



Sievers Lane, Glenhope, Victoria:
Golden Sun Moth Offset Management Plan
(EPBC 2017/8008)

Prepared for Major Road Projects Victoria

5 April 2020

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Summary

Biosis Pty Ltd was commissioned by Major Road Projects Victoria (MRPV) to prepare an Offset Management Plan (OMP) for an offset site required for losses associated with the development of the O'Herns Road/Hume Freeway Interchange project, Epping, Victoria as outlined under referral 2017/8008.

The Department of the Environment and Energy (DoEE) determined that the development project will have a significant impact upon Golden Sun Moth *Synemon plana* (GSM), and therefore the project is a controlled action and compensatory offsets are required.

A suitable offset site has been identified near Glenhope, Victoria. The offset area is located within a larger property which includes other offset sites, and management prescriptions within this plan are consistent with the plan for the broader property. The offset area has been the subject of a targeted survey for GSM which has been recorded at numerous locations across the property (Hamilton Environmental Services 2015).

While a significant proportion of the 78.8 ha offset site is not considered to be native vegetation (i.e. the perennial groundcover / understorey doesn't support a minimum of 25% cover of indigenous species) it still represents moderate to high quality habitat for GSM having regard also for GSM records and site context. The 78.8 hectare offset area provides an offset amounting to about 7.2 times the impact to habitat associated with the O'Herns Road/Hume Freeway Interchange project.

The offset site will be secured in-perpetuity through an appropriate legal encumbrance registered on the property (a covenant as to part Section 3A Victorian *Conservation Trust Act 1972*). Gains in vegetation and GSM habitat quality through on-ground actions are expected over the initial 10 years of this OMP, and maintained through enduring commitments to manage the offset site for GSM and biodiversity conservation.

This plan specifies a range of management actions for the offset area, including weed management, management of tree and shrub recruitment, and protection of the habitat values of the offset site from degradation by stock and unauthorised access. The plan includes an adaptive management approach, in which management actions are modified based on the results of monitoring and auditing activities in order to keep management focussed on the outcome of protecting and enhancing GSM habitat. The risk assessment also includes triggers for plan review, following environmental events such as significant weed invasion that has the potential to prejudice attainment and maintenance of OMP completion criteria.

1. Introduction

1.1 Project background

Biosis Pty Ltd was commissioned by Major Road Projects Victoria (MRPV) to prepare an Offset Management Plan (OMP) for an offset site required for losses associated with the O'Herns Road/Hume Freeway Interchange Project, Epping, Victoria as outlined under referral 2017/8008 (Figure 1).

An ecological assessment of the O'Herns Road site, including a habitat hectare assessment, is documented by Biosis (2017a). That report identifies the condition and extent of native vegetation and Golden Sun Moth *Synemon plana* (GSM) habitat to be impacted and protected in association with the proposed development (Figure 2). Biosis (2017a) was used, in conjunction with the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) offsets policy, to identify the extent of GSM habitat to be protected outside the project area.

A native vegetation removal permit has been approved by the City of Whittlesea for the interchange project (717308). Clearing associated with the development of the interchange was also assessed by the Department of Environment, Land, Water and Planning (DELWP) as part of the development approvals process. The development has also been assessed and approved by the Department of Environment and Energy (DoEE) under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) through referral 2017/8008.

The plans developed by MRPV would result in clearing of 10.888 ha of GSM habitat (Figure 2) (note this excludes areas covered by the Melbourne Strategic Assessment and within the Aurora subdivision).

Offsets for the proposed development are prescribed by both state (DELWP) and federal (DoEE) regulators. Offsets prescribed under the EPBC Act and relevant Victorian requirements cannot be generated concurrently and will therefore be sourced separately. Offsets proposed for this project under the EPBC Act involve securing an external offset supporting 78.8 ha of GSM habitat.

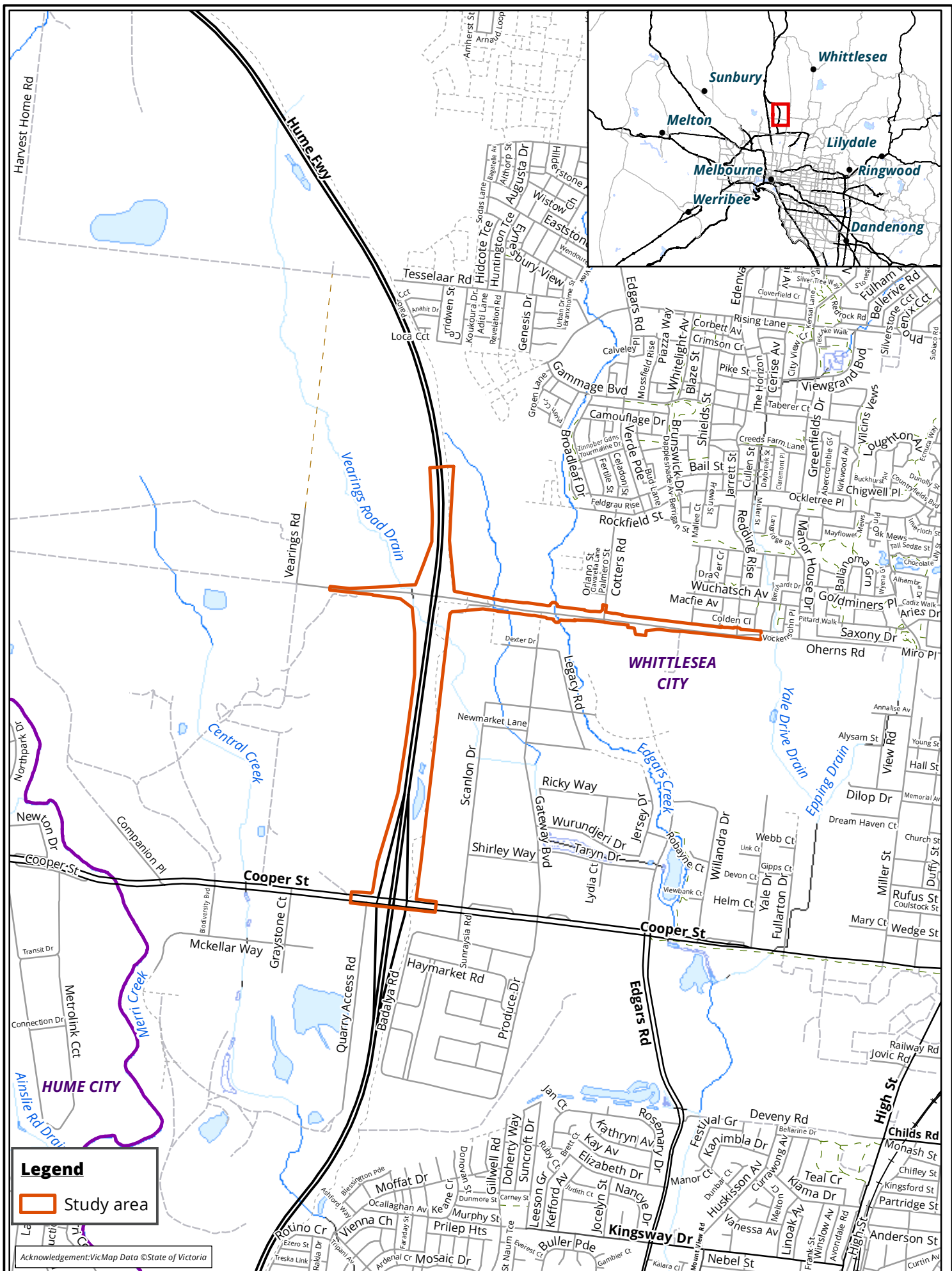
The EPBC Act offset prescription for GSM is proposed to be sourced from a 78.8 ha section of Lots 3 to 6 of PS727973 at Sievers Lane, Glenhope (Figure 3). An ecological assessment of the proposed external offset area was conducted by Biosis (2018). This report provides the basic ecological information to support this OMP and identified a contiguous area of GSM habitat known to support a significant population of GSM (Hamilton Environmental Services 2015, 2017, this report).

Management of the external EPBC Act offset will involve protection and active ecological management of 78.8 hectares of relatively unimproved pasture which supports various degrees of native and introduced GSM food plants.

The overall development of the O'Herns Road/Hume Freeway Interchange Project will be conducted over a period of about 18 months. The project is expected to begin in mid to late 2019.

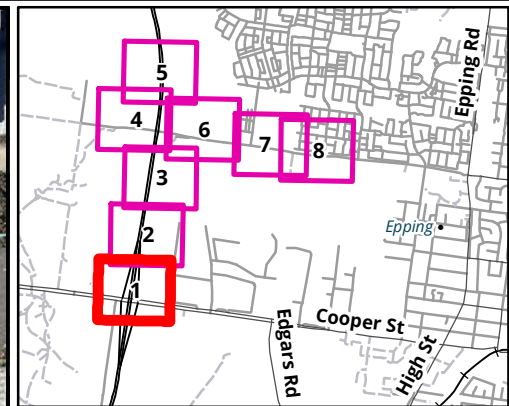
The Sievers Lane offset site is approximately 87 kilometres north north-west of the O'Herns Road development site. The O'Herns Road interchange is within the Victorian Volcanic Plain (VVP) Bioregion while the Sievers Lane offset site is mapped by DELWP as being within the Goldfields bioregion (www.delwp.vic.gov.au). However, the northern end of the offset site clearly supports an outlier of olivine basalt consistent with the geology of parts of the VVP bioregion.

A glossary of technical terms used throughout this OMP is provided in Appendix 2.



Legend
 Study area

Acknowledgement: VicMap Data © State of Victoria



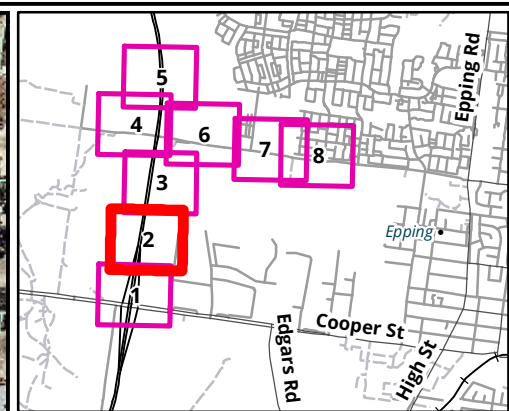
- Legend**
- Study area
 - Impact area
- No. of Golden Sun Moth observed**
- + 1
 - + 2 - 10
 - + 11 - 20
 - + 21 - 29
 - + 30+
- Habitat Status**
- Confirmed Golden Sun Moth habitat
 - Un-confirmed Golden Sun Moth habitat
- Cadastre**
- Active parcel

Figure 2.1 Golden Sun Moth habitat within the O'Herns Road/Hume Freeway Interchange Project, Epping, Victoria

0 20 40 60 80 100
 Metres
 Scale: 1:2,000 @ A3
 Coordinate System: GDA 1994 MGA Zone 55



Matter: 26577,
 Date: 04 April 2018,
 Checked by: SGM, Drawn by: SKM, Last edited by: smitchell
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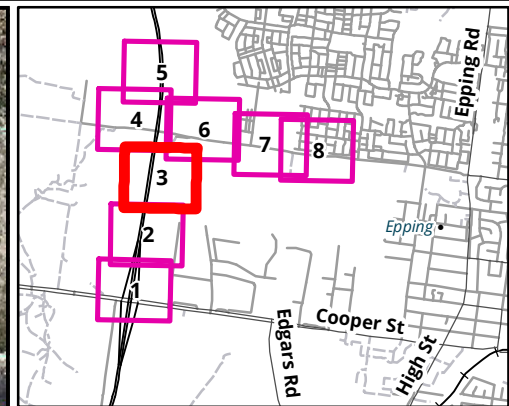
- Legend**
- Study area
 - Impact area
- No. of Golden Sun Moth observed**
- + 1
 - + 2 - 10
 - + 21 - 29
- Golden Sun Moth habitat**
- Confirmed
 - Un-confirmed
- Cadastre**
- Active parcel
 - Proposed parcel

Figure 2.2 Golden Sun Moth habitat within the O'Herns Road/Hume Freeway Interchange Project, Epping, Victoria

0 20 40 60 80 100
 Metres
 Scale: 1:2,000 @ A3
 Coordinate System: GDA 1994 MGA Zone 55

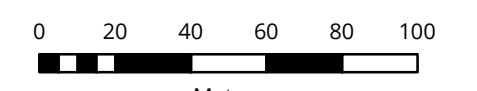


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- Legend**
- Study area
 - Impact area
- No. of Golden Sun Moth observed**
- + 1
 - + 2 - 10
 - + 11 - 20
- Golden Sun Moth habitat**
- Confirmed
 - Un-confirmed
- Cadastre**
- Active parcel
 - Proposed parcel

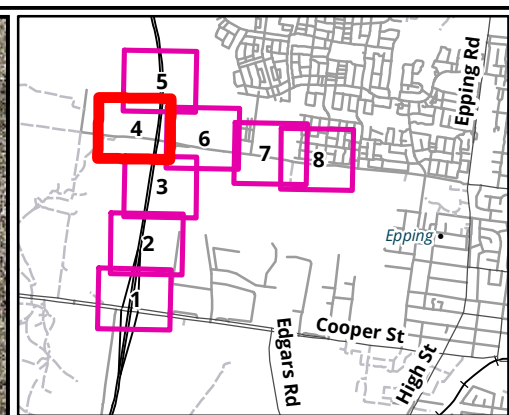
Figure 2.3 Golden Sun Moth habitat within the O'Herns Road/Hume Freeway Interchange Project, Epping, Victoria



Scale: 1:2,000 @ A3
 Coordinate System: GDA 1994 MGA Zone 55



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 Date: 04 April 2018,
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Legend

- Study area
- Melbourne Strategic Assessment Biodiversity Conservation Strategy extent
- Impact area

No. of Golden Sun Moth observed

- + 1
- + 2 - 10
- + 11 - 20

Habitat

- Confirmed Golden Sun Moth habitat
- Un-confirmed Golden Sun Moth habitat

Cadastre

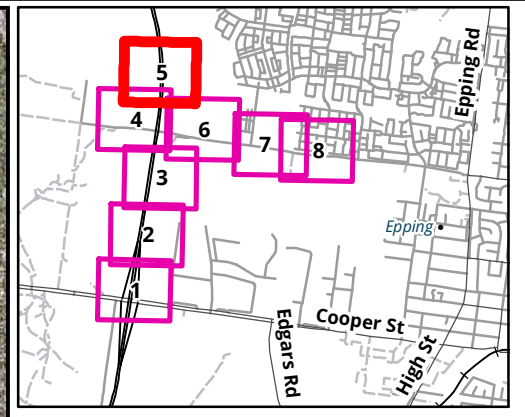
- Active parcel
- Proposed parcel

Figure 2.4 Golden Sun Moth habitat within the O'Herns Road/Hume Freeway Interchange Project, Epping, Victoria

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 Metres
 Scale: 1:2,000 @ A3
 Coordinate System: GDA 1994 MGA Zone 55

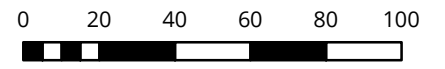


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- Legend**
- Study area
 - Melbourne Strategic Assessment Biodiversity Conservation Strategy extent
 - Impact area
- No. of Golden Sun Moth observed**
- + 1
 - + 2 - 10
- Golden Sun Moth habitat**
- Confirmed
 - Un-confirmed
- Cadastre**
- Active parcel
 - Proposed parcel

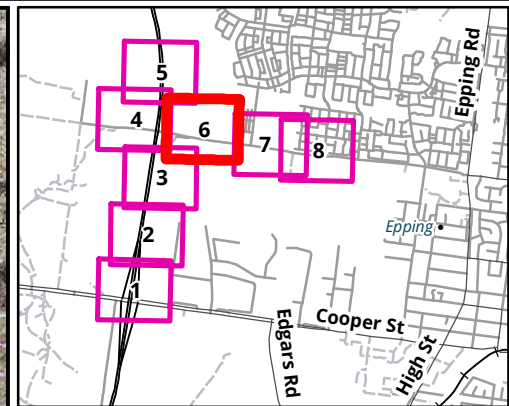
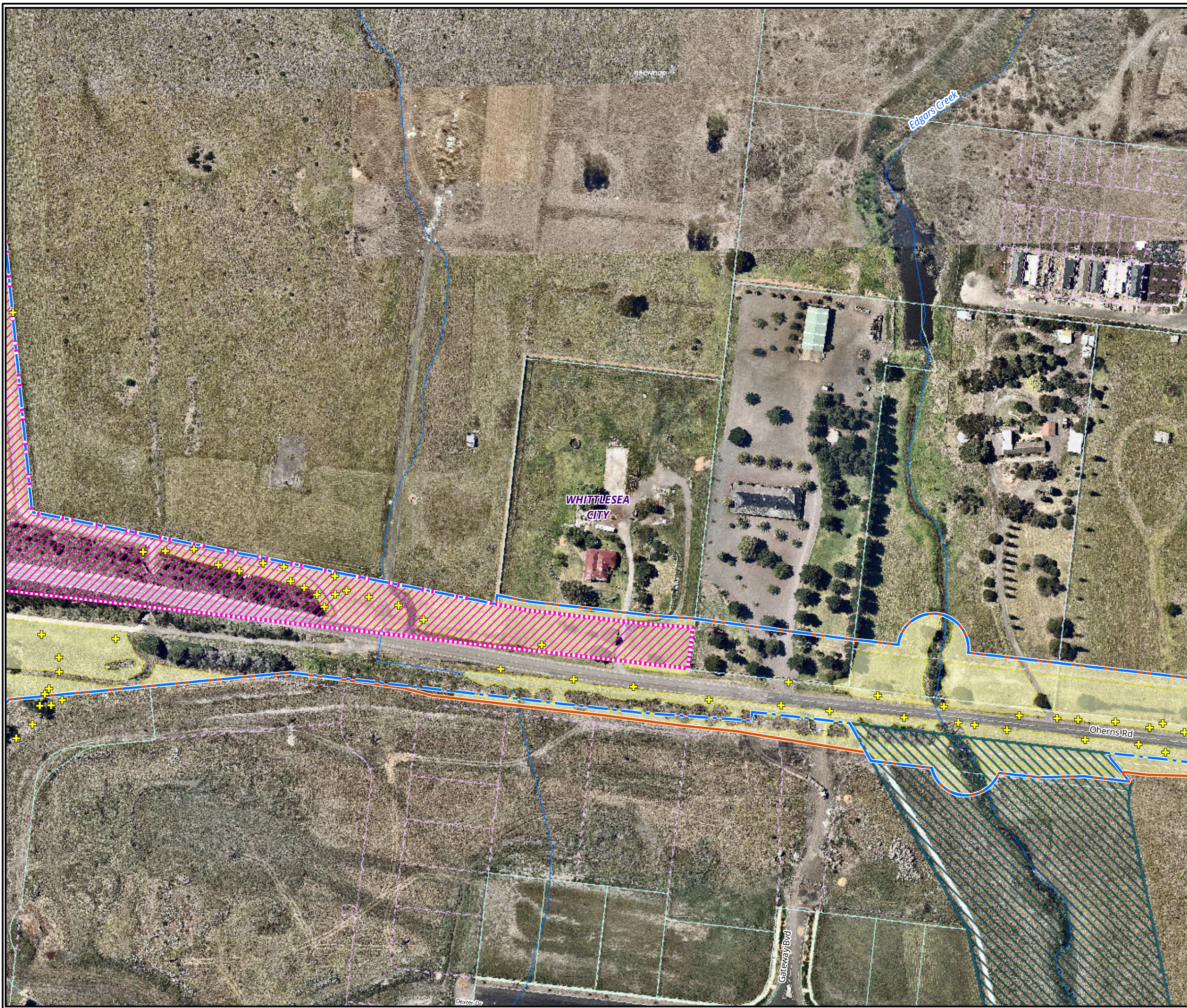
Figure 2.5 Golden Sun Moth habitat within the O'Herns Road/Hume Freeway Interchange Project, Epping, Victoria



Scale: 1:2,000 @ A3
 Coordinate System: GDA 1994 MGA Zone 55



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 Date: 04 April 2018,
 Checked by: SGM, Drawn by: SKM, Last edited by: smitchell
 Location: P:\26500s\26577\Mapping\26577_OMP_F2_O'Herns_GSM.mxd



- Legend**
- Study area
 - Melbourne Strategic Assessment
 - Biodiversity Conservation Strategy extent
 - Impact area
 - No. of Golden Sun Moth observed**
 - + 1
 - Confirmed
 - Golden Sun Moth habitat
 - EPBC Referral No. 2012/6298**
 - Reserves**
 - Edgars Creek corridor
 - Cadastre**
 - Active parcel
 - Proposed parcel

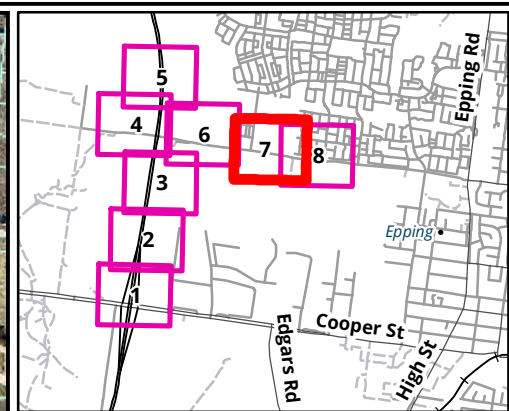
Figure 2.6 Golden Sun Moth habitat within the O’Herns Road/Hume Freeway Interchange Project, Epping, Victoria

0 20 40 60 80 100
 Metres
 Scale: 1:2,000 @ A3
 Coordinate System: GDA 1994 MGA Zone 55

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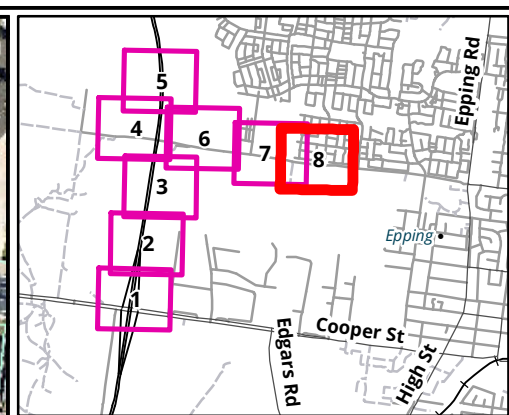
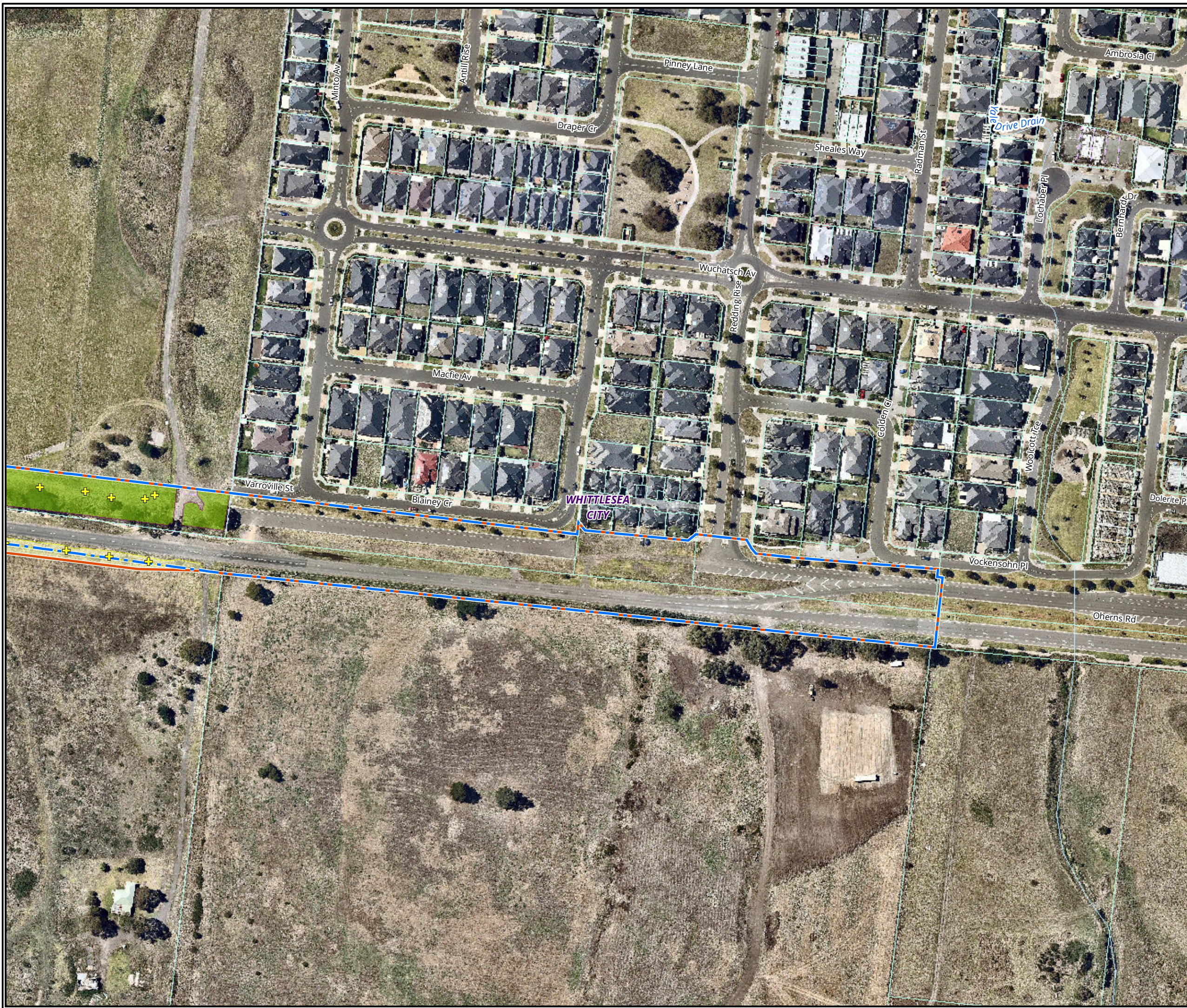
- Legend**
- Study area
 - Impact area
- No. of Golden Sun Moth observed**
- + 1
 - + 2 - 10
- Confirmed Golden Sun Moth habitat - existing EPBC offset**
- Confirmed Golden Sun Moth habitat - existing EPBC offset
 - Confirmed Golden Sun Moth habitat
- EPBC Referral No. 2012/6298**
- Reserves**
- Edgars Creek corridor
- Cadastre**
- Active parcel
 - Proposed parcel

Figure 2.7 Golden Sun Moth habitat within the O'Herns Road/Hume Freeway Interchange Project, Epping, Victoria

0 20 40 60 80 100
Metres
Scale: 1:2,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55



EPPING CREEK



- Legend**
- Study area
 - Impact area
- No. of Golden Sun Moth observed**
- + 1
 - Confirmed Golden Sun Moth habitat - existing EPBC offset
 - Confirmed Golden Sun Moth habitat
- Cadastre**
- Active parcel
 - Proposed parcel

Figure 2.8 Golden Sun Moth habitat within the O’Herns Road/Hume Freeway Interchange Project, Epping, Victoria

0 20 40 60 80 100
 Metres
 Scale: 1:2,000 @ A3
 Coordinate System: GDA 1994 MGA Zone 55



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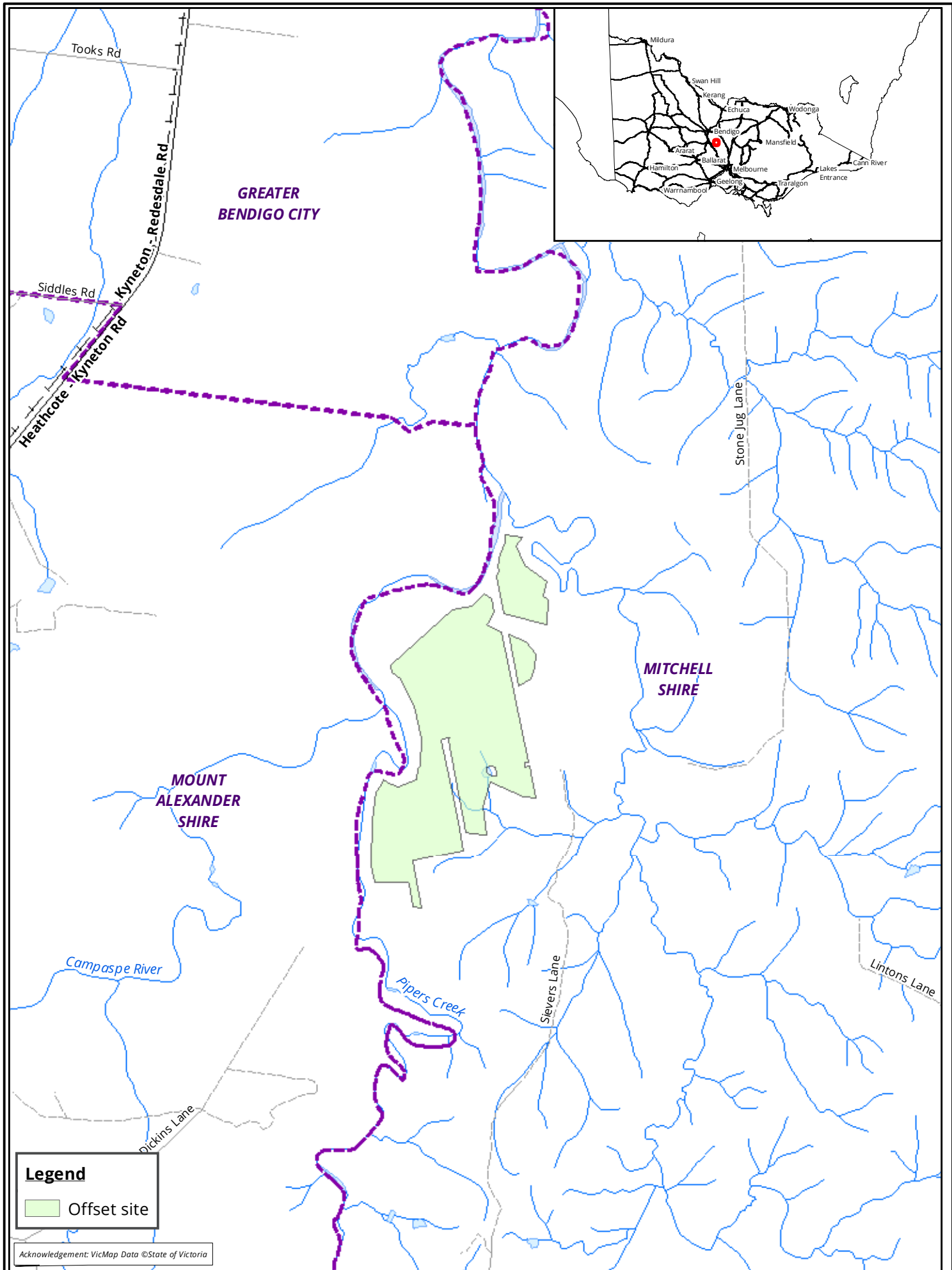
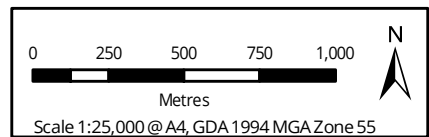


Figure 3 Location of the Sievers Lane offset site, Glenhope, Victoria



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1.2 Objectives

The objective of the OMP is to document the development site and offset site details to meet EPBC Act approval requirements of offsetting impacts to GSM by securing, maintaining and improving GSM habitat within the designated offset site. The objectives of this plan are to:

- Improve the condition of 78.8 hectares of GSM habitat at the Sievers Lane offset property in a manner consistent with the EPBC Act Environmental Offsets Policy;
- support establishment of legal security arrangements for the in perpetuity protection and management of the offset site;
- Undertake management actions to protect and improve the quality of native vegetation and GSM habitat within the offset site;
- Provide a timetable of management actions, outcomes and progress reviews;
- Detail appropriate monitoring and evaluation of management actions and completion criteria; and
- Attain and maintain the offset completion criteria for the life of the EPBC Act approval for EPBC 2017/8008.

This OMP is consistent with regional priority recovery and threat abatement actions in the Department of Environment's *Approved Conservation Advice for Synemon plana (Golden Sun Moth)* (DoEE 2013), including:

- Establishing formal conservation arrangements, management agreements and covenants on private land.
- Preventing ongoing loss and degradation of habitat and retaining and protecting natural vegetation remnants within the known distribution of the species.
- Monitoring known populations to determine the species' status.
- Monitoring the effectiveness of management actions and the need to adapt them if necessary.
- Control of invasive weeds that threaten habitat.
- Implementation of appropriate grazing and burning to maintain and enhance habitat values for the species.

1.3 Report structure

The structure and content of the OMP is consistent with the requirements of the 'Standard Offset Plan' template provided by DELWP and is organised in a number of parts:

- **Introduction** - This section summarises the background information relevant to the Project, including the purpose and scope of the work and the assessment methodology.
- **Part A: Offset Suitability** - This section assesses the suitability of the proposed offset site, and includes details regarding approved clearing, gain and site improvement calculations. Part A should be read in conjunction with Part B, but due to its technical nature, the information it contains is not intended to be placed on title (e.g. Covenant under the *Victorian Conservation Trust Act 1972*).
- **Part B: Offset Implementation** - This section describes how the offset is to be implemented. Part B includes details regarding landowner and EPBC Act approval holder commitments, management activities, monitoring and reporting. This section is intended for those responsible for implementing the OMP, including MRPV and future landowners. Information in this section is intended to be placed on title.

The plan also addresses the requirements of guidelines for the preparation of an OMP under the EPBC Act Environmental Offsets Policy (Commonwealth of Australia 2014).

1.4 Relevant EPBC approval conditions (EPBC Number 2017/8008)

Condition 8 of the EPBC approval states that *The approval holder must submit to the Department an Offset Management Plan for the offset area.*

The EPBC approval conditions relevant to this OMP and where they are addressed in in the OMP are outlined below.

<p>8 b Demonstrate how the offset area and environmental services will compensate for the loss of 10.88 ha of Golden Sun Moth habitat consistent with the EPBC Environmental Offsets Policy.</p>	<p>The suitability of the offset site and the offset calculations are provided in Section 2.4. Implementation of the plan is described in Section 3 and a schedule of management actions, risks, monitoring and reporting is detailed in Section 4. It is anticipated that the proposed management actions outlined in the plan will result in the required condition improvement to compensate for the loss of 10.88 ha of GSM habitat.</p>
<p>c must include but not be limited to:</p>	
<p>c i A description of the offset area including location, size, condition, environmental values present and surrounding land uses</p>	<p>Section 2.3</p>
<p>c ii Baseline data and other supporting evidence that documents the presence and baseline quality of Golden Sun Moth habitat within the offset area</p>	<p>Section 2.3, Section 2.4, Figure 4 (GSM records)</p>
<p>c iii Maps and shapefiles of the offset area</p>	<p>Location of the offset is illustrated in Figure 3. Shapefiles have been provided to DoEE.</p>
<p>c iv Specific objectives to demonstrate Golden Sun Moth habitat quality improvement over the life of the approval</p>	<p>Performance criteria are described in section 3.4.2 and summarised in Table 4. Criteria include completion of scheduled management, monitoring and reporting activities (Section 3.4.2).</p>
<p>c v Specific management actions, and timeframes for implementation, to be carried out to meet the specific objectives to improve the quality of Golden Sun Moth habitat within the offset area</p>	<p>Section 3.6 describes ongoing management commitments which will be carried out in perpetuity.</p> <p>Section 3.7 describes the key management issues which will be addressed by the plan. It is anticipated that an active management period of ten years will be required to achieve the required quality gain, with maintenance to continue in perpetuity.</p> <p>Management actions are described in greater detail in Section 3.8. This sets out the key issues and measures by which they will be addressed.</p> <p>Table 4 provides a schedule of management actions and how often they will be implemented.</p>

<p>c vi Key performance indicators to demonstrate the improvement to the quality of Golden Sun Moth habitat</p>	<p>Performance criteria are described in section 3.4.2 and summarised in Table 4. Criteria include completion of scheduled management, monitoring and reporting activities (section 3.4.2).</p>
<p>c vii The nature, timing and frequency of monitoring to determine the success of management actions against key performance indicators</p>	<p>Section 3.9 describes the proposed monitoring regime including descriptions of monitoring activities, effort and frequency, which are summarised in Section 4.</p>
<p>c viii Indicative corrective actions that will be implemented in the event monitoring activities indicate key performance indicators are not or are unlikely to be achieved</p>	<p>Key risks are described in Section 3.7. This includes potential impacts from the proposed pulse-grazing regime, ecological burning and weed control.</p>
<p>c ix The roles and responsibilities for implementing management actions</p>	<p>Roles and responsibilities are described in Section 3.10 and summarised in Table 7.</p>
<p>c x Evidence of consistency with relevant conservation advices, recovery plans and/or threat abatement plans</p>	<p>The actions detailed in this plan are consistent with Department of the Environment (2013). <i>Approved Conservation Advice for Synemon plana (golden sun moth)</i>. Canberra: Department of the Environment and evidence of consistency with this conservation advice is described in Sections 1.2 and 3.8.5.</p>

2. Part A: Offset suitability

This section provides details of the clearing site, assesses the suitability of the proposed offset site, and includes details regarding approved clearing, gain and site improvement calculations. This section should be read in conjunction with Part B, but due to its technical nature, the information it contains is not intended to be placed on title (e.g. Covenant under the *Victorian Conservation Trust Act 1972*). The location of the clearing site and the proposed offset site are provided in Figures 1 and 3 respectively.

2.1 Development Site Details

Landowner of development site	Department of Transport
Location and address of development site	O'Herns Road Interchange with the Hume Freeway, Epping, Victoria
Local Government Area	City of Whittlesea
Catchment Management Authority	Port Phillip and Western Port
Responsible Authority	Department of Environment, Land, Water and Planning
Permit applicant	MRPV
Native Vegetation Removal Permit (ID)	717308
Date Approved	04 May 2018

2.2 Vegetation Approved for Removal

Vegetation / habitat removal associated with the O'Herns Road/Hume Freeway Interchange Project (Figure 1) has been approved under the City of Whittlesea Native Vegetation Removal Permit 717308. Vegetation proposed for removal is described in the biodiversity assessment prepared by Biosis (2017a) and the 10.888 ha GSM habitat to be removed is identified in Figure 2.

2.3 Description of offset site – Sievers Lane, Glenhope, Victoria

The offset site at Sievers Lane at Glenhope (78.8 hectares), has been identified as meeting Commonwealth offset policy requirements. The following summarises the existing conditions at the Sievers Lane offset site, including current permitted uses on the land and its suitability as an offset as assessed against Commonwealth requirements.

The proposed offset site is located in central Victoria near the locality of Glenhope, approximately 87 kilometres north north-west of the Melbourne central business district (Figure 2). The property is within the Goldfields Bioregion (<http://maps.biodiversity.vic.gov.au/viewer/?viewer=NatureKit>), on the eastern bank of Pipers Creek, and surrounds an undeveloped road reserve. It is dominated by undulating hills with a sedimentary geology. However, an outlier of quaternary basalt geology occurs in the northern end of the site and along Pipers Creek.

The broader property was surveyed by Stephen Mueck (accredited DELWP vegetation quality assessor HH173 – current until 24/5/2018) on 2 March 2018. Data was collected to provide a general assessment on the condition of the vegetation present and the overall structure of the vegetation present. Notes were taken as to the location and extent of pest plants and animals, with a focus on target weeds such as woody weeds (Biosis 2018).

A population of GSM was recorded across the property in 2014 and 2017 (Hamilton Environmental Services 2015, 2019). Additional individuals were observed late in the 2017/18 flight season (S. Mueck pers. obs.) and during targeted surveys performed by Biosis in the 2019/20 flight season (Biosis 2020).

Biosis (2020) conducted baseline surveys for GSM using standard survey techniques during the 2019/20 flight season. This included four surveys (25 November, 9 December, 16 December and 27 December) although the flight season appeared to be largely over by the third survey.

Vegetation

The offset site only supports scattered eucalypts including River Red-gums *Eucalyptus camaldulensis* in the north and a combination of Bundy *Eucalyptus goniocalyx*, Yellow Box *Eucalyptus melliodora*, and Grey Box *Eucalyptus microcarpa* elsewhere.

DELWP identifies the native (pre-1750) vegetation of the site as a combination of the ecological vegetation classes (EVC) Plains Grassy Woodland (EVC 55) on the volcanic geology in the northern third of the site, Valley Grassy Forest (EVC 47) along drainage lines and adjacent to the volcanic geology in the middle third and otherwise as Heathy Dry Forest (EVC 20) (southern areas).

Shrubs are typically absent apart from a few scattered Black Wattle *Acacia mearnsii* and Tree-violet *Melicytus dentatus*.

A modified ground cover, typically dominated by annual introduced grasses such as Oats *Avena* spp., Bromes *Bromus* spp., Fescue *Vulpia* spp. and Rye-grass *Lolium* spp. There are also patchy areas of perennial pasture species (weeds) such as Brown-top Bent *Agrostis capillaris*, Toowoomba Canary-grass *Phalaris aquatica* and Cocksfoot *Dactylis glomerata*.

However, native ground cover species are scattered across the site and occasionally form small patches which would be classified as native vegetation. Common species include Wattle Mat-rush *Lomandra filiformis*, Common Wheat-grass *Anthosachne scabra*, Weeping Grass *Microlaena stipoides*, Spear-grasses *Austrostipa* spp., Kangaroo Grass *Themeda triandra* and Wallaby-grasses *Rytidosperma* spp.

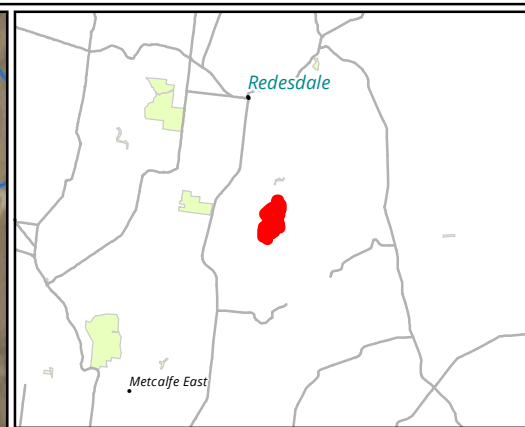
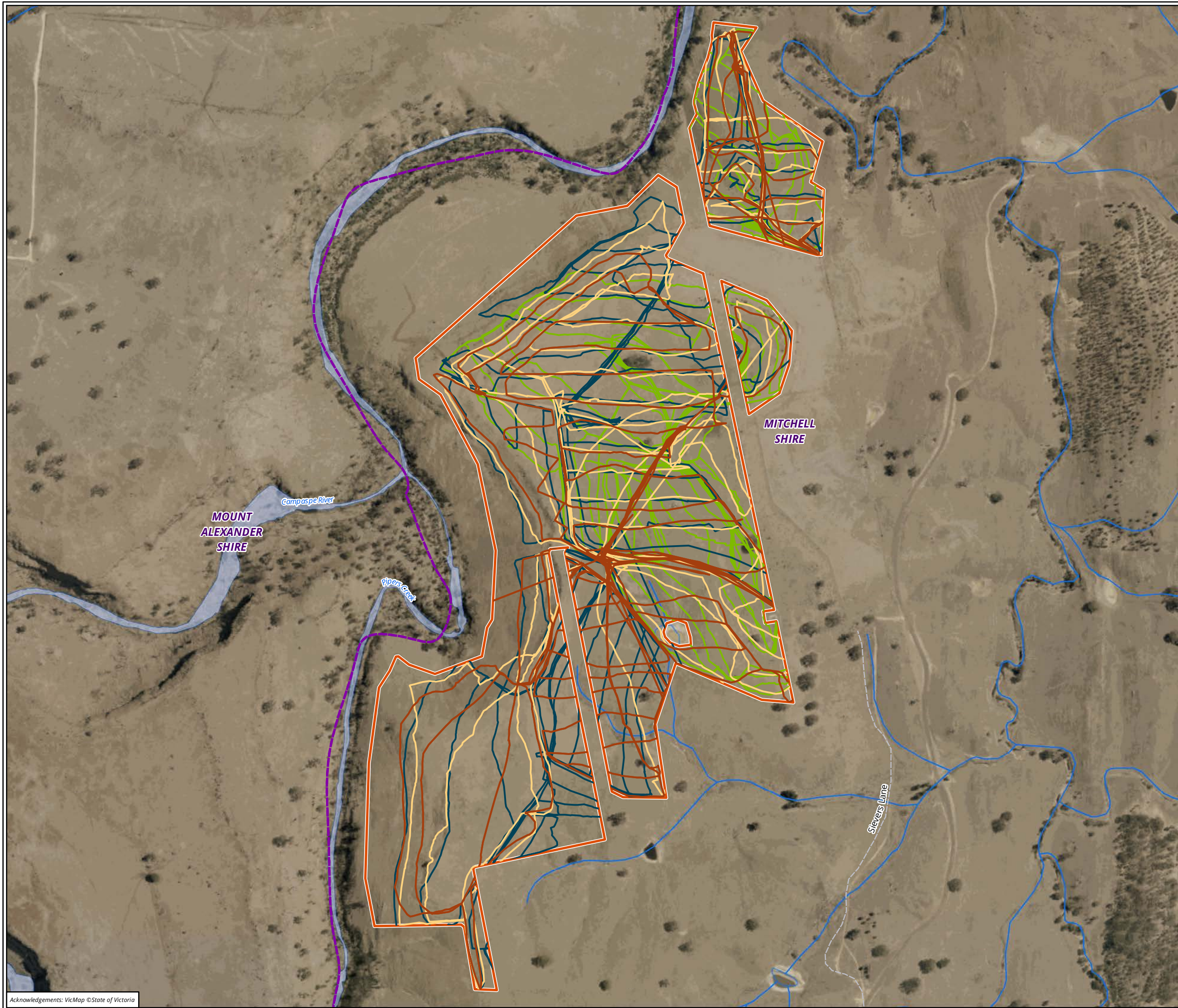
The undulating hills are typically rocky and appear to have been overlooked for cultivation. The ground cover is relatively open and perennial grasses provide an open tussock structure with bare rock and open ground readily apparent.

Relatively flat areas are uncommon. These areas tend to have a more uniform and dense cover of grass except where rocky ground makes that cover discontinuous.

Golden Sun Moth Habitat

The open nature of the grassy ground cover and the scattered to common presence of suitable food plants (such as Wallaby-grasses and Spear-grasses) provides suitable habitat for GSM.

GSM baseline abundance surveys, conducted as per Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (DEWHA 2009), were performed by Biosis (2020), (Figure 4). These surveys identified 1085 GSM over the four surveys recording 627, 439, 19 and 0 individuals in successive surveys (Figure 5). The final survey is excluded from the species density calculation and is replaced by a repeat of the third survey (19 individuals). A total of 1104 individuals is used for the population estimate over four surveys within the 78.8 hectare site and provides a density of 14.01 individuals per hectare.



- Legend**
- Study area
 - Golden Sun Moth survey tracks**
 - Survey 1
 - Survey 2
 - Survey 3
 - Survey 4

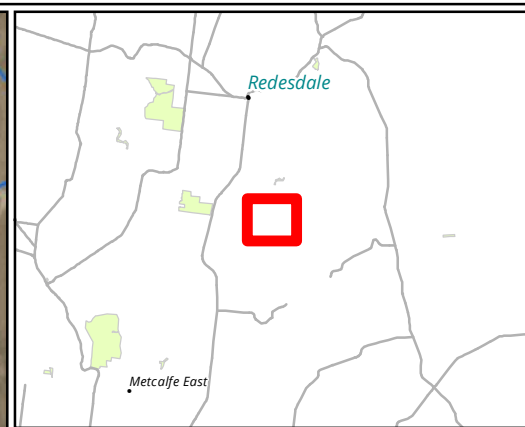
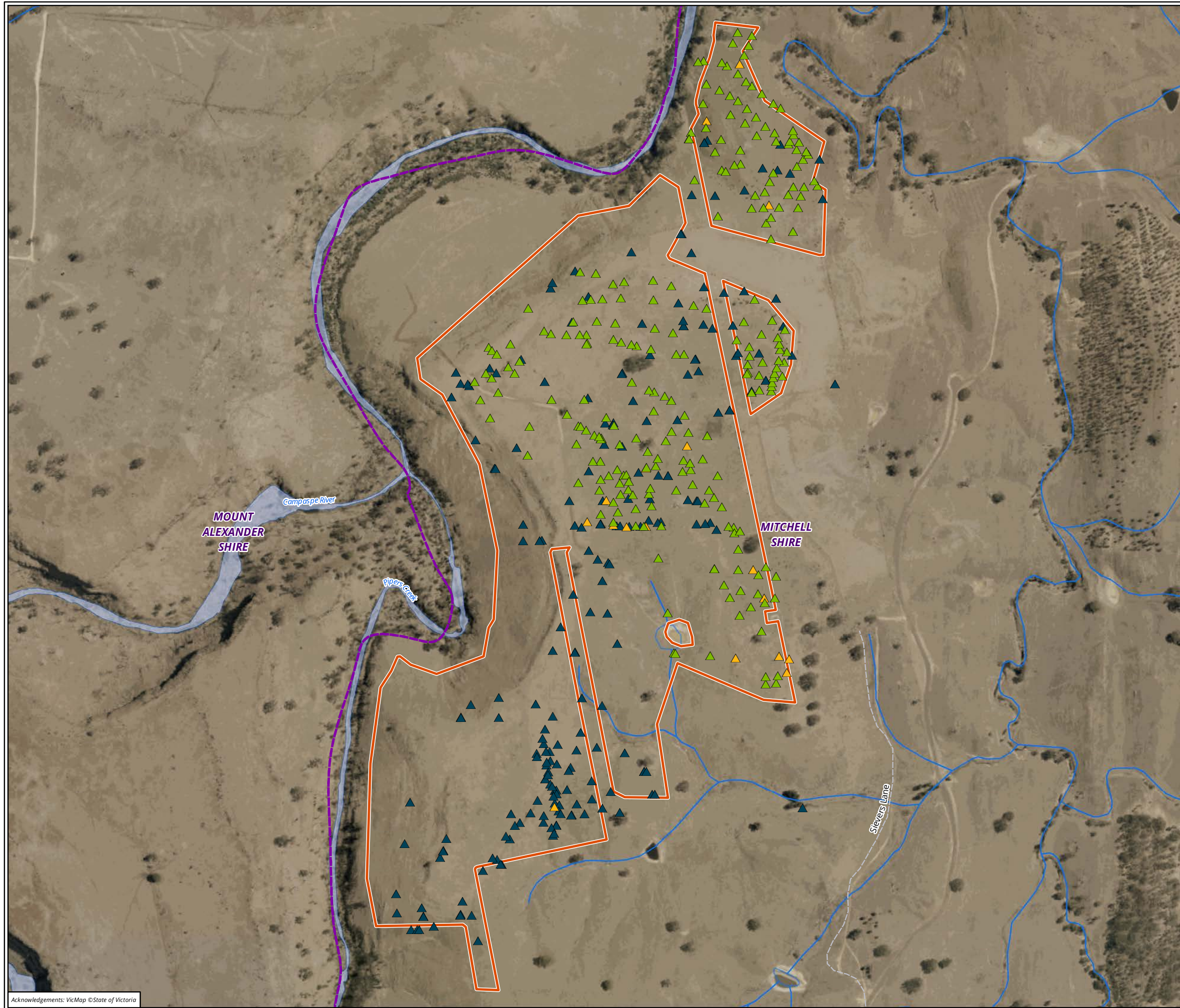
Figure 4 Golden Sun Moth survey effort, 2019/2020 survey season, Sievers Lane offset site, Glenhope, Victoria



Scale: 1:7,000 @ A3
 Coordinate System: GDA 1994 MGA Zone 55



Matter: 31190,
 Date: 14 January 2020,
 Checked by: MJ, Drawn by: LW, Last edited by: lwilson
 Location: P:\31100s\31190\Mapping\



- Legend**
- Study area
- Golden Sun Moth records**
- ▲ Survey 1
 - ▲ Survey 2
 - ▲ Survey 3

Figure 5 Golden Sun Moth records, 2019/2020 survey season, Sievers Lane offset site, Glenhope, Victoria



Scale: 1:7,000 @ A3
 Coordinate System: GDA 1994 MGA Zone 55



Matter: 31190,
 Date: 14 January 2020,
 Checked by: MJ, Drawn by: LW, Last edited by: lwilson
 Location: P:\31100s\31190\Mapping\

2.4 Offset site suitability

The proposed offset site has been subject to past land clearing for the grazing of domestic stock (sheep and cattle). It has been subject to some level of pasture improvement activities which has established a patchy cover of selected agricultural grasses such as Rye-grass, Oats, Toowoomba Canary-grass and Cocksfoot. While the site may have been subject to some level of fertilizer application, the existing vegetation suggests any application has been infrequent.

While most of the ground cover does not support a sufficient component of perennial native species to be defined as native vegetation (i.e. Victoria's definition of native vegetation requires 25% of the perennial ground cover to be composed of native species for areas to be defined as a patch of native vegetation), the rocky sedimentary slopes do support small patches of spear-grasses, wallaby grasses and Kangaroo Grass which achieve this threshold.

Weed cover is typically dominated by annual introduced grasses. However, noxious weeds such as Spear Thistle *Cirsium vulgare*, Paterson's Curse *Echium plantagineum*, Spiny Rush *Juncus acutus*, Gorse *Ulex europaeus*, Variegated Thistle *Silybum marianum* and Chilean Needle-grass *Nassella neesiana*, while present at relatively low abundance, retain the potential to degrade the GSM habitat present.

Shrub and tree regeneration is present but the development of the vegetation from an open grassland to a shrubland or woodland is constrained by browsing of domestic stock and presumably the local population of Eastern Grey Kangaroos.

There are also signs of the presence of European Rabbit (scratchings and latrine sites).

As such, active ecological management of the site is expected to be able to provide improvements in the condition of habitat for GSM.

Method for calculating offset site suitability

The suitability of the site as an offset was assessed using the EPBC Act Offsets Assessments Guide to ensure it meets the requirements of the Department's *EPBC Act Environmental Offsets Policy* (October 2012). Assessments of species habitat quality are based on separate assessments of three parameters: site context, site condition and species stocking rate based on scoring criteria defined under previously approved GSM assessment protocols (Biosis 2019) as follows:

Site context is assessed as a score out of three as follows:

- 0/3 = Habitat patch* size <0.25 ha.
- 1/3 = Habitat patch size more than 0.25 ha and up to 10 ha.
- 2/3 = Habitat patch size more than 10 ha, shaped appropriately** to reduce edge effects.
- 3/3 = Habitat patch size more than 10 ha, shaped appropriately to reduce edge effects, slightly sloped (3° or less) and north-facing, minimal shading.

*A patch is considered to be an area of suitable habitat separated from other areas of suitable habitat by >200m of unsuitable habitat, or barriers to flight

**Assessed on a case by case basis.

Note: Add 1 point (up to a maximum of 3) if the proposed offset results in an occupied linkage between 2 populations.

Site condition is assessed as a score out of three as follows:

- 0/3 = dominated by introduced vegetation that isn't a known food source.

- 1/3 = dominated by poor quality native vegetation (VQA score greater than or equal to 30/75) including <20% cover of known food source.
- 2/3 = dominated by moderate quality native vegetation (VQA score 31-45/75) including between 20% and 40% cover known food source and limited inter-tussock space (or dominated by introduced vegetation that is a known food source (i.e. Chilean needle grass) where species stocking rate is greater than 20 moths per hectare*
- 3/3 = dominated by high quality native vegetation (VQA equal to or greater than 46/75) including >40% cover known food source, appropriate inter-tussock space.

*Density calculated as an average across the area of suitable habitat. Density to be rounded up if rounding is required.

Species stocking rate is assessed as a score out of four as follows:

- 0/4 = species not present
- 1/4 = 0-5 males per hectare*
- 2/4 = >5-20 males per hectare
- 3/4 = >20-50 males per hectare
- 4/4 = >50 males per hectare

*Density calculated as an average across the area of suitable habitat. Density to be rounded up if rounding is required. It is expected that impact and offset sites to be surveyed on four occasions during the flying season and the survey results to be summed (consistent with survey guidelines). Justification will need to be provided to the Department to support proceeding in the absence of suitable survey effort. For clarity, if lower survey effort is accepted, the Department will consider:

- for impact sites, the highest recorded density is assumed to be the remaining score (e.g. three surveys detect 5, 10, 15/ hectare, therefore the assumed score is 45/ hectare). If only one survey record of 5/ hectare, then assumed total 20/ hectare.
- for offset sites, the lowest record is assumed to be the remaining score (e.g. three surveys detect 5, 10, 15/ hectare, therefore the assumed score is 35/ hectare). If only one survey record of 5/ hectare, then assumed total 20/ hectare.

Calculations for offset site suitability

The offset site GSM habitat quality score of the Sievers Lane offset site is set at 5/10 based on the presence of a large population of GSM (Biosis 2020) within a large area (greater than 100 hectares) area of modified (dominated by introduced vegetation) but suitable habitat, contiguous with other areas of modified occupied habitat, which is otherwise imbedded within a broader area of unsuitable habitat.

This is assessed to provide the following scores which contribute to the start quality of the Sievers Lane offset site:

- Site Context score of 2/3 (more than 10 ha but does not satisfy the requirements for 3/3)
- Site Condition Score of 1/3 (not moderate quality native vegetation or dominated by other known food plant and therefore reverts to the level below 2/3)
- Stocking Rate score of 2/4 (density of 14.01 individuals per hectare)

The quality of such areas when managed in a manner with little or no consideration for the biodiversity values can deteriorate rapidly. In Victoria, there are no restrictions to practices such as the application of fertiliser, high stocking rates, seeding areas with exotic pasture or changing the type of animal traditionally raised within a property (i.e. changing from sheep to cattle or horses). All such practices are considered as of right uses associated with farming land, whether or not such areas support native vegetation. Given the agricultural nature of such habitat, business as usual (BAU) under this land use is likely to result in GSM

habitat suffering significant declines in condition within a relatively short period of time. These impacts would include an increase in the abundance of introduced pasture species such as Toowoomba Canary-grass *Phalaris aquatica*, Oat *Avena* spp. and Cocksfoot *Dactylis glomerata*, which are not known GSM food species, both from natural and farmer facilitated spread. Other likely impacts include the spread of agricultural chemicals such as superphosphate which is known to be toxic to native grasses which are a GSM food source. The resultant habitat decline therefore occurs as a result of an increase in the abundance of introduced, non-GSM food pasture species and a decrease in the known food resource. This would also be expected to result in a decline in the overall density of animals present.

Without the establishment of an offset site, a decline in condition from a score of 5/10 to 4/10 is considered conservative for a 10-year period. The future quality of this site without offset is therefore set at 4/10.

An elevated level of weed control and permanent application of targeted management to improve the habitat for GSM is expected to provide an improvement by elevating the site condition of Sievers Lane from habitat dominated by poor quality native vegetation with <20% cover of known food plants to moderate quality vegetation with between 20 and 40% cover of known food plants (which improve the site condition score from 1/3 to 2/3). It is also possible that the density of animals could increase from 5 to 20 animals per hectare to 20 to 50 animals per hectare. This would provide an equivalent improvement in the habitat provided by an increase in the condition of the vegetation present. The future quality with offset is therefore elevated to 6/10.

The presence of GSM within the offset site could suggest BAU management is such that the species can continue to inhabit the site in perpetuity. However this assumption ignores the continual and ongoing expansion of introduced species which degrade this type of habitat and ongoing, even if erratic, facilitation of this process by normal farm management. In this context BAU management for agricultural production will almost always result in habitat decline and eventual extinction as has proven to be the case across the landscape. This ongoing threat is clearly documented in the approved conservation advice for this species (pages 2-3 under threats).

There is no information on the extent of GSM in the broader environment nor on any thresholds of change likely to result in its local extinction. However BAU is considered a threat to this environment as ongoing agricultural practices focus on pasture improvement to the detriment of indigenous species which provide the food resource for this species.

A percentage confidence level in the degree of habitat loss and change is a required input for the offset calculator. Given limited knowledge a conservative approach based on broader observations in habitat change is appropriate. DoEE have nominated the annual probability of extinction for a critically endangered species as 6.8%. Given there is a limited extent of habitat for this species in any region and BAU is considered to provide an ongoing threat, selecting a risk of loss without offset of 10% is considered both conservative and realistic. Lower estimates (i.e. 5%) would suggest a finer scale understanding of potential ongoing impacts to this species which does not have any supporting information, while an estimate of 10% at least provides some level of accord with the DoEE probability of local extinction.

The risk of loss without offset is therefore not solely dependent on events such as clearing or land-use intensification. GSM habitat is being lost as a result of BAU without needing to be offset under Victorian or Commonwealth legislation. The offset site is not readily identified as a patch of native vegetation (DELWP map only small isolated patches of native vegetation in this area) and changes of this vegetation would not attract biodiversity offsets under the Victorian *Planning and Environment Act 1987*. Continuing use rights exist over the offset site land (e.g. use for grazing and pasture improvement) and continued use of the land in an agricultural context (without intensification of use) could result in complete loss of the GSM habitat that is present. Continuing use would be exempt from the requirement for offsets under the EPBC Act.

When such a site is secured for an offset the risk of loss is considered to decline significantly. However, despite this the potential for loss is not considered zero as unknown circumstances could still influence the

survivorship of this species at this site. The risk of loss with offset is set at the lowest level above zero (i.e. 1%) to reflect the low probability of the vegetation, habitat and stocking density deteriorating.

Again these assumptions are provided with a relatively high degree of confidence (set at 80% for the risk settings and 90% for the quality settings) because of our observations over time in areas managed for the protection and maintenance of GSM populations. Risk settings are set at a lower confidence level because of the general lack of information relating to ongoing declines under BAU and potential threats even with protection. A higher level of confidence is provided for the quality settings because of regular observations that active management will improve habitat and the lack of management will result in habitat decline. The single unit score changes are considered conservative, particularly limiting the decline in habitat condition to a single unit.

Based on the assumptions outlined and as described in Biosis (2019), an offset protecting 78.8 hectares of GSM habitat at Sievers Lane would satisfy the current policy requirements (i.e. provide a 100% or greater direct offset).

Current permitted land uses

The property is zoned Farming Zone (FZ) within the Mitchell Shire Planning Scheme. The purpose of the FZ is to provide for the use of land for agriculture including the establishment of plantations for timber production over areas of at least 40 hectares.

The property is also subject to the Environmental Significance Overlay (ESO2). The objective of the ESO2 is to protect and maintain water quality and water yield in the Eppalock and Mollison Creek (Pyalong) Special Water Supply Catchment Areas. However, this ESO provides no restrictions for normal agricultural activities such as grazing, fencing, timber production etc.

Within Victoria, removal of native vegetation is controlled under Clause 52.17 of the Victoria Planning Provisions. Some removal of native vegetation is currently permitted (exempt from a planning permit requirement – See Clause 52.17-7) to the minimum extent possible, for activities including:

- Removal of dead vegetation (except for dead trees with a diameter at breast height greater than 40 cm at 1.3 metres above ground level).
- Removal of vegetation for construction of a boundary fence.
- Mowing of understorey grass vegetation to a height of 100 millimetres above ground level.
- Grazing by domestic stock.
- Timber harvesting of ‘reasonable amounts’ for personal use, including firewood and construction of fences or buildings.
- Pruning of up to 1/3 of the foliage of individual plants.
- Treatment of pest animal burrows or weed infestations.
- Stone exploration or extraction.
- Fire protection, including periodic fuel reduction burning or construction of firebreaks and firefighting access tracks.

There are no existing buildings within the property in which the proposed offset site is located.

Existing offset arrangements

The proposed offset site has not been allocated for the provision of any other offsets, either under the EPBC Act Environmental Offsets Policy or for provision of offsets under any current or past Victorian policy, including the Biodiversity Assessment Guidelines or the Net Gain Framework. Other sections of the property contain habitat and records of GSM. These sections may be subject to separate, future offset arrangements for other projects.

3. Part B: Offset Implementation

This section presents the actions required to implement the OMP. The OMP details methods for the management, conservation and improvement of native vegetation at the offset site for the benefit of the protected matter (GSM) over a ten year period commencing from EPBC Act approval of this OMP. These actions are required over the initial ten year period and, while the OMP may be updated after that period with approval from DoEE, active ecological management to maintain or improve GSM habitat condition is required for the life of the EPBC Act Approval and from thereon in perpetuity.

All works will be conducted by a suitably qualified and experienced contractor and/or the landholder. Prescribed management actions are, where relevant, in accordance with the Victorian BushBroker standards for management (DSE 2012a, DSE 2012b and DSE 2012c).

The OMP aims to achieve habitat improvement gains through on-ground actions and therefore is required to be achievable, straightforward and practical. All of the management actions specified must be measurable and support the offset completion criteria.

3.1 Offset site details

Table 1 provides details of the offset site, including the landowner, parcel details and local government property information.

Table 1 Offset Site Details

Landowner of offset site	Kinrara Pty Ltd of Burke and Wills Track, Kyneton VIC 3444
Type of offset	3 rd party
Location and address of offset site	Portions of Lots 1 – 4, Sievers Lane, Glenhope VIC 3444
Area of offset site	78.8 ha
Parish	Glenhope
Allotment	Lots 3 - 6 PS 727973
Volume / Folio	11609 / 429 - 432
Local Government Area	Mitchell Shire
Council Property Number	120655
Bioregion	Goldfields

3.2 Strategy for Offset Site

The offset site is to be secured and managed for the purposes of conservation for GSM in perpetuity. This offset site is a smaller component of a larger area of farmland which will be managed in a sympathetic manner on a voluntary basis. The current land owners have secured formal offset agreements to protect other portions of this broader area of GSM habitat but the nominated section of this parcel has not been allocated for the provision of any other offsets, either under the EPBC Act Environmental Offsets Policy or for

provision of offsets under any past or present Victorian policy, including the Biodiversity Assessment Guidelines or the Net Gain Framework.

All easements noted on the current title have been excluded from the offset area. No future easements can be applied to the offset area as these are likely to conflict with the objectives of this OMP.

3.3 Offset security, management responsibility and reporting requirements

MRPV has located a suitable offset site and negotiated an agreement with the owner(s) of the property. The proposed offset area is located within a larger property on Sievers Lane, Glenhope. The property is owned by Kinrara Pty Ltd (or other future owner), who will be responsible for ongoing management of the offset site throughout the period of this plan.

The offset site will be secured and managed for the purposes of conservation in perpetuity via covenant as to Section 3A *Victorian Conservation Trust Act 1972* managed by the Trust for Nature (TfN). The management strategy for the proposed offset site consists of implementing a vegetation OMP incorporating the management of ground cover biomass using the timed grazing of domestic stock, weed and vermin control and regular monitoring. Details of security and management responsibility are shown in Table 2.

Table 2 Security and Management Responsibility and Reporting Requirements

Who is liable/responsible for meeting offset requirements?	Major Road Projects Victoria
Type of security	Covenant as to part Section 3A <i>Victorian Conservation Trust Act 1972</i>
Date of commencement for the covenant	To be completed in 2019
Date covenant registered on-title	To be completed in 2019
Offset site management responsibility	Kinrara Pty Ltd
Offset Monitoring Responsibility	Kinrara Pty Ltd
Site management	Kinrara Pty Ltd
Monitoring	Kinrara Pty Ltd
Auditing	Major Road Projects Victoria
Reporting responsibility (to TfN)	Kinrara Pty Ltd
Reporting responsibility (to DoEE)	Major Road Projects Victoria
Plan review	Major Road Projects Victoria

The offset area will be secured in-perpetuity via a covenant as to part Section 3A *Victorian Conservation Trust Act 1972*, to be registered on the title in 2019. The encumbrance registered on title requires the landholder and future owners to manage the land in accordance with this OMP or any future approved revisions of this plan.

The covenant will specifically state the in-perpetuity land-use commitments across the offset site to:

- Retain and manage all native vegetation as directed by this offset management plan;
- Retain all fallen timber and branches;
- Exclude domestic stock except as permitted by this plan;
- Exclude the use of stock feed such as hay or other material which could support weed seeds that is sourced from outside the offset area. Sterile feed such as pellets may be sourced externally;
- Eliminate any woody weeds and control the cover of other high threat weeds ensuring this cover does not exceed levels achieved upon attainment of Year 10 offset completion criteria;
- Ensure that pest animals are controlled and that level of control attained at the completion of Year 10 of management is maintained in perpetuity.
- Exclude pasture improvement and any type of cultivation and cropping;
- Exclude fertilizer application for the first ten years of the covenant. TfN may then permit low levels of fertilizer application if the land owner can prove this will not adversely impact native vegetation or GSM habitat.
- Control the accumulation of ground cover biomass through either the controlled grazing of sheep and/or cattle or using the controlled application of fire;
- Monitoring for any new and emerging weeds and continuously treating those weeds to avoid further seed set, dispersal or infestation; and
- Maintain a progressive annual works plan which caters to current conditions and prescribes ongoing management with the promotion of native perennial grasses, and attainment and maintenance of offset completion criteria, as its primary objective.
- Monitor and report on the abundance of GSM within the offset site during the first flight season after EPBC Act approval of this OMP and then during the flight seasons in years 2, 4, 6, 8 and 10 of this OMP and thereafter as requested by DoEE.

Implementation of this management plan is the overall responsibility of MRPV, which has engaged the land owner (Kinrara Pty Ltd) to deliver the offset outcomes on MRPV's behalf. However, direct management responsibility may be delegated to a designated site manager and/or managing ecologist. The land owner is responsible for engaging a qualified ecologist to conduct monitoring (Section 3.9) with reports submitted to TfN, MRPV and DoEE. Management actions by the land owner will be overseen by the TfN as part of the legal protection over the site.

The TfN is responsible for:

- Undertaking site inspections at least 4 times over the initial 10 year period and provide input into the annual works program.
- Review of ecological monitoring reports including an assessment of attainment and maintenance of the offset completion criteria.

Implementation of the management plan will be monitored by the TfN, who will verify that the management actions have been carried out appropriately.

Implementation of the OMP will begin from the date of the approval or as otherwise agreed with the landowner with registration of the covenant to be completed as soon as possible in 2019. While preparation of the covenant is expected to be completed in mid 2019, formal signing of the covenant by the Minister may be delayed by other priorities. However, MRPV will pay all the prescribed fees within four weeks of the approval of this OMP. These fees will be non-refundable and the covenant signing will therefore be an administrative formality.

Funding for implementation of this OMP has been agreed between MRPV, the land owner and TfN. Where appropriate, or otherwise agreed, funding will be held by the TfN and paid to the land owner over the 10 year management period as per a land owner agreement. This will include agreed funding for anticipated ongoing management required to maintain completion criteria at the offset site in perpetuity, beyond the initial 10 year period during which the completion criteria are achieved.

3.4 Offset completion criteria

The key environmental outcomes / criteria to be achieved through protection and management of the offset area are:

- Permanent legal protection of 78.8 hectares of GSM habitat;
- Physical protection of the habitat area from manageable threats including uncontrolled stock grazing, weed infestations and degradation by pest animals.
- Attainment of GSM habitat condition completion criteria, as measured by habitat monitoring.

3.4.1 Future site condition - completion criteria

The offset calculations used to define the extent of the offset area (Biosis 2019), specify an improvement in average habitat condition throughout the offset site over the period of the OMP from 5/10 to 6/10. Habitat condition will be assessed using the habitat features known to support GSM, including the presence of an open tussock grassland structure (with at least 5% but preferably 20 – 40% open ground or inter-tussock spaces) and the abundance of known food plants such as spear-grasses *Austrostipa* spp. and wallaby-grasses *Rytidosperma* spp.

Specifically, the 78.8 hectare offset site must achieve the following site condition:

- a) be dominated by moderate quality native vegetation (VQA site condition score 31-45/75); and
- b) a cover including between 20% and 40% cover known food source for Golden Sun Moth with appropriate inter-tussock space/bare ground (<5% cover); or
- c) be dominated by introduced vegetation that is a known food source (i.e. Chilean needle grass) where the species stocking rate is greater than 20 moths per hectare.

Alternatively the GSM stocking rate would need to increase from the existing measure of between 5 and 20 males per hectare to between 20 and 50 males per hectare where a failure to meet the targets was attributable to site management, as opposed to seasonable variation.

The most appropriate outcome is attainment of (a) above. Monitoring assessments will be undertaken in marked quadrats distributed through the offset site as described in Section 3.9. Key performance targets for continuous improvement in the quality of GSM habitat include:

- a) a continuous decline in the abundance of perennial, introduced pasture grasses (such as Brown-top Bent, Toowoomba Canary-grass and Cocksfoot) at a measureable rate to be identified by annual monitoring; and
- b) an increase in the density of perennial native grass species at a rate measurable by annual monitoring.

Attaining the nominated future condition class will require the VQA site condition score to be between 31 and 45 out of 75 and the ground cover to include between 20% and 40% cover of known food grasses with at least some inter-tussock spaces (1%-5%) although a greater cover of inter-tussock spaces is acceptable as this is also an indicator of better quality GSM habitat.

3.4.2 Performance criteria

Key performance criteria for this OMP are:

- Controlling stock and preventing unauthorised vehicle access by maintaining boundary fencing to the standard detailed in the Management Standards for Native Vegetation Offset Sites (DELWP 2019).
- Preparation of a detailed baseline report on the flora of the offset site against which the effectiveness of management activities can be compared.
- Establishment of 10 monitoring quadrats and 10 photo points to form the basis of vegetation monitoring to document changes in GSM habitat quality over time, performance in continuous improvement, and assessment against habitat quality completion criteria.
- Improving GSM habitat quality through the removal of all existing woody weeds and maintaining woody weed levels at <1% cover by the end of year 1 of commencement of the plan.
- Annual monitoring and control of woody and herbaceous weeds with weed control carried out in accordance with the Management Standards for Native Vegetation Offset Sites (DELWP 2019).
- Implementation of a biomass management (grazing) regime to develop and maintain an open grassland structure.
- Implementation of a biomass management (grazing) regime to reduce the abundance of perennial weeds while increasing the abundance of grasses which are known food plants for GSM.
- Introduced perennial grass cover within the offset site reduced to at least 50% of baseline cover at the end of 10 years of management. As a general measure of continuous improvement, a measurable reduction in these weeds will be identifiable every two years using information collected in quadrats. Note that this will include the control of Chilean Needle-grass which is a GSM food plant. However, this weed is relatively rare within the offset site and its control is not expected to have a measurable impact on the GSM population.
- New and emerging woody weeds identified and eradicated.
- Implementation of a GSM survey monitoring and evaluation program.
- No measurable decline in the abundance and area of occupancy of GSM within the offset area.
- Identification and removal of surface harbour for pest animals.
- Control of rabbits and foxes in accordance with the *Management Standards for Native Vegetation Offset Sites* (DELWP 2019 including achieving a target of no active fox dens or rabbit warrens within the offset area.
- New and emerging pest animals identified and prevented from establishing in the offset area.
- Monitoring and management of indigenous tree and shrub regeneration to ensure regeneration does not degrade the quality of GSM habitat in the offset area.
- Prepare annual reports detailing the monitoring and management actions and outcomes outlined in this OMP

The gradual improvement of the offset site will be identifiable by the gradual decrease in the extent of perennial grassy weeds and the gradual increase in the overall cover of indigenous grasses, most of which are GSM food plants.

3.5 Limitations and uncertainty

This management plan has been formulated using information from recently conducted site inspections (Biosis 2018). The OMP has been subject to external review and quality assurance by TfN as part of the process to register the site covenant. Relevant federal and state government policies, procedures and databases have also been consulted where appropriate.

The proposed offset site supports a population of GSM, which has been confirmed by recording the species within the offset site during targeted surveys in the 2014/15, 2017/18 and 2018/19 flight seasons (Hamilton

Environmental Services 2015, 2018, 2019), from incidental observations by Biosis late in the 2017/18 flight season and from surveys conducted in the 2019/2020 flight season by Biosis.

The OMP includes a reasonable expectation that the control of environmental weeds to reduce their cover and prevent / restrict their production of seed, while concurrently encouraging the growth and seed production of the existing cover of indigenous grasses, will result in an increase in the abundance and cover of native grasses. As most of the native grasses present are GSM food plants, this management strategy is expected to improve the habitat condition for GSM. However, there is a possibility that the recruitment of indigenous species will be slower than expected or prolonged drought conditions may inhibit recruitment.

If seed production is restricted by unforeseen circumstances such as drought then seed collection and dispersal options would be investigated. Alternatively the time period for active management would be extended to compensate for any lag in the establishment of native grasses.

3.6 Ongoing management commitments

The offset site will be managed for the conservation of GSM.

From the commencement of the approved OMP and conservation agreement, the landowner agrees to undertake the following management commitments in perpetuity:

- Eliminating all woody weeds through continuous detection, treatment and infestation prevention.
- Monitoring for any new and emerging weeds and eliminate through continuous detection, treatment and infestation prevention.
- Controlling rabbits, hares and foxes to an extent above existing legal requirements.
- Retaining all standing trees, dead or alive.
- Retaining fallen logs and fallen branches.
- Exclude stock except as otherwise specified under this approved plan.
- Exclude the use of stock feed such as hay or other material which could support weed seeds that is sourced from outside the offset area. Sterile feed such as pellets may be sourced externally;
- Exclude pasture improvement (but not ground cover rehabilitation to increase the cover of native grasses and herbs), and cultivation for commercial cropping;
- Exclude fertilizer application for the first ten years of the covenant, and only apply superphosphate fertiliser after this time in accordance with written agreement from the TfN. TfN may permit low levels of fertilizer application if the land owner can demonstrate that this will not adversely impact native vegetation or GSM habitat quality.

3.7 Risk assessment and adaptive management

Active ecological management is expected to provide a high probability of generating improvements in the condition of the vegetation present (i.e. increasing the abundance of native grasses and herbs while decreasing the abundance of introduced species) and attainment of the offset completion criteria. Note however that the extent of this offset has conservatively been based on the assumption that management will, at a minimum, improve the condition of GSM habitat present so as to be dominated by moderate quality native vegetation (VQA site condition score 31-45/75) including between 20% and 40% cover known food source with limited inter-tussock space (<5%) (note that a greater cover of inter-tussock space is acceptable).

The management actions proposed in this plan are based on a combination of experience in the management of native grasslands and grassy woodlands, documents prepared by Victoria's Department of Environment, Land, Water and Planning (DELWP) (i.e. DSE 2009) and other publications (i.e. Marshall 2013, Williams et al. 2015).

The proposed strategies for the management of this site are consistent with established practices for the management of grasslands and grassy woodlands elsewhere including State conservation reserves and offset sites.

The active involvement of TfN is also expected to provide high quality guidance and advice to the landholder in their management of the site.

The monitoring protocols documented in this plan are considered adequate to detect attainment of the offset completion criteria (above).

The plan includes a basic strategy (pulse grazing) for ground-cover biomass control which is considered a major ecological management requirement for the site. Where this fails to deliver the prescribed outcome in any one year, ecological burning provides an option to achieve the required biomass management target (i.e. maintaining an open grassland environment dominated by native species). The application of one or both of these management actions will provide the biomass control outcome required.

It is acknowledged that the response of natural environments to management can be unpredictable and management activities need to be flexible to respond to changing conditions and unpredictable events. Examples of potential risks are outlined in Table 5 and discussed below. Seasonal conditions can also vary greatly from year to year and influence offset site management actions in any one year. This seasonality is recognised in this offset plan by allowing for flexibility around timing of actions at the discretion of the land manager in consultation with TfN so as to attain and maintain performance and completion criteria.

There is some risk that biomass control is not properly managed in any one year. This has the potential to occur in response to above average rainfall years when ground cover growth is persistently high and wet conditions restrict stock access or limits opportunities for the application of ecological burning to reduce biomass. If such events occur, the land manager will ensure additional efforts are made by in subsequent years to maintain the rate of improvement required.

Another major ecological management requirement is weed control, with the objective of reducing the overall presence of weeds and reducing biomass. Varying seasonal conditions will provide triggers for changes in the abundance of different species, particularly weeds. The greatest risk to achieving the required outcomes is a failure to conduct an appropriate level of work at an appropriate time or the occurrence of persistent adverse conditions restricting an appropriate management response. The regular site inspections will allow land managers to anticipate changes in seasonal conditions and respond accordingly. Persistent, well timed management actions will be able to take advantage of seasonal fluctuations to achieve the completion criteria.

Woody weeds in particular are currently absent from the offset site and it will be a relatively simple management exercise to maintain this condition. While woody weeds will probably colonise the site from near-by infestations, seedlings will be detected through monitoring and controlled by the proposed on-going works. If live, woody weeds are detected in the offset area beyond Year 2 of the plan corrective actions would be required (e.g. increase woody weed control activities to ensure elimination of these species within one year).

Similarly control works will target perennial weeds including Canary-grasses, Brown-top Bent and Cocksfoot. Persistent herbicide application is an effective control measure for these species and while these species are likely to reinvade from surrounding infestations, ongoing works are planned to cope with the associated management requirements. If adequate resources are not allocated to these tasks, the cover of these species may remain static or increase. Any observations or monitoring which detect an increase in perennial weeds above the previous assessed conditions and percentage cover will trigger a requirement for a greater management input (the required corrective action being targeted increased management actions). In that context additional site observations (over and above formal monitoring) collected by TfN (or an independent

ecologist) is essential in providing feedback on the efficacy of management.

Another significant risk associated with the management of this site is the occurrence of climatic triggers which would increase the abundance of weed species by triggering the germination of any soil stored seed reserves. In the first instance management will over allocate resources to weed control as the more comprehensive control achieved by such works the lower the ability these species have to recover / recolonise. Integrating herbicide control works with biomass control works (grazing and/or fire) increases the efficacy of both actions and the outcomes-based approach to this plan (i.e. to attain and maintain the offset completion criteria) supports this approach. Given persistent management occurs it is considered a relatively low risk that the completion criteria will not be achieved.

If after the first 8 years of management, the monitoring results indicate that the completion criteria are unlikely to be achieved, DoEE will be contacted to determine potential additional future offset requirements. If the offset area fails to attain and maintain the completion criteria at or following year 10, but during the period of EPBC Act Approval, an additional offset will be provided to account for the failed offset. DoEE will be consulted to determine the suitability of the replacement offset.

Active management to target the control of pest plants and to manage the accumulation of ground-cover biomass is advantageous to both the health of a native grassy ground-cover but also to the ability of GSM to persist within this environment. As such the proposed management regime is considered unlikely to have a negative impact on GSM. This has been our experience where Biosis has managed other grassland reserves in metropolitan Melbourne. If the GSM monitoring detects significantly fewer GSM observations (i.e. a decline of over 50%) in successive monitoring events potential causes for such a decline would be investigated and appropriate corrective actions implemented. Such an outcome resulting from the implementation of this OMP is considered highly unlikely (i.e. low risk).

The risk of trampling during the GSM breeding has been considered and poses a low risk to GSM persistence. Male moths are capable flying away (avoiding being trampled). Females are also capable of short flights and could be expected to avoid trampling. Any (small) impact that trampling might have on the vegetation within the offset area is outweighed by the benefits grazing has in reducing biomass and thus maintaining and improving GSM habitat quality. Biosis and other consultants have documented high quality GSM habitat in areas subjected to moderate and in some cases heavy grazing during and trampling by domestic livestock and in these sites moths have persisted and indeed thrived with this management regime for many years.

This OMP describes management and monitoring actions at the offset site for the 10 year period following commencement of the OMP. At the end of that period management and monitoring actions will be reviewed in light of the new condition of the offset and any new information relating to the management of this type of grassy woodland environment. Note that active conservation management is required for the period of this OMP and the quality of the vegetation needs to be maintained in perpetuity. The timing of actions is based on adaptive management. By monitoring management actions, and habitat condition, management will be adapted to ensure the stated commitments in the OMP are achieved. Also over time, new management techniques may become available, or further information on the ecology and status of the vegetation communities onsite may necessitate adjustment to management actions. The landowner will continue to receive advice from TfN on any developments in grassy woodland management and update the OMP as appropriate in perpetuity.

Section 4 includes tables of management actions (Table 4) and a risk assessment (Table 5) with associated monitoring (Table 6) and reporting (Table 7) programs.

Key risks identified in Table 5 include:

- Unauthorised entry of domestic stock or vehicles into the offset area;
- Woody weed infestations;

- Failure to detect and control new infestations, as well as failure to reduce existing infestations;
- Failure to increase the species composition and density of perennial native grasses
- Rabbit infestations;
- Over abundant tree regeneration; and
- An unexplainable decline in the abundance of GSM.

Failure of the adaptive management approach to adequately respond to risks, as identified in monitoring reports (Section 3.10) or audits (Section 3.11), will result in a review of this plan, as discussed in Section 3.12 and Table 5.

3.8 Management actions and land use commitments

This section outlines the actions required to achieve the completion criteria by Year 10. The offset site is to be secured and managed for conservation purposes in perpetuity. Management actions described below are to be implemented for a period of 10 years. The OMP will be revised after the end of the initial ten year period to ensure it remains appropriate for maintaining the completion criteria. The revised OMP will continue to apply to the land and the landowner will continue to manage the offset site after the completion of year 10 as specified under the covenant. Formal reporting to DoEE will be required for the ten year period of this OMP but the offset will be managed for conservation in perpetuity.

The broad objective of site management will be to produce a decrease in the abundance of perennial weeds with a commensurate increase in the abundance of perennial native species, particularly grasses which are known food plants for GSM.

Offsets will be achieved by:

- Weed control:
 - Ensuring that weed cover declines continuously.
 - Ensuring that the cover of introduced perennial grasses decreases by 50% of the baseline monitoring cover (this will at least improve the Lack of Weeds score).
 - Eliminating all woody weeds.
 - Monitoring for any new and emerging weeds and eliminate.
- Limiting organic litter and biomass accumulation as compared to the relevant EVC benchmark.
- Monitoring the regeneration of eucalypts and conducting ecological thinning as required to prevent the formation of a dense sward of young regrowth. The maximum density will be one tree per 5000 square metres (average per definable offset management unit (paddocks or land parcels)).
- Controlling rabbits, hares and foxes (over and above existing legal requirements).
- Monitoring and controlling new and emerging pest animals.
- Retaining all standing trees, dead or alive.
- Retaining fallen logs and fallen branches.
- Excluding stock except as otherwise prescribed by this plan.

The management actions listed below outline the prescribed actions for achieving the required gains through active management (maintenance and improvement) and permanent protection of the offset site. Table 4 specifies these prescribed actions and the timing for implementation. These actions will be applied to the entire offset area as identified in Figure 4.

Prior to works being undertaken each year an annual works program (based on Table 4) will be developed by an experience bushland regenerator. The person undertaking the works will prepare a detailed works

program in consultation with TfN. The works program for the coming year will also address issues that may not have been anticipated in formulating this original management plan. The OMP will be updated as required with any revised versions of the OMP to be submitted to the DoEE for approval.

3.8.1 Fencing

Threats, including stock grazing must be able to be managed within the offset area at all times. Unauthorised access must also be prevented, particularly access via vehicle for unauthorised firewood collection. Preventing access will also minimise soil disturbance, soil compaction and the import of weeds and pathogens. The intention of fencing is to protect the property from threats in perpetuity.

The property boundary is currently fenced and has adjacent features, e.g. limited access from the west because of the presence of Pipers Creek and the Campaspe River, that currently control access and threats effectively. There is no requirement to provide additional fencing for the offset area, as it is located within a fully fenced property.

Monitoring of access and threats will be conducted on an ongoing basis with fencing repaired or upgraded as required to control threats.

Posts marking the boundary of the offset site will be set up at the beginning of the offset period to clearly identify the area for monitoring and management purposes. Posts will be located in accordance with advice from a qualified ecologist to ensure impacts to native vegetation are avoided.

If existing land-use rights are to be fully exercised in the remainder of the broader parcel, fencing to control stock access to the offset site will be required. Fencing will meet the minimum standard set by DELWP's fencing standards in BushBroker Information Sheet 12 - Standards for Management – Fencing, to establish a sturdy stock proof fence. If rabbit populations impacting the site cannot be controlled to an adequate level (based on advice from TfN) then fencing protecting the offset site will be upgraded to a rabbit proof standard.

The landowner will ensure all fencing around the perimeter of the property is maintained in good condition according to the standard detailed in the *Management Standards for Native Vegetation Offset Sites* (DELWP 2019), for the term of the EPBC Act approval and as otherwise required in perpetuity by the TfN covenant.

3.8.2 Woody weeds

Elimination of all woody weeds

Woody weeds present and otherwise known from the local area include Blackberry *Rubus anglocandicans*, Horehound *Marrubium vulgare* and Gorse *Ulex europaeus*. The few woody weeds present throughout the offset site will be removed within the first year after the OMP commencement date. Any woody weed recruits subsequently observed within the offset site will be recorded and effectively treated within 6 months of observation. Woody weeds will not be permitted to set seed and will be effectively treated before any viable seed is produced.

Any other woody weeds recorded on site will be eliminated. Any impact to Indigenous plants will be minimised during treatment of woody weeds. Woody weeds will be controlled by either cut & paint techniques, spot spraying or be hand pulled. Monitor areas controlled for woody weeds for any re-sprouting or seedlings and eradicate.

New and emerging woody weeds

Monitoring for new and emerging woody weeds will be conducted throughout the year for the term of the agreement, and any new and emerging woody weeds eliminated.

Refer to the standard detailed in the *Management Standards for Native Vegetation Offset Sites* (DELWP 2019).

3.8.3 Herbaceous weeds

Control of all herbaceous weeds

The Catchment and Land Protection Act 1994 (CaLP Act) lists noxious weeds and requires that all landowners take reasonable steps to prevent the spread of, eradicate and / or control noxious weeds on their land.

The control of high threat and listed noxious weed species is a key management action within the offset site and must be adequately addressed if the completion criteria are to be achieved.

All weeds will be treated. Weeds listed in Table 3 were found on site and are considered to be a high threat. These weeds will be monitored each year to ensure their cover is continuously reduced. Increasing cover of these weeds will be controlled using the methods outlined in Table 3 or as otherwise approved by TfN.

Herbaceous weeds will be treated before the plant has flowered and set seed. Impacts to indigenous plants will be minimised during treatment.

Relatively flat areas with a low erosion risk can be treated more intensively than areas on slopes which are more erosion prone.

Refer to the standard detailed in the *Management Standards for Native Vegetation Offset Sites* (DELWP 2019).

New and emerging herbaceous weeds

Monitoring for new and emerging herbaceous weeds will be conducted throughout the year for the term of the agreement, and any new and emerging weeds eliminated. In addition to any high threat weeds, this must include any noxious weeds listed under the CaLP Act.

3.8.4 Pest animals

The Catchment and Land Protection Act 1994 lists rabbits, hares 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.

Rabbits and hares will be monitored and controlled throughout the year. If rabbit activity is detected on the site the land owner will implement a comprehensive control strategy in accordance with the standard detailed in the *Management Standards for Native Vegetation Offset Sites* (DELWP 2019). This involves fumigation, hand collapsing of burrows and baiting. Carcasses will be removed to prevent poisoning of native predators.

Foxes are a threat to native fauna and will be controlled if found on the property. Fox dens where present will be destroyed through fumigation and hand collapse.

Any observations of pest animals within the offset site during other activities will be recorded. Pest animals will be formally monitored annually in November through the conduct of spotlight transects across the offset site. This is expected to require about 2 to 4 hours of walking across the site. This assessment of the presence and abundance of each pest species will be included in the annual report. Control works will ensure that the abundance of any pest species is maintained at low to negligible levels.

Active control works targeting pest animals are not expected to have any negative impact on GSM located at the offset site. The land owner will monitor and control rabbits, hares and foxes all year round as well as any new and emerging pest animals.

3.8.5 Biomass / Organic Litter control

Biomass management throughout the offset site is essential to maintain the open tussock grassy ground cover structure preferred by GSM. While there are no specific guidelines for habitat management for GSM within the relevant conservation advice for GSM (DoEE 2013), habitat degradation of grassland and grassy woodland environments is a known threat for the species.

Where there is a sustained build up in ground cover biomass over any one year, resulting in a reduction of inter-tussock space to an average of less than 30%, biomass will need to be actively reduced. Site productivity is a key determinant of ecosystem responses to disturbance regimes and in productive systems frequent disturbance (i.e. 1 to 5 year intervals) are commonly required to maintain diversity. This is because potentially dominant species, predominantly grasses, can rapidly re-establish between disturbances causing the sub-dominant inter-tussock species to be outcompeted (Morgan 2015).

Table 3 Herbaceous weeds to be controlled – method and timing

<i>Avena</i> spp.	Oats	Crash graze, spot spray with an appropriate herbicide.	Late winter to early summer
<i>Cirsium vulgare</i>	Spear Thistle	Chip out or spot spray rosettes with an appropriate herbicide.	Late winter to early summer
<i>Echium plantagineum</i>	Paterson's Curse	Disperse biocontrol agents as appropriate. Spot spray or boom spray with herbicide as appropriate.	Late winter to early summer
<i>Juncus acutus</i>	Spiny Rush	Pull out and remove from site. Spot spray with an appropriate herbicide.	Late winter to early summer
<i>Nassella neesiana</i>	Chilean Needle-grass	Spot / boom spray infestations with an appropriate herbicide.	Late winter to early summer
<i>Phalaris aquatica</i>	Toowoomba Canary-grass	Spot spray with an appropriate herbicide.	Late winter to early summer
<i>Paspalum dilatatum</i>	Paspalum	Spot spray with an appropriate herbicide.	Late winter to early summer
<i>Agrostis capillaris</i>	Brown-top Bent	Crash graze, spot spray with an appropriate herbicide. Localised burning may also be effective.	Late winter to early summer
<i>Bromus</i> spp., <i>Vulpia</i> spp., <i>Aira</i> spp., <i>Hordeum</i> spp.,	Weedy annual grasses	Crash graze, spot spray with an appropriate herbicide.	Late winter to early summer
<i>Lolium</i> spp.	Rye-grass species	Crash graze, spot spray with an appropriate herbicide.	Winter to Spring
<i>Silybum marianum</i>	Variegated Thistle	Chip out or spot spray rosettes with an appropriate herbicide.	Late winter to early summer

Judgements on the cover of inter-tussock space and the build-up of groundcover biomass will be made by the landowner in consultation with the TfN and include an assessment of relevant monitoring data. Biomass accumulation will be measured using the 'Golf Ball Method' (Morgan 2015) with measurements of high biomass accumulation requiring a management response. The independent ecological monitoring undertaken by a suitably qualified ecologist will also assess the effectiveness of the biomass control techniques applied and the need for any adjustments to the management regime to achieve or maintain the completion criteria.

Controlled grazing will be applied to reduce biomass and maintain an open tussock-grass structure for this grassy ground cover. The species used for grazing will be determined by the landowner in consultation with TfN. Cattle will only be used where high levels of biomass are encountered. If appropriate, ecological burning will be utilised.

Use of grazing for ecological management

Currently the offset site is subject to unrestricted grazing by sheep and cattle. Given the diversity of native species found within the uncultivated sections of this site, this method of disturbance (grazing by domestic stock) is seen as a reliable and conservative action to maintain the ecological values associated with the area.

While grazing by domestic stock will continue as a method of biomass reduction at this site, it will be undertaken in a controlled manner as outlined in this OMP. Biomass accumulation control at this site will therefore be in accordance with the standards for management of ecological grazing published by DSE (2009).

The offset site supports patches of native grassy understorey but in general does not support enough indigenous ground cover to be uniformly defined as native vegetation (DELWP 2017). Timed grazing in the offset area to maintain an open tussock grassland structure is seen as a precautionary management method to disadvantage introduced annual and perennial grasses and provide an advantage to native perennial grasses. Grazing of domestic stock will utilise both sheep and cattle. The use of cattle is more suited for the initial knockdown in high biomass areas or areas containing extensive areas of dry grass or weeds not palatable to sheep.

Grazing by other domestic stock including but not restricted to goats and horses will be excluded from the offset site by this plan and the conservation covenant.

The timing of grazing will be controlled to allow native species to grow and set seed over the spring to mid-summer period (DSE 2009). Stock will be excluded or only occur at very low levels (i.e. less than 20% of recommended stocking rates) from the beginning of October to the end of December annually, for the life of the OMP. However, this period will be flexible to reflect the prevailing climatic conditions and allow the period of grazing exclusion to be varied on ecological advice. The landowner will keep records of the number of stock, timing and duration of grazing within the offset area. This data will be provided to the TfN on an annual basis as part of the Landholder monitoring and reporting process. This data and the resultant impact on biomass will provide the basis for an on-going grazing strategy to be approved by the TfN or an independent ecologist approved by the TfN.

The only exception to requirements specified for the control of grazing is if an ecological burn is planned and occurs during the grazing period. In this instance a fire management plan produced by the landholder in consultation with TfN will inform when grazing will be removed to allow for a build-up in biomass to establish post-fire.

Note that the objective of grazing is to maintain an open tussock ground cover structure and to allow native perennial grasses to set seed and increase their abundance over time, in order to attain and maintain the offset completion criteria.

Use of fire for ecological management

Burning within the offset area will be undertaken only with due consideration to relevant health and safety issues, in consultation with the Country Fire Authority and in line with a fire management plan completed by a suitably qualified consultant. The following provides guidelines for use of burning only in an ecological sense.

While grazing by domestic stock will be the typical manner in which ground cover biomass will be regulated, the controlled application of fire is an efficient and cost-effective alternative technique for reducing biomass in grassy ecosystems such as those that occur within the offset site. Importantly, burning (compared to grazing or slashing) allows greater access and efficiency for weed control and increased natural regeneration of indigenous plant species. While burning may enhance germination of indigenous species, it can also be expected to promote certain exotic species and as such post-burning weed control will be vital to effective weed control. However, stimulating the soil-stored weed seed bank is seen as positive as this allows this seed bank to be exhausted through active management.

Burning is acknowledged as an important component of the natural disturbance regime in grassy ecosystems but because of the habitat requirements for GSM, burning will be restricted to outside the GSM flight season (generally November to January in Victoria). This allows management to be consistent with the relevant conservation advice.

The controlled application of fire will be used for biomass reduction in all or parts of the offset site. Selected areas of grassland may be burnt to tackle particular weed issues or to assist in the lowering of soil nitrogen and phosphorous which would also assist in weed control works. However no area is to be burnt more frequently than once every three years (unless approved by TfN in consultation with a qualified ecologist). Burning will be conducted in a mosaic pattern and any individual burn will not burn the entire site.

The landowner will prepare maps identifying the fire history of the offset area to ensure biomass control efforts are at appropriate frequencies and recorded. Details of fire and grazing within the offset will also be documented in the annual reporting as outlined in Section 3.10.

Any ecological burns will be conducted during benign (nil to low wind and mild temperature) weather conditions and are likely to be patchy (i.e. not result in the uniform burning of all areas). Patch burning will ensure an array of small patches are burnt covering no more than about a hectare for any burnt patch. This will be mapped by GPS to ensure appropriate tracking of management actions.

No portion of the offset site will be burnt at a frequency of more than three times over any decade covered by this OMP. This is considered a low fire frequency for the management of grassy ecosystems.

Any burning strategy will minimise impacts to GSM and the potential for fire to spread in an uncontrolled manner. Ecological burning will:

- be in accordance with a controlled burn plan, developed in consultation with the CFA, TfN and following any Council requirements.
- be applied when grazing is deemed insufficient to manage biomass.
- only occur outside the prescribed declared fire danger period for this region.
- only occur outside the flight season of the species (November to January) in late summer or autumn
- implemented in a mosaic fashion with no more than 20% of the site in any one year.
- be monitored, measuring the extent of burns and influence on GSM habitat quality.

Burnt areas will be protected from grazing for at least 6 months immediately following the burn to allow species regeneration and recruitment to occur. A cover of ground-storey vegetation above 60% is required before grazing can be re-introduced.

3.9 Monitoring

3.9.1 Baseline Site Condition

While the condition of the broader area of grassland is documented by Biosis (2018), details of the specific matters relating to the selected offset area of 78.8 hectares will be established by the collection of baseline condition data. These data will provide the baseline information for future comparisons and assessments to define the efficacy and progress of the management of the offset site to achieve the completion criteria.

Within three months of approval of this OMP and prior to the commencement of any management activities a suitably experienced botanist will systematically survey the site and collect information on the flora species (native and introduced) present and maintain a complete list of all vascular species observed. Notes will be taken on the distribution and location of weed species with GPS waypoints recorded to provide detailed information on the location, extent and severity of target pest plant infestations. This information will be mapped to provide a guide to both management activities and allow a visual assessment of management progress over the life of the plan.

GPS locations will be recorded and mapped to identify the location of any threatened species observed and the location of any other survey and monitoring infrastructure (i.e. photo points and monitoring quadrats).

A minimum of ten permanent five by five metre monitoring quadrats will be established within the offset site, having regard for the size, nature and variability of management zones (paddocks). The minimum of 10 plots

was selected on the basis of the extent of the site (provide at least 1 plot per ten hectares), the topographic variation present (upper, mid and lower slopes, ridgetops and valley floors) and the variations in site conditions (across a spectrum of weed dominated to predominantly native).

These locations will be defined during the baseline site inspection prior to the commencement of other management works and will be representative of the offset site. They will be evenly distributed across the site and if considered appropriate, additional monitoring sites can be included. Quadrats will be clearly marked and accurately located by GPS or similar within the offset site. These quadrats will be used to assess and record the percentage total vegetation cover, the percentage cover of inter-tussock spaces (bare ground), the average height of vegetation and the cover of native and exotic life-forms. These areas will also include the collection of biomass data using the golf ball method (Morgan 2015). These data will be collated, in conjunction with the observations made on herbaceous and woody weeds collected during the systematic site assessment survey, and be used to report on the baseline condition of the offset site. Ongoing monitoring will then assess progress in the management of weeds (including grasses) and biomass over the entire offset site. Ongoing use of the established monitoring plots will continue if this information is required to evaluate ongoing compliance with the completion criteria.

Five of these plots will be expanded to cover one hectare. Each of these one hectare areas will be subject to an assessment to score the site condition components associated with a habitat hectare assessment using the relevant EVC benchmark identified by DELWPs mapping of ecological vegetation classes at each location. The data collected will be used to evaluate changes in vegetation condition with the target outcome being the increase in site condition scores outlined in Section 3.4.1.

A project database will be maintained allowing for data storage and protection, data extraction, quality control, analysis, interpretation, reporting and presentation. The landowner and TfN will have ownership of all data collected, and be responsible for its distribution, availability and licensing to DoEE for compliance and recovery planning purposes.

All of the permanent vegetation monitoring quadrats established by the botanist will also serve as permanent photo points. Photo points will be located to adequately characterise the current vegetation condition. Using a selected marker point for the vegetation monitoring quadrat, a photo will be taken facing the four points of the compass (N, S, E & W). These baseline photos will be used to provide a visual document and for monitoring the vegetation response to management until the end of this OMP.

The average level of open inter-tussock spaces (as determined by the 10 monitoring plots) will be taken as the average open space available across the offset site unless the broad observations taken during the annual vegetation monitoring indicate this result is atypical.

Improving the abundance and cover of Spear-grasses and Wallaby-grasses identified in the baseline vegetation condition assessment will be taken as improving the relevant food resources for GSM. The abundance of these plant genera will be measured in the 10 monitoring plots established for vegetation condition monitoring. Improving these levels will be taken as the improvement of food resources for GSM. A 25% reduction in the cover of these species will be taken as a trigger for corrective management action.

3.9.2 Continuous monitoring

Monitoring of the site is an integral component of the regular site management activities. Such monitoring identifies changes early, allowing an appropriate and timely management response to matters which would otherwise undermine the objectives of the OMP. This includes observations by the landowner during normal activities within the offset site and broader property. Such observations are important for maintaining things such as the integrity of fencing and site security. While these are normal land management activities they have also been formalised in this OMP (See Table 4).

Regular site inspections (of about three to five hours at least every two months) to provide general condition observations are also a requirement of this plan (See Table 4). At a minimum the landowner must keep a diary of any works conducted within the offset site and record any observations which could influence or initiate a management response (e.g. “observed seedlings of a new woody weed in the middle of the offset site today. Will spot spray these with an appropriate herbicide by the end of the week”). These details provide valuable information on the management of the site and detail the commitment of the landowner to the OMP.

More general supervision/monitoring of the offset site will be undertaken by the TfN to ensure the grassy ground cover response to management actions achieve the offset completion criteria. TfN will visit the site a minimum of four times over any 10 year period (at least the spring of years 1, 3, 6 and 10) and will liaise with the land owner annually regarding the development of an annual works plan.

The progress of management works will be inspected by the land owner on a regular basis (at a minimum once every 2 months). The land owner will provide a management progress report to TfN on an annual basis (or more frequently as required).

Records of all management actions will be kept to provide evidence of completed works and management tasks.

A list of plant species observed, noting which, if any, weed species have become locally extinct will be maintained for the offset site by the landowner. While all data collection will be the responsibility of the landowner, all data collected will be provided to DoEE on request.

Annual vegetation monitoring assessments conducted by suitably qualified ecologists will include a broad assessment of the entire offset site to document the general overall condition of the site and the ability of management works to attain and maintain the OMPs completion criteria).

3.9.3 Fence monitoring

Surveys of the property boundary fence will be conducted quarterly, and when visiting the site to conduct other monitoring or management actions. Any damage to the fence that may allow vehicles or stock to enter outside of the parameters outlined in this OMP will be repaired within seven days.

3.9.4 Weed monitoring

Weed monitoring will be conducted annually in spring (September – November). There will be three components to the monitoring:

- Inspection of the entire offset area by a suitably qualified ecologist for woody weeds, by walking and / or driving throughout the area such that a visual inspection (including with binoculars) would detect the presence of any woody weeds. Complete coverage of the offset site will likely require at least four hours of survey. All patches of infestations or individual plants will be mapped with a GPS, and the locations will be supplied to the weed management contractor/landholder for treatment. Subsequent monitoring will then revisit previously mapped/identified infestations to evaluate the success of weed control, as well as inspecting the entire offset site for new infestations.
- While conducting the woody weed surveys, notes will be taken regarding the cover of herbaceous weed species, and cover will be estimated to the nearest five percent cover. Species and areas suitable for targeted treatment (such as spot spraying), will be mapped and supplied to the weed management contractor/landholder for treatment.
- A minimum of ten five by five metre quadrats will be established in selected locations across the offset site. Each monitoring quadrat will be representative of the management unit identified for that portion of the offset site. These quadrats will be used to assess and record the:

- percentage % total vegetation cover;
- percentage % cover of inter-tussock spaces and % cover bare ground;
- floristic composition (with a focus on GSM food species and weed species);
- total % cover GSM food species, % native and exotic grasses, % *Rytidosperma* spp. cover, and % cover of Chilean Needle-grass;
- grassland structure and biomass using the 'golf-ball' method (Morgan 2015);
- average height of vegetation (and grasses/GSM food species); and
- the cover of native and exotic life-forms.

These data will be collated and, in conjunction with the observations made on herbaceous weeds collected in association with woody weed monitoring, will be used to assess performance toward offset completion criteria, continuous improvement in specific criteria, and inform adaptive management.

- The permanent vegetation monitoring quadrats established by the botanist will also serve as permanent photo points. Photo points will be located to adequately characterise the current vegetation condition, and include a range of weed species. Using a selected marker point for the vegetation monitoring quadrat, a photo will be taken facing the four points of the compass (N, S, E & W). These baseline photos will be used to provide a visual document and for monitoring the vegetation response to management.

3.9.5 Pest animal monitoring

Signs of pest animals (rabbits, hares and foxes) will be recorded during weed monitoring surveys, and at all other times when visiting the offset site. In particular, the locations of any active rabbit warrens will be mapped using GPS, and the locations supplied to the pest animal management contractor/landholder for treatment. Subsequent monitoring will then revisit previously mapped warrens to check for on-going use, as well as searching for new warrens throughout the offset area.

More formal monitoring for the presence of pest animals will occur annually in November. This will include a systematic spotlight survey of the offset site lasting no less than three hours. The results of this survey will be included in the annual report to the DoEE.

3.9.6 Tree and shrub monitoring

A dense cover of tree and / or shrub recruitment will reduce the overall suitability of the GSM habitat. While grazing would likely limit the establishment of woody native species, there is some potential for dense stands of woody native species to develop as a result of changed management activities.

Tree and shrub recruitment within 10 metres of an identifiable drainage line on moderate to steep slopes will be encouraged. This will also provide greater landscape resilience to erosion. However at a broader scale, the regeneration of woody native species (trees and shrubs) will need to be controlled to prevent it becoming a dominant feature of the offset area.

An open cover of tree regeneration is considered desirable as it is likely that an open woodland was the natural condition of this environment and allows both the structure and species composition of GSM habitat to be maintained. In that context an initial density for tree regeneration, beyond any regeneration along defined drainage lines, be restricted to one tree for every 5000 square metres. If monitoring indicates that no tree regeneration is able to cope with the grazing regime applied to the offset site then selected tree regeneration may be protected with localised fencing to prevent browsing by domestic stock.

3.9.7 Golden Sun Moth Monitoring

Monitoring during the flight season for GSM is considered essential for DoEE to be satisfied as to the continued suitability of the site and its management as an offset for impacts to GSM. Baseline monitoring the population of GSM within the offset site will occur in the first flight season after the EPBC Act approval of this OMP (expected to be the 2019/20 flight season). Monitoring will record the location and number of individuals observed along monitoring transects as described below.

As the species is known to occur at the offset site no reference site is required for monitoring the population of GSM. However, prior to surveys being conducted, reports of GSM flying in or around Melbourne are likely to provide a useful indicator to identify the start of the flight season around Glenhope.

Monitoring for GSM will occur every year during the flight season. While some information on the abundance of GSM within the offset site is provided by Hamilton Environmental Services (2015, 2018 & 2019) these surveys are not evenly distributed across the site, do not represent four systematic surveys and do not record information relating to habitat condition within the offset. Baseline monitoring data on the distribution and abundance of GSM within the offset site is therefore required to be collected during the 2019/20 flight season. Repeated monitoring of these transects every second year for the duration of this OMP will be conducted to evaluate the persistence and relative abundance of Golden Sun Moth at this site. Ongoing monitoring every second year will then be required for the duration of this OMP.

A monitoring event includes four GSM surveys (i.e. the site is assessed four times during a flight season) to document the occurrence and abundance of GSM within the offset site. The results of these surveys will be compared to the original baseline surveys (2019 /20 flight season) and those of the previous monitoring event. Surveys will be conducted biennially for the first ten year period of this OMP. Surveys will be undertaken during the GSM flight season, which in this region is expected to be between November and December. As the timing of the flight season varies annually and geographically, surveys will be initiated from when warm weather is considered likely to stimulate emergence. In this region this is expected to occur anytime from late October onwards. Any observations of GSM during monitoring for vegetation condition and during inspections by the land owner or TfN will be recorded and reported.

Surveys within the flight season are to be spaced at least one week apart to allow for variations in emergence patterns. Surveys will take place when conditions are suitable for male flight (generally >20oC, bright, clear days, full sun, absence of rain and wind other than a light breeze) between 10:00 hrs and 15:00 hrs.

Each survey will systematically walk over the entire offset site using two suitably qualified ecologists separated by about 200 metres. Each pair of transects will then be separated by another 200 metres and be located to cover all sections of the offset site. The beginning and end of each transect will be recorded as a GPS waypoint. Tracks will be recorded using a GPS and a waypoint taken for each location where GSM are observed.

Any obvious changes to the habitat characteristics of the offset area will be recorded during the GSM survey. This will be supported by relevant photos of the habitat or management issues identified.

The results of each survey will be reported to TfN and DoEE. The report will also include an assessment of any changes or trends noted in either the habitat condition or number of GSM observed noted by the ecologist.

3.10 Reporting

Unless otherwise advised by the Minister, the landowner, via the approval holder (MRPV), must submit a report annually to TfN and DoEE for the duration of this OMP. Reports are to be submitted at least two months prior to the anniversary date of the execution of the OMP to allow time for compliance to be

assessed before the anniversary date. Reports will also be published on the MRPV website within 3 months of every 12 month anniversary.

The Annual Report will address progress against the commitments set out in this OMP. Annual Reports will provide enough detail in the form of written comments and supporting evidence that an assessor can easily determine the completion of/progress against the management commitments and completion criteria for the offset site.

The annual report will include:

- Details of management actions, including on ground works, undertaken within the reporting period.
- Results of monitoring activities, including fence condition, weeds, pest animals, habitat quality, vegetation quality and ground cover biomass accumulation / the cover of open ground.
- Tracking and evaluation of results in comparison to management performance targets and completion criteria
- Site photographs including from ten defined photo points.
- Details of compliance or non-compliance with the schedule of management actions (Table 4).
- Details of compliance or non-compliance with performance targets (Section 3.4.2).
- Details of any incidents or new and emerging management issues, with recommendations for corrective action and plan review in order to attain the offset completion criteria.
- Any triggers exceeded and which corrective actions were implemented
- Details of any GSM monitoring events including an assessment of the relevant results.

The reporting schedule is detailed in Table 7.

3.11 Auditing

The approval holder (MRPV) is responsible for auditing the implementation and effectiveness of the OMP. Audits will be conducted by an independent ecologist at the following stages:

- At the end of the first year of site management - this is to ensure that initial management and monitoring actions are conducted to the satisfaction of the approval holder and DoEE, including implementing the legal security mechanism, ensuring the property is securely fenced, and that other initial management and baseline monitoring actions have commenced.
- At the end of the fourth year of site management – this will involve a review of four annual monitoring and management reports, as well as an independent assessment of the condition of GSM habitat within the site.
- At the end of the eighth year of site management – as per the four year audit.
- Following the completion of the 10th year – to be an audit of the implementation and effectiveness of this OMP.

The timing of scheduled audits is detailed in Table 7. Additional audits may be triggered as a result of a plan review (Section 3.12) or following an environmental incident resulting in significant change to site conditions, as identified in the risk assessment (Table 5).

3.12 Plan review

This plan includes an adaptive management approach, where corrective actions may be triggered by events occurring within the offset site, or the results of monitoring activities. A review of the OMP will only be

necessary in the event of a major incident that makes a significant change to the character or condition of the offset area. The most likely such event is a major wildfire, as described in Table 5.

If a plan review is triggered, this will be conducted by MRPV in consultation with the offset site owner and DoEE. Any future adaptive management changes will be incorporated into the OMP and an updated version of the OMP will be supplied to DoEE for approval.

The OMP review will involve changes to any part of the OMP, in order to adequately respond to the trigger and re-direct management actions towards achieving the offset completion criteria under potentially altered site conditions.

This could involve changes to:

- Specific details of offset site management methods.
- Monitoring methodology.
- Schedules of monitoring, reporting and auditing.

4. Schedule of management actions, risks, monitoring and reporting

This section provides a schedule of management actions (Table 4) for the offset area, an assessment of the risk of failing to achieve desired outcomes (Table 5), and specifies how this relates to the monitoring (Table 6) and reporting (Table 7) program.

Table 4 Management plan actions and timing for offsets on the Sievers Lane offset site

	Entire offset site			
1 and all years following	<p>1. Control of stock, prevent unauthorised activities and vehicle access.</p> <p>Ensure the offset site is appropriately fenced from neighbouring land and road reserves.</p> <p>Fences to be monitored and maintained in functional condition.</p>	<p>Initial fence inspection completed within 1 month of commencement of this OMP</p> <p>Boundary fence monitored once every 3 months (January, March, July, October).</p> <p>Damaged fencing repaired within 1 month of damage being observed.</p>	<p>Boundary fence monitored 4 times per year.</p> <p>Damaged fencing repaired within 1 month of damage being observed.</p> <p>Effective control of domestic stock access to offset area.</p> <p>Unauthorised vehicles excluded from offset area.</p> <p>Exclusion of unauthorised access or unauthorised firewood collection.</p> <p>Fencing around the perimeter of the property maintained to the standard detailed in the <i>Management Standards for Native Vegetation Offset Sites</i> (DELWP 2019).</p> <p>New fences, if required, be constructed to the DEWLP (2019) standard and included in the monitoring regime.</p>	<p>Management Sec. 3.8.1</p> <p>Monitoring #1 - Sec. 3.9.1</p>
1 and all years following	<p>2. Remove all existing woody weed infestations within the offset area</p> <p>Weeds to be managed in accordance with the <i>Management Standards for Native Vegetation Offset Sites</i> (DELWP 2019)</p>	<p>Completed within 1 year of commencement of this OMP.</p>	<p>No mature woody weeds present within offset area (<< 1% cover) after the completion of Year 1.</p> <p>Minimal off-target damage (avoid all native plants)</p> <p>Record and control any woody weed regeneration / re-colonisation</p>	<p>Management Sec. 3.8.2</p> <p>Monitoring #2 - Sec. 3.9.2</p>

All years	<p>3. Monitor and control herbaceous weeds.</p> <p>Control methods and timing specified in Table 3 and in accordance with the <i>Management Standards for Native Vegetation Offset Sites</i> (DELWP 2019). Establish baseline monitoring sites including quadrats (10) and photo points (10).</p>	<p>Systematic botanical survey of offset site and establishment of 10 monitoring quadrats and 10 photo points completed within 3 months of approval of this OMP.</p> <p>Detailed botanical report prepared within 3 months of approval of this OMP.</p> <p>Annual Monitoring of the 10 quadrats each spring.</p>	<p>Production of a detailed baseline report on the flora of the offset site completed, including complete list of all vascular plants observed and location all woody and high threat herbaceous weeds.</p> <p>Annual monitoring and reporting of herbaceous weeds over the entire offset site.</p> <p>Ten monitoring quadrats and 10 photo points established across the offset site and monitored annually in spring.</p> <p>Herbaceous weed cover reduced and maintained at less than baseline cover.</p> <p>A decrease in the abundance of perennial weeds with a commensurate increase in the abundance of perennial native species, particularly grasses which are known food plants for GSM.</p> <p>Minimal off-target damage (avoid all native plants) as a result of weed control activities.</p> <p>Introduced perennial grasses reduced to at least 50% of baseline cover at the end of 10 years management.</p>	Management Sec. 3.8.3 Monitoring #2 - Sec. 3.9.2
All years	<p>4. Monitor and control new and emerging woody weeds</p>	<p>Entire offset site monitored once per year in spring (September – November).</p> <p>Location of new woody weed outbreaks supplied to contractor/ landowner within 1 month of monitoring.</p> <p>New outbreaks of woody removed within 6 months of being observed.</p>	<p>Annual monitoring of woody weeds within offset site, including areas previously treated for woody weeds to determine effectiveness.</p> <p>New outbreaks of woody weeds identified and mapped each year. Mapped location of woody weeds supplied to management contractor within 1 month of monitoring.</p> <p>Woody weeds within offset area maintained at <1%. Minimal off-target damage (avoid all native plants).</p>	Management Sec. 3.8.2 Monitoring #2 - Sec. 3.9.2

All years	<p>5. Monitor and control ground cover biomass</p>	<p>Establishment of 10 monitoring quadrats and 10 photo points completed within 3 months of approval of this OMP.</p> <p>10 quadrats to be monitored annually each spring.</p> <p>Minimise or exclude grazing from the beginning of October to the end of December each year (may be varied depending on ecological advice).</p> <p>Ecological burning, if undertaken, can only occur between February and October each year and burnt areas will not be grazed for at least 6 months after the burn.</p>	<p>Ten monitoring quadrats and 10 photo points established and monitored annually each spring.</p> <p>GSM habitat quality improved by maintaining an open tussock grassy ground cover with inter-tussock spaces covering about 30% (+/- 10%) during the GSM flight period.</p> <p>Biomass levels measured using 'golf-ball' method and appropriate judgements made on the need for control works.</p> <p>GSM habitat quality improved through increased proportional cover of native GSM food plants (spear-grasses and wallaby-grasses) within the offset site.</p>	<p>Management Sec. 3.8.5 Monitoring #2 - Sec. 3.9.2</p>
Years 0, 2, 4, 6, 8 and 10	<p>6. Monitor and evaluate Golden Sun Moth population.</p> <p>Establish baseline monitoring transects and repeat surveys in years 2, 4, 6, 8 and 10 during the GSM flight season.</p> <p>Report on population and habitat condition.</p>	<p>Permanent GSM Monitoring transects established before October 2020</p> <p>Four GSM surveys (spaced 1 week apart between early November and late December) every second year.</p>	<p>Establishment of permanent GSM monitoring transects throughout offset site.</p> <p>Regular documentation of GSM population from monitoring events.</p> <p>Assessment of any trends in GSM population size or extent.</p> <p>Documentation of the condition of GSM habitat based on visual assessments.</p> <p>Distribution and abundance of GSM within the offset site maintained at levels observed during baseline surveys.</p> <p>No measurable decline in the GSM population within the offset site.</p>	<p>Management Sec. 3.9.7 Monitoring #2 -</p>

All years	<p>7. Monitor and evaluate Golden Sun Moth habitat condition.</p> <p>Utilise 10 quadrats used for weed monitoring and other general observations.</p>	<p>10 quadrats to be monitored annually each spring.</p>	<p>A decrease in the abundance of perennial weeds with a commensurate increase in the abundance of perennial native species, particularly grasses which are known food plants for GSM.</p> <p>Ten monitoring quadrats and 10 photo points established and monitored annually each spring.</p> <p>GSM habitat quality improved by maintaining an open tussock grassy ground cover with inter-tussock spaces covering about 30% (+/- 10%) during the GSM flight period.</p> <p>Documentation of the condition of GSM habitat based on the abundance of GSM food plants and inter-tussock spaces.</p>	Management Sec. 3.9.1 Monitoring #6
All years	<p>8. Monitor and control Rabbits, Hares and Foxes.</p>	<p>Monitor signs of rabbits, hares and foxes annually during vegetation condition surveys and incidentally throughout the year</p> <p>Formal monitoring of pest animals to be carried out once per year through spotlight surveys along pre-determined transects. First survey to commence within 3 months of the approval of this OMP</p> <p>Control of pest animals to occur throughout the year. Fumigate fox dens in August and September when the vixen and cubs are confined to the den.</p>	<p>Signs of pest animals documented incidentally during vegetation surveys.</p> <p>Locations of rabbit warrens and artificial harbour mapped.</p> <p>Removal of all surface harbour such as rubbish, woody weeds and artificial piles of logs and rocks.</p> <p>Rabbits managed in accordance with the <i>Management Standards for Native Vegetation Offset Sites</i> (DELWP 2019).</p> <p>No fresh ground disturbance by pest animals (particularly rabbits) observed in the offset area.</p> <p>No active rabbit warrens within offset area, minimal surface harbour for rabbits and hares present (excluding natural harbour such as logs and rocks).</p> <p>No active fox dens within offset area.</p>	Management Sec. 3.8.4 Monitoring #3 - Sec. 3.9.5

			Abundance of each pest species reduced to and maintained at low levels.	
All years	9. Monitor and control all new and emerging pest animals.	Monitor signs of new and emerging pest animals annually during vegetation condition surveys and incidentally throughout the year	Effective control numbers of any new and emerging pests. No new or emerging pest animals establishing within the offset area.	Management Sec. 3.8.4 Monitoring #3 - Sec. 3.9.5
All years	10. Monitor tree and shrub regeneration and undertake ecological thinning if required (section 3.6.6).	Autumn each year.	Maintenance of an open / scattered cover of immature canopy trees and understorey trees or large shrubs in the offset area to a level of not greater than one tree and 10 shrubs per 5000 square metres. If trees and shrubs exceed these densities then they will be thinned to achieve the designated target.	Management Sec. 3.8 Monitoring #4 - Sec. 3.9.6
All years	11. Prepare and submit an annual report.	Submit 2 months prior to agreement anniversary date. Annual reporting under this OMP will be aligned with the reporting requirements of the BushBroker Agreement.	Annual report is signed, dated and submitted by the landholder at least 2 months prior to the anniversary date of the agreement, as specified in the BushBroker agreement.	Refer to section 3.10

Table 5 Risk assessment and management

This risk assessment uses the risk framework from the DoEE EMP guidelines. The likelihood and consequence classification is summarised in Appendix 1.

Objective (refer to Table 4)	Event or circumstance	Likelihood	Consequence	Risk level	Trigger	Contingency/s	Related monitoring activity (# See Table 6)
1	Unauthorised entry of domestic stock to the offset area. Grazing, browsing and trampling damage to vegetation. Damage to or loss of juvenile trees and shrubs	Unlikely	Minor	Low	Domestic stock sighted on offset site out of authorised periods.	Remove stock or Reduce stocking rate. Repair fencing. Monitor vegetation.	1
1	Entry of vehicles to offset area. Damage to understorey vegetation, soil compaction.	Unlikely	Minor	Low	Vehicle observed on offset site. Evidence of recent vehicle access e.g. tyre tracks.	Repair fencing. Assess adequacy of fencing.	1
1	Unauthorised access.	Unlikely	Minor	Low	Evidence of firewood collection or physical disturbance observed.	Assess adequacy of fencing.	1
2, 3, 4	Woody weeds are identified within offset area. Herbaceous weed cover exceeds baseline levels.	Possible	Minor	Low	Woody weeds are detected. Herbaceous weed cover exceeds baseline levels.	Control weeds. Minimise off-target damage (avoid all native plants)	2
5 & 7	Native grasses fail to recolonise areas opened up by weed control works	Possible	Moderate	Medium	Areas subject to the control of perennial grassy weeds become dominated by annual weeds or bare ground.	Review grazing strategy to allow native grasses to set seed. Harvest and disperse native grass seed to effected areas.	2 & 6

Objective (refer to Table 4)	Event or circumstance	Likelihood	Consequence	Risk level	Trigger	Contingency/s	Related monitoring activity (# See Table 6)
7, 8	Pest animals observed within offset site. Damage to understorey vegetation or recruiting trees and shrubs.	Possible	Moderate	Medium	Fresh ground disturbance or scats of pest animals observed in the offset area. Active rabbit warrens observed within offset area. Active fox dens observed within offset area. New and emerging pest observed within offset area.	Destroy fox dens and rabbit warrens through fumigation and hand collapse. Undertake control works for new and emerging pests as appropriate.	3
9	Tree and shrub recruitment is significantly above or below that allowed under this OMP.	Possible	Minor	Low	Cover of immature trees and shrubs are more than defined. Recruitment of immature trees and shrubs not observed.	Ecological thinning to achieve target density of tree regeneration. Undertake action to encourage regeneration and address threats to regeneration.	4
6	GSM population drops significantly without apparent reason	Possible	Critical	Severe	Population of GSM declines by over 50% in comparison to any previous years without explanation as to how it may recover or habitat condition noted as significantly lower than previous year and recovery is uncertain.	Review ecological management parameters. Review plan.	5
7	Fail to approach site condition / stocking rate targets by year 8	Possible	High	Medium	Perennial grassy weeds have not significantly reduced in extent at the end of year 8 and the site condition and/or GSM monitoring indicates that target gains are unlikely to be achieved.	Increase levels of management (i.e. more intensive weed control)	2,5 & 6

Objective (refer to Table 4)	Event or circumstance	Likelihood	Consequence	Risk level	Trigger	Contingency/s	Related monitoring activity (# See Table 6)
1, 2, 3, 4, 5, 6, 7, 8	Wildfire or uncontrolled planned burn. May impact temporarily or permanently on overstorey condition and natural regeneration. May impact upon weed recruitment patterns. May destroy fencing.	Possible	Medium	Medium	Wildfire observed within offset area.	Monitor for increased erosion (immediately post fire and 12 months post fire). Undertake weed control works to take advantage of new growth. Inspect fence condition and repair any damage. Significant wildfire throughout the majority of the offset area is a trigger for plan review (Section 3.12).	1, 4

Table 6 Monitoring schedule

1	Fence condition	Condition of boundary fences.	Survey the perimeter of the offset site to ensure fences are intact and assess evidence of domestic stock, vehicle access or firewood harvesting. Refer to Section 3.8.1 and 3.9.3 for details.	Offset site perimeter	Quarterly	High
2	Weed monitoring	Cover of woody and herbaceous weed species present.	Vegetation survey to be conducted to identify woody and herbaceous weed species and determine cover. Woody species to be mapped using GPS. Herbaceous weed cover (percentage cover) to be estimated for defined sections of the offset site. All weed species present identified to species level. Refer to Section 3.8.2, 3.8.3 and 3.9.4 for details.	Offset area.	Annual - Spring	High
3	Pest animal monitoring (Rabbits, Hares and Foxes, and new and emerging pest animals)	Presence of pest animals or signs e.g. scats, diggings, browsing or grazing	Signs of pest animals to be recorded during vegetation surveys. Locations of rabbit warrens to be mapped using GPS. Refer to Section 3.8.4 and 3.9.5 for details.	Offset area.	Annual – Spring During vegetation condition survey	High
4	Tree and shrub recruitment survey	Number of juvenile trees and shrubs	Tree and shrub species and size classes to be assessed within permanently marked quadrats. Refer to Section 3.8 and 3.9.6 for details.	Offset area.	Annual – Spring During vegetation condition survey	High
5	Golden Sun Moth population monitoring	Number of GSM observed. Subjective condition of habitat	Refer to Section 3.9.7 for details.	Offset area.	GSM flight season	High
6	Golden Sun Moth habitat condition monitoring	Condition of habitat (VQA related parameters)	Refer to Section 3.9.1 for details.	10 permanent plots.	Annual – Spring (part of weed monitoring).	High

Table 7 Reporting schedule

#	Type of report	Approval condition	Responsibility	Timing	Reporting authority	Trigger (if any)
1	Annual management actions report Tabulates management actions completed within the offset area (Section 3.10).	3e & 8	Offset site owner	Report to be completed by August 31 so information is available prior to spring monitoring.	DoEE TfN	Not Applicable
2	Annual monitoring report. Presents results of offset site monitoring activities (Section 3.10).	3	Offset site owner	Annual monitoring to be completed in spring. Report to be completed by November 30 of each year.	DoEE TfN	Completion of annual monitoring
3	Review of offset management plan (Section 3.12).	3	Offset site owner	As required.	DoEE TfN	Significant environmental event causing widespread impact to habitat within the offset site e.g. Wildfire.
3	GSM population and habitat condition assessment.	3	Offset site owner	Annual compliance report to DoEE.	DoEE TfN	Baseline population information in 2019/20 flight season. Biennial during flight season thereafter. Completion of annual habitat assessment using 10 monitoring plots.
3	Audit report (Section 3.11).	3 & 10	Approval holder (MRPV)	End of years 1, 4, 8 and 10.	DoEE	Not Applicable

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Appendices

Appendix 1 DoEE EMP Guidelines Risk Framework

Risk Framework

		Consequence				
		Minor	Moderate	High	Major	Critical
Likelihood	Highly Likely	Medium	High	High	Severe	Severe
	Likely	Low	Medium	High	High	Severe
	Possible	Low	Medium	Medium	High	Severe
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

Likelihood

Highly Likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely
Rare	May occur in exceptional circumstances

Consequence

Minor	Minor incident of environmental damage that can be reversed
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts
High	Substantial instances of environmental damage that could be reversed with intensive effort
Major	Major loss of environmental amenity and real danger of continuing
Critical	Severe widespread loss of environmental amenity and irrecoverable environmental damage

Appendix 2 Glossary

This appendix contains definitions of technical terms used in this OMP.

Items marked with an asterisk (*) are cited from DELWP (2007b)

Benchmark*

A standard vegetation –quality reference point, dependent on vegetation type, which is applied in Habitat hectare assessments. Represents the average characteristics of a mature and apparently long undisturbed state of the same vegetation type.

Biodiversity*

The variety of all life forms, the different plants, animals and microorganisms, the genes they contain, and the ecosystems of which they form a part.

Bioregion*

Biogeographic areas that capture the patterns of ecological characteristics in the landscape or seascape, providing a natural framework for recognising and responding to biodiversity values. A landscape based approach to classifying the land surface using a range of environmental attributes such as climate, geomorphology, lithology and vegetation.

Canopy Tree

Defined in the Habitat Hectare (DSE 2004) vegetation quality assessment method, as a mature tree that is greater than three metres in height, and is normally found in the upper layer of the relevant vegetation type.

Completion Criteria

Targets defined under the EPBC Act approved OMP required to be achieved by management at the completion of the OMP.

DBH (Diameter at Breast Height)*

The diameter of the main trunk of a tree measured 1.3 m above ground level.

Ecological vegetation class (EVC)*

A native vegetation type classified on the basis of a combination of its floristic, life form, environmental and ecological characteristics.

EPBC Act

Environmental Protection and Biodiversity Conservation Act 1999

Habitat hectares*

Combined measure of condition and extent of native vegetation. This measure is obtained by multiplying the site's condition score (measured between 0 and 1) with the area of the site (in hectares).

Habitat score*

The score assigned to a habitat zone that indicates the quality of the vegetation relative to the ecological vegetation class benchmark – sum of the site condition score and landscape context score, usually expressed as a percentage or on a scale of 0 to 1.

Habitat zone*

A discrete area of native vegetation consisting of a single vegetation type (EVC) within an assumed similar quality. This is the base spatial unit for conducting a Habitat hectare assessment. Separate *Vegetation Quality Assessments* (or Habitat hectare assessments) are conducted for each habitat zone within the designated assessment area.

Indigenous vegetation*

The type of native vegetation that would have normally been expected to occur on the site prior to European settlement.

Offset*

Protection and management (including revegetation) of native vegetation at a site to generate a gain in the contribution that native vegetation makes to Victoria's biodiversity. An offset is used to compensate for the loss to Victoria's biodiversity from the removal of native vegetation.

Offset Management Plan (OMP)

A document which sets out the requirements for establishment, protection and management of an offset site.

Scattered tree*

An indigenous canopy tree that does not form part of a remnant patch of native vegetation (see definition of remnant patch of native vegetation).

Site

An area of land that contains contiguous patches of native vegetation or scattered trees, within the same ownership.

Site gain

Predicted improvement in the condition, or the condition and extent, of native vegetation at a site (measured in Habitat hectares) generated by the landowner committing to active management and increased security.

Recruitment*

The production of new generations of plants, either by allowing natural ecological processes to occur (regeneration etc.), by facilitating such processes such as regeneration to occur, or by actively revegetating (replanting, reseeding). See Revegetation.

Remnant vegetation*

Native vegetation that is established or has regenerated on a largely natural landform. The species present are those normally expected in that vegetation community. Largely natural landforms may have been subject to some past surface disturbance such as some clearing or cultivation (or even the activities of the nineteenth century gold rushes) but do not include man-made structures such as dam walls and quarry floors.

Understorey*

Understorey is all vegetation other than mature canopy trees – includes immature trees, shrubs, grasses, herbs, mosses, lichens and soil crust. It does not include dead plant material that is not attached to a living plant. More information on understorey life forms is set out in the Vegetation Quality Assessment Manual (DSE 2004).