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Final Report

Offset Management Plan for Rosenthal Estate: 100 Vineyard Road, Sunbury, Victoria

Prepared for

Urban Design and Management

December 2015

Ecology and Heritage Partners Pty Ltd

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- Tom Milinkovic, David Sammut and Julie Lancashire (Urban Design and Management Pty Ltd) for project information and ongoing comments and assistance with offset and transition arrangements;
- The Millett family for property access and historical site information;
- The Taylor family for the provision of offset details;
- Hume City Council for project and planning advice;
- The Department of Environment, Land, Water and Planning (DELWP) for access to ecological databases and planning advice; and,
- The Department of the Environment (DoE) for project advice and communications.

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SUMMARY

Introduction

Ecology and Heritage Partners Pty Ltd was commissioned by Urban Design & Management Pty Ltd, on behalf of T.F & A. Millett, to develop an Offset Management Plan (OMP) for the removal of remnant vegetation and Golden Sun Moth *Synemon plana* habitat associated with the development of Rosenthal Estate, 100 Vineyard Road, Sunbury, Victoria.

The objective of the OMP is to outline the details for both the clearing site and offset sites, and document a strategy to meet both State and Commonwealth offset requirements via securing, maintaining and improving remnant vegetation within both *in-situ* and *ex-situ* designated offset sites. Note: all State offsets are calculated with regard to the Framework.

Proposed Losses of Native Vegetation

Based on the most up to date development plan (Urban Design and Management Plan Ref: 11031_DP-PP, Dated 3 December 2014) a total of 8.85 habitat hectares of remnant vegetation is proposed for removal. This total includes:

- 7.95 habitat hectares (16.18 hectares) of Very High conservation significance Plains Grassland; and,
- 0.9 habitat hectares (2.53 hectares) of High conservation significance Creekline Tussock Grassland.

A further 0.11 hectares of both Plains Grassland and non-native vegetation, comprising part of the existing east-west sewerage easement, has also been considered as lost and is included within the offset accounting. Although this area is unlikely to be disturbed, the need to conduct future maintenance works throughout any given length of the easement cannot be categorically ruled out.

Proposed Losses of Golden Sun Moth habitat

A total of up to 43 hectares of Golden Sun Moth habitat has been approved for removal as part of the development of Rosenthal Estate. The proposed loss is 42.27 hectares of Golden Sun Moth habitat with a further 0.11 hectares of GSM habitat offset in relation to the sewerage easement, increasing the total loss to 42.38 hectares.

Net Gain offset targets (State Offsets)

The total Net Gain offset target for the removal of native vegetation in accordance with the Framework consists of 17.25 habitat hectares of Very High conservation significance vegetation, or a reduced target of 16.91 habitat hectares of Very High conservation significance vegetation via trading up.

Offset strategy

An offset strategy to meet both State and Commonwealth requirements within the one package is proposed. This package will be achieved through a combination of the protection and ongoing maintenance and improvement of approximately 12.64 hectares of known Golden Sun Moth habitat (which includes 10.16 hectares of Plains Grassland) within two *in-situ* conservation reserves, as well as via the purchase of approximately 86.01 hectares of both confirmed Golden Sun Moth habitat and Plains Grassland at the nominated *ex-situ* offset site - Warrambeen. The total figure (98.65 hectares) was negotiated with the

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Commonwealth Department of Environment, in order to meet the required standard of 90% direct offset as determined by the EPBC Act offset calculator.

All relevant like-for-like criteria, including bioregion, Ecological Vegetation Class and quality objectives have been met by the proposed offset sites. The offset sites will be protected and secured using a Section 173 agreement under the *Planning and Environment Act 1987*.

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1 TITLE OFFSET PLAN

Title information for the offset site is documented in Table 1.

Table 1. Title information for the offset site

Title Offset Plan	
Planning Permit Number (ID) / Work Authority No:	P18681
Proponent:	T.F & A Millett Pty Ltd
Address:	PO Box 468 Sunbury, VIC 3429
Landowner and Permit (Work Authority) Holder Statement	
Permit (Work Authority) Holder	
Print Name:	T.F & A Millett
Signature:	
Date:	To be completed
Landowner of Offset Site	
Print Name:	Ian And Trish Taylor
Signature:	
Date:	To be completed
Referral Authority Statement	
The native vegetation credits described in this plan provide an offset for the removal of native vegetation specified in this plan to the satisfaction of the Department of Environment, Land, Water and Planning.	
Print Name:	
Position:	
Signature:	
Date:	To be completed
Responsible Authority Approval	
This Offset Plan has been approved and is endorsed by the responsible authority.	
Print Name:	
Position:	
Responsible Authority:	Hume City Council
Signature:	
Date:	To be completed
Date of Commencement:	To be completed

2 INTRODUCTION

2.1 Background

Ecology and Heritage Partners Pty Ltd was commissioned by Urban Design & Management Pty Ltd, on behalf of T.F & A. Millett, to develop an Offset Management Plan for the removal of remnant vegetation and Golden Sun Moth *Synemon plana* habitat associated with the development of Rosenthal Estate, 100 Vineyard Road, Sunbury, Victoria (Figure 1).

A number of ecological assessments have previously been conducted throughout the study area to inform the planning phase and current development plan. Relevant reports include:

- Wlodarczyk., P. & Williams, L. (2005a) A Botanical Assessment and Habitat Significance of 100 Vineyard Rd, City of Hume;
- Wlodarczyk., P. & Williams, L. (2005b) A Short Report into the Habitat Hectare Value and Net Gain Analysis of Habitat Zone PG4;
- Wlodarczyk, P. & Williams, L. (2005c) Addendum 2: A botanical assessment and habitat significance of 100 vineyard road, city of Hume;
- Wlodarczyk, P. & Williams, L. (2006) Brief Report: Presence of *Synemon plana* (Golden Sun Moth) at 100 Vineyard Rd Sunbury;
- Wlodarczyk, P., Hatt, T. & Richards, J. (2007) Second Report: Presence & Density of *Synemon plana* (Golden Sun Moth) at 100 Vineyard Rd Sunbury (Amended August 2008);
- Wlodarczyk. P., Williams, L. & Hatt, T. (2007) Targeted Fauna Search *Delma impar* – Striped Legless Lizard, 100 Vineyard Rd Sunbury;
- Wlodarczyk, P. & Hatt, T. (2008) Flora and of Habitat Hectare Assessment for the area of the Retarding Basin - 100 Vineyard Road;
- Wlodarczyk, P. & Richards, J. (2009a) Abundance and Distribution of the Golden Sun Moth *Synemon plana* at 100 Vineyard Road, Sunbury;
- Wlodarczyk, P. & Richards, J. (2009b) Survey for the Presence of Striped Legless Lizard *Delma impar* - 100 Vineyard Rd Sunbury;
- Wlodarczyk, P. & Richards, J. (2009c) Presence of the Growling Grass Frog *Litoria raniformis* 100 Vineyard Rd Sunbury;
- Richards, J. & Wlodarczyk, P. (2009). Flora Assessment- 100 Vineyard Road;
- Richards, J. & Wlodarczyk, P. (2010). Habitat Hectare Assessment of Non-ploughed Vegetation - 100 Vineyard Road, Sunbury;
- Brett Lane and Associates Pty Ltd (2011). 100 Vineyard Road Sunbury. Suitability of Habitat for grassland earless Dragon;
- Ecology and Heritage Partners Pty Ltd (2012). Advice regarding a previous Habitat Hectare assessment of land at Vineyard Road, Sunbury, Victoria: and,
- Ecology and Heritage Partners Pty Ltd (2013). Net Gain review of a previous Habitat Hectare assessment of land at Vineyard Road, Sunbury, Victoria.

The following OMP is written with reference to the findings and recommendations of the above reports and is intended as an accompanying document to the recently updated Conservation Management Plan (CMP) for Rosenthal Estate (Ecology and Heritage Partners Pty Ltd 2015a).

2.2 Context

Planning for the development of Rosenthal Estate has been in progress for more than 10 years. An EPBC Act referral (EPBC 2008/4214) was submitted on 21 April 2008, and was deemed a controlled action, as the proposed development was considered likely to have a significant impact on a Matter of National Environmental Significance (MNES) in Golden Sun Moth. Further information in the form of Preliminary Documentation was requested by the Commonwealth on 11 July 2008. Preliminary documentation was supplied and exhibited from 8-9 May 2014. A 'decision on approval' notice was then issued by the Commonwealth Department of Environment on 7 July 2014 outlining the final conditions of approval.

Since this time there has been ongoing communications and negotiations with the Commonwealth Department of Environment post-approvals branch, which has shaped the final OMP package as presented in this report (version 4). The key outcome in these discussions was the determination that offsets for all MNES (i.e. Golden Sun Moth) must meet the minimum 90% direct offset threshold required under the EPBC Act Offset Policy (SEWPaC 2012) and as determined via the use of the EPBC Act Offset Impact Calculator. This requirement is outlined in recent email communication from the Department (J. Fung, dated 01 July 2015).

Note: the Rosenthal Estate development area contains grassland vegetation that meets the condition thresholds to qualify as the nationally significant ecological community *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP). However, this vegetation has been deemed exempt from all offset requirements, as an agreement has been reached between the proponent, the Department of Environment, Land, Water and Planning (DELWP, formerly the Department of Environment and Primary Industries) and the Commonwealth Department of Environment (previously the Department of Environment and Water Resources) regarding the presence and historical context of NTGVVP within the study area. In their referral assessment letter dated 11 July 2008, the Commonwealth department states that because NTGVVP was listed as a critically endangered community under the EPBC Act on 21 June 2008 (two months after the EPBC Act referral for the site) the vegetation community will not be considered as part of the assessment process.

With regard to State offsets, although the Biodiversity Assessment Guidelines (the 'Guidelines') (DEPI 2013a) have now replaced the former *Victoria's Native Vegetation Management: A Framework for Action* (the 'Framework') (NRE 2002), all offset calculations within this OMP have been treated under the Framework in accord with Scenario 6 of the Transition Guidelines (DEPI 2013b). This State offset strategy has been identified and endorsed by all stakeholders, including the City of Hume and the Department of Environment, Land, Water and Planning (DELWP), as a valid pathway to fulfil offset obligations given the current uncertainty and lack of availability of specific offsets under the Guidelines and the associated vegetation credit trading system.

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2.3 Objectives

The primary objective of the following OMP is to document the clearing site and both *in-situ* and *ex-situ* offset site details to provide a suitable offset strategy for the approved removal of both Golden Sun Moth habitat and remnant vegetation. More specifically the OMP aims to document the following components:

- Means of calculating the offsets;
- Location and suitability of the offset sites;
- Type of offset to be provided;
- Broad details of management actions for remnant vegetation within the offset sites;
- The 'security' arrangement for the offset sites;
- A map of the offset site(s); and,
- The development of a timetable of proposed management actions, outcomes and progress reviews.

2.4 Report Structure

As State offset requirements have been calculated with reference to the Framework (NRE 2002), the structure and content of this OMP primarily follows the 'Standard Offset Plan' template (DSE 2010a) and is organised in several 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. 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 or Section 173 Agreement pursuant to the *Planning and Environment Act 1987*).
- *Part B: Offset Implementation* - This section describes how the offset is to be implemented. Part B includes details regarding landowner commitments, management activities monitoring and reporting. This section is intended for those responsible for implementing the plan, including future landowners. Information in this section is intended to be placed on title.

3 METHODS

3.1 Database and Literature Review

The Victorian Biodiversity Atlas (DELWP 2014a; 201), the Flora Information System (Viridans 2014a) and the Victorian Fauna Database (Viridans 2014b) were reviewed to identify previous records of native and exotic flora and fauna species within the local area, as well as threatened flora and fauna species that have the potential to occur within 10 kilometres of the proposed offset site.

Information pertaining to matters protected under the EPBC Act including listed taxa, ecological communities and Ramsar wetlands, was obtained from the Department of Environment (DoE) Protected Matters Search Tool (PMST) (DoE 2015).

3.2 Net Gain Analysis

Habitat Hectare results obtained from the Net Gain review conducted by Ecology and Heritage Partners Pty Ltd (2013) were used to inform this OMP, rather than the previous vegetation quality scores and habitat hectare results provided by Richards & Wlodarczyk (2009; 2010).

Habitat hectare scores for Areas B1 & E at the Warrambeen offset site are taken from the previous habitat assessment by Brett Lane & Associates Pty Ltd (2014). The condition and extent of these patches were also confirmed by Ecology and Heritage Partners during a recent (9 July 2015) ecological inspection at Warrambeen as part of the preparation of the following OMP. A habitat hectare assessment of Area B2 was conducted as part of the recent site visit (9 July 2015) using the approved Vegetation Quality Assessment method (DSE 2004).

3.3 Gain Scoring Methodology

Although a new Native Vegetation Gain Scoring Manual: Version 1 (DEPI 2013c) and a revised Gain calculator for small first party on-site offsets have been released as part of the recent planning provision reforms for the permitted clearing of native vegetation, all gain estimations presented in this report are calculated using the earlier gain calculator (Version 1.2.5 September 2010) (DSE 2010b) in accordance with the Framework (NRE 2002).

4 PART A - OFFSET SUITABILITY

4.1 Clearing Site Details

The clearing site details are provided in Table 2. Descriptions of ecological values within the study area are provided in the various flora and fauna, and targeted surveys previously conducted in relation to Rosenthal Estate (e.g. Wlodarczyk P. & Williams L. 2005a; 2005c; Ecology and Heritage Partners Pty Ltd 2015a; 2015b).

Table 2. Clearing Site Details

Clearing Site Details	
Landowner of clearing site	T.F & A. Millett Pty Ltd
Landowner nominated representative	Urban Design and Management Pty Ltd
Location and address of clearing site	100 Vineyard Road, Sunbury, Victoria
Local Government Area	Hume City Council
Catchment Management Authority	Port Phillip and Westernport Catchment Management Authority
Responsible Authority	Hume City Council
Applicant	T.F & A. Millett Pty Ltd
Planning Permit Number (ID)	P18681
Date approved	To be completed

4.1.1 Significant Species and Communities

Despite the presence of suitable grassland habitat, no nationally significant flora species have been recorded from the study area (Richards, J. & Wlodarczyk 2009). However, one State significant grass species, Rye Beetle-grass *Tripogon loliiformis*, listed as rare under the *Advisory List of Rare or Threatened Plants in Victoria* (DEPI 2014) was incidentally recorded during the Net Gain review assessment (Ecology and Heritage Partners Pty Ltd 2013) (Figure 2).

One nationally significant fauna species (Golden Sun Moth) has consistently been identified within the study area over a ten year period (Wlodarczyk, P. & Williams, L. 2006; Wlodarczyk, P., Hatt, T. & Richards, J. 2007; Wlodarczyk, P. & Richards, J. 2009a; Ecology and Heritage Partners Pty Ltd 2015b). Although population numbers have fluctuated throughout this period the latest targeted survey results for Golden Sun Moth over the 2014-15 flying season recorded 363 individuals (Ecology and Heritage Partners Pty Ltd 2015b).

Previous targeted surveys for all other relevant significant fauna species including Growling Grass Frog, Grassland Earless Dragon and Striped Legless Lizard failed to detect these species despite the presence of suitable habitat (surface and embedded rock, soil cracking, tussock-grasses and inter-tussock spaces etc.) throughout the study area (Wlodarczyk, P. & Richards, J. 2009b, 2009c; Brett Lane and Associates Pty Ltd 2011).

4.1.2 Remnant vegetation proposed for removal

Based on the most up to date development plan (Urban Design and Management Plan Ref: 11031_DP-PP, Dated 3 December 2014) a total of 8.85 habitat hectares of remnant vegetation is proposed for removal. This total includes:

- 7.95 habitat hectares (16.18 hectares) of Very High conservation significance Plains Grassland; and,
- 0.9 habitat hectares (2.53 hectares) of High conservation significance Creekline Tussock Grassland.

Vegetation quality assessment scores for remnant patches are shown in Table 3.

A further 0.11 hectares of both Plains Grassland and non-native vegetation, comprising part of the existing east-west sewerage easement, has also been considered as lost and is included within the offset accounting. Although Western Water have confirmed that this area is unlikely to be disturbed, the need to conduct future maintenance works throughout any given length of the easement cannot be categorically ruled out.

Note: the alignment of the easement currently intersects native vegetation (part of polygon PG4 or Management Area A) and an area dominated by non-native vegetation (Management Zone B) (see Figures 2 and 2a). However, the 'non-native' area is required to be rehabilitated under the conditions of the OMP and associated CMP to a state of similar quality to that of the surrounding remnant patch (PG4). Under this assumption, the discrete area of non-native vegetation (approximately 0.04 hectares) associated with the easement has been granted the same condition score as habitat zone PG4, as a 'future default' score.

Consideration of the east-west easement increases the total area of loss to 8.91 habitat hectares, including:

- 8.01 habitat hectares (16.29 hectares) of Very High conservation significance Plains Grassland; and,
- 0.9 habitat hectares (2.53 hectares) of High conservation significance Creekline Tussock Grassland.

Table 3. Quantification and significance of remnant patches within Rosenthal Estate

Study Area			VRS	VRS	VRS	VRS	VRS
Habitat Zone			**PG1a**	**PG1b**	**PG4**	**CT1**	**CT2**
Bioregion			**VVP**	**VVP**	**VVP**	**VVP**	**VVP**
EVC Name			**PG(HS)**	**PG(HS)**	**PG(HS)**	**CTG**	**CTG**
EVC Number			**132_61**	**132_61**	**132_61**	**654**	**654**
		Max Score	**Score**	**Score**	**Score**	**Score**	**Score**
Site Condition	Large Old Trees	10	N/A	N/A	N/A	N/A	N/A
	Canopy Cover	5	N/A	N/A	N/A	N/A	N/A
	Under storey	25	15	10	20	10	15
	Lack of Weeds	15	4	0	6	2	6
	Recruitment	10	3	3	3	3	0
	Organic Matter	5	5	4	5	4	4
	Logs	5	N/A	N/A	N/A	N/A	N/A
Treeless EVC Multiplier		Multiplier	1.36	1.36	1.36	1.36	1.36
		Subtotal =	36.72	23.12	46.24	25.84	34
Landscape value	Patch Size	10	2	1	8	1	1
	Neighbourhood	10	1	1	2	0	2
	Distance to Core	5	1	0	1	1	1
Habitat points out of 100		100	40.72	25.12	57.24	27.84	38
Habitat Score (habitat points/100)			0.41	0.25	0.57	0.28	0.38
Total Area of Habitat Zone within the Study Area (ha)			5.60	1.75	18.92	0.70	1.83
Area (ha) proposed to be removed			4.47	1.75	10.07	0.70	1.83
Area (ha) proposed to be retained			1.13	0.00	8.85	0.00	0.00
Total habitat hectares within the Study Area			2.3	0.44	10.78	0.2	0.7
Habitat hectares to be removed			1.83	0.44	5.73	0.2	0.7
Habitat hectares to be retained			0.47	0	5.05	0	0
EVC Conservation Status			End	End	End	End	End
Conservation Significance	Conservation status x Habitat Score		V. High	High	V. High	High	High
	Threatened Species		V. High	V. High	V. High	N/A	N/A
	Other Site Attributes		N/A	N/A	N/A	N/A	N/A
	Overall (highest rating)		V. High	V. High	V. High	High	High

Notes: VRS-Vineyard Road Sunbury; PG(HS)-*Heavier Soils* Plains Grassland; CTG-Creekline Tussock Grassland; EVC-Ecological vegetation Class; VVP-Victorian Volcanic Plain; End – Endangered; V. High – Very High; N/A-Not Applicable.

4.1.3 Significant species habitat removal

In accordance with the 'decision on approval' notice issued by the Commonwealth Department of Environment, no more than 43 hectares of Golden Sun Moth habitat may be impacted as part of the

development of Rosenthal Estate (EPBC Ref: 2008/4214, dated 7 July 2014). The proposed loss of Golden Sun Moth habitat is 42.27 hectares with a further 0.11 hectares of GSM habitat considered lost in relation to the sewerage easement; increasing the total loss to 42.38 hectares (Figure 2).

4.2 Gain Targets

The Framework sets out requirements for proposals that intend to clear and offset native vegetation (e.g. like-for-like criteria and Net Gain ratios) (NRE 2002). Offsets are determined by the conservation significance of the vegetation, which is determined by the habitat score, bioregional conservation status, and potential for the vegetation to support significant flora and fauna species. In accordance with the Framework, Net Gain target calculations are shown below (Table 4).

Table 4. Gain targets for clearing remnant patches

Vegetation Offset Target						Large Old Tree Offset Target				
Bioregion	Target EVC	Conservation significance	Total Losses (HabHa)	Net Gain Multiplier*	Net Gain Target (HabHa)	Total Losses	Protection Multiplier	Total to be Protected	Recruitment Multiplier	Total to be Recruited
VVP	PG	V. High	8.00	2	16.00	0	8	0	40	0
VPP	CTG	High	0.9	1.5	1.35	0	4	0	20	0
Total			**8.9**		**17.35**					**0**
Adjusted target with trading up discount for CTG (1.35 x 0.75)					**17.01**					

Notes: VVP = Victorian Volcanic Plain; PG = Plains Grassland; CTG = Creekline Tussock Grassland; HabHa = Habitat Hectare *Multipliers obtained from the *Port Phillip and Westernport Native Vegetation Plan* (PPWCMA 2006).

Under the Framework, all gains are required to be generated from the Victorian Volcanic Plain bioregion in order to meet the objectives of the Net Gain policy. The total offset requirement as specified in accordance with Appendix 4, Table 6 pp. 54–55 of the Framework (NRE 2002) for the proposed removal of native vegetation associated with Rosenthal Estate includes:

- 16.00 habitat hectares of Very High conservation significance Plains Grassland; and,
- 1.35 habitat hectares of High conservation significance Creekline Tussock Grassland;

Or via 'Trading Up' a total of:

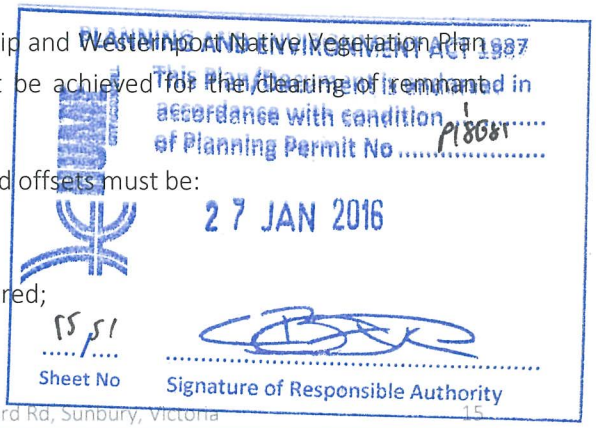
- 17.01 habitat hectares of Very High conservation significance vegetation.

4.2.1 Like-for-Like Criteria

In accordance with the Framework and Table 3.4B of the Port Philip and Westernport Native Vegetation Plan (PPWCMA 2006), the following 'like-for-like' requirements must be achieved for the clearing of remnant patches of native vegetation.

For patches of Very High conservation significance Plains Grassland offsets must be:

- At least two times the calculated loss in habitat hectares;
- The same vegetation/habitat type (EVC) as that being cleared;



- Of similar or more effective ecological function and land protection function as impacted by the loss; and,
- At least 90% of the quality of the area being cleared.

For patches of High conservation significance Creekline Tussock Grassland offsets must be:

- The same vegetation/habitat type as that removed by clearing OR a Very High conservation significance vegetation/habitat in the same bioregion;
- Of similar or more effective ecological function and land protection function as impacted by the loss; and,
- At least 75% of the quality of the area being cleared.

4.3 Offset Management Strategy

The majority of the offset requirements will be achieved through the securing of an *ex-situ* offset via a third party. However, the offset strategy also includes available gains from the improvement, maintenance and security of the two *in-situ* conservation reserves, as a means to contribute to the overall offset requirement and to provide some ongoing protection for the extant Golden Sun Moth population, as well as the highest quality patch of Plains Grassland within the development site (Figure 2).

As part of ongoing discussions with the Commonwealth Department of Environment, an overall offset package has been approved that includes the combined protection and ongoing maintenance and improvement of approximately 12.64 hectares of known Golden Sun Moth habitat and 10.16 hectares of Plains Grassland within two *in-situ* conservation reserves, as well as the purchase of third party vegetation 'offset credits' for approximately 86 hectares of both confirmed Golden Sun Moth habitat and Plains Grassland at the nominated *ex-situ* offset site - Warrambeen. The total offset package therefore includes permanent protection and ongoing management of:

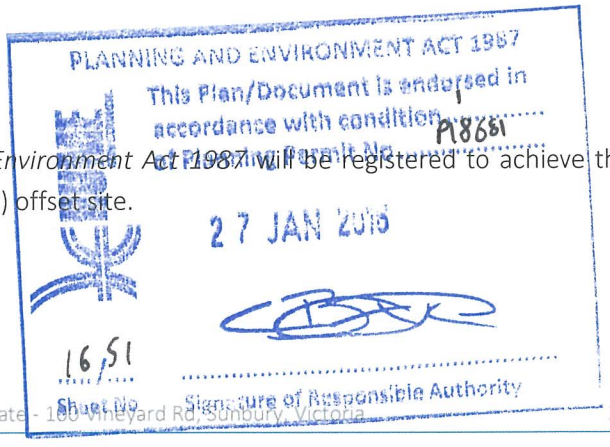
- 98.65 hectares of Golden Sun Moth habitat;
- Two Golden Sun Moth populations (Sunbury and Warrambeen); and,
- Approximately 96 hectares of Plains Grassland (that also qualifies as Natural Temperate Grassland of the Victorian Volcanic Plain);

Offsets to compensate for the loss of remnant vegetation and Golden Sun Moth habitat will be achieved within both *in-situ* and *ex-situ* offset sites via a combination of security, maintenance and improvement gains as summarised below.

4.3.1 Security gain

Ex-situ offset site

A Section 173 agreement under the *Planning and Environment Act 1987* will be registered to achieve the relevant security gains over the *ex-situ* (Warrambeen) offset site.



In-situ offset sites

A Section 173 Agreement currently supports the Development Plan for the entire Rosenthal Estate. The agreement includes key infrastructure details and the timing for their delivery and covers the two designated *in-situ* conservation reserves. However, as the security agreement relates to the entire Rosenthal Estate, Hume City Council has requested that a separate security agreement is prepared that specifically relates only to the *in-situ* conservation reserves. In this instance, Hume City Council have requested as part of Planning Permit Condition 1.d. that:

> *'Offset sites which are to be vested to Council must be secured via a Section 69 agreement or Trust for Nature Covenant. Section 173 agreements are not to be used for this purpose. They may be used as a temporary measure (subject to Council approval) during the process of securing offsets through other means.*

4.3.2 Maintenance gain

Maintenance gain will be achieved through the management of the offset sites with a focus on:

- Foregoing grazing during flowering and seeding periods for native flora and employing low density pulse grazing throughout the remainder of the year (Warrambeen site only);
- Regular biomass control via controlled prescribed burns (Rosenthal Estate site only);
- Establishing appropriate fencing and signage to minimise future disturbance; and,
- Monitoring for, and eradicating any new weed species.

4.3.3 Improvement gain

Improvement gain will be achieved through the management of the offset site with a focus on:

- Eliminating high threat woody weeds;
- Reducing the cover of herbaceous and grassy weeds and preventing new invasions;
- Appropriate biomass control regimes;
- Supplementary planting and rehabilitation of any degraded areas; and,
- Pest animal control.

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4.4 Description of offset sites

4.4.1 *In-situ* offset sites (Rosenthal Estate)

The two *in-situ* offset sites (conservation reserves) occur within the north-western and north-eastern arms of Rosenthal Estate and have been approved as part of the Rosenthal Development Plan (Figure 2). The offset areas have historically been used for low intensity agricultural purposes including grazing of cattle and are not currently purpose managed for the conservation of native vegetation or threatened species habitat. The larger western reserve covers a total of 11.17 hectares and contains approximately 8.95 hectares of remnant

Plains Grassland (Management zone A) and 2.22 hectares of Minor Treeless Vegetation dominated by introduced grasses (Management Zone B). The smaller, eastern reserve covers a total of 1.47 hectares and contains approximately 1.21 hectares of Plains Grassland, 0.19 hectares of Minor Treeless Vegetation and 0.07 hectares of Modified Treeless Vegetation.

The proposed *in-situ* conservation reserves are characterised by moderate to good condition *Heavier-soils* Plains Grassland, with a high cover of native grasses including Kangaroo Grass *Themeda triandra*, and a relatively diverse range of native herbs (Ecology and Heritage Partners Pty Ltd 2013). The western conservation reserve will protect the most intact and highest quality native vegetation within the entire Rosenthal Estate, and the reserve in its current proposed size and location has previously been deemed an appropriate response by the then Department of Environment and Primary Industries (DEPI) (Ref: SP442138 LA/03/3013, dated 7 May 2012).

Both reserves provide high value habitat for grassland fauna and are known to support the nationally listed Golden Sun Moth. The reserves are not known to contain any significant flora species, however, one State significant flora species, Rye Beetle-grass *Tripogon loliiformis,* has been recorded within the greater study area. Where possible, any specimens of Rye Beetle-grass should be translocated into the western conservation reserves prior to the commencement of any construction activities.

Both reserves also contain areas of Minor Treeless Vegetation which are suitable for revegetation and supplementary planting (Management Zone B, Figure 2). A very small portion of the eastern conservation reserve also overlaps with an area of Modified Treeless Vegetation, which is also suitable for revegetation and supplementary planting. Rehabilitation of these areas is a mandatory requirement of the OMP, as they are currently in poor condition and dominated by several weeds of national significance (WoNS) including Chilean Needle-grass *Nassella neesiana* and Serrated Tussock *Nassella trichotoma*. It should be noted however, that gains from revegetation and supplementary planting are generally only available in relation to woody vegetation communities and the generation of gain from the revegetation of grassland communities is not currently a valid option (DEPI 2013c).

4.4.2 Available Gain from the *in-situ* conservation reserves

Quantification of available gains from the protection and management of remnant vegetation within the two *in-situ* offset sites are shown below (Table 5).

An estimated **3.02 habitat hectares** of gain is available from the protection and ongoing management of approximately 10.1 hectares of Very High conservation significance Plains Grassland (EVC 132_61) within the two *in-situ* conservation reserves. A residual amount of 14.33 habitat hectares would still be required to be secured and managed into perpetuity to achieve the overall offset target of 17.35 habitat hectares (or alternatively a residual amount of 13.99 habitat hectares via trading-up, given a reduced target of 17.01 habitat hectares). A summary of the allocation of available native vegetation gains is provided in Section 4.3.8 and Table 7.

Note: although the offset calculations above relate specifically to the removal of remnant patches at the State level, the long-term protection of the two *in-situ* conservation reserves also contribute to a reduction in the offset targets for Matters of National Environmental Significance, given that the reserves are intended to also protect and manage Golden Sun Moth habitat (see Section 4.4.6).

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Table 5. Quantification of gains available from the security and management of two in-situ conservation reserves

EOI Code / land manager name			Rosenthal Estate			Rosenthal Estate		
Site code (number) / Habitat Zone ID (letter)			PG1a*			PG4*		
Land tenure			Freehold			Freehold		
Property Size			>=10 Ha			>=10 Ha		
Patch Size			<5 Ha			>=5ha <20ha		
Zone type			Offset (Stat Planning)			Offset (Stat Planning)		
Proposal type			Remnant patch			Remnant patch		
Security arrangement			Registered on-title agreement or crown land equivalent			Registered on-title agreement or crown land equivalent		
Bioregion			Victorian Volcanic Plain			Victorian Volcanic Plain		
EVC name			Plains Grassland			Plains Grassland		
BCS			Endangered			E		
EVC standardiser			1.36			1.36		
		Max	Current condition	Maintenance gain/ha	Improvement gain/ha	Current condition	Maintenance gain/ha	Improvement gain/ha
Scores	Large Trees	10	Na	Na		Na	Na	
	Tree Canopy Cover	5	Na	Na	Na	Na	Na	Na
	Understorey	25	15	7.5	1.25	20	10	0
	Lack of Weeds	15	4		1	6		0
	Recruitment	10	3	1.5	0.5	3	1.5	0
	Organic Litter	5	5	2.5	0	5	2.5	0
	Logs	5	Na	Na	Na	Na	0	0
	Standardised Site Condition	75	37			46		
	Landscape Context	25	4			11		
	HHa Score	100	41			57		
Subtotal of gains				11.5	3.25		14	0
Standardised Sum Main + Improvement Gain/Ha					20.06			19.04
Prior Management Gain/Ha					4.1			5.7
Security Gain/Ha					4.1			5.7
Total Gain/Ha					28.26			30.44
Size of habitat zone (Ha)					1.1			8.9
TOTAL GAIN (HHa)					**0.31**			**2.71**

Notes: *only includes area of patch within offset site; Ha = Hectare, HHa = Habitat hectare; Na = Not Applicable

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4.4.3 *Ex-situ* offset site (Warrambeen)

The Warrambeen offset site is located at 1372 Rokewood-Shelford Road, Shelford (Figure 3). The site occurs within the Victorian Volcanic Plain bioregion and the Golden Plains Shire (DELWP 2015). The land is currently zoned Farming Zone (FZ) and is also covered by an Environment Significance Overlay – Schedule 2 (ESO2).

The entire Warrambeen landholding covers approximately 4,046 hectares. The Warrambeen property has in recent history been used for wool production and substantial parts of the property have never been improved with fertilisers or cleared of embedded and scattered rock. Large tracts of remnant vegetation therefore persist throughout the property.

The Warrambeen property currently contains over 600 hectares of Very High quality grassland, which is purpose managed to maintain native vegetation cover. Warrambeen currently has 210 hectares of grassland covenanted or protected under land title agreements as offsets for five separate projects. All areas currently under covenant or security agreements are independently monitored to ensure management obligations, goals and plans are achieved.

The current owners of Warrambeen (Ian and Trish Taylor) have a long-standing (since 1989) involvement with Landcare projects, training and education programs, and are highly experienced in the ongoing management and improvement of native grassland. The Warrambeen business plan contains proven and robust management systems and a multi-generational commitment to ensure ongoing stewardship capacity for the preservation of grasslands across the landholding.

A range of potential *ex-situ* offset sites have previously been explored to address offset requirements. The current OMP focuses on one site (Warrambeen), as it is considered appropriate to meet both State and Federal offset requirements in one package. Due to the large size of the Warrambeen property, a range of offset options are possible. The current representative for the 'Warrambeen offsets program' (James Taylor) has recently provided an outline of recommended patches of remnant vegetation within the greater Warrambeen landholding that are appropriate and available to meet all 'like-for-like' offset requirements relating to the development of Rosenthal Estate.

The specific Warrambeen offset sites relating to the Rosenthal Estate development include the property sections referred to as Group 3 Areas B1, B2 & E within Woolly and Creek Paddocks (Figure 4). The use of these three sections (currently defined by fence lines) will enable the offset to be met in one contiguous patch. The entire Group 3 Area encapsulates approximately 15 patches of grassland within a 3km radius that effectively link the larger areas of remnant vegetation in both the southern (Woolshed area) and northern (860 Acres and Saxon & East Creek paddocks) sections of the Warrambeen property (Figures 3 & 4). All of these areas are currently being purpose managed for the preservation of native vegetation by foregoing grazing during key flowering and seeding periods, then pulse grazing with sheep throughout the remainder of the year. All patches within the Group 3 section of the Warrambeen property are also confirmed to support Golden Sun Moth.

Group 3 Areas B1, B2 & E cover a total of 86 hectares, consisting of:

- Area B1 (41.54 hectares);
- Area B2 (36.03 hectares); and,
- Area E (8.44 hectares).

Previous vegetation quality assessments assigned habitat scores of 68 for Area B1 and 53 to Area E, giving both patches a bioregional conservation significance rating of Very High (Brett Lane & Associates Pty Ltd 2014). Both habitat scores exceed the minimum 90% like-for-like condition thresholds to meet offset obligations under the Framework.

Note: Area B2 was surveyed as part of recent investigations, to determine the eligibility of the vegetation for use as an offset, and also to determine if the final offset could be provided in one contiguous patch. Area B2 was assigned a habitat condition score of 53 (Table 6). The additional survey verified that the western border of Area B1, as previously mapped by Brett Lane and Associates (2014), is an artefact of the current fence alignment between the series of 'creek' paddocks, and is not reflective of the overall extent of remnant vegetation. Although the additional area was surveyed at sub-optimal time of year (early to mid-winter), the entire western paddock was considered to meet the thresholds for a remnant patch. Area B2 occurs over a low ridge and contains a high level of scattered and embedded rock especially along the interface of Warrambine Creek. The entire paddock consists of open-structured tussock grassland, dominated by Common Tussock-grass *Poa labillardierei* with an underlying matrix of wallaby-grasses *Rytidosperma* spp. and introduced pasture grasses. Although some of the 'spring' herbaceous component recorded by Brett Lane and Associates within the adjoining section of Area B1 was absent at the time of survey, a small number of herbs were emerging, such as Sheep's Burr *Acaena echinata* and Small Loosestrife *Lythrum hysoppifolium,* and evidence (withered stalks and seed heads) of additional herbs including Common Raspwort *Gonocarpus tetragynus* and Bluebell *Wahlenbergia* spp. were also identified. Due to the direct nexus of the patch to Area B1 it is likely that the vegetation could be given the same condition score. However, as the survey was conducted in winter, the condition score for the additional patch is slightly lower (53/100).

Areas B1 & E have both been confirmed as containing high quality habitat for Golden Sun Moth (GSM) (Brett Lane and Associates Pty Ltd 2013). Areas B1, B2 and E were also confirmed as high quality GSM habitat in the recent survey by Ecology and Heritage Partners (9 July 2015). Targeted surveys have previously been conducted for GSM in small parts of the Group 3 area during December and January 2012-13 resulting in the detection of four individuals on the boundary of Area B1 and E. However, it should be noted that surveys were highly constrained by bad weather and were also potentially conducted too late in the survey season to provide an accurate estimate of GSM distribution and abundance within the Group 3 section of the Warrambeen property (Brett Lane and Associates Pty Ltd 2013).

As supplementary evidence, Ian Taylor previously noted high numbers of GSM within the Group 3 area during December 2012, and Trust for Nature have also positively identified GSM in the Group 3 section of Warrambeen within recent years. In addition, targeted surveys for GSM during the 2010-2011 and 2012-13 flying seasons recorded the species in 'high abundance' within sections of the Warrambeen property immediately north and west of the Group 3 area (Brett Lane and Associates Pty Ltd 2011; 2013). Golden Sun Moth have also been identified and documented in high numbers (several hundred moths on each occasion) during November 2009 targeted surveys within the adjoining Group 2 areas to the north known as the '860 Acres' and 'East Creek' paddock sections (Libby Woodard 2009) (Figure 3). In addition, previous targeted surveys within the southern section of Warrambeen known as 'Woolshed Hill' have documented large numbers of GSM, including 470 individuals in 2012 (Brett Lane and Associates Pty Ltd 2013) and 132 individuals in 2009 (Ecology Partners Pty Ltd 2010) (Figure 3).

All of the above matters and results are discussed in greater detail within the Warrambeen Native Grassland Offsets overview document (dated 20 April 2015) as provided by the Taylors (See Appendix 1).

Table 6. Quantification and significance of offset Area C at Warrambeen

Study Area			**Warrambeen**
Habitat Zone			**Area B2**
Bioregion			**VVP**
EVC Name			**PG (HS)**
EVC Number			**132_61**
		Max Score	**Score**
Site Condition	Large Old Trees	10	N/A
	Canopy Cover	5	N/A
	Under storey	25	10
	Lack of Weeds	15	6
	Recruitment	10	6
	Organic Matter	5	5
	Logs	5	N/A
Treeless EVC Multiplier		Multiplier	1.36
		Subtotal =	36.72
Landscape Context		25	16
Habitat points out of 100		100	52.72
Habitat Score (habitat points/100)			0.53
Total Area of Habitat Zone within the Study Area (ha)			36.03
Area (ha) proposed to be removed			0
Area (ha) proposed to be retained			36.03
Total habitat hectares within the Study Area			19.09
Habitat hectares to be removed			0
Habitat hectares to be retained			19.09
EVC Conservation Status			End
Conservation Significance	Conservation status x Habitat Score		V. High
	Threatened Species		V. High
	Other Site Attributes		N/A
	Overall (highest rating)		V. High

Notes: PG(HS)-*Heavier Soils* Plains Grassland; EVC-Ecological vegetation Class; VVP-Victorian Volcanic Plain; End – Endangered; V. High – Very High; N/A-Not Applicable.

4.4.4 Available Gain from the *ex-situ* Warrambeen offset sites

Quantification of the available gain from the protection and management of remnant vegetation within Group 3 Area B1 and B2 offset sites are shown below (Table 7). Note: only Area B Gain calculations are shown in Table 7 as the protection and ongoing management of this section of Warrambeen alone is sufficient to generate enough Gain to exceed the target of 17.01 habitat hectares.

An estimated **14.11 habitat hectares** of Gain is available from the protection and ongoing management of the 41.45 hectares of Very High conservation significance Plains Grassland (EVC 132_61) known as Group 3 Area B1 (Table 7). When combined with Gains available from the *in-situ* offset sites (3.02 habitat hectares, see Table 5), the estimated Gain exceeds the 17.01 habitat hectare target for the removal of native vegetation under the Framework, resulting in a surplus of 0.12 habitat hectares. A summary of the allocation of available Gains is provided in Section 4.3.8 and Table 8.

Table 7. Quantification of gains available from the security and management of Group 3 Area B1, Warrambeen

EOI Code			Rosenthal Estate		
Site code (number) / Habitat Zone ID (letter)			Group3 B1		
Land tenure			freehold		
Property Size			>=10 Ha		
Patch Size			>=20 Ha		
Zone type			Offset (Stat Planning)		
Proposal type			Remnant patch		
Security arrangement			Registered on-title agreement or crown land equivalent		
Bioregion			Victorian Volcanic Plain		
EVC name			Plains Grassland		
BCS			E		
EVC standardiser			1.36		
		Max	Current condition	Maintenance gain/ha	Improvement gain/ha
Scores	Large Trees	10	Na	na	
	Tree Canopy Cover	5	Na	na	na
	Understorey	25	15	7.5	0
	Lack of Weeds	15	9		0
	Recruitment	10	10	5	0
	Organic Litter	5	3	1.5	1
	Logs	5	Na	na	na
	Standardised Site Condition	75	50		
	Landscape Context	25	18		
	HabHa Score	100	68		
Subtotal of gains				14	1
Standardised Sum Main + Impr Gain/Ha			20.4		
Prior Mgt Gain/Ha			6.8		
Security Gain/Ha			6.8		
Total Gain/Ha			34		
Size of habitat zone (Ha)			41.5		
TOTAL GAIN (HHa)			14.11		

Notes: Ha = Hectare, HHa = Habitat hectare; Na = Not Applicable

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4.4.5 Allocation of Native Vegetation Gains

Based upon the estimated Gain calculations shown in Tables 5 & 7, a total of 17.13 habitat hectares of gain is available from the combined protection and management of 10.16 hectares of Very High conservation significance Plains Grassland within the two *in-situ* conservation reserves, as well as 41.54 hectares of Very High conservation significance Plains Grassland within Group 3 Area B1 at the *ex-situ* Warrambeen offset site. Table 8 documents the allocation of Gain generated at each offset location toward the overall offset target and illustrates that the protection of both *in-situ* conservation reserves and the Group 3 Area B1 section at Warrambeen will generate a surplus of approximately 0.12 habitat hectares.

Table 8. Allocation of native vegetation gains for clearing remnant patches

Gain Target		Trading Up	Source of Gains to meet target				Outcome	
Target Name	Target (Hha)	Discount	Offset Zone	Gain (Hha)	Offset Zone	Gain (Hha)	Total gains (Hha)	Surplus/Deficit (Hha)
PG - Very High	16	n/a	PG1a (*in-situ*)	0.31	PG4 (*in-situ*)	2.71	3.02	-12.98
			Group 3 Area B1 Warrambeen	14.11			14.11	+1.13
CTG – High	1.35 (1.01*)	Yes (0.25%)	Surplus of Area B1	(1.13)			(1.13)	+0.12
Total	**17.01**						**17.13**	**+0.12**

Notes: Hha = Habitat hectare; PG = Plains Grassland; CTG = Creekline Tussock Grassland; * reduced total via trading up

4.4.6 Offsets for Matters of National Environmental Significance

Table 9 summarises the quantity and location of offsets identified to compensate for the approved removal of 42.38 hectares of Golden Sun Moth habitat.

Table 9. Offsets associated with Matters of National Environmental Significance (MNES)

MNES	Losses (ha)	Offset area (ha)	Location
Golden Sun Moth habitat	42.38	*In-situ* Western conservation reserve 11.17	Rosenthal Estate, 100 Vineyard Rd, Sunbury
		In-situ Eastern conservation reserve 1.47	Rosenthal Estate, 100 Vineyard Rd, Sunbury
		Ex-situ Group 3 Area B1 41.54	Warrambeen
		Ex-situ Group 3 Area B2 36.03	Warrambeen
		Ex-situ Group 3 Area E 8.44	Warrambeen
Total	42.38	98.65 hectares	

4.4.6.1 *Environment Protection and Biodiversity Conservation Act 1999 Offsets Policy*

Offset requirements have been discussed at length with DoE and the final offset target guided by the EPBC Act Offsets Policy (SEWPaC 2012) and the offset impact calculator. The offset calculations combine details for both the *in-situ* and *ex-situ* offset sites. The assumptions used to populate the calculator for each site are

presented below. Final assumptions are based on the combined values of both the *in-situ* and *ex-situ* offset sites (Table 9).

***In-situ* offset sites**

- *In-situ Offset location* = 100 Vineyard Rd, Sunbury (12.64 hectares);
- *GSM Habitat to be removed* = 42.38 hectares;
- *Habitat quality* = Approximately 4/10. The majority of the Golden Sun Moth habitat approved for removal comprises grassland areas that do not qualify as a remnant patch due to a native species cover of less than 25%, and a high cover of Chilean Needle-grass and other introduced grasses. However, approximately 38% of the GSM habitat approved for removal consists of Very High quality Plains Grassland EVC. Areas of Creekline Tussock Grassland approved for removal are not considered as habitat for GSM;
- *Time over which loss is averted* = 20 years. The land will be managed in perpetuity for the conservation of Golden Sun Moth habitat and Plains Grassland EVC;
- *Time until ecological benefit* = 10 years. Native vegetation is expected to improve in extent, species diversity and quality within 5 years through applied weed and biomass control regimes;
- *Start area and quality* = Approximately 12.6 hectares and predominantly 5/10. The *in-situ* offset sites contain approximately 10.05 hectares of Very High quality Plains Grassland (8.92 hectares in the western conservation reserve and 1.13 hectares in the eastern conservation reserve). The remaining areas of both reserves are dominated by a range of introduced grasses including Chilean Needle-grass and are of poor quality (2/10). The poor quality sections of both reserves occur on steep south facing slopes (approximately 2.25 hectares and 0.34 hectares in the western and eastern conservation reserves respectively);
- *Risk of loss without offset* = 40%. Without protection as an offset site there is uncertainty regarding the future use of the land. The property would most likely continue to be managed under the current regime of low density cattle grazing and cropping;
- *Future quality without offset* = 3/10. Assumes management proceeds as per the current regime and quality persists for a time then deteriorates as invasive weeds such as Chilean Needle-grass further dominate;
- *Risk of loss with offset* = 10%. The reserves will be managed in perpetuity for conservation purposes for Golden Sun Moth and Plains Grassland, therefore the risk of loss is considered minimal, however, it is acknowledged that the reserves will be relatively isolated and disconnected from other remnant areas and populations of Golden Sun Moth in the future;
- *Future quality with offset* = 7-8/10. The *in-situ* offset site is to be secured and managed for conservation purposes in perpetuity, with implementation of this OMP and the accompanying Conservation Management Plan (CMP) and by incorporating maintenance and improvement measures such as weed control and regular monitoring, there is expected to be an improvement in the condition of Plains Grassland and overall habitat quality for Golden Sun Moth;

- *Confidence in result* = 80%. Confidence in applied scores is relatively high due to careful consideration of the future management and improvement obligations for the offset sites, as well as the current landscape context.

***Ex-situ* offset sites**

- *Ex-situ offset location* = Warrambeen - 1372 Rokewood Shelford Road, Shelford, Victoria;
- *Habitat to be removed* = 0 hectares;
- *Habitat quality* = As above;
- *Time over which loss is averted* = 20 years. The land will be managed in perpetuity for the conservation of Plains Grassland and Golden Sun Moth habitat;
- *Time until ecological benefit* = 10 years. Native vegetation is expected to improve in extent, species diversity and density within 2-5 years through applied weed and biomass control regimes, and substantial ecological benefit is expected within 10 years;
- *Start area and quality* = Total of 86.0 hectares, including Group 3 Area B1 (41.54 hectares), Area B2 (36.03 hectares) and Area E (8.44 hectares) with an average condition score of 5-6/10. The offset site consists of contiguous areas of high quality native grassland in good condition (Figure 4). Percentage cover and species abundance of indigenous grass and herbs is relatively high, with low weed cover;
- *Risk of loss without offset* = 10-15%. Without protection as an offset site there is uncertainty regarding the future use of the land, however, the proposed offset areas would continue to be maintained under the current agricultural regime, which is specifically tailored to the management of native grassland for future use as offsets;
- *Future quality without offset* = 5-6/10. Assumes management proceeds in accord with the current regime and quality remains relatively stable at 5-6/10;
- *Risk of loss with offset* = 5%. The land will be managed in perpetuity for the conservation of Plains Grassland and Golden Sun Moth habitat, therefore the risk of loss under this scenario is considered minimal;
- *Future quality with offset* = 8/10. The offset site is to be secured and managed for conservation purposes in perpetuity. With the implementation of the OMP incorporating greater security, maintenance and monitoring, it is expected that the quality of the offset sites will substantially improve over time;
- *Confidence in result* = 80%. Confidence in applied scores is high as the proposed *ex-situ* offset site is already in relatively good condition, will be protected and managed in perpetuity, and has strong landscape context.

Combined offset site conditions

The combined offset site condition assumptions for both *in-situ* and *ex-situ* offset sites are summarised below (Table 10).

Table 10. Combined *in-situ* and *ex-situ* offset site conditions

Site	In-situ	Ex-situ	Combined
Location	100 Vineyard Rd Sunbury (12.64 hectares)	1372 Rokewood Shelford Road, Shelford, Victoria	
GSM habitat removed (ha)	42.38 hectares	0 hectares	42.38 hectares
Habitat quality removed	4/10 - includes a mixture of Very High quality Plains Grassland (~38%) and primarily introduced vegetation	n/a	n/a
Time over which loss averted	20 years	20 years	20 years
Time until ecological benefit	10 years	10 years	10 years
Start area and quality	12.64 hectares and 4-5/10	86 hectares and 5-6/10	5/10
Risk of loss without offset	40%	10-15%	25-30%
Future quality without offset	3/10	5-6/10	4/10
Risk of loss with offset	10%	5%	7.5%
Future quality with offset	7-8/10	8/10	8/10
Confidence in result	80%	80%	80%

4.4.7 Meeting like-for-like criteria

The two *in-situ* offset sites (conservation reserves) directly meet the required like-for-like criteria specified in Appendix 4, Table 6, pp. 54–55 of the Framework (NRE 2002) (see Section 4.2.1). The reserves are located in the Victorian Volcanic Plain bioregion and both contain the same vegetation and habitat type (i.e. *Heavier-soils* Plains Grassland and Golden Sun Moth habitat). Remnant vegetation within the offset sites is of the same Conservation Status (Endangered) as the areas approved to be removed and is of an appropriate quality (i.e. at least 90% of the quality of the vegetation being lost), as well as being within the same priority landscape zone as the loss. Furthermore, vegetation within both *in-situ* reserves provides high quality habitat for a variety of threatened species including Golden Sun Moth (previously recorded in both reserves), Striped Legless Lizard and Spiny Rice-flower.

With regard to the *ex-situ* (Warrambeen) offset sites, the nominated areas (Group 3 Areas B1, B2 & E) also meet all like-for-like criteria as they occur within the Victorian Volcanic Plain, consist of the same vegetation type and the same conservation status, meet at least 90% of quality of the vegetation being lost or have equivalent or higher conservation significance than the areas of loss. Areas B1, B2 & E also qualify as both the FFG Act listed *Western (Basalt) Plains Grassland Community* (WBPGC) and the EPBC Act listed *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP). In addition, the Warrambeen offset sites are confirmed to contain Golden Sun Moth and are considered to contain an equivalent if not higher distribution and abundance of Golden Sun Moth than the impact site, especially in the context of the broader landholding. With the addition of Group 3 Area B2, the Warrambeen site effectively contains almost seven kilometres of contiguous Golden Sun Moth habitat extending northward from Rokewood Shelford Road and covering an area of more than 600 hectares (Figure 3).

5 PART B – OFFSET IMPLEMENTATION

All offset sites will be protected under specific land title agreements to ensure that the sites are secured and managed appropriately in perpetuity (see Section 4.3.1).

The following report section broadly discusses the actions required to implement the Offset Management Plan (OMP). The plan details methods for the management and conservation of native vegetation and Golden Sun Moth habitat at both the *in-situ* (Rosenthal Estate) and *ex-situ* (Warrambeen) offset sites over the requisite ten year management period and into perpetuity.

It is anticipated that the offset management works will begin prior to the clearing of native vegetation associated with the proposed development, and that all works will be conducted by suitably qualified and experienced contractors.

Note: while this document covers both *in-situ* and *ex-situ* offset sites, it is acknowledged that each site will be managed uniquely and independently, therefore separate management tables are provided below for each reserve (Section 5.6).

5.1 Details of Offset Sites

Details of the offset sites are presented below (Table 11).

Table 11. Offset Site Details

Offset Site Details		
	Ex-situ offset site	**In-situ offset sites**
Landowner of offset site	Ian and Trish Taylor	T.F & A. Millett Pty Ltd
Type of offset (on-site, 3rd party)	3rd Party	On-site
Location and address of offset site	Warrambeen: 1372 Rokewood Shelford Road, Shelford, Victoria	Rosenthal Estate, 100 Vineyard Road, Sunbury, Victoria
Area of offset site (ha)	86 hectares of Plains Grassland and Golden Sun Moth habitat. Overall Warrambeen property is greater than 4000 hectares in total	12.64 hectares of Golden Sun Moth habitat and Plains Grassland
Offset site number (if applicable)	N/A	To be completed
Volume	-	-
Folio	-	-
Parish	-	-
Allotment	Lot 1 TP16458	To be completed
Local Government Area	Golden Plains	Hume City Council
Responsible Authority	Golden Plains	Hume City Council
Bioregion	Victorian Volcanic Plain	Victorian Volcanic Plain

5.2 Strategy for Offset Site

The offset sites are to be secured and managed for conservation purposes in perpetuity. The management strategy for the proposed offset sites consist of implementing a vegetation management plan incorporating weed and biomass control, as well as regular monitoring specifically tailored to the ecological requirements of Golden Sun Moth and the maintenance of Plains Grassland. Details of security and management responsibility are shown in Table 12.

Table 12. Security and Management Responsibility

Offset Security and Management Responsibility	
Who is liable/responsible for meeting offset requirements?	Rosenthal Estate: T.F & A. Millett Pty Ltd Warrambeen: The current landowners of - Ian and Trish Taylor
Type of security i.e. Planning Permit Condition, Section 69 of the *Conservation, Forest and Lands Act 1987 (Vic)*, Section 173 of the *Planning and Environment Act 1987 (Vic)* Covenant under the *Victorian Conservation Trust Act 1972 (Vic)*	Rosenthal Estate: Section 69 Agreement Warrambeen: Section 173 Agreement
Agreement or Planning Permit Number (ID)	Rosenthal Estate: P18681 Warrambeen: To be completed
Date 10-year offset management to commence	Rosenthal Estate: To be completed Warrambeen: To be completed
Date 10-year offset management expires	Rosenthal Estate: To be completed Warrambeen: To be completed
Registered on title? (Yes/No)	Rosenthal Estate: To be completed Warrambeen: To be completed
Offset site management responsibility (i.e. Landowner, Authority Name)	Approval holder and Landowner
Offset Monitoring Responsibility (i.e. Responsible Authority, DELWP)	Responsible authority / Landowner

5.3 Management Objectives

The offset sites will be managed for the purposes of conservation. Management of these sites will involve physical protection of the proposed offset sites, the control of pest animals and a number of high threat environmental weeds, biomass reduction and general maintenance of the character and quality of the native vegetation, consistent with its historic context. The offset management plan and specified management actions will form part of a broader strategy for long-term management of Golden Sun Moth and its habitat as well as associated threatened species and ecological communities.

5.4 Management Actions

The following section discusses the actions required to implement the management strategy for the ongoing protection of the existing Golden Sun Moth population and Plains Grassland vegetation. The offset site is to be secured and managed for conservation purposes in perpetuity. Management actions described below are to be implemented for a mandatory period of 10 years. The landowners will continue to manage the offset site after the completion of year 10 as specified in this plan, such that:

- weed cover is managed in perpetuity to ensure it does not increase beyond the level attained at year 10 of management;
- pest animals are controlled in perpetuity to the level attained at year 10 of the management; and,
- Golden Sun Moth populations and habitat are maintained or improved.

Any proposed uses or development of the site which conflict with the landowners commitments are not permitted under this plan.

5.4.1 Security Arrangements

The offset sites will include on-title legal agreements in accordance with the relevant Responsible Authority to ensure the land is secured and managed appropriately in perpetuity.

The Warrambeen site will be covered by a Section 173 Agreement or Trust for Nature covenant, while the Rosenthal Estate offset sites will be covered by a Section 69 Agreement or Trust for Nature covenant (see Section 4.3.1).

5.4.2 Access Control

Without active management and appropriate fencing, unrestricted access into the offset site may result in loss of native vegetation cover, soil disturbance and compaction, and weed facilitation.

In-situ offsets

The designs for access and interface treatments for the Rosenthal Estate offset sites are documented in the accompanying Conservation Management Plan (Ecology and Heritage Partners Pty Ltd 2015a).

Ex-situ offset

The perimeter the nominated offset area at the Warrambeen property is currently enclosed by permanent post-and-wire fencing.

Access control will proceed in accordance with the following considerations:

- Maintain permanent fences surrounding the offset site. Any new fencing should be permanent post-and-wire fencing and constructed with minimal impact to the offset site (i.e. no stock piling of fencing materials or soil during construction); and,
- Fence condition will be constantly monitored given that much of the Warrambeen property is still used for the controlled grazing of sheep. Any gaps or holes in fencing will be repaired immediately.

Key Performance Targets

The following key performance target has been provided to measure the success of the access control:

- Permanent (stock and vehicle proof) fencing maintained to prevent accidental or unauthorised access to the offset sites.

5.4.3 Biomass Control

In-situ offsets

The preferred method for ongoing biomass control for the Rosenthal Estate offset sites is the use of prescribed burns. Biomass control methods for the *in-situ* reserves, as well as considerations of the ecology of Golden Sun Moth are documented in greater detail within the accompanying Conservation Management Plan (Ecology and Heritage Partners Pty Ltd 2015a).

Ex-situ offsets

The current biomass reduction method applied throughout the Warrambeen property consists of low-intensity rotational grazing. All sheep are removed during the critical flowering/reproductive period for native species (September to February) then sheep are allowed to return to graze on biomass over autumn and winter. The current grazing regime is considered an appropriate method for managing biomass given that remnant vegetation has persisted throughout the site as a direct result of the grazing disturbance regime.

It is envisaged that low intensity mosaic burns could be used in the future to maintain biomass levels, as well as aid in the recruitment and persistence of indigenous flora species. Should the use of fire be considered as a biomass control mechanism, such an activity must be conducted outside of the normal active period for Golden Sun Moth (approximately October to February) through the incorporation of cool autumn burns.

Low intensity mosaic burns are the preferred method of biomass control for the Rosenthal Estate offset sites.

The need for biomass reduction via prescribed burns will be assessed on an annual basis and be implemented on an as-needs basis according to an approved burn plan.

Key Performance Targets

The key performance target for biomass control in this instance is the maintenance of open structured Plains Grassland community suitable for the ecological requirements of Golden Sun Moth.

5.4.4 Pest Control

5.4.4.1 Weed Control

The control of weed species is a key management action within the offset area and is critical to the maintenance of indigenous vegetation cover and species diversity. Effective weed control should promote the regeneration of existing populations of indigenous species and encourage recruitment from soil seed banks. Weed control work should be carried out by a suitably qualified contractor.

Whilst the ultimate objective is to eliminate or reduce all weed species to less than 1-5% cover, emphasis will be placed on priority weeds within the offset site and adjacent land. Priority weeds include woody weeds, all noxious weeds listed under the *Catchment and Land Protection Act 1994* (CaLP), or any other high threat weed species (DPI 2008).

The following key management actions will be undertaken to ensure success of the weed management program:

- Eliminate high threat environmental weeds (cover reduced to <1%) and control medium threat environmental weeds within all habitat zones (cover reduced to <5%);
- Identify new infestations of weed species and implement control as appropriate;
- Control all other weeds within all habitat zones (ideally at a reduced cover of current levels);

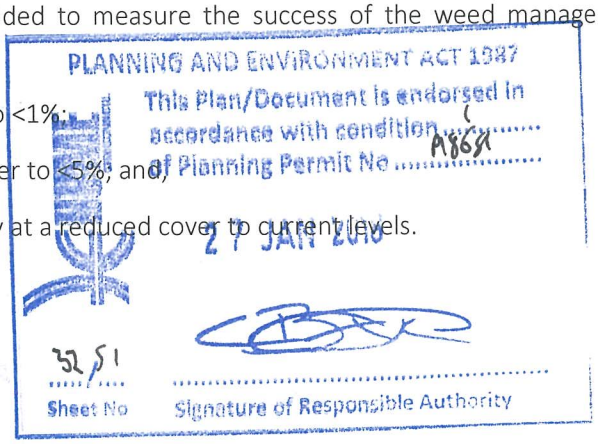
The following guidelines should be taken as general management principles in regards to weed control:

- Weed control methodology for eradicating graminoid and herbaceous weeds will consist of manual removal and/or spot spraying weeds with an appropriate herbicide. Care should be taken when spraying herbicide to ensure that the poison does not affect native vegetation in the local application area. Weed species should be treated before seed is set, which may involve localised slashing if spot-spraying proves ineffective. A dye should be used in the spray to mark where the spraying has occurred;
- Selective herbicide application is preferable to broad area application but clearly the loss of non-target species needs to be balanced with the threat of incomplete control of the existing weed population;
- Weed control actions should be conducted outside of the normal active period for Golden Sun Moth (approximately October to February) and activities should also be conducted in a mosaic fashion to avoid any unexpected impacts potentially affecting the entire Golden Sun Moth population at the same time, as the effects of herbicides on Golden Sun Moth larvae remain unknown. Likewise, herbicide application should proceed with great care for at least six weeks post flying season to avoid contact with any Golden Sun Moth eggs that may have been oviposited on indigenous grass species;
- Any weed control should be done in a manner that minimises soil disturbance;
- All herbicide application should use waterway sensitive products and non-residual herbicides to avoid unwanted off-target effects;
- Pest plants that reproduce sexually (by seed) are best controlled before seed set. If herbicide application is proposed after seed set, slashing should be undertaken to ensure seed does not reach maturity; and,
- Weed control works should be monitored regularly to assess their effectiveness, and evaluated for follow up actions.

Key Performance Targets

The following key performance targets are provided to measure the success of the weed management program and include at a minimum:

- The reduction of high threat weed cover to <1%;
- The reduction of medium threat weed cover to <5%; and,
- The maintenance of all other weeds ideally at a reduced cover to current levels.



5.4.4.2 *Pest Animal Control*

European Rabbits remain a threat for the regeneration/recruitment of native species throughout Victoria. All vermin harbour (i.e. burrows) should be treated, without disturbance to native vegetation or significant soil disturbance. The land owner/contractor is to monitor pest animal use of the offset site whilst undertaking vegetation management works. Any changes in the influences of pest animals may require a change in the management actions.

The following key management actions will be undertaken to ensure success of the pest animal program:

- Monitor the population of pest animals (namely rabbits, hares, feral cats and foxes) during weed control works and adapt management as considered appropriate (i.e. if an increase in pest animal activity is observed then a targeted pest animal control program should be implemented.);
- Identify potential harbour and burrows, and destroy if soil disturbance can be minimised and all native vegetation retained; and,
- If necessary, undertake a pest animal control program (e.g. baiting, trapping and shooting of foxes, hares, rabbits or feral cats).

Key Performance Targets

The following key performance targets are provided to measure the success of the pest animal management:

- No increase in pest animal activity from approval of this plan; and,
- Minimal soil disturbance and no native vegetation loss from pest animal management activities.

5.4.5 Supplementary Planting

It is anticipated that natural regeneration of remnant native vegetation and implementation of weed control measures are likely to improve the overall cover and diversity of indigenous flora within the offset sites. Direct seeding and supplementary planting is considered unnecessary at Warrambeen and has not been included as a required management action as part of this plan. However, supplementary planting and/or direct seeding is a requirement for degraded sections of the *in-situ* offset sites (Management Area B, Figure 2) and has been specifically treated in greater detail within the accompanying Conservation Management Plan (Ecology and Heritage Partners Pty Ltd 2015a).

Key Performance Targets

The following key performance target is provided to measure the success of supplementary planting:

- By end of year 10, Management B areas should have equivalent cover of native grasses (and also herbaceous species) as remnant areas within each of the *in-situ* reserves, with the cover of Chilean Needles-grass reduced to a negligible amount (ideally <1%).

5.4.6 Threatened Species

Suitable habitat exists throughout the both the Warrambeen and Rosenthal offset sites for a range of significant flora and fauna species including Golden Sun Moth, Striped Legless Lizard *Delma impar*, Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* and Small Scurf-pea *Cullen parvum*. Management actions should be undertaken to ensure that any threatened species are protected, and actions tailored to

encourage an increase in both the distribution and abundance of any threatened species, or the likelihood of re-colonisation for a given species.

Key Performance Targets

- All threatened flora and fauna species are explicitly mapped and monitored, to maintain or improve existing populations within the offset site.

5.5 Monitoring and Reporting

Monitoring of native vegetation and Golden Sun Moth habitat should be undertaken by a suitably qualified ecologist to ensure key performance targets are met and the responsible authorities notified of the success and or failure of works through regular progress reports.

5.5.1 Monitoring

5.5.1.1 *Native vegetation*

Monitoring is required to assess the positive and negative impacts of management actions on the integrity of the offset site, and to implement any changes in management responses if required. Vegetation monitoring will be conducted annually, with progress reports provided to the responsible authority at the end of year 2, 4, 6 and 10 of the program for the *ex-situ* Warrambeen site, and at the end of year 2, 5 and 10 for the *in-situ* Rosenthal Estate offset sites (Table 13).

Monitoring will be undertaken by a suitably qualified ecologist, with input from the landowners. However, the frequency of monitoring may need to vary to allow for seasonal variations and to target periods of active weed growth. Similarly, pest animal monitoring should be undertaken at a time of year when the target species are most active so that an accurate assessment of population size can be made.

It is recommended that monitoring be undertaken by qualified ecological consultants familiar with the methodology for assessing the quality of remnant vegetation as well as any offset and EPBC Act referral conditions.

Monitoring and progress reports should include the following:

- Overall condition and composition of vegetation as well as consideration of measurable vegetation quality outcomes i.e. habitat hectare assessment;
- Condition and health of scattered trees (if required);
- Biomass levels;
- The extent, severity, trend and presence of current weed species and any new and emerging weed species; and,
- Implementation of permanent photo points. Photographs must be taken at the same location and during the same time of each year. Photo points will allow monitoring of weed populations and maintenance of the current condition of native vegetation within the offset site. Details of photo points and photographs will be provided to DELWP where required as evidence of progress.

5.5.1.2 *Golden Sun Moth*

Golden Sun Moth populations are known to vary on spatial and temporal scales depending upon habitat conditions at a particular site. Monitoring is required to determine if Golden Sun Moth has persisted in grassland areas and to ensure that management actions and habitats are suitable for a viable Golden Sun Moth population in the future.

Annual monitoring of Golden Sun Moth populations will be undertaken for an initial 4 year period, and then in years 6, 8 and 10 (within the ten year management timeframe) at both *in-situ* and *ex-situ* offset sites. If, at the end of the four year monitoring program, the results indicate a decline in the Golden Sun Moth population or degradation of Golden Sun Moth habitat, the OMP will be re-evaluated and adapted accordingly.

Specific survey procedures will follow those approved by DoE and outlined in the Biodiversity Precinct Planning Kit (DSE 2009). The following measures will be undertaken as part of population and habitat monitoring for Golden Sun Moth in the initial 4 year period (and extended if required):

- Collection of baseline data to be used as a reference point to assess the impacts of management actions. This action will comprise targeted Golden Sun Moth surveys undertaken throughout the extent of the offset site, and the remainder of the property where possible;
- Surveys are to be conducted by suitably trained observers;
- Surveys must take place during the species' flight season. This is generally late October to early January. Ensure moths are active on the day of assessment by using a reference site where the species is known to be present;
- Surveys must be undertaken during conditions suitable for detecting the species. Male moths generally fly between 10am and 3pm on warm (over 20˚C by 10am) days with minimal cloud cover and still conditions. However if males are observed flying after 3pm or during moderately windy conditions surveys can continue until males are no longer observed flying; and,
- Surveys should be conducted using 50 metre wide, parallel transects with two observers walking or, if terrain permits, driving in a car at < 10 km / hour (flying male moths can be readily seen from a vehicle) until moths are observed. Tracks (transects) must be recorded with a GPS to show where survey has been undertaken.

5.5.1.3 *Other Monitoring*

Information relating to fencing, weed control and pest animal control will be provided by landowners and the relevant contractors, with a landowner monitoring form completed on an annual basis (see below). This information will be included in the progress report, discussed below.

5.5.2 Reporting

Progress reports for the *ex-situ* Warrambeen site will be provided to the responsible authority at the end of year 2, 4, 6 and 10 of the program, while progress reports for the *in-situ* Rosenthal Estate offset sites will be provided to the responsible authority at the end of year 2, 5 and 10 of the program (Table 13). Information to be provided in the progress report includes:

- A copy of the Management Actions Table (Table 13) detailing actions completed during the reporting period;
- Landowner monitoring and reporting forms;
- A description of the specific monitoring results from ecological surveys undertaken;
- Results of weed and pest animal control work;
- Successful management tools (i.e. techniques used to control weed species, monitoring technique, etc.);
- Any problems or issues experienced (i.e. new infestation of weed species, etc.);
- Any corrective actions and contingency measures where monitoring indicates that there has been a deterioration in the native vegetation or Golden Sun Moth population; and,
- Photographs showing evidence of works.

In order to meet EPBC Act referral conditions, all records/evidence of management actions must be maintained, and be submitted to DoE upon request, and any proposed management changes must be submitted to DoE prior to the changes being undertaken.

If any agreed management actions or commitments are incomplete or have not been undertaken in the times specified, the landowner is to document the justification and the actions that will be undertaken to implement the requirement.

5.5.2.1 *Landowner Monitoring and Reporting Form*

Information relating to fencing, weed control and pest animal control will be provided by landowners and the relevant contractors, with a landowner monitoring form completed on an annual basis (see below). The template for a landowner monitoring and reporting form is shown in Table 14.

If any agreed management actions or commitments are incomplete or have not been undertaken in the times specified, the responsible party must explain the reasons why and what program of action/s will be undertaken to implement the action. If no action has been undertaken please explain the reason(s) and how the targets specified will be met.

5.6 Management Actions Table

Management actions are summarised in Table 13. The actions in each table constitute the minimum management requirements for the offset sites over the mandatory 10 year management period.

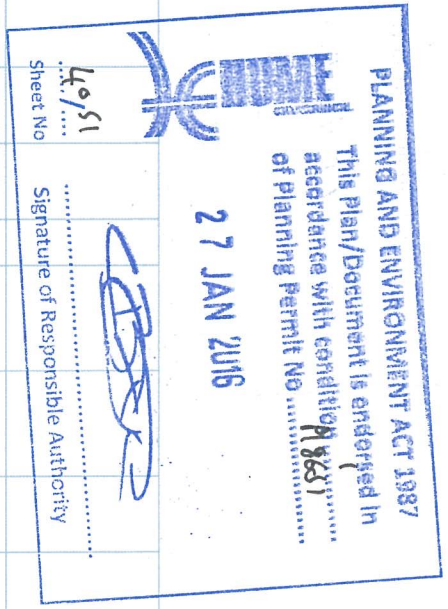
Table 13: Management Actions Table

Year	Action	Management action	Responsible authority / personnel	Timing of action	Date completed
0	0.1	Implement on-title legal agreements for offset site	Liaise between the landowner, DELWP and Council.	Within three months of this plan being approved by DELWP and DoE	
0	0.2	Acquire baseline monitoring data	Suitably qualified ecological specialist	Within three months of this plan being approved by DELWP and DoE	
0	0.3	Prepare tenders for relevant management contractors where required	Landowners / engaged consultants	Prior to commencement of development	
1	1.1	Install permanent fences and access gates surrounding the offset sites	Landowner	Within three months of this plan being approved by DELWP and DoE	
1	1.2	Conduct weed control	Landowner/Bushland Management Contractor	Species dependent	
1	1.3	Monitor populations of pest animals and conduct control works if required	Landowner/Pest Animal Contractor	After peak breeding season - late summer/early autumn	
1	1.4	Conduct monitoring for Golden Sun Moth	Suitably qualified ecological specialist	One year after commencement of OMP	
1	1.5	Monitor biomass density and implement stock grazing regime or develop ecological burn/ fuel reduction plan if appropriate	Landowner/Bushland Management Contractor/CFA	Summer/Autumn	
1	1.6	Contract nursery for seed collection and propagation of native species suitable for supplementary planting into **Management Zone B of each *in-situ* reserve.**	Landowner/Bushland Management Contractor/Local Nursery	Year 1 for potential supplementary planting in Year 2 or Year 3 and progressively on an annual or biennial basis. **Management Zone B – *in-situ* reserves only.**	
2	2.1	Conduct weed control	Landowner/Bushland Management Contractor	Species dependent	
2	2.2	Monitor populations of pest animals and conduct control works if required	Landowner/Pest Animal Contractor	After peak breeding season - late summer/early autumn	
2	2.3	Conduct monitoring for vegetation and Golden Sun Moth	Suitably qualified ecological specialist	Two years after commencement of OMP	
2	2.4	Maintain fences	Landowner/Fencing Contractor	As required	

Year	Action	Management action	Responsible authority / personnel	Timing of action	Date completed
2	2.5	Monitor biomass density and implement stock grazing regime or develop ecological burn/ fuel reduction plan if appropriate	Landowner/Bushland Management Contractor/CFA	Summer/Autumn	
2	2.6	Commence supplementary planting within **Management Zone B of *in-situ* reserves**	Landowner/Bushland Management Contractor	Early Spring Year 2 – subject to availability of plants and environmental conditions	
2	2.7	Monitor and assess works, and prepare progress report for **both *in-situ* and *ex-situ* offsets**	Suitably qualified ecological specialist	Two years after commencement of OMP for **both *in-situ* and *ex-situ* offsets**	
3	3.1	Conduct weed control	Landowner/Bushland Management Contractor	Species dependent	
3	3.2	Monitor populations of pest animals and conduct control works if required	Landowner/Pest Animal Contractor	After peak breeding season - late summer/early autumn	
3	3.3	Conduct monitoring for Golden Sun Moth	Suitably qualified ecological specialist	Three years after commencement of OMP	
3	3.4	Maintain fences	Landowner/Fencing Contractor	As required	
3	3.5	Monitor biomass density and implement stock grazing regime or develop ecological burn/ fuel reduction plan if appropriate	Landowner/Bushland Management Contractor/CFA	Summer/Autumn	
3	3.6	Continue supplementary planting within **Management Zone B of *in-situ* reserves**	Landowner/Bushland Management Contractor	Early Spring Year 3 – subject to availability of plants and environmental conditions	
4	4.1	Conduct weed control	Landowner/Bushland Management Contractor	Species dependent	
4	4.2	Monitor populations of pest animals and conduct control works if required	Landowner/Pest Animal Contractor	After peak breeding season - late summer/early autumn	
4	4.3	Conduct monitoring for vegetation and Golden Sun Moth	Suitably qualified ecological specialist	Four years after commencement of OMP	
4	4.4	Maintain fences	Landowner/Fencing Contractor	As required	

Year	Action	Management action	Responsible authority / personnel	Timing of action	Date completed
4	4.5	Monitor biomass density and implement stock grazing regime or develop ecological burn/ fuel reduction plan if appropriate	Landowner/Bushland Management Contractor/CFA	Summer/Autumn	
4	4.6	Assess success of supplementary planting efforts within **Management Zone B of *in-situ* reserves**	Landowner/Bushland Management Contractor	End of year 4	
4	4.7	Monitor and assess works, and prepare progress report for ***ex-situ* Warrambeen offset**	Suitably qualified ecological specialist	Four years after commencement of OMP for ***ex-situ* Warrambeen offset**	
5	5.1	Conduct weed control	Landowner/Bushland Management Contractor	Species dependent	
5	5.2	Monitor populations of pest animals and conduct control works if required	Landowner/Pest Animal Contractor	After peak breeding season - late summer/early autumn	
5	5.3	Maintain fences	Landowner/Fencing Contractor	As required	
5	5.4	Monitor biomass density and implement stock grazing regime or develop ecological burn/ fuel reduction plan if appropriate	Landowner/Bushland Management Contractor/CFA	Summer/Autumn	
5	5.5	Monitor and assess works, and prepare progress report for ***in-situ* Rosenthal offsets**	Suitably qualified ecological specialist	Five years after commencement of OMP for ***in-situ* Rosenthal offset sites**	
5	5.6	Continue supplementary planting within **Management Zone B of *in-situ* reserves**	Landowner/Bushland Management Contractor	Early Spring Year 5 – subject to availability of plants and environmental conditions	
6	6.1	Conduct weed control	Landowner/Bushland Management Contractor	Species dependent	
6	6.2	Monitor populations of pest animals and conduct control works if required	Landowner/Pest Animal Contractor	After peak breeding season - late summer/early autumn	
6	6.3	Conduct monitoring for vegetation and Golden Sun Moth	Suitably qualified ecological specialist	Six years after commencement of OMP	
6	6.4	Maintain fences	Landowner/Fencing Contractor	As required	

Year	Action	Management action	Responsible authority / personnel	Timing of action	Date completed
6	6.5	Monitor biomass density and implement stock grazing regime or develop ecological burn/ fuel reduction plan if appropriate	Landowner/Bushland Management Contractor/CFA	Summer/Autumn	
6	6.6	Monitor and assess works, and prepare progress report for ***ex-situ* Warrambeen offset site**	Suitably qualified ecological specialist	Six years after commencement of OMP for ***ex-situ* Warrambeen offset site**	
6	6.7	If required continue supplementary planting within **Management Zone B of *in-situ* reserves**	Landowner/Bushland Management Contractor	Early Spring Year 6 – subject to availability of plants and environmental conditions	
7	7.1	Conduct weed control	Landowner/Bushland Management Contractor	Species dependent	
7	7.2	Monitor populations of pest animals and conduct control works if required	Landowner/Pest Animal Contractor	After peak breeding season - late summer/early autumn	
7	7.3	Maintain fences	Landowner/Fencing Contractor	As required	
7	7.4	Monitor biomass density and implement stock grazing regime or develop ecological burn/ fuel reduction plan if appropriate	Landowner/Bushland Management Contractor/CFA	Summer/Autumn	
7	7.5	If required continue supplementary planting within **Management Zone B of *in-situ* reserves**	Landowner/Bushland Management Contractor	Early Spring Year 7 – subject to availability of plants and environmental conditions	
8	8.1	Conduct weed control	Landowner/Bushland Management Contractor	Species dependent	
8	8.2	Monitor populations of pest animals and conduct control works if required	Landowner/Pest Animal Contractor	After peak breeding season - late summer/early autumn	
8	8.3	Conduct monitoring for Golden Sun Moth	Suitably qualified ecological specialist	Eight years after commencement of OMP	
8	8.4	Maintain fences	Landowner/Fencing Contractor	As required	
8	8.5	Monitor biomass density and implement stock grazing regime or develop ecological burn/ fuel reduction plan if appropriate	Landowner/Bushland Management Contractor/CFA	Summer/Autumn	



Year	Action	Management action	Responsible authority / personnel	Timing of action	Date completed
8	8.6	If required continue supplementary planting within **Management Zone B of *in-situ* reserves**	Landowner/Bushland Management Contractor	Early Spring Year 8 – subject to availability of plants and environmental conditions	
9	9.1	Conduct weed control	Landowner/Bushland Management Contractor	Species dependent	
9	9.2	Monitor populations of pest animals and conduct control works if required	Landowner/Pest Animal Contractor	After peak breeding season - late summer/early autumn	
9	9.3	Maintain fences	Landowner/Fencing Contractor	As required	
9	9.4	Monitor biomass density and implement stock grazing regime or develop ecological burn/ fuel reduction plan if appropriate	Landowner/Bushland Management Contractor/CFA	Summer/Autumn	
9	9.5	If required continue supplementary planting within **Management Zone B of *in-situ* reserves**	Landowner/Bushland Management Contractor	Early Spring Year 9 – subject to availability of plants and environmental conditions	
10	10.1	Conduct weed control	Landowner/Bushland Management Contractor	Species dependent	
10	10.2	Monitor populations of pest animals and conduct control works if required	Landowner/Pest Animal Contractor	After peak breeding season - late summer/early autumn	
10	10.3	Conduct monitoring for vegetation and Golden Sun Moth	Suitably qualified ecological specialist	Ten years after commencement of OMP	
10	10.4	Maintain fences	Landowner/Fencing Contractor	As required	
10	10.5	Monitor biomass density and implement stock grazing regime or develop ecological burn/ fuel reduction plan if appropriate	Landowner/Bushland Management Contractor/CFA	Summer/Autumn	
10	10.6	Monitor and assess works, and prepare final report for **both *in-situ* and *ex-situ* offsets**	Suitably qualified ecological specialist	Ten years after commencement of OMP for **both *in-situ* and *ex-situ* offsets**	

Table 14. Landowner Monitoring and Reporting Form

Landowner of offset site		
Location and address of offset site		
Offset site number (if applicable)		
Offset plan reference number (if applicable)		
Responsible Authority		
Report #		
Actions completed within the offset site (since commencement)	**Date and details of action**	**Key performance target met (Y/N)**
Signature		
Date		

6 REFERENCES

Brett Lane and Associates Pty Ltd 2011. 100 Vineyard Road Sunbury. Suitability of Habitat for grassland earless Dragon.

Brett Lane and Associates Pty Ltd 2011. 100 Vineyard Road Sunbury. Native Vegetation Assessment and Golden Sun Moth Habitat Survey.

DELWP 2015a. Biodiversity Interactive Map 3.1., available from URL. Department of Environment, Land, Water and Planning, Melbourne, Victoria.

DELWP 2015b. EVC Benchmarks. www.depi.vic.gov.au. Department of Environment, Land, Water and Planning, Melbourne, Victoria.

DELWP 2015c. Victorian Biodiversity Atlas. Sourced from: 'VBA_FLORA25' and VBA_FLORA100'. Department of Environment, Land, Water and Planning, Melbourne, Victoria.

DELWP 2015d. Victorian Biodiversity Atlas. Sourced from: 'VBA FAUNA25' and VBA FAUNA100'. Department of Environment, Land, Water and Planning, Melbourne, Victoria.

DEPI 2014. *Advisory list of rare or threatened plants in Victoria*. Victorian Department of Environment and Primary Industries.

DEPI 2013a. Permitted clearing of native vegetation - Biodiversity assessment guidelines (the Guidelines). Victorian Department of Environment and Primary Industries.

DEPI 2013b. Reforms to Victoria's native vegetation permitted clearing regulations: Transitional guidance to support applications to remove native vegetation. Victorian Department of Environment and Primary Industries.

DEPI 2013c. Native vegetation gain scoring manual, Version 1. May 2013. Victorian Department of Environment and Primary Industries

DEWHA 2009. EPBC Act Policy Statement 3.12 – Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (Synemon plana). Department of Environment, Water, Heritage and the Arts.

DPI 2008. Declared Noxious Weeds – Listed by Common Name. Landcare Notes. Department of Primary Industries.

DoE 2015. Environment Protection and Biodiversity Conservation Act 1999 Protected Matters Search Tool (PMST). http://www.environment.gov.au/erin/ert/epbc/index.html. The Department of Environment, Canberra.

DSE 2004. Vegetation quality assessment manual: Guidelines for applying the habitat hectares scoring method. Version 1.3. Victorian Department of Sustainability and Environment.

DSE 2010a. Standard Offset Plan Template. Victorian Government, Department of Sustainability and Environment, East Melbourne.

DSE 2010b. Gain calculator Version 11.5 September 2010. Victorian Government, Department of Sustainability and Environment, East Melbourne.

Ecology and Heritage Partners Pty Ltd 2015a. *Conservation Management Plan: Rosenthal Estate 100 Vineyard Road, Sunbury, Victoria.* Unpublished report prepared on behalf of Urban Design and Management Pty Ltd.

Ecology and Heritage Partners Pty Ltd 2015b. *Targeted Surveys for Golden Sun Moth, 100 Vineyard Road, Sunbury, Victoria.* Unpublished report prepared for Urban Design and Management Pty Ltd.

Ecology and Heritage Partners Pty Ltd 2013. Net Gain review of a previous habitat hectare assessment of land at Vineyard Road, Sunbury, Victoria.

Ecology Partners 2010. Targeted Golden Sun Moth surveys at two potential offset sites: Western Highway Realignment – Melton to Bacchus Marsh, Victoria. Unpublished report on behalf of VicRoads.

Kutt, A. S., McKenzie, V. J., Wills, T. J., Retallick, R. W. R., Dalton, K., Kay, N. and Melero-Blanca, E. 2015. Spatial and temporal determinants of golden sun moth Synemon plana distribution. Austral Ecology, 40: 100–107.

Marshall, A. 2013. *Start with the Grasslands: Design Guidelines to support native grasslands in urban areas.* Melbourne, Victorian National Parks Association.

NRE 2002. *Victoria's Native Vegetation Management: A Framework for Action.* Department of Natural Resources and Environment, Victoria.

PPWCMA 2006. *Port Phillip and Westernport Native Vegetation Plan,* Port Phillip and Western Port Catchment Management Authority, Frankston, Victoria.

Richards, J. and Wlodarczyk, P. 2009. Flora Assessment- 100 Vineyard Road. A report for Keith Altmann and Associates. Gagin Pty Ltd.

SEWPaC 2012. *Environment Protection and Biodiversity Conservation Act 1999* Environmental Offsets Policy (October 2012). Australian Government Department of Sustainability, Environment, Water, Population and Communities.

Viridans 2014a. Flora Information System (FIS), Viridians Biological Databases Pty Ltd.

Viridans 2014b. Victorian Fauna Database (VFD), Viridians Biological Databases Pty Ltd.

Wlodarczyk., P. and Williams, L. 2005a. A Botanical Assessment and Habitat Significance of 100 Vineyard Rd, City of Hume. A report for Keith Altmann and Associates. Gagin Pty Ltd.

Wlodarczyk., P. and Williams, L. 2005b. A Short Report into the Habitat Hectare Value and Net Gain Analysis of Habitat Zone PG4. A report for Keith Altmann and Associates. Gagin Pty Ltd.

Wlodarczyk, P. and Williams, L. 2005c. Addendum 2: A botanical assessment and habitat significance of 100 vineyard road, city of Hume. A report for Keith Altmann and Associates. Gagin Pty Ltd.

Wlodarczyk, P. and Hatt, T. April 2008. Flora and of Habitat Hectare Assessment for the area of the Retarding Basin - 100 Vineyard Road. A report for Keith Altmann and Associates. Gagin Pty Ltd.

Wlodarczyk, P., Hatt, T. and Richards, J. 2007. Second Report: Presence and Density of Synemon plana (Golden Sun Moth) at 100 Vineyard Rd Sunbury (Amended August 2008). A report for Keith Altmann and Associates. Gagin Pty Ltd.

Wlodarczyk, P. and Richards, J. 2009a. Abundance and Distribution of the Golden Sun Moth Synemon plana at 100 Vineyard Road, Sunbury. A report for Keith Altmann and Associates. Gagin Pty Ltd.

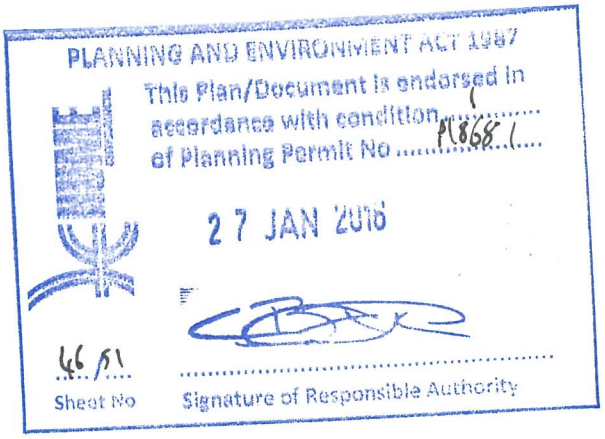
Wlodarczyk, P. and Richards, J. 2009b. Survey for the Presence of Striped Legless Lizard Delma impar - 100 Vineyard Rd Sunbury - A report for Keith Altmann and Associates. Gagin Pty Ltd.

Wlodarczyk, P. and Richards, J. 2009c. Presence of the Growling Grass Frog Litoria raniformis 100 Vineyard Rd Sunbury. A report for Keith Altmann and Associates. Gagin Pty Ltd.

Wlodarczyk. P., Williams, L. and Hatt, T. 2007. Targeted Fauna Search Delma impar – Striped Legless Lizard, 100 Vineyard Rd Sunbury. A report for Keith Altmann and Associates. Gagin Pty Ltd.

Wlodarczyk, P. and Williams, L. 2006. Brief Report: Presence of Synemon plana (Golden Sun Moth) at 100 Vineyard Rd Sunbury. A report for Keith Altmann and Associates. Gagin Pty Ltd.

FIGURES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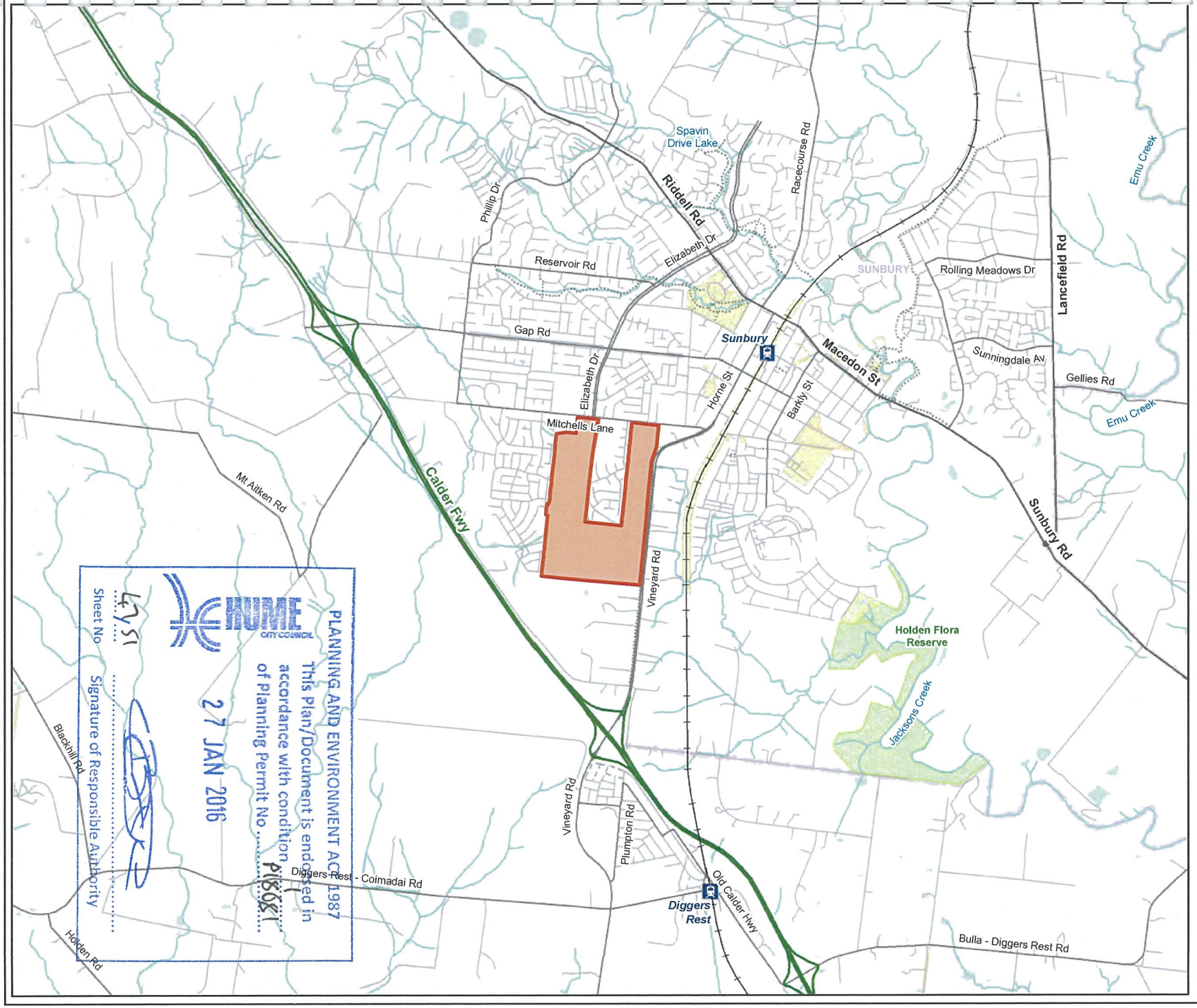

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Legend

- Study Area
- Freeway
- Major Road
- Collector Road
- Minor Road
- Proposed Road
- Walking Track
- Minor Watercourse
- Permanent Waterbody
- Land Subject to Inundation
- Parks and Reserves
- Crown Land
- Localities

Figure 1
Location of the study area
Rosenthal Estate, Sunbury

N

0 495 990
Metres

ecology & heritage partners

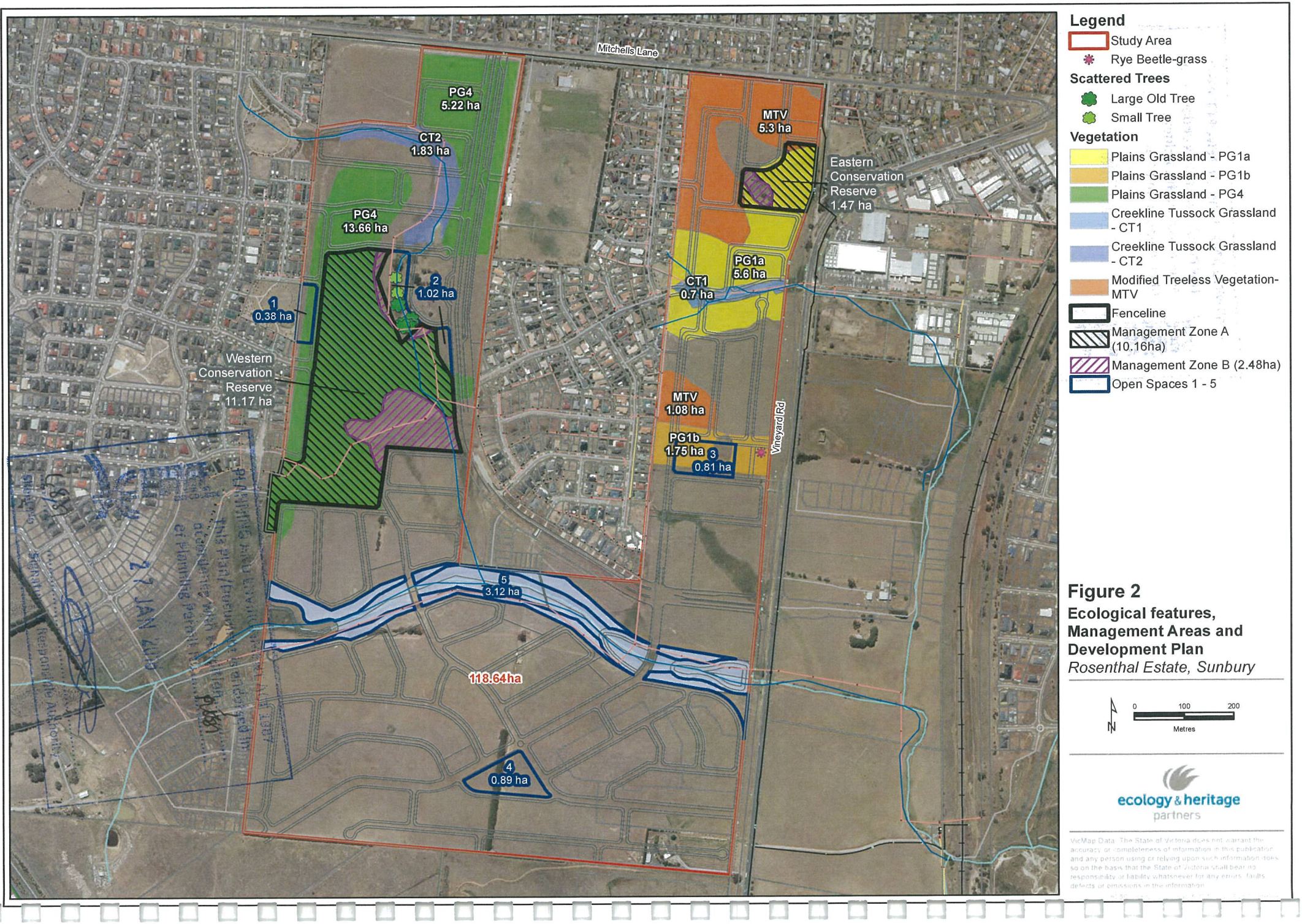

Figure 2

Ecological features, Management Areas and Development Plan

Rosenthal Estate, Sunbury

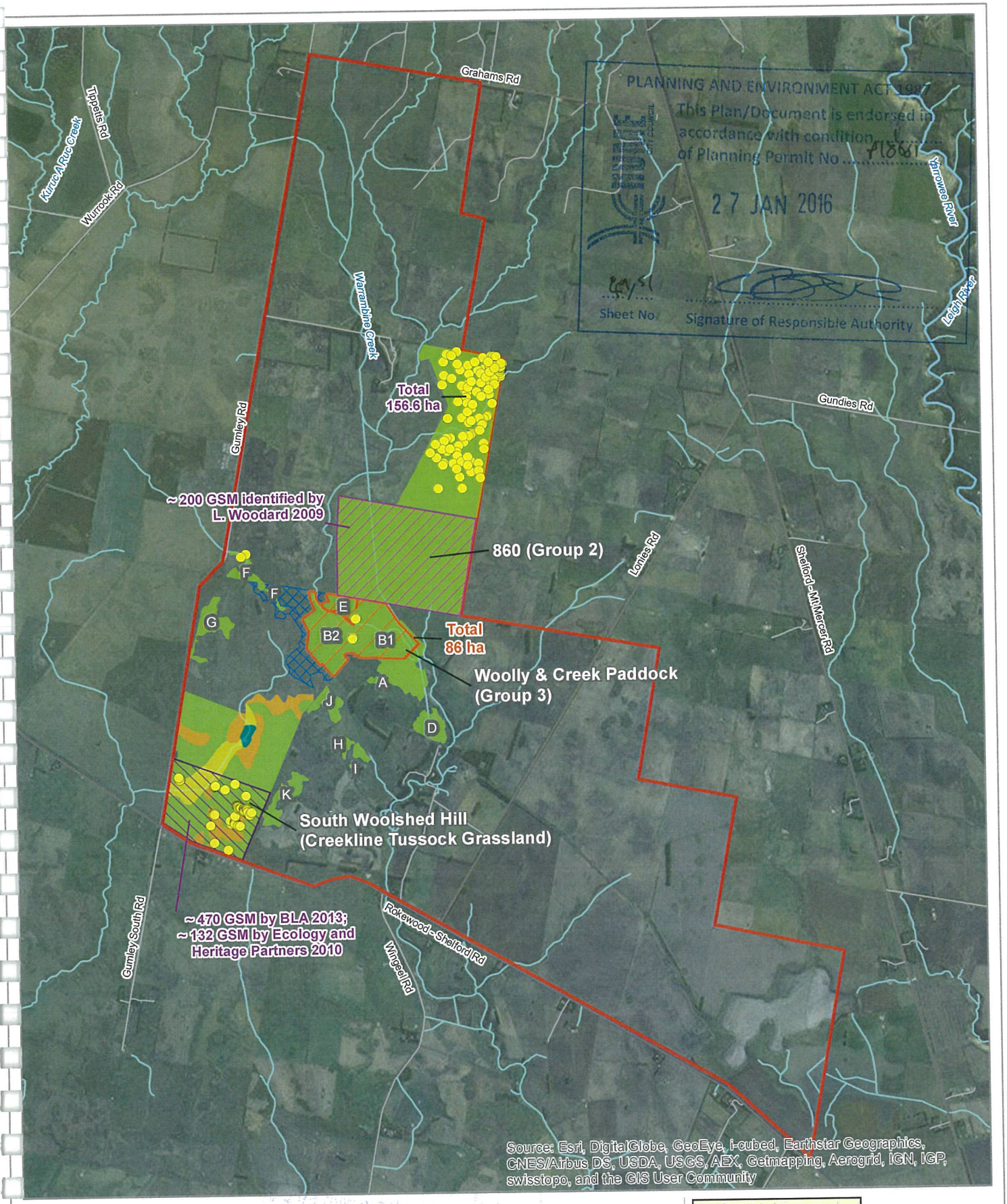

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Figure 3
Warrambeen Context Map
Warrambeen Offset Site

Legend
- Property boundary
- Proposed Rosenthal Estate Offset Area
- Golden Sun Moth Records

Native vegetation *
- Creekline Tussock Grassland
- Plains Grassland
- Plains Grassy Wetland
- Stony Knoll Shrubland
- Patch likely to extend to hatched area

* All native vegetation patches are suitable Golden Sun Moth habitat

N

0 500 1,000
Metres

ecology & heritage partners

Figure 4
Group 3 Offset Area
Warrambeen
Warrambeen Offset Site

Legend

- Property boundary
- Proposed Rosenthal Estate Offset Area
- Golden Sun Moth Records

Native vegetation *

- Creekline Tussock Grassland
- Plains Grassland
- Plains Grassy Wetland
- Stony Knoll Shrubland
- Patch likely to extend to hatched area

* All native vegetation patches are suitable Golden Sun Moth habitat

N

0 125 250
Metres

ecology & heritage partners

APPENDICES

Appendix 1 – Warrambeen Native Grassland Offsets overview document (dated 24 July 2015)