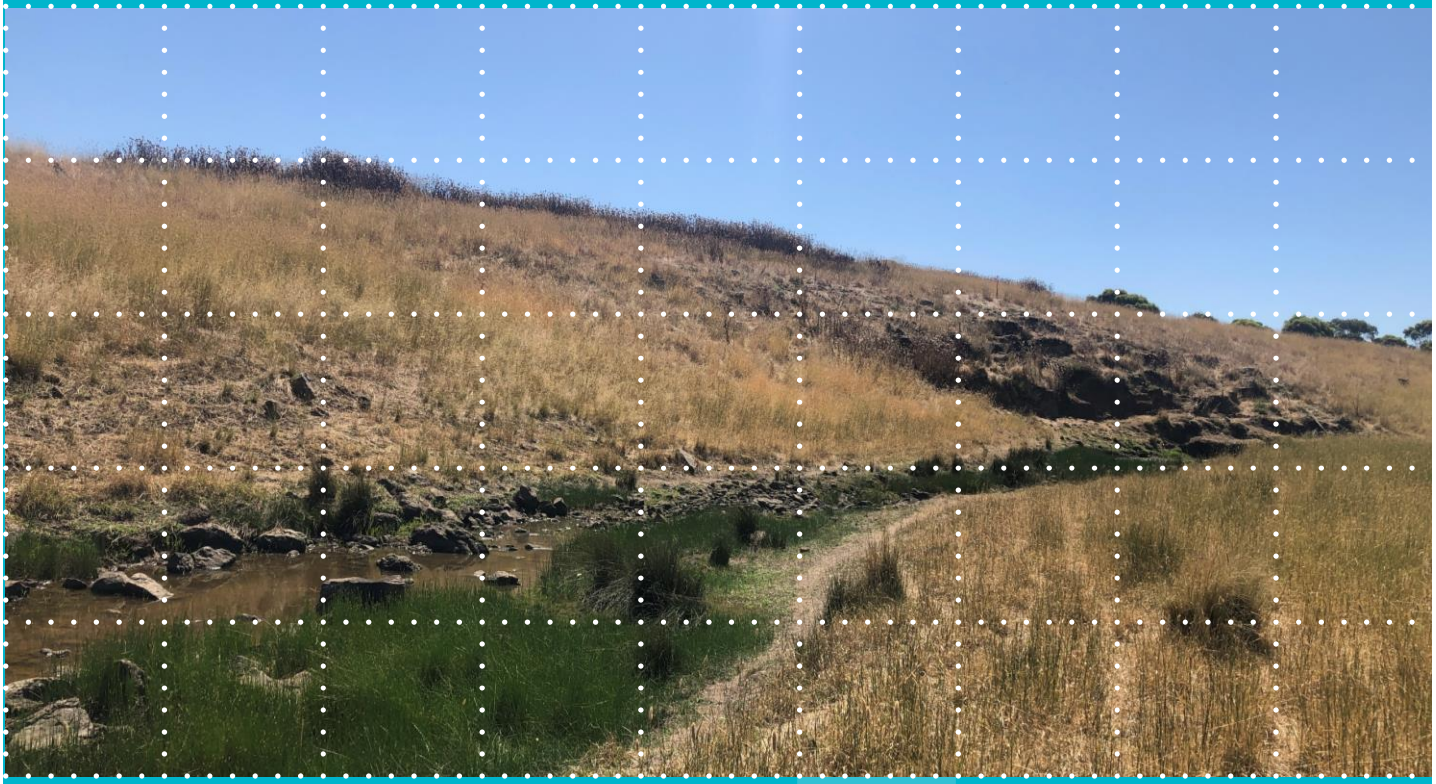
Draft Report

Detailed Vegetation Assessment, and Golden Sun Moth Population and Habitat Monitoring – Year 2 (2023/24): Mount Gow, Shelford, Victoria

Prepared for

Greater Western Water

December 2024



Ecology and Heritage Partners Pty Ltd

MELBOURNE: 292 Mt Alexander Road, Ascot Vale VIC 3032 **GEELONG:** 230 Latrobe Terrace, Geelong West VIC 3218
BRISBANE: Level 22, 127 Creek Street, Brisbane QLD 4000 **ADELAIDE**: 78 Edmund Avenue, Unley SA 5061
CANBERRA: 19-23 Moor Street, Turner ACT 2612 **SYDNEY:** Level 5, 616 Harris Street, Ultimo NSW 2007
www.ehpartners.com.au | 1300 839 325

DOCUMENT CONTROL

Assessment	Vegetation Assessment and Golden Sun Moth *Synemon plana* Population and Habitat Monitoring for Year 2 (2023/24)
Address	Mount Gow, Shelford, Victoria
Project number	16882
Project manager	Matthew Boyd (Consultant Ecologist)
Report reviewer	Jared McGuiness (Associate Botanist); Andrew Hill (Director/Principal Ecologist)
Other EHP staff	Jamie Willey (Consultant Ecologist); Simon Casey (Technical Officer); Braden Callaway (Botanist)
Mapping	Petra Sorensen (GIS Officer)
File name	16882_EHP_Monitoring_Year2_RockleaPastoral_MountGow_Final_19122024
Client	Greater Western Water
Bioregion	Victorian Volcanic Plain
CMA	Corangamite
Council	Golden Plains

VERSION CONTROL

Report versions	Comments	Comments made by:	Date submitted
Draft	Report sent to the client for review	MB	05/12/2024
Final	Final updated following client review	MB	19/12/2024

Ecology and Heritage Partners acknowledge the Traditional Owners of the country we live and work on, and we pay our respect to Elders past, present and emerging.

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1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was engaged by Greater Western Water to undertake vegetation monitoring and Golden Sun Moth *Synemon plana* population and habitat quality monitoring for Year 2 for the offset site located at Mount Gow, Shelford, Victoria (herein referred to as the Mount Gow offset site). The requirement for Golden Sun Moth offset monitoring was associated with the construction of the recycled water pipeline, Parwan to Melton, Victoria (EPBC 2018/8260). The offset requirements were conditions under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the removal of 5.1 hectares of Golden Sun Moth habitat and 4.96 hectares of the Natural Temperate Grasslands of the Victorian Volcanic Plain (NTGVVP) at the development site.

A total of 26.5 hectares of Golden Sun Moth habitat has been protected within the offset site, in accordance with the *Victorian Conservation Trust Act 1972* via a Trust for Nature covenant. The management, monitoring and auditing works required to be undertaken at the offset site are detailed in the Offset Management Plan (OMP) (Ecology and Heritage Partners 2021) prepared for the Mount Gow offset site. The OMP was approved by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the EPBC Act (EPBC 2018/8228).

Detailed vegetation monitoring and Golden Sun Moth population and habitat monitoring has been undertaken in accordance with Section 8 of the endorsed OMP (Ecology and Heritage Partner 2021). The following report outlines the results of Year 2 monitoring results, and also provides future targets over subsequent years for the ongoing monitoring and management within the Mount Gow offset site.

1.2 Scope and Objectives

The Mount Gow offset site is being managed for the purposes of biodiversity conservation. Management of this site involves the physical protection of the offset site, control of pest animals and high threat environmental weeds, biomass reduction and general maintenance of the character and quality of the native vegetation, consistent with its historic context. The OMP and specified management actions form part of a broader strategy for long-term management of extant Golden Sun Moth populations and habitat.

The objectives of the vegetation monitoring and Golden Sun Moth monitoring were to:

- Undertake detailed vegetation monitoring of GSM habitat (i.e. Plains Grassland) to assess the overall quality and quantity of vegetation and composition of species (i.e Habitat Hectares assessment);
- Assess biomass levels within 14 x 1 m^2 sampling plots equidistant within the Mount Gow offset site;
- The extent, severity, trend and presence of current weed species, and any new and emerging weed species;
- Determine the abundance and distribution of Golden Sun Moth throughout the offset site;

- Determine any potential impacts to Golden Sun Moth and their associated habitat in response to current management practices; and,
- Provide advice on recommendations that may be undertaken to avoid and/or mitigate potential adverse impacts on significant ecological values.

1.3 Study Area

The Mount Gow offset site is located at a private property in Mount Gow, Shelford, Victoria, and is approximately 42 kilometres west of Geelong, Victoria (Figure 1). The offset site comprises 26.5 hectares of Golden Sun Moth habitat, which was assessed to contain suitable grassland habitat and the confirmed presence of Golden Sun Moth (Ecology and Heritage Partner 2021). The offset site is part of a larger property intersected by Warrambine Creek and additional areas within the property at Mount Gow, Shelford, are currently secured and managed for the conservation of GSM and remnant NTGVVP (under previous EPBC Act approval conditions). The offset site is managed by the Rocklea Pastoral Co.

According to the DEECA NatureKit Map (DEECA 2024a), the study area occurs within the Victorian Volcanic Plain Bioregion, the jurisdiction of the Corangamite Catchment Management Authority (CMA) and the Golden Plains Shire municipality.

1.4 Golden Sun Moth

EPBC Act Conservation Status: Vulnerable*

FFG Act Conservation Status: Listed

Golden Sun Moth (Plate 1) typically occurs in native grassland, grassy woodland, dominated by greater than 40% cover of wallaby-grass, in particular *Rytidosperma* spp. (DSE 2004), but may also inhabit areas dominated by Kangaroo Grass *Themeda triandra* (Endersby and Koehler 2006) and introduced grassland dominated by Chilean Needle-grass *Nassella neesiana* and other introduced species (A. Organ pers. obs.). Male flight is typically low, to about a metre above the ground, fast and can be prolonged, but they are generally not recorded flying more than 100 metres from suitable habitat (Clarke and O'Dwyer 2000).

Plate 1. Golden Sun Moth (Ecology and Heritage Partners Pty Ltd)

Prior to European settlement, the Golden Sun Moth was widespread and relatively continuous throughout its range, inhabiting grassy open woodlands and grassland, although it now mainly inhabits small, isolated sites (DSE 2004). The species is threatened by habitat loss, disturbance and fragmentation due to agricultural expansion and urbanisation. Many populations are isolated and fragmented, impeding the ability of the relatively immobile females to recolonise areas, thereby reducing the likelihood of genetic exchange (DSE

2004). Such populations are therefore vulnerable as there is little likelihood of recolonisation in the event of a local extinction.

Note: * = The EPBC Act Conservation Status for Golden Sun Moth was downgraded from Critically Endangered to Vulnerable, effective 7 December 2021.

2 METHODS

2.1 Annual Monitoring and Reporting

Year 2 monitoring has been undertaken by Ecology and Heritage Partners Pty Ltd on behalf of the landowner, and included an assessment of:

- The extent, severity, trend and presence of current weed species, and any new and emerging weed species;
- The extent, severity, trend and presence of pest animal activity;
- Biomass levels, visually assessed across the site;
- Evidence of unpermitted human/stock access; and,
- Any new threats.

Annual monitoring will occur in Years 1-4, 6, 8 and 10 (seven events) over the course of the ten years of the endorsed Offset Management Plan.

2.2 Vegetation Assessment

2.2.1 Detailed Vegetation Monitoring

Detailed vegetation monitoring was conducted by a qualified ecologist and documented the following components:

- Overall assessment of the quality and quantity of vegetation and composition of species (i.e. Habitat Hectare assessment);
- Biomass levels, assessed from 14 x 1-metre^2 sampling plots, randomly spread throughout the offset site (see Figure 2). The biomass levels were consistently sampled from the north-west each star picket that was deployed; and,
- The extent, severity, trend and presence of current weed species, and any new and emerging weed species.

2.2.2 Field Assessment

A field assessment was undertaken on 15 October 2024 to inform this monitoring event, within the study area. The study area was walked, with all observed vascular flora species recorded, any significant records mapped, any pest animal activity, the overall condition of vegetation noted and the percentage cover of native plants, weeds, leaf litter, and bare ground estimated. A habitat hectare assessment was undertaken following the methodology described in the Vegetation Quality Assessment Manual (DSE 2004).

2.3 Golden Sun Moth Population Monitoring

Golden Sun Moth surveys were conducted in accordance with the recommended survey guidelines detailed in the *Significant impact guidelines for the critically endangered Golden Sun Moth (Synemon plana) – EPBC Act policy statement 3.12* (DEWHA 2009). Surveys were undertaken at a time, which is considered suitable for detecting the GSM (i.e. when adult males are flying), and when the species was observed flying at a nearby reference site (i.e. Lethbridge, Mount Mercer etc.). The following measures were undertaken as part of population and habitat monitoring for Golden Sun Moth at the offset site:

- Surveys were conducted by suitably trained observers at 50 metre transects, across the entire offset site;
- Surveys were conducted over four separate days during the known flight season. Traditionally this would be November to early January, however the flight season did not commence until mid-December due to unseasonably cool and wet weather. As such, the last survey was conducted in early January;
- Surveys were undertaken at a time which is considered suitable for detecting the species (i.e. when adult males are flying), and when Golden Sun Moth was observed flying at nearby locations (The male of this species generally flies between 11am and 3pm on calm, warm [over 20°C], sunny days); and,
- Surveys were conducted by qualified zoologists walking 50-metre-wide parallel transects across all areas of suitable habitat.

2.3.1 Targeted Golden Sun Moth Surveys

Targeted surveys for Golden Sun Moth were undertaken on 05, 12 and 18 December 2023 and 12 January 2024. Areas of suitable habitat were walked by qualified ecologists at a time, which is considered suitable for detecting the species (i.e. between 10:00am and 3:00pm during suitable weather conditions, when adult males are likely to be flying [DEWHA 2009]). The species was noted to be flying at other sites in the broader locality (i.e. Lethbridge, Mount Mercer etc.) on the day of the surveys and via the Ecological Consultants Association of Victoria Golden Sun Moth flight diary.

2.4 Assessment Qualifications and Limitations

2.4.1 Vegetation Assessment

This report has been written based on the quality and extent of the ecological values and habitat considered to be present or absent at the time of the desktop and/or field assessments being undertaken.

Ecological values identified on site were recorded using a hand-held GPS or tablet with an accuracy of +/-3 metres. This level of accuracy is considered adequate to provide an accurate assessment of the ecological values present within the study area although this data should not be used for detailed surveying purposes.

The terrestrial flora and fauna data collected during the field assessment and information obtained from relevant desktop sources is considered to inform an accurate assessment of the ecological values present within the study area.

The offset site landowner engaged in discussions with Trust for Nature regarding extending pulse grazing throughout October. While not a direct action of the OMP, this approach was intended to reduce the cover of weeds in early spring and encourage the recruitment of native species. As pulse grazing was being undertaken when the site assessment was undertaken, the height of tussock grasses was limited, which may have impacted the results of the vegetation monitoring. In order to remedy this in future years, detailed vegetation monitoring will commence in early-late summer, when stock are excluded from the offset area.

2.4.2 Golden Sun Moth

Targeted GSM surveys were undertaken by experienced personnel during the known flight period of the species and during appropriate conditions by following suitable survey guidelines. Fauna surveys were conducted under the Ecology and Heritage Partners Pty Ltd Research Permit (#10009538) issued by DEECA under the *Wildlife Act 1975*.

Typically, Golden Sun Moth emergence declines in the lead up to and in early January. In temperate regions, insect larvae often face a decision between development into their adult stage, or ongoing growth for emergence in the subsequent season (DAWE 2021). We therefore experienced a truncated emergence period for the species once conditions became suitable.

Golden Sun Moth was known to be flying at other sites in the broader locality on the days of the survey. Given the species presence in the region and the experience of surveyors, the results of this assessment are considered suitable for the purposes of assessing the works against the objectives of the project.

3 RESULTS

The purpose of this Year 2 monitoring was to assess vegetation condition and habitat for 26.5-hectares of Golden Sun Moth offset area within the Mount Gow offset site. Based on the OMP, Golden Sun Moth habitat was categorized as high-quality habitat and moderate quality habitat, comprising 20.5-hectares and 6-hectares, respectively. Previously, the 26.5-hectare Golden Sun Moth habitat offset area comprised of multiple patches of Plains Grassland, including:

- Several high-condition patches (PG1; 0.60/1), which met the condition threshold to be considered Natural Temperate Grassland of the Victoria Volcanic Plain (NTGVVP) (NTGVVP not included as part of this offset) and corresponded with some of the high-quality GSM offset areas (Ecology and Heritage Partners 2021); and,
- Several moderate-condition patches (PG3; 0.39/1), which corresponded with some of the high and moderate quality GSM offset areas (Ecology and Heritage Partners 2020; Ecology and Heritage Partners 2021).

The results of the Year 2 detailed vegetation monitoring are outlined below.

The Landowner held discussions with Trust for Nature in September 2024 regarding the management of weeds across the site. These discussions resulted in extending pulse grazing within the offset site throughout October. While the OMP outlined that pulse grazing should not occur in October, this action was approved by Trust for Nature, with the intent of reducing the cover of weeds, lowering biomass and enabling recruitment of native vegetation within the study area. Year 2 monitoring was conducted when pulse grazing was still underway, and as such, the site was heavily grazed. During Year 3 of monitoring, the detailed vegetation assessment will be conducted in late summer (i.e. February-March) to ensure that monitoring occurs outside of the grazing period and to determine if the extended grazing has been successful.

3.1 Vegetation Assessment

During the site assessment, the Mount Gow offset site was observed to be highly modified, due to environmental weed incursions. Previously, native vegetation within the study area comprised of one EVC: *Heavier Soils* Plains Grassland (EVC 132_61) (Plate 2;Plate 3). Since the OMP was prepared, the Mount Gow offset site has degraded considerably in condition, and large portions of the site no longer meet the condition threshold to be considered a patch of native vegetation (i.e. >25% relative native cover). As such, due to considerable weed invasion, large portions of the Mount Gow offset site no longer support suitable Golden Sun Moth habitat, due to the lack of native grasses.

The current extent of native vegetation within the Mount Gow offset site is 0.68-hectares, comprising two EVCs, including:

- 0.581 hectares of *Heavier Soils* Plains Grassland, which was in low condition (i.e. 0.20-0.37/1); and,
- 0.098 hectares of Plains Grassy Wetland, which was in low condition (i.e. 0.17/1).

The extent of native vegetation (i.e. Plains Grassland) compared with the previous monitoring results is outlined in Table 1.

In total, 33 flora species were observed within the study area, including 14 indigenous species and 19 non-indigenous species.

A list of all flora species recorded during the field assessment is provided in Appendix 1.1.

Table 1. Yearly comparison of the extent of Plains Grassland identified in the Mount Gow offset site.

	Baseline	Year 1	Year 2
Extent of Plains Grassland EVC	26.5 hectares	0.60 hectares	0.58 hectares

3.1.1 Native Vegetation

The entirety of the 26.5-hectare Golden Sun Moth offset area was assessed, of which native grasses comprised approximately 5-10% total cover. Some small patches of native vegetation were identified within the study area; however, the majority of the Golden Sun Moth offset area did not have the 25% relative native cover to be considered a patch of native vegetation (Figure 2). Flora species recorded in existing patches of Plains Grasslands (i.e. PG1 & PG2a-d on Figure 2), include Sheep's Burr *Acaena echinata,* Spear Grass *Austrostipa* spp.*,* Rush *Juncus* spp.*,* Tussock Grass *Poa* spp.*,* Wallaby Grass *Rytidosperma* spp.*,* Kangaroo Grass *Themeda triandra,* Blue Devil *Eryngium ovinum,* Grassland Wood-sorrel *Oxalis perennans,* Twining Glycine *Glycine clandestina,* Tangled Shrub-violet *Melicytus angustifolius* subsp*. divaricatus,* Small Vanilla-lily *Arthropodium minus,* Creeping Knotweed *Persicaria prostrata,* and Tall Spike-sedge *Eleocharis sphacelata.*

At the time of the site assessment, some areas of the creekline were practically dry and contained flora species indicative of Plains Grassy Wetland, rather than Plains Grassland. Several patches of Plains Grassy Wetland (PGWe1 on Figure 2) were identified along the creekline and were predominantly comprised of Common Spike-sedge *Eleocharis acuta* and Creeping Knotweed*.*

Year 2 monitoring identified several small discrete patches of Plains Grassland within the study area, scattered throughout, which varied in vegetation condition (Appendix 1.2). Patch PG2a were of higher comparative condition (i.e. 0.35/1), containing a higher diversity of flora species (Plate 2; Plate 3), while patches of PG1 and PG2b-d were generally of lower quality (i.e. 0.20-0.25/1) and contained a lower diversity of flora species (Plate 4 – Plate 6; Appendix 1.2). In addition, several small discrete patches of Plains Grassy Wetland (i.e. PGWe1 on Figure 2) were identified along the creekline, which were of low floristic diversity and low condition (i.e. 0.17/1) (Plate 7; Appendix 1.2). During the Year 2 Monitoring, several patches that were identified in Year 1 no longer comprised a patch of native vegetation as they did not contain the 25% relative cover of native perennial grasses to be considered a patch of native vegetation (Figure 2).

The results of the habitat hectare assessment are outlined in Appendix 1.2.

Since the OMP was implemented, the cover of native grasses and herbaceous plants has reduced considerably, largely due to the presence of Toowoomba Canary Grass *Phalaris aquatica*, which has spread across much of the offset site. This discrepancy is also represented in the audit that was conducted by Jacobs in August 2023 (Jacobs 2023).

Based on the results of this assessment, the overall quality of native vegetation and habitat that it provides for Golden Sun Moth has reduced considerably since the OMP was enacted. In order to improve Golden Sun Moth habitat within the offset area, a variety of methods will be required to increase native vegetation cover within the offset site, such as planned burns, spot-spraying and direct seeding.

Plate 2. Patch of Plains Grassland (PG2a on Figure 2) in the north-west of the offset site, comprised of Wallaby-grass, Blue Devil, Small Vanilla Lilly and Acaena Echinata (Ecology and Heritage Partners Pty Ltd 15/10/2024).

Plate 3. Patch of Plains Grassland (PG2a on Figure 2) in the north-west of the offset site (Ecology and Heritage Partners Pty Ltd 15/10/2024).

Plate 4. Patch of Plains Grassland (PG2b on Figure 2) in the north of the study area, comprised of Wallaby-grass (Ecology and Heritage Partners Pty Ltd 15/10/2024).

Plate 5. Patch of Plains Grassland (PG2b on Figure 2) in the south of the study area, comprise of Wallaby-grass (Ecology and Heritage Partners Pty Ltd 15/10/2024).

Plate 6. Patch of Plains Grassland (PG2c on Figure 2), comprised of Tall Spike Sedge (Ecology and Heritage Partners Pty Ltd 15/10/2024).

Plate 7. Patch of Plains Grassy Wetland (PGWe1 on Figure 2), comprised of Common Spike Sedge (Ecology and Heritage Partners Pty Ltd 15/10/2024).

3.1.2 Weeds

The overall cover of exotic vegetation has increased considerably since the Offset Management Plan was implemented in 2022. In Year 2 of monitoring, several annual and perennial weeds were identified within the study area, with observed specimens including Hair Grass *Aira* spp., Wild Oat *Avena fatua,* Brome *Bromus* spp., Cat's Ear *Hypochaeris* spp., Rye Grass *Lolium* spp., Toowoomba Canary-grass *Phalaris aquatica,* Onion Grass *Romulea rosea,* Rough Dog's-tail *Cynosurus echinatus,* Variegated Thistle *Silybum marianum,* Fescue *Vulpia* spp., Common Heron's-bill *Erodium cicutarium,* Cape Weed *Arctotheca calendula,* Wild Sage *Salvia verbenaca,* Clover *Trifolium* spp., Nightshade *Solanum* spp., Burr Medic *Medicago polymorpha,* Common Sow-thistle *Sonchus oleraceus,* Chilean Needle-grass *Nassella neesiana* and Ox-tongue *Helminthotheca echioides.*

A list of all observed weeds, percentage covers and the Year 10 target cover is outlined in Table 2.

In Year 2, the overall cover of weeds within the offset area was estimated between 76-95%. The cover of weeds is largely due to the expansion of Toowoomba Canary Grass, which had a varied cover of 44-55% across the offset area. Other annual and perennial weeds had a combined cover of approximately 32-40% (Table 2). Since the OMP was enacted, woody weeds, primarily African Box-thorn *Lycium ferrocicimum,* has reduced to <1% cover. The OMP noted the herbaceous weed cover within the offset area to be estimated at 30-75% throughout the offset area, with weed cover higher in areas not recorded as NTGVVP. As per the OMP, management of herbaceous weeds was proposed to be undertaken through pulse grazing and spot-spraying; however, current methods to manage herbaceous weed cover within the offset area appear inadequate, given the increase in total weed cover. The Landowner advised that, in discussions with Trust for Nature, they are extending pulse grazing into October, to assist in managing annual and perennial weeds throughout the offset site, with a particular focus on managing Toowoomba Canary Grass. The field assessment was undertaken in October, and the additional pulse grazing appears to have been beneficial, as the degree of biomass throughout the site has reduced, which may assist in native recruitment throughout summer.

Two declared noxious weeds, Variegated Thistle and Serrated Tussock, as defined under the *Catchment and Land Protection Act 1994* (CaLP Act), were observed during the site assessment; however, these species both comprised <1% cover (i.e. <0.01%). Serrated Tussock is also listed as a Weed of National Significance (WoNS).

Ongoing, intensive active management is required to ensure the percentage cover of weeds and biomass meets the objectives of the OMP, and options such as conducting a planned burn at the site to reduce biomass and weed cover, followed by targeted weed control, should be investigated.

Table 2. Weeds and percentage cover identified within the OMP Assessment (EHP 2022), Year 1 and Year 2 Monitoring and Year 10 Target Cover.

Scientific Name	Common Name	High Threat	OMP % Cover (EHP 2022)	Year 1 Monitoring % Cover	Year 2 Monitoring % Cover	Year 10 Target % Cover
Annual Weeds						
Acetosella vulgaris	Sheep Sorrell	-	1%	1%	<0.01%	<1%
Aira spp.	Hair Grass	-	0%	1%	<0.01%	<1%
Arctotheca calendula	Cape Weed	-	-	-	2%	<1%
Avena fatua	Wild Oat	-	3%	3%	2%	<1%
Bromus spp.	Bromes	Y	0%	3-5%	5%	<1%
Erodium cicutarium	Common Heron's-bill	-	-	-	<0.01%	<1%
Hordeum spp.	Barley Grass	-	3%	3%	3%	<1%
Hypochaeris radicata	Flatweed	Y	3%	3%	2%	<1%
Medicago polymorpha	Burr Medic	-	-	-	<0.01%	<1%
Romulea rosea	Onion Grass	-	0%	1%	4-5%	<1%
Trifolium spp.	Clover	-	-	-	1%	<1%
Vulpia spp.	Rat-tail Fescue	Y	2%	3-8%	5-8%	<1%
Perennial Weeds						
Cirsium vulgare	Spear Thistle	Y	<1%	0%	<0.01%	<1%
Cynosurus echinatus	Rough Dog's-tail	Y	0%	3%	3%	<1%
Helminthotheca echioides	Ox-tongue	-	-	-	<0.01%	<1%
Lolium spp.	Rye Grass	Y	0%	3-5%	1-2%	<1%
Lycium ferrocicimum	African Boxthorn	-	<1%	0%	0%	<1%
Nassella neesiana	Chilean Needle-grass	-	-	-	<0.01%	<1%
Nassella trichotoma	Serrated Tussock	Y	<1%	<1%	<0.01%	<1%
Phalaris aquatica	Toowoomba Canary-grass	Y	25-40%	45-60%	44-55%	<1%
Salvia verbenaca	Wild Sage	-	-	-	3-4%	<1%
Silybum marianum	Variegated Thistle	Y	0%	<1%	<0.01%	<1%
Solanum spp.	Nightshade	-	-	-	<0.01%	<1%
Sonchus oleraceus	Common Sow-thistle	-	-	-	<0.01%	<1%
	Total % Cover		40-55%	71-95%	76-95%	N/A

Notes:; *Annual weeds which have been averaged due to grouping in the original baseline assessment and Jacobs Audit report; N/A = not applicable, not observed during the assessment; Y = High threat weed.

3.1.3 Biomass Monitoring

As outlined in the Offset Management Plan for the Mount Gow offset site (Ecology and Heritage Partners 2021), the objective of biomass control is to promote and maintain floristic diversity, and inter-tussock space for germination of native flora associated with NTGVVP community. Biomass monitoring was undertaken across 14x1-metre^2 plots within the study area, which were deployed sporadically throughout the study area (Figure 2). The purpose of biomass monitoring was to determine the percentage native vegetation cover, percentage weed cover, percentage of bare ground and organic litter, and percentage cover of rocks. The aim of biomass monitoring is to maintain approximately 20% cover of bare ground or inter-tussock space to allow for sufficient space for recruitment of native herbs and grasses. The results of the Year 2 assessment are as follows:

- Native vegetation cover was approximately 6.79%;
- Weed cover was approximately 76.21%;
- Bare-ground cover was approximately 8.14%;
- Rock cover was approximately 8.86%.

The Year 2 biomass monitoring results are outlined in Appendix 1.3.

In comparison with the objectives outlined in the OMP, the Year 2 biomass monitoring indicates that the cover of bare ground is lower than the objective cover of 20%. This is likely due to the increase in weed cover across the site, primarily due to the spread of Toowoomba Canary-grass. On-going management is required in order to increase the percentage cover of bare-ground, which will enable the recruitment of native grasses and herbs. Due to the high percentage cover of weeds and lack of suitable recruitment space for native species, a variety of methods such as planned burns, spot-spraying, pulse grazing and direct seeding will be required to improve biomass conditions within the offset site.

During the Year 2 Assessment, several biomass plots (i.e. Plot 6, Plot 8, Plot 11) were relocated within approximately 1-2-metres of the original plot, as the stakes had fallen over and they could not be relocated securely in the original location. As such, there are likely to be slight discrepancies between the results for Year 1 and Year 2.

3.2 Golden Sun Moth Monitoring

The following sections summarise the previous and current Golden Sun Moth monitoring results for the offset site located at Mount Gow, Shelford, Victoria.

3.2.1 Previous Survey Results

Golden Sun Moth was initially recorded during targeted surveys across the north of the Mount Gow offset site. The result of the population monitoring is provided below (Table 3).

More than 991 Golden Sun Moth were recorded during habitat monitoring on 14 and 24 November 2017, 15 and 22 December 2017, and 11 January 2018 across the offset site (Ecology and Heritage Partners 2021).

In addition, several individuals were detected during targeted surveys across Mount Gow offset site, during the 2014/15 flight period (AECOM 2015).

The species has been recorded predominantly within areas of NTGVVP, containing more open ground and preferred host plants, including Wallaby Grasses. Targeted surveys were undertaken in accordance with the Significant Impact Guidelines for the Golden Sun Moth (DEWHA 2009).

Table 3. Previous Golden Sun Moth Population Monitoring within the Mount Gow offset site.

Survey Year	GSM Abundance	Management Recommendations
2014/15	low	While the number of GSM was lower this is likely due to the timing of the surveys as opposed to the quality of habitat on site given conditions have not decreased in quality over the past year.
2017/18	991	The species was detected in high numbers demonstrating that the species still resides in high population numbers within the offset site.
2019/20	60+	The species was detected in the northern portion of the offset site in substantial population numbers.

3.2.2 Year 2 Survey results

Prior to undertaking the Year 2 Golden Sun Moth surveys within the study area, reference sites were checked to determine if the species was actively flying on the day (Table 4).

Table 4. Reference sites for the 2023/2024 flight season.

Date	Survey times	Reference site*	Temperature (°C)	Wind (km/hr)	Cloud cover (%)	No. of days since rain	No. GSM recorded within reference area
5/12/2023	10:00-3:00pm	Beaufort	26	25 NW	50	2	80
5/12/2023	10:00-3:00pm	Ombersley	26	25 NW	50	1	10
12/12/2023	10:00-3:00pm	Broadmeadows	24	6 NW	30	4	4
12/12/2024	10:00-3:00pm	Lethbridge	23	9 W	35	1	1
18/12/2023	10:00-3:00pm	Taradale	23.5	3.8 NE	95	1	1
12/01/2024	10:00-3:00pm	Mount Mercer	28	15 NW	20	2	6

*reference site refers to known locations of GSM populations where individuals were recorded flying on the day of the relevant survey to allow confidence that the survey conditions were suitable.

Targeted surveys identified a total of six (6) Golden Sun Moth at the Mount Gow offset site (Table 5; Figure 3).

All six individuals were identified on the 05 December 2023, in the western and south-western portions of the offset site. Two individuals were recorded in high quality habitat and four were recorded in areas of low-quality habitat, as stipulated in the OMP (Figure 3).

GSM were not detected in similar numbers relative to previous surveys undertaken in surrounding areas (Table 3), potentially demonstrating that unfavourable weather conditions have negatively impacted the flight season for GSM. Additionally, since the OMP was enacted, the total cover of native vegetation has reduced considerably throughout the offset site, resulting in a reduction in total habitat for Golden Sun Moth. The combined increase in cover of weeds, reduction in native vegetation and poor weather conditions throughout the 2023/2024 period may be indicative of the reduced number of Golden Sun Moth recorded within the study area.

Table 5. Golden Sun Moth survey results during the 2023/24 flight season.

Date	Survey times	Temperature (°C) (start and end of survey)		Wind (km/hr)	Cloud cover (%)	No. of days since rain	No. GSM recorded within study area
05/12/2023	10:00-3:00pm	22.5	29.4	4 SSW	30	2	6
12/12/2023	10:00-3:00pm	22.0	28.8	9 ESE	15	1	0
18/12/2023	10:00-3:00pm	22.9	26.3	11 NNW	40	4	0
12/01/2023	10:00-3:00pm	23.5	32.3	7 SW	10	1	0

3.2.3 Stocking Rate

Based on the monitoring results for Year 2 surveys, the stocking rate of GSM for the 2023/2024 survey season was 0.226 GSM/Hectare (Table 6), which has increased from 0.0057 in Year 1.

Table 6. Golden Sun Moth Stocking Rate at the Mount Gow Offset Site

Year	No. of GSM^	Stocking Rate*
1	3	0.0057
2	6	0.226

Note: ^ Four Surveys undertaken**; *** GSM per hectare

4 MANAGEMENT TARGETS

The following section discusses the performance measures outlined within the OMP (Ecology and Heritage Partners Pty Ltd 2021), and the recorded cover of biomass and pest plant cover during the 2023/24 monitoring of the offset site. The following information aims to compare the overall targets of the vegetation quality noted within the OMP and baseline assessment with the current levels measured on site during the spring and summer of the 2023/24 assessments (i.e. Year 2). The management targets outlined in the OMP aim to improve and/or maintain existing Golden Sun Moth habitat within the study area by the end of Year 10 of management.

4.1 Weed Control

The objective of weed control within the offset site is to improve the existing quality of Golden Sun Moth habitat by reducing/minimising future invasion by exotic flora. This will be achieved through a combination of controlled pulse grazing (to limit opportunities for weed establishment and seed set in exotic flora) and weed spraying, through on-ground management activities.

The performance indicators for weed control and whether the targets have been met are outlined in Table 7.

Table 7. Performance indicators for Weed Control

Weed control Performance indicator	Year 2 Targets Met (Yes/No/On going)
Eliminate all high threat and woody weeds (<1% cover) within Habitat Zone 1	No
Where herbicide application is employed, waterway sensitive products and non-residual herbicides are to be employed	Yes
Achieve a VQA weed score of at least 6/15 by the end of the 10 year management period	On-going
Achieve an understory score of at least 15/25 by the end of the 10 year management period	On-going
No off-target damage to indigenous plants	Yes
No new or high threat weeds establishing within the offset site	No

4.2 Biomass Control

The objective of biomass control within the offset site is to promote and maintain floristic diversity, and inter-tussock spaces for germination and recruitment of native flora associated to provide Golden Sun Moth habitat. In addition, these actions will improve habitat quality for existing flora present within the offset site, and assist with minimising the growth of weeds.

The performance indicators for biomass control and whether the targets have been met are outlined in Table 8

Table 8. Performance Indicators for Biomass Control.

Maintain or improve species richness and improve species diversity	No
Improve species recruitment through improvement and maintenance of suitable vegetation structure throughout the site	No
Biomass remains moderate (i.e. no increase on current levels), and suitable inter-tussock spaces for natural recruitment maintained/provided (through transect monitoring and photo-points – see below)	No
Achieve a VQA understory score of at least 15/25 by the end of the 10 year management period	On-going
Achieve a VQA recruitment score of at least 6/10 by the end of the 10 year management period	On-going
Stock grazing is excluded between October-November, except where necessary for further biomass reduction during dry periods. Grazing does not occur between October-November in more than two consecutive years	No – Agreement in place with TfN
Establishment of 14 x 1m2 quadrats throughout the offset site to monitor density of biomass	Yes
Weed biomass does not increase in areas of remnant vegetation;	No
Minimum of 20% of total offset site cover will comprise inter-tussock space; and,	No
All grazing events effectively documented.	Yes (Appendix 2)

4.3 Pest Animals

The objective of pest animal management is to control pest animals (e.g. rabbits, foxes) within the offset site, as required, to minimise negative impacts to the Plains Grassland communities, which provides habitat for GSM. The *Catchment and Land Protection Act 1994* lists rabbits and foxes as established pest animals and requires that all landowners take reasonable steps to prevent the spread of, and as far as possible eradicate, established pest animals on their land.

The performance indicators for Pest Animals and whether the targets have been met is outlined in Table 9.

Table 9. Performance indicators for Pest Animals.

Biomass Control Performance indicator	Year 2 Targets Met (Yes/No/On going)

Any rabbit warrens or fox dens are controlled immediately following detection	Yes
Reduction in the abundance of pest animals, and no detectable impacts to the native grassland community	Yes
All monitoring and management activities are effectively documented	Yes

4.4 Fencing

An existing permanent stock-proof fence currently exists around the perimeter of the broader offset property. Under this agreement livestock (sheep) may be permitted into the offset site for control of herbaceous/grassy weeds and biomass management, with grazing to be generally excluded between 1st October and 31st January. The purpose of maintaining fencing along the border of the offset site is to ensure that stock are excluded during the relevant periods.

The performance indicators for fencing and whether the targets have been met is outlined in Table 10.

Table 10. Performance indicators for Fencing.

Biomass Control Performance indicator	Year 2 Targets Met (Yes/No/Partial)
Stock excluded from offset site during relevant exclusion period (generally October-November).	No – Agreement in place with TfN
Access to the offset site is appropriately controlled	Yes
Existing and temporary fencing is maintained in good repair	Yes
Posts around the perimeter of the offset site are established for monitoring and management purposes	Yes
All fencing activities and repairs are effectively documented	Yes

5 DISCUSSION

5.1 Vegetation Condition

Native vegetation condition and extent has reduced considerably within the Mount Gow Offset site over the past several years, since the original baseline assessment was conducted in 2020 (Ecology and Heritage Partners 2020) and the OMP was enacted in 2022 (Ecology and Heritage Partners 2021). The OMP was enacted to secure 26.5 hectares of Golden Sun Moth habitat within the offset site, which corresponded with 26.5 hectares of *Heavier Soils* Plains Grassland (EVC 132_61). When the original baseline assessment was conducted, two distinct quality conditions for patches of native vegetation were recorded within the offset area, including; several high condition patches (PG1), which also met the condition threshold to be considered NTGVVP (approximately 2.21 hectares); and several low condition patches (PG3), which corresponded with the remainder of the Golden Sun Moth offset area (approximately 24.29 hectares).

In Year 2 of management (2023/2024), the overall extent of native vegetation within the study area was 0.68 hectares, comprising two EVCs:

- 0.581 hectares of *Heavier Soils* Plains Grassland, which contained a low condition score of 0.20-0.37/1 (Appendix 1.2);
- 0.098 hectares of Plains Grassy Wetland, which contained a low condition score of 0.17/1(Appendix 1.2).

Plains Grassy Wetland was identified within the study area; however, this is not being considered in the context of the site, as it does not provide suitable habitat features for Golden Sun Moth.

For patches of *Heavier Soils* Plains Grassland, there has been a marked reduction in the *understorey*, *lack of weeds*, *recruitment* and *organic matter* scores.

Understorey

In the original baseline assessment the *understorey* component achieved a score of 15/25, whereas in Year 1 and Year 2, there was marked reduction in these scores. The highest quality patches (i.e. PG2a) achieved a score of 10/25 and the lower quality patches (i.e. PG1, PG2b-d) achieved a score of 5/25, indicating lower floristic diversity in patches of native vegetation (Table 11.

Table 11). Based on the results of the field assessment, the higher quality patch of PG2a contained up to six species and four of seven lifeforms were met. Patches PG1 and PG2b-d it is still well below the benchmark number of species, and generally comprised of only one or two species and lifeforms.

The results of the lifeform assessment for Year 1 and Year 2 are outlined in Table 11.

Table 11. Results of the Year 1 and Year 2 lifeform species diversity, compared against the benchmark *Heavier Soils* Plains Grassland.

Lifeform	Benchmark # Spp.	Year 1	Year 2		
		PG1	PG1	PG2a	PG1, PG2b d
LH	2	0	0	0	0

MH	12	1	0	1	0
SH	4	0	0	1	0
LTG	1	1	0	0	0
MTG	13	4	1-2	4	1-2
MNG	4	0	0	0	0
BL	N/A	Present	Present	Present	Present
# Lifeforms observed / EVC benchmark # of lifeforms		4/7	2/7	4/7	2/7
Score		10/25	5/25	10/25	5/25

Note: LH = Large Herb; MH = Medium Herb; SH = Small or Prostrate Herb; LTG = Large Tufted Graminoid; MTG = Medium to small Tufted Graminoid; MNG = Medium to Tiny Non-tufted Graminoid; BL = Bryphytes Lichens and Soil Crust

Lack of Weeds

In the original baseline assessment, the *lack of weeds* component achieved a score of 6/15, whereas in Year 2, the majority of patches of native vegetation had a reduced *lack of weeds* score, with the exception of PG2a which achieved a score of 7/15 .

In Year 2, the majority of patches of native vegetation achieved a higher relative *lack of weed* score than patches identified in Year 1, suggesting that the additionally pulse grazing may be assisting in reducing the total cover of weeds across the site. It's important to note that the above scores only relate to patches of native vegetation, and the cover of weeds across the broader site was considerably higher.

The results of the lack of weeds assessment for year 1 and Year 2 are outlined in Table 12

Table 12. Lack of Weed Score compared with the results of Year 1 and Year 2 Monitoring.

	Year 1	Year 2		
	PG1	PG1	PG2a	Pg2b d
Lack of Weeds Score /15	2/15	2/15	7/15	4/15

Recruitment

The original baseline assessment achieved a *recruitment* score of 6/10, which indicates that the percentage of bareground, byophytes/lichens and soil crust was estimated to be between 20-40%. In Year 1, there was a reduction in the *recruitment* score across the site, and in Year 2, some of the patches (i.e. PG1, PG2b) were consistent with the scores for the baseline assessment (Table 13).

Based on the results of the Year 2 monitoring, some patches of native vegetation achieved a higher relative score than what was achieved during the Year 1 assessment. This may be the result of increased pulse grazing which extended through October, and coincided with the time the field assessment was undertaken.

The results of the *recruitment* assessment for Year 1 and Year 2 are outlined in Table 12.

Table 13. Recruitment score compared with the results of Year 1 and Year 2 Monitoring

	Year 1	Year 2	
	PG1	PG1, PG2b	PG2a, PG2c d
Recruitment /10	3/10	6/10	3/10

Organic Matter

In the baseline assessment, the *organic matter* component (benchmark of 10% cover) achieved a score of 5/5, whereas Year 1 achieved an *organic matter* score of 3/5 and Year 2 achieved an *organic matter* score of between 2-4/5 depending on the patch (Table 14).

Based on the requirements outlined in the OMP, the vegetation condition and extent has reduced considerably within Plains Grassland patches, which is consistent with the finding of the Jacobs audit (Jacobs 2023). The study area contained low floristic diversity and a high cover of exotic species, predominantly Toowoomba Canary-grass.

In order to improve the condition and extent of native vegetation within the study area, and concurrently the Golden Sun Moth habitat, intensive management actions will be required to decrease the cover of exotic plants and increase the cover of native vegetation within the study area. Direct seeding of native grasses and herbaceous plants will be required to improve the understorey component, and active weed management (i.e. spot-spraying) will be required to improve the lack of weed score. Other methods, such as planned burns and pulse grazing should be undertaken to reduce the cover of weeds, improve the organic litter components and increase the recruitment scores.

The results of the *organic matter* assessment for Year 1 and Year 2 are outlined in Table 14.

Table 14. Organic Matter score compared with the results of Year 1 and Year 2 Monitoring

	Year 1	Year 2		
	PG1	PG1	PG2a c	PG2d
Organic Matter /5	3/5	4/5	2/5	3/5

Weed cover and management measures are outlined below (Section 4.1.1)

5.1.1 Weed Cover

The OMP noted the total percentage cover of weeds to be between 40-55% within the Golden Sun Moth Offset area. Year 1 monitoring indicated the overall cover of weeds was between approximately 71-95% across the study area, with patches of native vegetation (i.e. PG1) having the lowest cover of weeds. Year 2 monitoring had similar findings, with the overall cover of weeds estimated between 76-95%. Outside patches of native vegetation, the cover of weeds was considerably higher. As outlined in the OMP, the objectives of weed

management is to achieve and maintain a VQA *lack of weed* score of at least 6/15 (i.e. 25-50% cover and less than 50% high threat weeds). As outlined above (i.e. Section 4.1), the lack of weeds scores for patches of native vegetation obtained a higher weed score, relative to Year 1; however, on-going work is required to ensure that the cover of weeds within these patches and across the broader site does not expand. A target of the OMP was to eliminate all high threat and woody weeds (<1% cover), and any new and emerging herbaceous weeds need to be eliminated (<1% cover).

In Year 2 monitoring, all woody weeds, primarily African Box-thorn, were appropriately managed and the cover of woody weeds across the study area was <1% (i.e. <0.01%). During the field assessment, the total cover of environmental weeds has increased considerably (Table 2), including:

- Toowoomba Canary-grass which was in high abundance through the offset area, with a total cover of 44-65%, increased from 25-45% since the OMP was enacted. Due to the large degree of encroachment which has occurred, on-going and active management will be required (i.e. spot-spraying) to manage Toowoomba Canary-grass, and potentially an ecological burn;
- The cover of Barley Grass has remained consistent since the OMP was enacted, with a total cover of 3%;
- The cover of Flatweed has remained relatively consistent, with a total cover of 2%;
- While not recorded in the baseline assessment, Bromes have been recorded within the study area, with an estimated cover of 5%;
- The cover of Rat-tail Fescue has increase to 5-8%, from 2% since the OMP was enacted;
- The cover of Wild Oat has remained reduced marginally, with an estimated 2% cover, compared to the 3% identified in the baseline assessment; and,
- While not previously identified in the OMP, Rye-grass and Rough Dog's-tail were recorded within the offset area, with a total cover of 1-2% and 3%, respectively.

Since the OMP was completed in 2021 (Ecology and Heritage Partners 2021), there has been a considerable increase in the total cover of environmental weeds, despite the decrease in cover of noxious weeds. Due to the high cover of environmental weeds the throughout the offset area, ongoing and intensive weed management will be required to meet the performance indicators outlined in the OMP. Given the increase in cover of a variety of environmental weeds, high-threat weeds have been recategorized based on the threat they pose to Golden Sun Moth habitat within the offset area. The list of current high threat weeds is outlined in Table 2. Ongoing intensive and integrated weed management is required to ensure these high threat weeds do not continue to increase in cover within the offset site, and over the next couple years, these weeds should be the focus of weed management activities. This should include a combination of herbicide application and pulse grazing as per the OMP. The idea of an autumn burn should also be investigated, which may assist in reducing the overall cover of weeds within the study area and support recruitment for native grasses and herbs. Weed management measures should aim to reduce the overall cover of weeds to <25% over the coming years, which would increase the *lack of weeds* score, improving the vegetation condition. Given the marked increase in environmental weeds, it's highly recommended a land management contractor is engaged to manage environmental weeds within the offset area.

Specific weed management actions undertaken (i.e. physical removal, spraying, pulse grazing) will be provided by the landowner as part of their annual report.

5.1.2 Biomass Control

Biomass management is essential to enhance the ecological values throughout the offset site, including the maintenance and improvement of GSM habitat. Biomass management is also required to maintain inter-tussock spaces and prevent excessive competition to grassland forbs. Biomass control will aim to maintain approximately 20% of bare ground or inter-tussock space to allow sufficient space for recruitment of herbs and grasses. Based on the results of Year 2 of Monitoring, the cumulative percentage of bare-ground was approximately 10%, which is relatively consistent with the finds of the biomass monitoring plots (i.e. 8.14%) and lower than the goal cover of 20% outlined in the OMP (Appendix 1.3). This may be due to the unseasonably wet conditions over the past several years, which maintained consecutive La Niña years.

In order to improve biomass levels to the amount specified within the OMP, the landowner should explore a variety of options, including:

- Pulse Grazing – which should occur throughout winter to prevent increases in weeds and biomass to uncontrollable levels. The OMP states that grazing should not occur between October 1 and January 31; however, the landowner received approval from Trust for Nature to extend pulse grazing throughout October, to help manage weeds within the study area and support recruitment of native vegetation throughout summer. Pulse Grazing should aim for total vegetation cover of no greater than 80% after grazing. Additionally, pulse grazing should not occur too frequently during periods of high rain, which might result in pugging, disturbing the soil. In Year 1, the intensity of pulse grazing may not have been sufficient, as evident by the increase in Toowoomba Canary-grass and other environmental weeds. Based on observations from the field assessment, the pulse grazing appears to be reducing the total cover of native grasses and the intensity may not be sufficient to reduce the cover of Toowoomba Canary-grass. Sheep may be preferring to graze native grasses, rather than environmental weeds. Thus, an increase in the intensity of pulse grazing throughout October and in winter may assist in reducing the cover of Toowoomba Canary-grass and other environmental weeds, creating space of native recruitment in spring;
- Ecological Burn – this is not a compulsory component of the OMP, however, it is considered that an appropriate ecological burning regime will appropriately control biomass and enhance and promote the maintenance of species diversity within the offset site. Given the ineffectiveness of pulse grazing to eliminate weeds to date, it is highly recommended that an ecological burn is explored, which would create space for native recruitment. If this option is explored, an ecological burn should occur in later summer, early autumn, and should occur every 2-5 years. The intensity and extent of the ecological burns may need to be adjusted based on the effectiveness of the action of the coming years; and,
- Weed spraying – this method should occur in conjunction with pulse grazing and ecological burns, and effort should be made to minimise environmental weeds within the offset area. This method would reduce the cover of weeds, enabling recruitment of native grasses and herbs in these areas. It is highly recommended that spot-spraying occurs, targeting high threat weeds outlined in Table 2. Boom spraying should not occur within the offset area, as this may inadvertently impact native grasses and Golden Sun Moth populations.

It is anticipated that, if weather conditions permit, an integrated approach with pulse grazing followed by weed spraying at the appropriate time would be beneficial to the site and assist in meeting the biomass control target of 80% by the completion of the OMP. Due to the high cover of environmental weeds, it is highly recommended an ecological burn should occur within the offset area.

5.1.3 Pest animals

The objective of pest animal management is to control pest animals (e.g. rabbits, foxes) within the offset site, as required, to minimise negative impacts to the Plains Grassland communities, which provides habitat for GSM. During the site assessment, one rabbit warren was recorded in the south of the offset area, approximately 700-metres to the south of the Golden Sun Moth offset area. As per the requirements of the OMP, the rabbit warren must be controlled immediately.

5.1.4 Fencing

During the site assessment, the boundary of the offset area was walked to ensure that permanent stock-proof fencing was maintained in good condition, as per the requirement of the OMP. It was noted that all fencing was maintained around the offset area in good condition, and no fence gaps were recorded (Plate 8; Plate 9). This ensures that stock is adequately excluded from the offset site during the relevant exclusion period (October-November). Current fencing meets the requirements outlined in the OMP.

Plate 8. Stock-proof fencing erected along the boundaries of the offset area (Ecology and Heritage Partners Pty Ltd 15/10/2024).

Plate 9. Stock-proof fencing erected along the boundaries of the offset area (Ecology and Heritage Partners Pty Ltd 15/10/2024).

5.2 Golden Sun Moth

In Year 2 of monitoring, Golden Sun Moth targeted surveys identified a total of six (6) Golden Sun Moth flying within the Mount Gow offset site over four days (05, 12 and 18 December 2023, and 12 of January 2024). In comparison, three (3) Golden Sun Moth were identified in Year 1 of monitoring, suggesting that the conditions were better for Golden Sun Moth in Year 2. However, compared to the results of the previous targeted surveys (Table 3), there has been a considerably reduction in the number of Golden Sun Moth recorded within the offset area, since the OMP was implemented.

In Year 1 and Year 2 Golden Sun Moth were not detected in similar numbers relative to previous surveys undertaken in surrounding areas, demonstrating that atypical weather conditions during the 2022/2023 and 2023/2024 survey seasons may have compelled Golden Sun Moth to stay in the larval stage rather than emerge and develop into an adult, and await warmer drier conditions in the subsequent season (DEWHA 2009).

Continued biomass and weed control within the offset site can enhance existing GSM habitat by reducing and/or minimising future invasion by exotic flora. This will assist in supporting the open structured Plains Grassland community suitable for the ecological requirements of Golden Sun Moth. Should the 2024/2025 (i.e. Year 3) survey period provide more favourable warm and dry survey conditions, we expect a more accurate representation of Golden Sun Moth abundance in the Year 3 monitoring season, particularly as these conditions relate to ground and soil dryness. Given the increase in environmental weeds and decrease in cover of native vegetation, which golden Sun Moth rely on, active weed management will be required to improve the habitat conditions for Golden Sun Moth. Direct seeding of native grasses should occur in conjunction with weed management activities and pulse grazing, to ensure that adequate recruitment of native grasses occurs.

Nevertheless, given the extent of suitable habitat for Golden Sun Moth within and adjacent to the offset site, as well as the high numbers of individuals previously recorded, it is anticipated that provided environmental conditions are optimal in future years and management actions are appropriately undertaken, the stocking rate will increase.

5.3 Management Actions Summary – 2023/24

A summary of the required management actions and completion dates for 2023/24 as outlined in the OMP are provided below in Table 15.

Table 15. Management Action Table for the offset site for the Year 2 (2023/24) monitoring period.

Year from Commencement	Area	Management Action Description	Resource	Timing of action	Key performance target/s for end of 10 year management plan	Year 1 Action Completed? (Yes/No)	Date	Additional Comments
Fencing								
Year 1 - 10	26.5 hectare GSM habitat	Establish fence around the boundary of the offset site in accordance with advice from a qualified ecologist and land surveyor Refer Section 5.5.2 of the OMP	Landowner	Ongoing	Exclude stock from the offset site during exclusion period to protect Golden Sun Moth habitat.	Yes	Details provided by Charles Cameron (Landholder)	See Appendix 2 for details
	26.5 hectare GSM habitat	Maintain fencing in good condition to appropriately exclude unintended grazing by livestock over the 10 year management period. Refer Section 5.5.2 of the OMP		ongoing	Maintain fencing to DELWP fencing standards in BushBroker Information Sheet 12 - Standards for Management – Fencing (excluding the southern boundary along the stone wall where a simple stock-proof fence will be used)	Yes	Details provided by Charles Cameron (Landholder)	See Appendix 2 for details
Woody Weed Control								

Year from Commencement	Area	Management Action Description	Resource	Timing of action	Key performance target/s for end of 10 year management plan	Year 1 Action Completed? (Yes/No)	Date	Additional Comments
Year 1 - 10	26.5 hectare GSM habitat	Control new and emerging woody weeds Refer Section 5.5.3 of the OMP	Landowner	Ongoing	Maintain woody weeds (<1% cover)	Yes	Details provided by Charles Cameron (Landholder)	See Appendix 2 for details
Herbaceous Weed Control								
Year 1 - 10	26.5 hectare GSM habitat	Control herbaceous weeds. Refer to Table 7 for list of herbaceous weeds, their control method and timing of actions Refer Section 5.5.3 of the OMP	Landowner	Refer to Table 8 of the OMP.	Maintain high threat weeds to levels outlined with section 5.5.4. Minimise off-target damage (avoid all native plants)	Yes	Details provided by Charles Cameron (Landholder)	Herbaceous weeds were controlled in accordance with the requirements of the OMP. However, new emerging weeds, such as Toowoomba Canary-grass, Brome and Rat-tailed fescue will need to be controlled during following years. See Appendix 2 for details
	26.5 hectare GSM habitat	Control all new & emerging herbaceous weeds Refer Section 5.5.3 of the OMP		Ongoing.	<2% cover of all new and emerging herbaceous weeds at the end of Year 10	Yes	Details provided by Charles Cameron (Landholder)	See Appendix 2 for details
Pest Animals								
Year 1 -10	26.5 hectare GSM habitat	Control rabbits and foxes. Refer to Section 5.5.4 for a list of control methods and timing of actions	Landowner / Pest Animal Contractor	Refer to Table 9 of the OMP.	No surface disturbance within the offset site; No active rabbit warrens to be present;	Yes	Details provided by Charles Cameron (Landholder)	See Appendix 2 for details

Year from Commencement	Area	Management Action Description	Resource	Timing of action	Key performance target/s for end of 10 year management plan	Year 1 Action Completed? (Yes/No)	Date	Additional Comments
		Refer Section 5.6 of the OMP			No active fox dens to be present; No rubbish/artificial harbour present; Minimal artificial piles of logs and rocks			
	26.5 hectare GSM habitat	Monitor and control rabbits and foxes Refer Section 5.5.4 of the OMP		Ongoing	Reduction in the abundance of pest animals, and no detectable impacts to the native grassland	Yes	Details provided by Charles Cameron (Landholder)	See Appendix 2 for details
	26.5 hectare GSM habitat	Monitor and control all new and emerging pest animals Refer Section 5.5.4 of the OMP		Ongoing	Control numbers of any new & emerging pest animals	Yes	Details provided by Charles Cameron (Landholder)	See Appendix 2 for details
Biomass Management								

Year from Commencement	Area	Management Action Description	Resource	Timing of action	Key performance target/s for end of 10 year management plan	Year 1 Action Completed? (Yes/No)	Date	Additional Comments
Year 1 -10	26.5 hectare GSM habitat	Pulse grazing in dry years and light grazing in wet years. Refer Section 5.5.5 of the OMP	Landowner	The maximum length of continuous grazing is four weeks with at least two weeks rest between cycles. Stock generally excluded during October - January Stock removed immediately following any high rainfall events.	Stock must be removed should total vegetation cover fall to or below 70% Sufficient bare ground (approximately 20%) maintained in order to maintain space for recruitment of herbs and grasses. Maintain or improve species richness and improve species diversity. No loss of native plant diversity as a result of grazing regimes. Reduction in weed cover. All grazing events to be documented.	Yes	Details provided by Charles Cameron (Landholder)	Year 2 pulse grazing was conducted, and in discussions with Trust for Nature, pulse grazing has extended throughout October to provide adequate recruitment space for native herbs and grasses. The intensity of pulse grazing should be maintained throughout Years 3 and 4 and an ecological burn should be considered.
Detailed Golden Sun Moth Population and Vegetation Monitoring								
Years 1-4, 6, 8 and 10	26.5 hectare GSM habitat	Monitoring Refer Section 8.2, 8.3 and 8. of the OMP Landowner responsible for arranging third party monitoring, while the Approval Holder	Suitably qualified ecologist (Ecology and Heritage Partners)	Spring/Summer	Assessment of the effectiveness of the management actions. Monitoring reports will include a review of past management works against the performance targets and objectives contained within this OMP, and recommended	Yes	See Sections 3 and 4 above.	N/A

Year from Commencement	Area	Management Action Description	Resource	Timing of action	Key performance target/s for end of 10 year management plan	Year 1 Action Completed? (Yes/No)	Date	Additional Comments
		is responsible for funding monitoring and reporting			changes to management actions where required. Landowner to submit Annual Reports including surveys to TFN and the Approval Holder. The Approval Holder is responsible for submitting all reporting to DCCEEW			

5.4 Recommendations

Recommended measures to improve the condition and extent of native vegetation and associated Golden Sun Moth habitat within the offset site, include:

- Continue to implement pulse grazing during late summer, early autumn and winter (if dry) to reduce (and then maintain) the overall biomass cover to 80% across entire offset site. In discussions with Trust for Nature, the landowner has extended pulse grazing throughout October to provide adequate recruitment space for native grasses and herbs. The effectiveness of the additional pulse grazing will need to be evaluated in Year 3 of monitoring;
- Pursue the possibility of conducting an autumn burn to help reduce the grassy weed cover on site and reduce the amount of weed seed present (that set and dropped due to conditions being unsuitable to spray prior to seed set). Care should be taken to ensure the native grasses have dropped their seed, as this may take place later than usual due to the wetter conditions this year. Burns should not occur more than once every 5 years. The frequency at which burns occur may need to be altered based on the effectiveness of the management action. Should the use of an burn be explored, this must be conducted outside the active period for Golden Sun Moth (i.e. October to February);
- Additional active weed control by the landowner or a suitable contractor will be required to maintain and/or reduce the cover of high threat weed species below the threshold of <1%. Spot spraying of Flatweed, Rat-tailed Fescue, Toowoomba Canary-grass, Wild Oat, Rye Grass, Bromes, and Rough Dog's Tail should occur throughout the study area, and controlling newly emerging high threat weeds must be actively continued to meet the required target weed cover across the offset site. Weed control actions, over multiple days, will be conducted outside of the normal active period for Golden Sun Moth (between October to February) to avoid any unexpected impacts to Golden Sun Moth populations as the effects of herbicide application on Golden Sun Moth remain unknown. A qualified land management contractor should be engaged to undertake weed management;
- Active seeding of native grasses, such as Wallaby Grass, Spear Grass, should be undertaken within the offset area to assist with native recruitment. Direct seeding will focus on establishment of wallaby-grasses, as these species are known to be the primary food source of Golden Sun Moth; however, a variety of species should also be used to improve the overall vegetation condition, such as Spear Grass, Tussock Grass and Kangaroo Grass. Direct seeding should occur in October/November, with a frequency of no more than once a year. A qualified land management contractor should be engaged to undertake direct seeding. Follow-up supplementary watering may assist in ensuring that seeds germinate during October/November; and,
- One rabbit warren was detected in the south of the offset site, approximately 700-metres to the south of the Golden Sun Moth offset area, on the eastern side of the river; however, it does not appear as though the rabbit warren is inhabited. If this has not already been actioned, the rabbit warren must be immediately fumigated, according to best practice management techniques. Fumigation works must be conducted by the landowner or a suitably qualified operator where rabbit activity is identified.

Whilst it is understood that the OMP allows for the landholder to use an Adaptive Management Approach to allow the flexibility to respond appropriately and effectively to the uncertainties involved in ecological processes, it should be noted that *any proposed changes to the management (i.e. alterations to strategic grazing regime) contrary to that specified within the OMP must be approved by DCCEEW, prior to implementation.* For instance, the OMP indicates that pulse grazing should not occur between 1st October and 31st January. As pulse grazing has been extended throughout October, DCCEEW should be notified.. Additionally, should an ecological burn be proposed to occur within the offset site, this action must be approved by DCCEEW prior to implementation.

A proposed timeline for Year 3 for recommended management actions to improve the condition and extent of Golden Sun Moth habitat within the offset area is outlined in Table 16.

Table 16. Proposed timelines for recommended management actions, the responsible authority and end of year 3 targets.

Year	Management Action	Recommended Timing of Action	Responsible Authority	End of Year 3 Target	Comments
Year 3	Pulse Grazing	Recommended pulse grazing cycle required is a minimum of four events; four weeks on, two weeks off, excluding November to February period. Noting that in discussions with Trust for Nature, the landowner has extended pulse grazing throughout October.	Landowner	<80% total biomass	Pulse grazing should continue to occur throughout year 3; however, if planned burns occur, stock should be excluded from the offset site for a month so the soil is not disturbed and to enable native recruitment. The landowner report (Appendix 2) indicates that ongoing pulse grazing has been occurring as per the requirement of the OMP. Consideration should be given to increasing the number of times pulse grazing occurs throughout Year 3.
	Ecological Burn	An ecological burn should occur in late summer, early autumn. Ecological burns should not occur more than once every 5 years.	Land Management Contractor/CFA	Decrease in exotic vegetation within the study area at the end of Year 3, measured by an increase in the quality and extent of Plains Grassland patches.	A late summer to early autumn burn is recommended because it avoids the reproductive cycle for most plants and animals. This would assist in managing rampart Toowoomba Canary-grass growth within the offset site. Livestock should be excluded from the offset site for approximately four weeks following the ecological burn, to ensure the soil is not significantly disturbed. As an ecological burn is not outlined as an approved management action within the OMP, this action must be approved by DCCEEW prior to commencement.
	Weed Management	Once every two weeks, conducted outside of October to February, when Golden Sun Moth are active.	Land Management Contractor	<20% cover of weeds	Weed management should be undertaken by a qualified land management contractor that is experienced in grassland management, in order to effectively manage environmental weeds within the offset site.
	Direct Seeding	Once in October and/or November, across the entire offset area	Land Management Contractor	Increase in native recruitment at the end of Year 3, measured by an increase in the quality and extent of Plains Grassland patches.	Direct seeding should occur in October or November, using an indigenous species mix supplied by a reliable contractor. As direct seeding is not outlined as an approved management action within the OMP, this action must be approved by DCCEEW prior to commencement.

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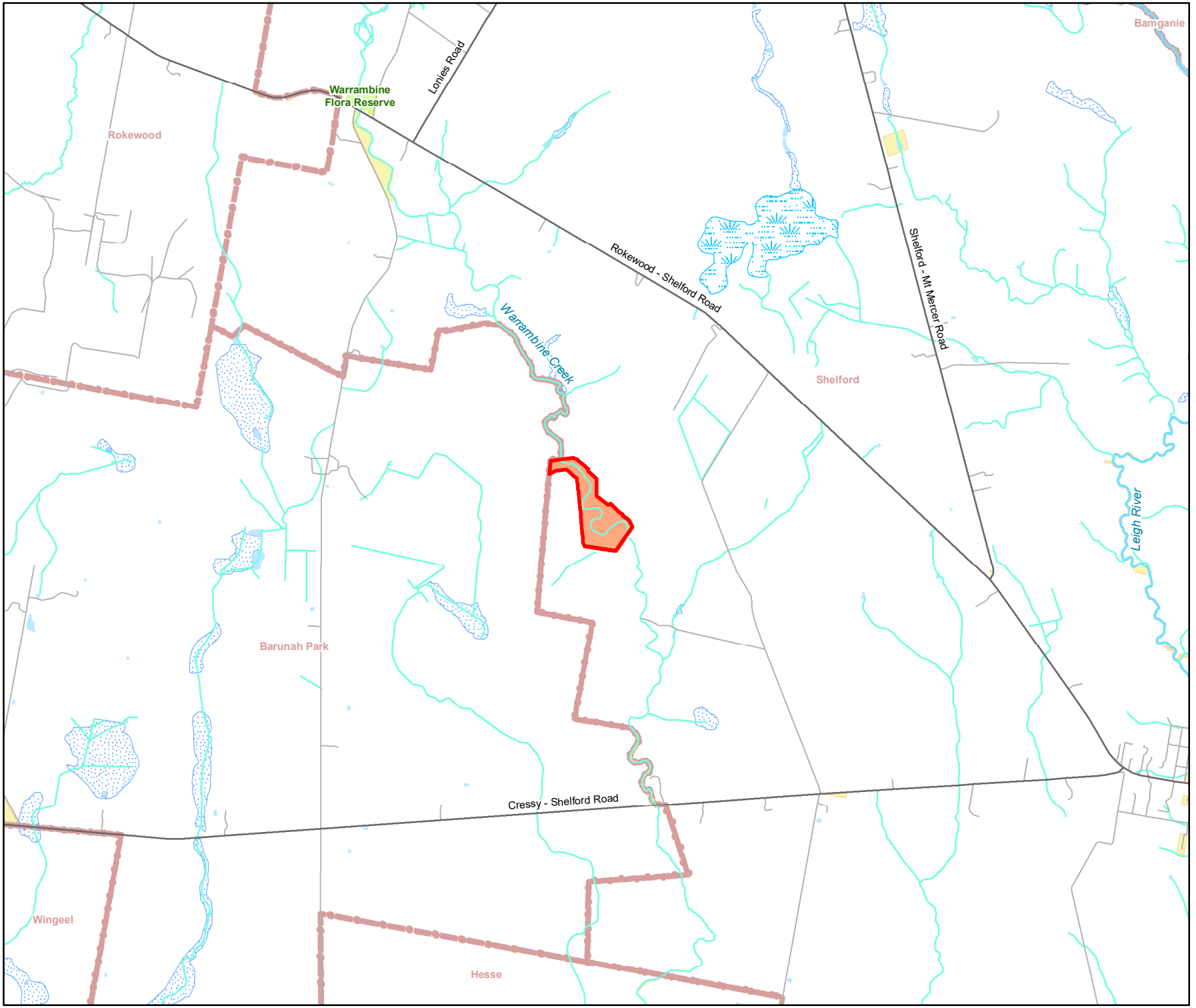
FIGURES



Legend

- Mount Gow Offset Site
- Collector Road
- Minor Road
- Minor Watercourse
- Major Watercourse
- Permanent Waterbody
- Land Subject to Inundation
- Wetland/Swamp
- Parks and Reserves
- Crown Land
- Localities

Figure 1

Location of Mount Gow Offset Site

Offset Site Monitoring - Year 2

N

0 750 1,500

Metres

ecology & heritage partners

16882_Fig01_SA_MtGowOS2 17/10/2024 melsley

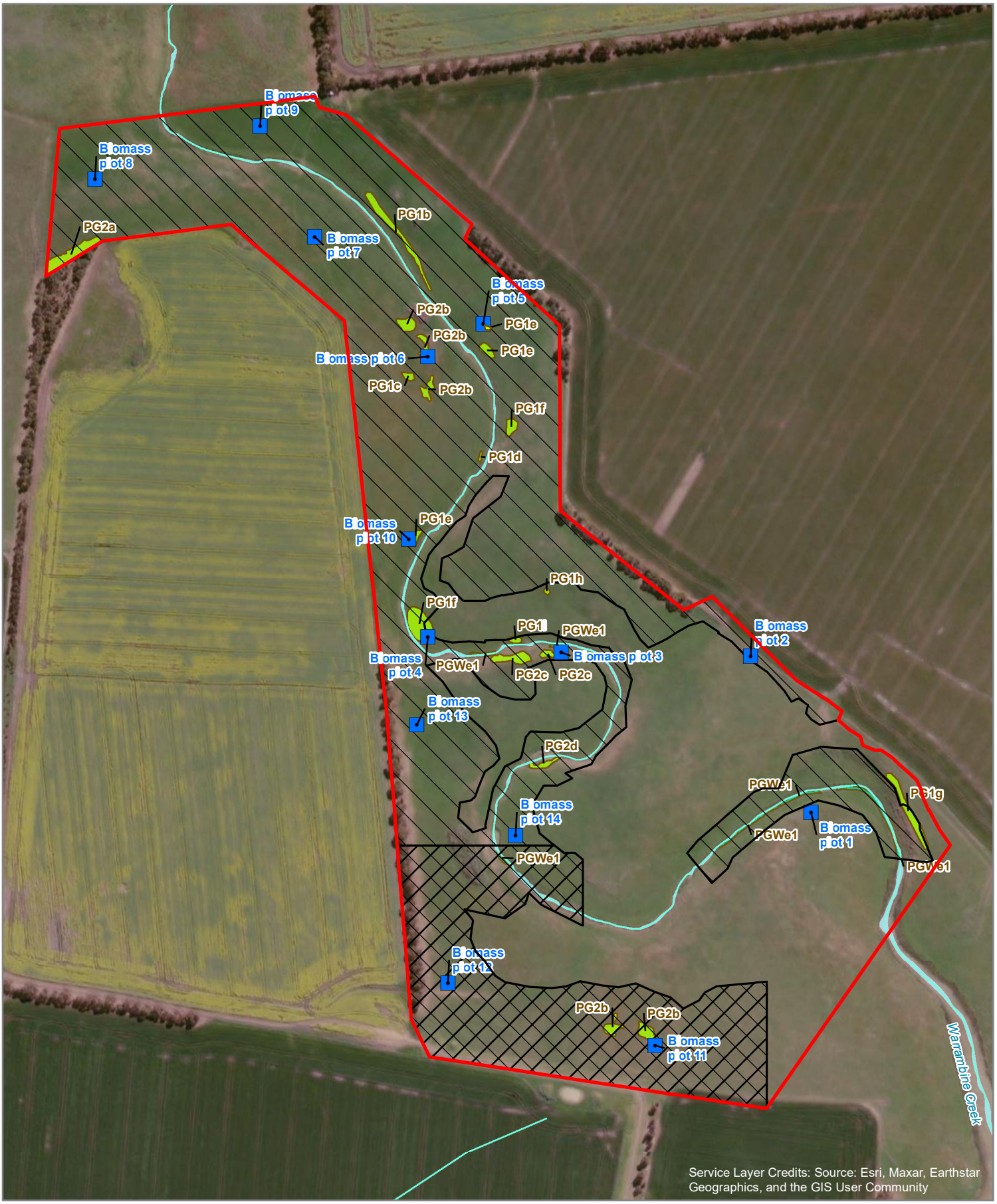


Figure 2

Survey Results - Mount Gow Offset Site

Offset Site Monitoring - Year 2

ecology & heritage partners

Legend

- Mount Gow Offset Site
- Biomass monitoring plot

Ecological Vegetation Class

- Plains Grassy Wetland (EVC 125)
- Plains Grassland (EVC 132)

Proposed offset sites for EPBC Act referral 2018/8260

- Proposed moderate quality GSM offset site (6 ha)
- Proposed high quality GSM offset site (20.5 ha)

N

0 50 100

Metres

Figure 3

Golden Sun Moth Habitat Quality - Mount Gow Offset Site

Offset Site Monitoring - Year 2

Legend

- Mount Gow Offset Site
- Golden Sun Moth (Survey date: 05/12/2023)

Golden Sun Moth Habitat Quality

- High Quality
- Low Quality

N

0 50 100

Metres

ecology & heritage partners

APPENDIX 1 FLORA

Appendix 1.1 Flora Results

Legend:

^ Naturally growing (i.e. non-planted) indigenous species to the study area

Table A1.1. Flora within the study area.

Scientific Name	Common Name	Notes
INDIGENOUS SPECIES		
Acaena echinata	Sheep's Burr	^
Arthropodium minus	Small Vanilla-lily	^
Austrostipa spp.	Spear Grass	^
Creeping Knotweed	Persicaria prostrata	^
Eleocharis acuta	Common Spike-sedge	^
Eleocharis sphacelata	Tall Spike-sedge	^
Eryngium ovinum	Blue Devil	^
Glycine clandestina	Twining Glycine	^
Juncus spp.	Rush	^
Melicytus angustifolius subsp. *divaricatus*	Tangled Shrub-violet	^
Oxalis perennans	Grassland Wood-sorrel	^
Poa spp.	Tussock Grass	^
Rytidosperma spp.	Wallaby Grass	^
Themeda triandra	Kangaroo Grass	^
NON-INDIGENOUS OR INTRODUCED SPECIES		
Aira spp.	Hair Grass	-
Arctotheca calendula	Cape Weed	-
Avena fatua	Wild Oat	-
Bromus spp.	Brome	-
Cynosurus echinatus	Rough Dog's-tail	-
Erodium cicutarium	Common Heron's-bill	-
Helminthotheca echioides	Ox-tongue	-
Hypochaeris spp.	Cat's Ear	-
Lolium spp.	Rye Grass	-

Scientific Name	Common Name	Notes
Medicago polymorpha	Burr Medic	-
Nassella neesiana	Chilean Needle-grass	-
Phalaris aquatica	Toowoomba Canary-grass	-
Romulea rosea	Onion Grass	-
Salvia verbenaca	Wild Sage	-
Silybum marianum	Variegated Thistle	-
Solanum spp.	Nightshade	-
Sonchus oleraceus	Common Sow-thistle	-
Trifolium spp.	Clover	-
Vulpia spp.	Fescue	-

Appendix 1.2 Habitat Hectare Assessment

Table A1.2 Quantification of the current Site Condition Score based on the management of the offset site during the 2023/24 monitoring period and the previous monitoring.

Year		Baseline Assessment 2021		Year 1	Year 2					
Vegetation Zone		PG1	PG3	PG1	PG1	PG2a	PG2b	PG2c	PG2d	PGWe1
Bioregion		VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP
EVC		PG	PG	PG	PG	PG	PG	PG	PG	PGWe
EVC Number		132_61	132_61	132_61	132_61	132_61	132_61	132_61	132_61	125
EVC Conservation Status		Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered
Site Condition /75	Large Trees /10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Tree Canopy Cover /5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Lack of Weeds /15	6	0	2	2	7	4	4	4	4
	Understorey /25	15	10	10	5	10	5	5	5	5
	Recruitment /10	6	3	3	3	6	3	6	6	1
	Organic Matter /5	5	4	4	4	2	2	2	3	2
	Logs /5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Treeless EVC Multiplier	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
	Subtotal =	43.52	23.12	25.84	19.04	34.00	19.04	23.12	24.48	16.32
Landscape Context /25	Patch Size /10	16	16	1	1	1	1	1	1	1
	Neighbourhood /10			0	0	0	0	0	0	0
	Distance to Core Area /5			0	0	0	0	0	0	0
	Subtotal =	16	16	1	1	1	1	1	1	1
Habitat Points /100		60	39	27	20	35	20	24	25	17
Habitat Score		**0.60**	**0.39**	**0.27**	**0.20**	**0.35**	**0.20**	**0.24**	**0.25**	**0.17**

Notes: PG = *Heavier Soils* Plains Grasslands; VVP = Victorian Volcanic Plain; N/A = not applicable; * As specified in the Offset Management Plan (Ecology and Heritage Partners Pty Ltd 2021); N/P = not provided in the original baseline assessment.

Appendix 1.3 Biomass Monitoring Results

Table A1.3 Biomass Monitoring conducted at 14 one-metre² established points across the study area.

Biomass Monitoring				
Plot Number	**Percentage (%) Native Cover**	**Percentage (%) Weed Cover**	**Percentage (%) Bare Ground**	**Percentage (%) Rock Cover**
Year 1				
1	30	60	8	2
2	20	70	10	0
3	25	45	30	0
4	25	70	5	0
5	15	65	5	15
6	15	65	5	15
7	0	70	30	0
8	0	100	0	0
9	0	99	1	0
10	20	70	10	0
11	5	60	15	20
12	0	95	5	0
13	0	99	1	0
14	15	70	15	0
Total Average	12.14286	74.14286	10	3.714286
Year 2				
1	30	53	15	2
2	20	60	20	0
3	2	88	10	0
4	5	85	10	0
5	10	60	15	15
6	15	47	8	30
7	0	93	5	2
8	0	58	2	40
9	5	90	5	0
10	0	97	3	0
11	3	59	3	35
12	0	90	10	0

13	0	97	3	0
14	5	90	5	0
Total Average	6.79	76.21	8.14	8.86

APPENDIX 2 – LANDOWNER REPORT

Landowner(s): Crichton Properties Pty Ltd (Charles Cameron)
Site Reference: TFN-GPN14251 (Off-INT13560-Mt Gow Rd - Shelford (North))
Year: 2023-24
Date: 30/5/2024

Management Actions –Fencing, Photopoints, Erosion, Signage, Grazing, Burning

Year	Site and Zone(s) (e.g. 001/A)	Management action to be completed	Standard to be achieved (from OMP)	Description of action from OMP (Management actions and Targets are found listed in the Offset Management Plan appended to your Deed of Covenant)	Timing (From the OMP) (What time of year?)	Actions completed this year (yes/no) (if no state % completed)	Description of Action (What method of control did you use? E.g. Hand weeding/spot spray using glyphosate)	Comments and Observations (Have you noticed any changes in the vegetation, fauna or other features of the site e.g. have you found new species, have the weed/pest increased/ decreased/ remained the same?)
1-10	All	Photo Points	Establish 7 photopoints	Establish seven permanent photo-points in the GSM habitat offset site. These points will be marked via GPS and shown on a Figure. Photographs taken from these points will be representative of the vegetation and objectives of the OMP (e.g. areas of high threat weed invasion). Photographs will be taken in October each year and clearly labelled. Each photo will be taken from as near to the same point each year and will use the same direction, trajectory and camera settings as is practicable.	Photographs will be taken in October annually	Yes	See grid below for these.	
1	All	Fencing	Facilitate management and monitoring of the offset site. Delineate location of temporary exclusion fence.	Establish posts to mark the boundary of the offset site in accordance with advice from a qualified ecologist and land surveyor	Immediately on approval of Year 1 of management works	Yes		

*** Please email this form along with your photopoints to offsetsreporting@tfn.org.au or post them to Trust for Nature, Level 5/379 Collins Street, Melbourne VIC 3000**

Year	Site and Zone(s) (e.g. 001/A)	Management action to be completed	Standard to be achieved (from OMP)	Description of action from OMP (Management actions and Targets are found listed in the Offset Management Plan appended to your Deed of Covenant)	Timing (From the OMP) (What time of year?)	Actions completed this year (yes/no) (if no state % completed)	Description of Action (What method of control did you use? E.g. Hand weeding/spot spray using glyphosate)	Comments and Observations (Have you noticed any changes in the vegetation, fauna or other features of the site e.g. have you found new species, have the weed/pest increased/ decreased/ remained the same?)
1-10	All	Fencing	Maintain fencing to DELWP fencing standards in BushBroker Information Sheet 12 - Standards for Management – Fencing	Maintain fencing in good condition around entire boundary of all sites where fencing exists or is required	Ongoing	Yes	All fencing is in good condition as of this report date.	No changes to fencing have been made.
1-10	All	Fencing	Exclude stock from the offset site during exclusion period to protect GSM habitat.	Erect temporary fencing around offset site during grazing exclusion period (if stock present during this period within the property cannot be confined to certain areas)	October -November	Yes	Stock was excluded between October and November.	In hindsight we should have requested further grazing through the off period. The rain caused significant growth of biomass that did affect the native growth this year.

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Year	Site and Zone(s) (e.g. 001/A)	Management action to be completed	Standard to be achieved (from OMP)	Description of action from OMP (Management actions and Targets are found listed in the Offset Management Plan appended to your Deed of Covenant)	Timing (From the OMP) (What time of year?)	Actions completed this year (yes/no) (if no state % completed)	Description of Action (What method of control did you use? E.g. Hand weeding/spot spray using glyphosate)	Comments and Observations (Have you noticed any changes in the vegetation, fauna or other features of the site e.g. have you found new species, have the weed/pest increased/ decreased/ remained the same?)
1-10	All	Biomass control	Stock must be removed should total vegetation cover fall to or below 70%. Sufficient bare ground (approximately 20% to 40% cover) maintained in order to maintain space for recruitment of herbs and grasses. No loss of native plant diversity as a result of grazing regimes. Reduction in weed cover.	Minimum of 3 Pulse Grazing cycles between December and October. Pulse graze events a Maximum of 4 weeks duration with a minimum 2 week rest interval in-between. Stock must be excluded at any time when standing water is present, or soil is waterlogged, to mitigate pugging of the soil surface.	The maximum length of continuous grazing is four weeks with at least two weeks rest between cycles. Stock generally excluded during October -November Stock removed immediately following any high rainfall events.	Yes	A 4 week on / 2 week off approach was adopted with our sheep program in order to keep the Phalaris & Toowoomba Canary grasses down.	Considering our rainfall during late 2023 and early 2024 we have seen increased exotic grass growth and due to the constraints of the OMP grazing schedule we were not able to have sheep on it during this period. We have since grazed it down as per the schedule however would like to review this.

Management Actions –Pest animals

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Year	**Site and Zone(s)** (e.g. 001/A)	**Management action to be completed**	**Standard to be achieved** (from OMP)	**Description of action from OMP** (Management actions and Targets are found listed in the Offset Management Plan appended to your Deed of Covenant)	**Timing** (From the OMP) (What time of year?)	**Actions completed this year (yes/no)** (if no state % completed)	**Description of Action** (What method of control did you use? E.g. Hand weeding/spot spray using glyphosate)	**Comments and Observations** (Have you noticed any changes in the vegetation, fauna or other features of the site e.g. have you found new species, have the weed/pest increased/ decreased/ remained the same?)
1-10	All	Rabbits	BushBroker Information Sheet 7 - Standards of Management – Rabbits No surface disturbance within the offset site; No active rabbit warrens to be present; No rubbish/artificial harbour present; Minimal artificial piles of logs and rocks;	Baiting. When baiting collect and dispose of carcasses to prevent poisoning of native predators. Fumigation and collapse of rabbit burrows if identified. Remove or disperse surface harbour.	Ongoing	Yes	We controlled the rabbit population by shooting the animals. We engaged in this every month. Remains are picked up and discarded. We regularly monitor ongoing animal populations in the area and have seen no new threats.	
1-10	All	Foxes	Any fox dens are controlled immediately following detection; No surface disturbance within the offset site; No active fox dens to be present; No rubbish/artificial harbour present; Minimal artificial piles of logs and rocks;	Fumigation and collapse of fox dens if identified. Remove or disperse surface harbour.	Ongoing	Yes	We controlled the fox population by means of hunting/shooting. We then picked up any remains. We regularly monitor ongoing animal populations in the area and have seen no new threats.	We saw a slight increase in foxes in the area however were able to control numbers through normal actions as per the OMP.
1-10	All	New & Emerging pest animals	Control numbers of any new & emerging pest animals	Monitor and control	Ongoing	Yes	No new pests have been seen.	

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Management Actions –Introduced plant species

*New and emerging weeds should also be documented here

The targets of either to control or eliminate should be reached by the end of the 10 year offset period

Year	**Site and Zone(s)** (e.g. 001/A)	**Species**	**Baseline Cover abundance**	**Standard to be achieved** (from OMP)	**Description of action from OMP** (Management actions and Targets are found listed in the Offset Management Plan appended to your Deed of Covenant)	**Timing** (From the OMP) (What time of year?)	**Actions completed this year (yes/no)** (if no state % completed)	**Description of Action** (What method of control did you use? E.g. Hand weeding/spot spray using glyphosate)	**Comments and Observations** (Have you noticed any changes in the vegetation, fauna or other features of the site e.g. have you found new species, have the weed/pest increased/ decreased/ remained the same?)
Woody Weeds									
1-10	All	African Boxthorn (*Lycium ferocissimum)*	**(<5%)**	Eliminate	Eliminate	Ongoing	Yes	Box thorns have been spot-sprayed and chipped and removed from the site.	No increase has been noted.
1-10	All	New and Emerging Woody Weeds	**N/A**	Eliminate woody weeds (<1% cover)	Eliminate all new and emerging woody weeds	Ongoing	Yes	We engage in regular spot spraying and keep an eye on new emerging weeds, none to report.	None noted.
Herbaceous Weeds									
1-10	All	Sheep Sorrel *Acetosella vulgaris* *Acetosella vulgaris*	1%	Reduce cover below current (Inception) levels	Pulse-grazing	Generally, early Spring to avoid GSM flying season	Yes	Our pulse grazing routine has been executed.	No noted increase.
1-10	All	Wild Oat *Avena fatua*	3%	Reduce cover below current (Inception) levels	Pulse-grazing	Generally, early Spring to avoid GSM flying season	Yes	We engaged in pulse grazing as recommended to deal with this.	No noted increase.

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Year	Site and Zone(s) (e.g. 001/A)	Species	Baseline Cover abundance	Standard to be achieved (from OMP)	Description of action from OMP (Management actions and Targets are found listed in the Offset Management Plan appended to your Deed of Covenant)	Timing (From the OMP) (What time of year?)	Actions completed this year (yes/no) (if no state % completed)	Description of Action (What method of control did you use? E.g. Hand weeding/spot spray using glyphosate)	Comments and Observations (Have you noticed any changes in the vegetation, fauna or other features of the site e.g. have you found new species, have the weed/pest increased/ decreased/ remained the same?)
1-10	All	*Hordeum* spp. Barley-grass *Hordeum spp.*	3%	Reduce cover below current (Inception) levels	Pulse-grazing	Generally, early Spring to avoid GSM flying season	Yes	We engaged in pulse grazing as recommended to deal with this.	No noted increase.
1-10	All	Cat's-ear *Hypochaeris radicata*	3%	Reduce cover below current (Inception) levels	Pulse-grazing and targeted spot spraying with appropriate herbicide.	Generally, early Spring to avoid GSM flying season. Spot-Spray: Spring and early summer	Yes	We engaged in pulse grazing as recommended to deal with this. No need for spraying as there was little Cat's ear in the offset area.	No noted increase.
1-10	All	Serrated Tussock *Nassella trichotoma*	<1%	Reduce cover below current (Inception) levels	Targeted spot spraying with appropriate herbicide.	Spot-Spray: Spring and early summer	Yes	Spot spraying was executed.	Minimal serrated tussock found not a notable increase or decrease.
1-10	All	Rat-tail Fescue *Vulpia spp.*	2%	Reduce cover below current (Inception) levels	Hand chip, or targeted spot spraying with appropriate herbicide.	Spot-Spray: Spring and early summer	Yes	We engaged in pulse grazing as recommended to deal with this.	No noted increase.
1-10	All	Toowoomba Canary-grass *Phalaris aquatica*	25-40%	Reduce cover below current (Inception) levels	Targeted spot spraying with appropriate herbicide. Pulse-grazing.	Spot-Spray: Spring and early summer; Graze: early Spring to avoid GSM flying season	Yes	We engaged in pulse grazing as recommended to deal with this.	We have seen the summer rain have a huge effect on this. More grazing is needed in future if we see summer rains.

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Year	Site and Zone(s) (e.g. 001/A)	Species	Baseline Cover abundance	Standard to be achieved (from OMP)	Description of action from OMP (Management actions and Targets are found listed in the Offset Management Plan appended to your Deed of Covenant)	Timing (From the OMP) (What time of year?)	Actions completed this year (yes/no) (if no state % completed)	Description of Action (What method of control did you use? E.g. Hand weeding/spot spray using glyphosate)	Comments and Observations (Have you noticed any changes in the vegetation, fauna or other features of the site e.g. have you found new species, have the weed/pest increased/ decreased/ remained the same?)
1-10	All	Spear Thistle Cirsium vulgare	<1%	Reduce cover below current (Inception) levels	Hand chip, or targeted spot spraying with appropriate herbicide.	Spot-Spray: Spring and early summer	Yes	We have been spot spraying spear thistle.	Slight increase on last year due to rain.
1-10	All	New and emerging herbaceous weeds	N/A	Eliminate (<1% cover)	Monitor for and eliminate any new and emerging weeds	Ongoing	Yes	The summer rain increased the amount exotic grasses, mostly Phalaris grasses, this year.	Seasonality changes need to be taken into account and OMP adjustments made especially to grazing and the addition of burning if necessary.

Additional Comments: Overall we have seen a more difficult year for natives due to the seasonality changes we have witnessed.. We need to be more adaptive in the OMP and be able to make adjustments. We would like to know what the process of doing something like this might be. EG if we need to do a burn to keep biomass down due to unforeseen rain events.

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PHOTO POINT MONITORING SHEET

Photo Point Number	Location of Photo Point	Site and Zones	Direction	Date	Notes/Observations	Photo
PP1	*SE Creek small section*	*South of PG1-A*	*-37.987270 0,143.8954359*	*1/10/23*	*Phalaris evident*	 North^  East^

*** Please email this form along with your photopoints to offsetsreporting@tfn.org.au or post them to Trust for Nature, Level 5/379 Collins Street, Melbourne VIC 3000**

Photo Point Number	Location of Photo Point	Site and Zones	Direction	Date	Notes/Observations	Photo
						 South ^  West ^

*** Please email this form along with your photopoints to offsetsreporting@tfn.org.au or post them to Trust for Nature, Level 5/379 Collins Street, Melbourne VIC 3000**

Photo Point Number	Location of Photo Point	Site and Zones	Direction	Date	Notes/Observations	Photo
PP2	**North of small creek section**	**PG1-C**	**-37.984911, 143.891692**	*1/10/23*	*Good undergrowth of native coming through*.	 **North ^**  **East ^**

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Photo Point Number	Location of Photo Point	Site and Zones	Direction	Date	Notes/Observations	Photo
						 South ^  West ^

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Photo Point Number	Location of Photo Point	Site and Zones	Direction	Date	Notes/Observations	Photo
PP3	**NE Corner**	**PG1-C**	-37.983090, 143.892215	*1/10/23*		 **North ^**  **East ^**

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Photo Point Number	Location of Photo Point	Site and Zones	Direction	Date	Notes/Observations	Photo
						 South ^  West ^

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Photo Point Number	Location of Photo Point	Site and Zones	Direction	Date	Notes/Observations	Photo
PP4	**NW Corner**	**PG1-C**	-37.981411, 143.886773	*1/10/23*		 **North ^**  **East ^**

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Photo Point Number	Location of Photo Point	Site and Zones	Direction	Date	Notes/Observations	Photo
						 South ^  West ^

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Photo Point Number	Location of Photo Point	Site and Zones	Direction	Date	Notes/Observations	Photo
PP5	South Section of Creek	PG1-C	-37.983646, 143.890990	*1/10/23*		 **North ^**  **East^**

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Photo Point Number	Location of Photo Point	Site and Zones	Direction	Date	Notes/Observations	Photo
						 South^  West^

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Photo Point Number	Location of Photo Point	Site and Zones	Direction	Date	Notes/Observations	Photo
PP6	East	PG1-B	-37.986833, 143.892581	*1/10/23*		 **North ^**  **East^**

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Photo Point Number	Location of Photo Point	Site and Zones	Direction	Date	Notes/Observations	Photo
						 South ^  West ^

*** Please email this form along with your photopoints to offsetsreporting@tfn.org.au or post them to Trust for Nature, Level 5/379 Collins Street, Melbourne VIC 3000**

Photo Point Number	Location of Photo Point	Site and Zones	Direction	Date	Notes/Observations	Photo
PP7	South	Moderate quality GSM Offset	-37.989784, 143.893882	*1/10/23*		 **North^**  **East^**

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Photo Point Number	Location of Photo Point	Site and Zones	Direction	Date	Notes/Observations	Photo
						 South^  West^

Please insert here or attach separately any supporting documentation (i.e. receipts for works completed, photos of works etc.)

I hereby declare that the supplied information contained within this report is accurate and complies with all the reporting requirements under the Offset Management Plan

*** Please email this form along with your photopoints to offsetsreporting@tfn.org.au or post them to Trust for Nature, Level 5/379 Collins Street, Melbourne VIC 3000**

Signed: Charlie Cameron **Name:** Charlie Cameron **Date:** 30/5/24

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