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Western Outer Ring Main Grassland Offset Strategy

APA VTS (Operations) Pty Ltd

April 2024

This Grassland Offset Strategy (Report) was prepared by APA VTS (Operations) Pty Ltd (APA) for the purpose of meeting the conditions outlined in the approval granted under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the Western Outer Ring Main Project (WORM).

Condition 6 of EPBC 2019/8569 (as amended on 9 November 2023) states that:

6. The approval holder must, before 1 February 2024, submit to the department for the Minister's written approval a Grassland Offset Strategy (GOS) ...

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Abbreviations

Abbreviation	Definition
AEMO	Australian Energy Market Operator
APA	APA VTS Australia (Operations) Pty Ltd (APA) (trading as APA Group, the proponent for the Project)
CaLP Act	*Catchment and Land Protection Act 1994* (Vic)
DAWE	Department of Agriculture, Water and the Environment (now DCCEEW)
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEECA	Department of Energy, Environment and Climate Action
DELWP	Department of Environment, Land, Water and Planning (now DEECA)
DSEWPAC	Department of Sustainability, Environment, Water, Population and Communities (now DCCEEW)
EES	Environment Effects Statement
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
GEWVVP	Grassy Eucalypt Woodland of the Victorian Volcanic Plain
GSM	Golden Sun Moth
ha	Hectare
HZ	Habitat zone
km	Kilometre
MNES	Matters of National Environmental Significance
MSA	Melbourne Strategic Assessment
NTGVVP	Natural Temperate Grassland of the Victorian Volcanic Plain
GOMP	Grassland Offset Management Plan
TEC	Threatened Ecological Community
VQA	Vegetation Quality Assessment
VTS	Victorian Transmission Network
VVP	Victorian Volcanic Plain
WORM	Western Outer Ring Main (the Project)

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1 Introduction

The Western Outer Ring Main (WORM) gas pipeline project (the Project) is a, approximately 51 kilometre (km), 500 millimetre (mm) nominal diameter high pressure gas transmission pipeline that will provide a high pressure connection between the eastern and western pipeline networks of the Victorian Transmission System (VTS).

APA VTS (Operations) Pty Ltd (APA) is the proponent for the Project. APA is Australia's largest natural gas infrastructure business. In Victoria, the VTS is owned and maintained by APA and consists of 2,267 km of gas pipelines. The VTS serves a total consumption base of approximately two million residential consumers and approximately 60,000 industrial and commercial users throughout Victoria.

The Project has been designed to provide critical infrastructure for Victoria's gas supply, distribution, and consequent security, efficiency and affordability. The key objectives of the Project are to:

- Improve system resilience and security of gas supply
- Increase the amount of natural gas that can be stored for times of peak demand
- Improve network performance and reliability
- Address potential gas shortages as forecast by the Australian Energy Market Operator (AEMO) in the March 2020 Victorian Gas Planning Report update.

1.1 Background

Project planning and impact assessment has worked through opportunities to avoid and minimise impacts to biodiversity values. The residual unavoidable impacts to some Matters of National Environmental Significance (MNES) – Natural Temperate Grassland of the Victorian Volcanic Plains (NTGVVP), and the associated Golden Sun Moth (GSM) habitat and Striped Legless Lizard (SLL) habitat – require offsetting and are the focus of this Grassland Offset Strategy.

The loss of vegetation and habitat presented is a conservative assessment based on assuming 100 per cent (%) vegetation/habitat loss within the construction corridor and the assumption of habitat presence where information may not be complete.

1.2 Scope and objectives of the Grassland Offset Strategy

This Grassland Offset Strategy has been prepared to address the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) conditions of approval (2019/8569) as amended 9 November 2023 and presented in Section 3. The Project requires offsetting of State and Commonwealth listed biodiversity values, which were identified in the following documents:

- APA VTS (Operations) Pty Ltd – Western Outer Ring Main (WORM) Environment Effects Statement Technical Report A – Biodiversity and Habitats Report (GHD, 2021a).
- Western Outer Ring Main Gas Pipeline Inquiry – Technical Note No. 15 – Biodiversity assessment of Revision 10 alignment changes (GHD, 2021b).

This document presents a summary of the impacts to NTGVVP, GSM and SLL, and subsequent offset requirements for the Project under Commonwealth legislation, along with the proposed strategy by which the Project will offset those residual impacts. The objectives of this Grassland Offset Strategy are to:

- Provide a method for offsetting project impacts to grassland MNES which cannot be avoided, minimised or mitigated.
- Present how the requirement offsets are proposed to be achieved.
- Provide a strategy consistent with the principles of the EPBC Act Environmental Offsets Policy (DSEWPAC, 2012) to meet the Project's biodiversity credit obligations.
- Address the requirements of the amended conditions of approval for EPBC 2019/8569, specifically Condition 6.

1.3 Approach to developing the offset strategy

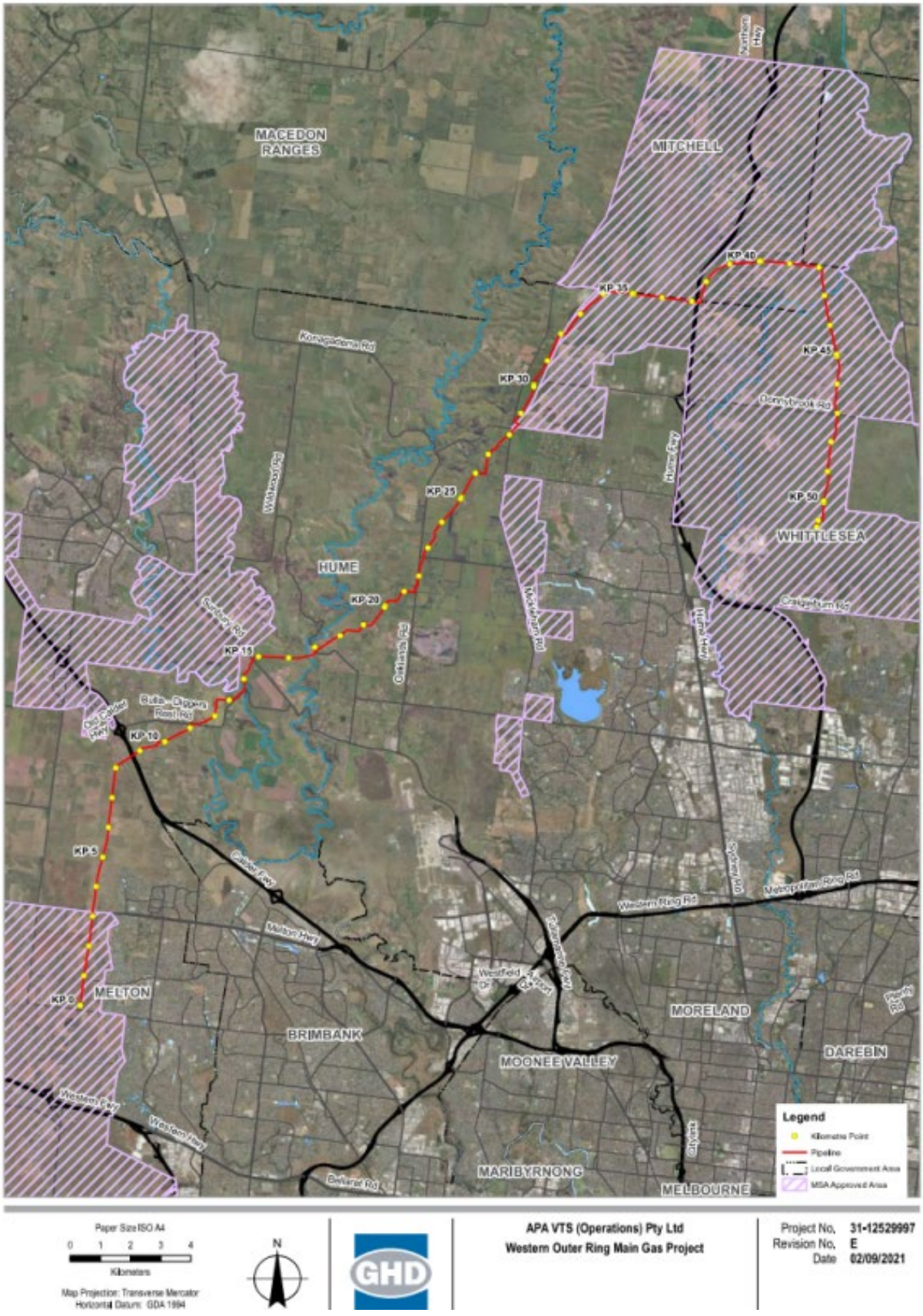
Project planning and impact assessment has worked through opportunities to avoid and minimise impacts to biodiversity values. The residual unavoidable impacts to MNES, including the NTGVVP and associated GSM and SLL habitat, require offsetting and are the focus of this Grassland Offset Strategy.

The Grassland Offset Strategy has been prepared by:

- Reviewing relevant Commonwealth and Victorian legislative offsets frameworks and policies;
- Reviewing APA VTS (Operations) Pty Ltd - Western Outer Ring Main (WORM) Environment Effects Statement Technical Report A - Biodiversity and Habitats Report (GHD, 2021a)
- Reviewing Western Outer Ring Main Gas Pipeline Inquiry - Technical Note No. 15 – Ecology assessment of Revision 10.
- Reviewing EPBC 2019/8569 Natural Temperate Grassland of the Victorian Volcanic Plain, Striped Legless Lizard *Delmar impar* and Golden Sun Moth *Synemon plana* Offset Management Plan - Draft, [redacted]

The location and route of the pipeline is presented in Figure 1.

Figure 1 **Pipeline route**



2 Legislative, regulatory and policy context

Environmental impacts resulting from the Project were assessed jointly at State and Commonwealth level, through the Environment Effects Statement (EES) process and the Bilateral Assessment Agreement, which accredited the EES process to undertake assessment for the purpose of the EPBC Act.

Following the assessment through the EES process, the Victorian Minister for Planning assessed the Project's environmental impacts to be acceptable, subject to recommendations on environmental management planning.

The Victorian Minister for Planning's assessment of the EES was provided to the Commonwealth Minister for the Environment (now the Minister for the Environment and Water), which approved the Project under the EPBC Act as a 'controlled action' (EPBC 2019/8569). This approval is subject to certain conditions under the EPBC Act, including federal offset requirements, and was amended on 9 November 2023.

For the Grassland offsets for this Project, offsets are required under the Commonwealth EPBC Act, approved by the Department of Climate Change, Energy, the Environment and Water (DCCEEW), and will be administered by Trust for Nature. Funds for the offset site will be paid directly to the landowner except for management costs. Management costs will be paid to Trust for Nature, who will release those funds annually over the management period.

2.1 Federal offset requirements

Offsets are required under the EPBC Act to compensate for residual significant impacts to MNES once avoidance and mitigation measures have been considered (DSEWPAC, 2012).

An offset must deliver an overall conservation outcome that improves or maintains the viability of the MNES and should tailored specifically to the attribute of the MNES that is to be affected.

An offsets package is defined in the EPBC Offsets Policy (DSEWPAC, 2012) as a suite of actions that a proponent undertakes to compensate for the residual significant impact of a project. An offsets package can comprise a combination of direct offsets and other compensatory measures. Direct offsets are actions that deliver a measurable conservation gain for an impacted protected matter. Conservation gains may be achieved by:

- Improving existing habitat for the protected matter
- Creating new habitat for the protected matter
- Reducing threats to the protected matter
- Increasing values of a heritage place
- Averting the loss of a protected matters of its habitat that is under threat.

Other compensatory measures are actions that do not directly offset the impacts on the protected matter but are anticipated to lead to benefits for the impacted protected matter. Under the EPBC Offsets Policy, a minimum of 90% of the offset requirements for any given impact must be met through direct offsets.

For this Project, offsets are required under the Commonwealth EPBC Act, approved by DCCEEW.

The EPBC Offsets Policy is guided by overarching principles to be applied when determining the suitability and assessment of offsets. Suitable offsets must:

1. Deliver an overall conservation outcome that improves or maintains the viability of the protected matter
2. Be built around direct offsets but may include other compensatory measures
3. Be in proportion to the level of statutory protection that applies to the protected matter
4. Be of a size and scale proportionate to the residual impacts on the protected matter
5. Effectively account for and manage the risks of the offset failing
6. Be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs
7. Be efficient, effective, timely, transparent, scientifically robust and reasonable
8. Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced

2.1.1 MSA levies

The Melbourne Strategic Assessment is an agreement between the Victorian and Australian governments made under Part 10 of the EPBC Act whereby impacts on MNES that are expected to occur within the Melbourne urban growth boundary are defined and accounted for a priori and can be considered early in the development of a plan, policy or program. No further approvals are required under the EPBC Act for urban development in these areas, provided development follows the Urban Growth Boundary Program Report and the conditions of the approvals.

3 Compliance

The Grassland Offset Strategy has been prepared to satisfy conditions of the EPBC 2018/8569.

Table 1 Reference table for grassland compliance with Condition 6 of EPBC 2019/8569 (amended 9 Nov 2023)

Condition	Reference
6. *The approval holder must, before 1 February 2024, submit to the department for the Minister's written approval a Grassland Offset Strategy (GOS). The approval holder must implement the GOS as and from when it is approved by the Minister in writing in accordance with the timelines specified in the GOS or at least until the expiry date of this approval, whichever is the longer. The GOS must, to the satisfaction of the Minister, meet the requirements of the Environmental Offsets Policy. The GOS must:*	The intent of this document is to satisfy Condition 6 of the EPBC Act approval conditions, and to implement the GOS once approved.
a) *Identify and describe an offset site;*	Section 5.1
b) *demonstrates that the offset site is of a size and scale proportionate to the residual impacts on NTGVVP, GSM and SLL, according to the Environmental Offsets Policy;*	Section 4, Section 5.1, Appendix A and Appendix B
c) *commit to specific ecological outcomes for NTGVVP, GSM and SLL; and;*	Section 5.2 and Appendix B
d) *specify management measures which will be undertaken on the offset site to achieve condition improvement.*	Section 5.2

4 Impacts and offset requirements

A detailed description of the residual ecological impacts resulting from the Project is contained in Sections 9 and 10 of the WORM Environment Effects Statement Technical Report A - Biodiversity and Habitats Report (GHD, 2021a). Further evidence was presented to the inquiry appointed under the *Environment Effects Act 1978* and *Pipelines Act 2005*, including Technical Note No. 15 – Biodiversity assessment of Revision 10 alignment changes (TN15) (GHD, 2021b).

Commonwealth MNES that require offsetting and are the focus of this Grassland Offset Strategy are:

- 4.52 ha of NTGVVP.
- 19.93 ha of GSM habitat
- 39.92 ha of SLL habitat.

These impacted areas are to be offset with the following:

- 33 ha NTGVVP
- 128 ha GSM habitat
- 153 ha SLL habitat.

This section provides a summary of the avoidance and minimisation methods (Section 4.1) adopted throughout the Project to mitigate impacts to MNES, and thereby reduce the required offsets. It also provides detail on each of the MNES (Sections 4.2 to 4.4) covered in this Grassland Offset Strategy and the predicted residual impacts of the Project on these, as well as how each offset area was calculated.

4.1 Avoidance and minimisation methods

Avoidance and minimisation steps taken in the Project are reflected in Section 13.1 of the Environment Effects Statement Technical Report A – Biodiversity and Habitats Report (GHD, 2021a) and Technical Note No. 15 – Biodiversity assessment of Revision 10 alignment changes (GHD, 2021b). The steps undertaken to avoid impacts are summarised below:

- Alignment and corridor
    - Five alignment options were analysed through a Multi Criteria Assessment (MCA) process, through this process Option C was identified as the preferred route option. This option, although being 12 km longer than others, was assessed as being the optimum alignment to satisfy key criteria which the Project weighted the greatest importance (environment, heritage, community and land considerations). This route includes the co-location of the pipeline within easements of other existing pipelines for approximately 16 km, which have been previously disturbed.
    - Stakeholder consultation and engagement with Landowners and Department of Transport (formerly VicRoads) has further refined the alignment. Items taken into consideration included suitable crossing locations for Jackson Creek, Sunbury Road and Deep Creek,

following property boundaries, avoiding impacts to urban growth land within the Sunbury South PSP and, alignment relative to the Outer Metropolitan Ring.

- Ecological and cultural heritage assessments, design/ constructability assessments and workshops with ecologists have resulted in further refinement of the alignment and construction footprint. These refinements aim to reduce biodiversity loss by avoiding, where reasonably practicable, established treelines, native vegetation patches and scattered trees; dams and wetlands; and habitat for threatened flora and fauna.

- Construction methods
  - There are three methods to construct the pipeline: Horizontal Directional Drilling and Horizontal Boring (both trenchless methods), and Open trench
  - Trenchless construction methods are being targeted to sealed road crossings, selected watercourses and associated vegetation or habitats to minimise biodiversity loss in these areas.

The key outcomes of avoid and minimisation measures to impacts on biodiversity for the Project are:

- Location of the alignment into existing easements which have previously been disturbed.
- Avoiding impacts to Matted Flax-lily *(Dianella amoena)* and Tough Scurf-pea *(Cullen tenax)* through minor changes to pipeline alignment/construction corridor in areas of recorded occurrence.
- Avoiding Growling Grass Frog *(Litoria raniformis)* and Platypus *(Ornithorhynchus)* habitat at Jackson Creek through the use of trenchless construction techniques.
- Reduction in impacts to other Growling Grass Frog habitat through minor changes to pipeline alignment/construction corridor in areas of recorded occurrences.
- Reduction in impacts to threatened ecological communities of both the EPBC and *Flora and Fauna Guarantee Act 1988* (Vic) through minor changes to pipeline alignment/construction corridor in areas of recorded occurrences.
- Realignment of the pipeline to avoid large River Red Gum *(Eucalyptus camaldulensis)* trees within an area of Grassy Eucalypt Woodland of the Victorian Volcanic Plain, that are likely to provide valuable habitat.
- Avoiding impacts to Groundwater Dependant Ecosystems through minor changes to pipeline alignment/construction corridor in areas of recorded occurrences.
- Reduction in the construction footprint in habitat known to contain GSM and SLL.

4.2 Natural Temperate Grassland of the Victorian Volcanic Plain

NTGVVP is listed as Critically Endangered under the EPBC Act as its original area of occupancy has reduced by more than 98% due to clearance primarily for agriculture. The threatened ecological community (TEC) occurs on fertile and poorly drained basalt soils in the Victorian Volcanic Plain bioregion that extends from the north and west of Melbourne to far west Victoria. It is dominated by

native tussock-forming perennial grasses, including Kangaroo Grass *(Themeda triandra)*, Wallaby grasses *(Rytidosperma* spp.*)*, Spear grasses *(Austrostipa* spp.*)* and Tussock grasses *(Poa* spp.*)*, with native herbs, mostly from the daisy, lily, pea and orchid families, occupying inter-tussock spaces. Native shrubs and trees are absent or sparse.

Sections 9 and 10.1.1 of the EES Technical Report A - Biodiversity and Habitats Report (GHD, 2021a) and TN15 (GHD, 2021b) assess and quantify impacts to TEC outside of the MSA approvals. The Project is considered to have a significant impact on NTGVVP based on the relevant EPBC Act criteria.

4.2.1 Area of community to be impacted

Some patches of Plains Grassland (EVC 132) within the Project area meet the criteria to be recognised as an occurrence of NTGVVP (GHD, 2021a). A total of 4.52 ha of the TEC is required to be offset due to impacts within the construction corridor.

4.2.2 Quality of community impacted

NTGVVP within the construction corridor comprises remnant native vegetation in moderate condition. The quality of a community is scored out of ten for offsets assessment guide calculations.

For the purpose of assessing the quality of the TEC for this Project, the Vegetation Quality Assessment (VQA, Habitat Hectares) score has been used. This method is used in Victoria to assess the quality of vegetation under the Guidelines for the removal destruction and lopping of native vegetation (DELWP, 2017). The VQA method measures the condition of the vegetation out of 7.5 points and the landscape context of the vegetation out of 2.5 points.

The weighting of these relevant attributes for NTGVVP was defined as follows:

- Site condition (/7.5): comprising an assessment of the condition of the community within the Project in relation to the ecological requirements of the community. Based on vegetation structure, native plant cover, species richness and presence of habitat resources.
- Site context (/2.5): comprising an assessment of the relative importance of the patches of the TEC in terms of its position in the landscape based on patch size, connectivity and proximity to threats.
- Species stocking rate (N/A): this attribute is not directly relevant to threatened communities.

Each characteristic was then scored based on the results of the field assessment as presented within Section 8.3.3 of the EES Technical Report A - Biodiversity and Habitats Report (GHD, 2021) and TN15.

The weighted average site condition and site context, as well as total quality score, are presented in Table 2.

These are based on consideration of the condition thresholds in the listing advice for the community (DSEWPAC, 2011a), the VQA (Habitat Hectares) results and other field survey data collected within the habitat zones that comprise NTGVVP within the Project area.

The patches of Plains Grassland that met the condition thresholds to be considered the NTGVVP were of moderate quality and had significant threats and were considerably isolated from large and continuous patches of the community.

The quality of the habitat to be impacted was scored as 3/10 overall.

Table 2 NTGVVP site condition, site context, species stocking rate and total quality score

Site condition	Site context	Species stocking rating	Total
2.7 / 7.5	0.3 / 2.5	N/A	3 / 10

4.2.3 *Quantum of impact*

When the above values for area of TEC impacted and quality of community impacted are entered in the offsets assessment guide calculations (DAWE, 2020b), the 'Quantum of Impact' is calculated as 1.36 'adjusted Hectares'. An impact area of '4.52 hectares' has been entered in the 'area of community' field and '3/10 quality' has been entered in the 'quality' field in the 'impact calculator' section of the offsets assessment guide for NTGVVP.

4.2.4 *Offset requirement*

An offsets assessment guide calculation was performed as a guide to the size and type of offset that would be required to meet the EPBC Act offset requirements for the Project's impacts on NTGVVP. Based on the offsets assessment guide calculations (Appendix A), the Project requires an offset of approximately 33 ha of NTGVVP.

4.3 Golden Sun Moth

The GSM is listed as Vulnerable under the EPBC Act. The GSM inhabits native temperate grassy and open woodlands communities, dominated by Wallaby grasses across NSW, ACT, Victoria and South Australia. This grassland habitat has been historically fragmented, leading to reduced genetic diversity amongst remaining populations. Other native grasses in GSM habitat includes Spear grasses, Tussock Grasses, Weeping Grass *(Microlaena stipoides* var. *stipoides)*, Wire grasses and Kangaroo Grass.

Sections 9 and 10.1.1 of the EES Technical Report A - Biodiversity and Habitats Report (GHD, 2021a) and TN15 assess and quantify impacts to a threatened species outside of the MSA approvals. Residual impacts for GSM have been assessed as significant based on the relevant EPBC Act criteria and are summarised below.

The Project occurs in a landscape of contiguous habitat (i.e., >10 ha) where the impact threshold for a significant impact is "habitat loss, degradation or fragmentation >0.5 ha". As such, the Project meets this criterion for a significant impact.

4.3.1 *Area of habitat impacted*

There are 19.93 ha of GSM habitat, as defined under the EPBC Act, which are required to be removed for construction of the Project outside of the MSA.

4.3.2 *Quality of habitat impacted*

GSM habitat within the Project area comprises remnant native vegetation in moderate condition and non-native vegetation of introduced species including weeds listed under the *Catchment and Land*

Protection Act 1994 (CaLP Act) (Vic) and Weeds of National Significance (WONS). The quality of threatened species habitat is scored out of ten for offsets assessment guide calculations.

DAWE's instructions for the offsets assessment guide identify three site characteristics that may contribute to quality: 'site condition', 'site context' and 'species stocking rate'. These three attributes must be weighted according to their relative importance to the offset calculations based on the ecology of the relevant species or community (DAWE, 2020a), i.e., their relative contribution to the total score out of ten.

Previous similar projects have been reviewed and an informed weighting has been used for this Project (Biosis, 2020a). The Biosis (2020a) report provides detail and background to the proposed weighting used below. The weighting of these three attributes for GSM habitat was defined as follows:

- Site condition (/3): comprising an assessment of the condition of the threatened species habitat within the Project area in relation to the ecological requirements of the threatened species. Based on vegetation structure, native plant cover, species richness and presence of habitat resources.
    - 3/3= dominated by high quality native vegetation including >40% cover of known food source, appropriate inter-tussock space
    - 2/3= dominated by moderate quality native vegetation including between 20-40 % cover of known food source with limited inter tussock space
    - 1/3= dominated by poor quality native vegetation including <20% cover of known food source
    - 0/3= dominated by introduced vegetation with no known food source present
- Site context (/3): comprising an assessment of the relative importance of the patches of the threatened species habitat in terms of its position in the landscape based on patch size, connectivity and proximity to threats. A patch is considered to be an area of suitable habitat (not constrained to the alignment corridor) separated from other areas of suitable habitat by >200 m of unsuitable habitat or barriers to flight.
    - 3/3= habitat patch size is > 10 ha, shaped appropriately to reduce edge effects, slightly sloped and north-facing, minimal shading
    - 2/3= habitat patch size is > 10 ha, shaped appropriately to reduce edge effects
    - 1/3= habitat patch size is > 0.25 ha but < 10 ha
    - 0/3= habitat patch size is < 0.25 ha
- Species stocking rate – (/4) – comprising an assessment of the density of the species across the area of suitable habitat. Density is calculated as an average across the area of suitable habitat, the average is weighted to consider survey areas.
    - 4/4 = >50 males per ha
    - 3/4= >20-50 males per ha

- 2/4= >5-20 males per ha
- 1/4= 0-5 males per ha
- 0/4 = no moths present
- Due to the surveys being completed in 2019 and 2020 flying seasons a few assumptions were made to calculate the stocking rate
  - Where incomplete surveys recorded no moths on a parcel, the parcel received a 4/4
  - Where incomplete surveys recorded moths, the total combined moths from the completed rounds was applied to the remaining rounds. For example, Round 1 and 2 complete surveys recorded two moths, Round 3 is given an assumed total of 2, Round 4 is given an assumed total of 2, whereby the total GSM recorded for the four rounds is six for that parcel.
  - In 2019 the surveys were suspended if moths were found (absence/presence), however in 2020 surveys were conducted to inform stocking rates and were conducted over four rounds. If in 2020, the complete surveys recorded no moths, but in 2019 the incomplete survey recorded a moth, this moth recorded was awarded to the parcel.

Each characteristic was then scored based on the results of the field assessment as presented within the EES Technical Report - Biodiversity and Habitats Report (GHD, 2021a) and TN15.

The site condition was scored as 1/3 based on consideration of the suitable habitat published for the threatened species (DEWHA, 2009) and other field survey data collected within the habitat zones that comprise of GSM habitat within the Project area. The site context was scored as 2/3 based on the size of the habitat patches and their connectivity with larger patches of habitat for GSM. The species stocking rate was scored as 2/4 based on the results of the targeted surveys completed over 2019, 2020 and 2021, moth survey results presented in Section 8.4.3 of the EES Technical Report - Biodiversity and Habitats Report (GHD, 2021a) and TN15.

Based on the inputs described above, 'Impact calculator - quantum of impact – quality' (i.e. the quality of habitat to be impacted) was scored as 5/10 overall. This is presented in Table 3

Table 3 GSM site condition, site context, species stocking rate and total quality score

Site condition	Site context	Species stocking rating	Total
1 / 3	2 / 3	2 / 4	5 / 10

4.3.3 Quantum of impact

When the above values for area of community impacted and quality of community impacted are entered in the offsets assessment guide calculations (DAWE, 2020b), the 'Quantum of Impact' is calculated as 9.97 'adjusted Hectares'. An impact area of '19.93 hectares' has been entered in the 'area of community' field and '5/10 quality' has been entered in the 'quality' field in the 'impact calculator' section of the offsets assessment guide for GSM habitat.

4.3.4 *Offset requirement*

An offsets assessment guide calculation (Appendix A) was performed as a guide to the size and type of offset that would be required to meet the EPBC Act offset requirements for the Project's impacts on GSM habitat. Based on the offsets assessment guide calculation, the Project requires an offset of around 128 ha of GSM habitat.

4.4 Striped Legless Lizard

The SLL is listed as Vulnerable under the EPBC Act as it is dependent on grassland habitat that is under threat of ongoing loss, degradation and fragmentation. It is usually found in native tussock grasslands and woodland, often dominated by Spear Grass and Kangaroo Grass. Non-native plant species can also support the SLL. Within their habitats, SLL are often found sheltering under logs, rocks and other debris.

Sections 9 and 10.1.1 of the EES Technical Report A - Biodiversity and Habitats Report (GHD, 2021a) and TN15 assess and quantify impacts to a threatened species outside of the MSA approvals. Residual impacts for SLL have been assessed as significant based on the relevant EPBC Act criteria and are summarised below.

The Project will involve removal of 39.92 ha of potential habitat for SLL outside of the MSA. This removal of known and assumed habitat for this species is considered to trigger a significant residual impact on this species and may result in a reduction in the area of occupancy of the species and fragmentation of a population if present within areas of assumed habitat only. As such, the Project meets this criterion for a significant impact.

4.4.1 *Area of habitat impacted*

There are 39.92 ha of SLL habitat as defined under the EPBC Act to be impacted within the construction corridor outside of the MSA. Consequently, a total of 39.92 ha of the SLL habitat is required to be removed for construction of the Project.

4.4.2 *Quality of habitat impacted*

SLL habitat within the Project area comprises remnant native vegetation in moderate condition and non-native vegetation of introduced species including weeds listed under the CaLP Act and WONS. The quality of threatened species habitat is scored out of ten for offsets assessment guide calculations. DAWE's instructions for the offsets assessment guide identify three site characteristics that may contribute to quality: 'site condition', 'site context' and 'species stocking rate'. These three attributes must be weighted according to their relative importance to the offset calculations based on the ecology of the relevant species or community (DAWE, 2020a) (i.e. their relative contribution to the total score out of ten). The weighting for this project has been informed from previous similar projects (Biosis, 2020b). The Biosis (2020b) report provided detail and background to the proposed weighting.

The weighting of these three attributes for SLL habitat was defined as follows:

- Site condition (/3): comprising an assessment of the condition of the threatened species habitat within the Project in relation to the ecological requirements of the threatened species. Based on vegetation structure, native plant cover, species richness and presence of habitat resources.
    - 3/3 = Good - Site (on average) supports a species-rich and structurally complex ground flora (reflecting appropriate biomass management). Dominated by an above average diversity of native tussock-forming grasses and above average native forbs, together with embedded and/or surface rock.
    - 2/3 = Satisfactory - Site (on average) supports a moderately diverse ground flora with good structural complexity (reflecting some biomass management). Dominated by an average diversity of native tussock forming grasses and average diversity of native forbs with or without embedded and/or surface rock.
    - 1/3 = Poor - Site (on average) supports a species-poor ground flora with low structural complexity (reflecting inadequate biomass management). Dominated by a few native or predominantly introduced tussock-forming grasses with no or very few native forbs with or without embedded and/or surface rock.
- Site context (/4): comprising an assessment of the relative importance of the patches of the threatened species habitat in terms of its position in the landscape based on patch size, connectivity and proximity to threats.
    - Connectivity score out of 2
        - 2/2 Site is equal to > 0.5 ha
        - 1/2= Site is < 0.5 ha
    - Threats that may impact upon SLLs have been categorised:
        - Site currently subject to continuous, intensive grazing by livestock or kangaroos, thereby reducing the floristic and structural complexity of the habitat
        - Site subject to frequent, widespread and intense fires, including deliberate burns that are not sympathetic to the maintenance of SLL habitat
        - Site subject to historical or ongoing ploughing, pasture improvement and agricultural intensification
        - Site subject to historical or ongoing removal of surface and/or embedded or rock
        - Site subject to frequent slashing thereby reducing the structural complexity of the habitat
        - Site dominated by exotic grasses to the extent that the majority of the site is no longer defined as native vegetation

- Site currently not subject to any form of appropriate biomass reduction (e.g. low-moderate intensity grazing or sympathetic ecological burns to maintain structural and floristic diversity of the habitat)
- 2/2= Site subject to none of the above threats
- 1/2= Site subject to between one and four of the above threats
- 0/2 = Site subject to five or more of the above threats

- Species stocking rate (/3): comprising an assessment of the density of the species across the area of suitable habitat. The method proposed by Biosis (2020b) uses the maximum number of SLLs detected at a tile grid during any one site survey as a surrogate for density. This includes counts of sloughs as well as actual lizards.
  - 3/3 = Three or more individuals or sloughs encountered under the tile grid during any one of seven monitoring events
  - 2/3 = A maximum of two individuals or sloughs encountered under the tile grid during any one of seven monitoring events
  - 1/3 = A maximum of one individual, or slough encountered under the tile grid during any one of seven monitoring events

Surveys must be carried out as per the survey standards in the referral guidelines, including the minimum number of grids based on the area of the site (DSEWPAC, 2011b). This standard requires fortnightly tile grid checks between 1 September and 31 December (a minimum of seven checks). More frequent checks can be undertaken (e.g. weekly), but this is not mandatory. All sloughs must be removed during each check.

Each characteristic was then scored based on the results of the field assessment as presented within the EES Technical Report - Biodiversity and Habitats Report (GHD, 2021a) and TN15 (GHD, 2021b). The site condition was scored as 1/3 based on consideration of the suitable habitat published for the threatened species (TSSC, 2016) and other field survey data collected within the habitat zones that comprise of Legless Lizard habitat within the Project area. The site context was scored as 2/4 based on the size of the habitat patches and the frequent and uncontrolled threats subjected to the habitat. Due to targeted surveys not being completed for all of the SLL habitat within the Project area, the species stocking rate is unable to be calculated therefore the species stocking rate was scored as 3/3, of the targeted surveys completed so far only one of the properties surveyed did detect the species (EES Technical Report - Biodiversity and Habitats Report (GHD, 2021a) and TN15 (GHD, 2021b).

Based on the inputs described above, 'Impact calculator - quantum of impact – quality' (i.e. the quality of habitat to be impacted) was scored as 6/10 overall. This is summarised in Table 4.

Table 4 SLL site condition, site context, species stocking rate and total quality score

Site condition	Site context	Species stocking rating	Total
1 / 3	2 / 4	3 / 3	6 / 10

4.4.3 *Quantum of impact*

When the above values for area of community impacted and quality of community impacted are entered in the offsets assessment guide calculations (DAWE, 2020b), the 'Quantum of Impact' is calculated as 23.95 'adjusted Hectares'. An impact area of 39.92 ha has been entered in the 'area of community' field and '6/10 quality' has been entered in the 'quality' field in the 'impact calculator' section of the offsets assessment guide for SLL habitat.

4.4.4 *Offset requirement*

An offsets assessment guide calculation (Appendix A) was performed as a guide to the size and type of offset that would be required to meet the EPBC Act offset requirements for the Project's impacts on SLL habitat. Based on the offsets assessment guide calculation, the Project requires around 153 ha of SLL habitat.

4.5 Summary of required offsets

Table 5 provides a summary of the values presented within Sections 4.2 to 4.4 and Appendix A.

Table 5 Impact and offset for relevant Grassland MNES (i.e., Cressy offset site)

Offset Type	Area of community / habitat requiring offsetting	Quality of impacted community/ fauna habitat	Quantum of Impact (Adjusted ha)	Area to be offset* / Offsets to be required (*based on generic net gain values)	Quality of offset community / fauna habitat
NTGVVP	4.52 ha	3/10	1.36	33 ha	6/10
GSM	19.93 ha	5/10	9.97	128 ha	6-7/10
SLL	39.92 ha	6/10	23.95	153 ha	8-9/10

5 Offset strategy

5.1 Offset site

This section provides a brief description of the offset site.

[redacted].

Two habitat zones that support Ecological Vegetation Class (EVC) 132 Plains Grassland of the Victorian Volcanic Plain bioregion have been identified. 108.06 ha of habitat zone 1 (HZ1) and 44.94 ha of habitat zone 2 (HZ2) are proposed for the 153 ha offsite site.

HZ1 meets the minimum condition thresholds to qualify for the EPBC Act listed NTGVVP, as well as provides suitable habitat for GSM and SLL. HZ2 also provides suitable habitat for EPBC Act listed GSM and SLL. Surveys undertaken in November and December 2021 found approximately 2,969 male GSM individuals and 30 SLL individuals.

5.1.1 HZ1

HZ1 vegetation is dominated by a variety of native grasses, including Wallaby grasses, Kangaroo Grass, Spear grasses and Tussock grasses. Native Rush and a variety of native herbs are also present in HZ1. No native trees or shrubs were identified in the area.

HZ1 also comprises moderate cover of introduced grasses and herbaceous weeds. Three noxious weeds and one declared noxious weeds were identified in the area.

Given the species present at HZ1, the area meets the minimum thresholds for NTGVVP and provides suitable habitat for GSM and SLL. HZ1 provides good inter-tussock spacing for GSM and a high diversity in native tussock forming grasses and native herbs, with embedded or surface rock which provide good structural complexity for SLL.

5.1.2 HZ2

HZ2 vegetation is also dominated by a variety of native grasses, including Wallaby grasses, Kangaroo Grass, Spear grasses and Tussock grasses. It also contains native Rush and a variety of native herbs. And no native trees or shrubs were identified in the area.

HZ2 comprises a high cover of introduced grasses and herbaceous weeds. Two declared noxious weeds were identified in the area.

HZ2 does not meet the minimum thresholds for NTGVVP, however it provides suitable habitat for GSM and SLL.

5.2 Offset measures

This section provides a summary of the measures that can be undertaken on the site, described in Section 5.1, which will achieve the required habitat quality/ecological community quality

improvements. Further details of the proposed measures will be provided in the Grassland Offset Management Plan (GOMP) (Biodiversity Offsets Victoria, 2024).

5.2.1 Security agreement

Prior to the commencement of the GOMP, the offset site will be secured on-title via a Section 173 Agreement under the *Planning and Environment Act 1987* (Vic) with the [redacted] to provide interim offset site security until the in-perpetuity registration of a Trust for Nature (TfN) Deed of Covenant (Offset) for the Conservation of Land is finalised. The commencement of the 10-year offset management plan will coincide with the Section 173 Agreement registration on-title.

5.2.2 Fencing and access

Fencing installation and upgrades will be undertaken as soon as practical within 18 months from the commencement of the GOMP. All fencing will be stock-proof and will assist in undertaking a controlled strategic grazing regime in the offset site. The offset site will not be accessed by heavy vehicles during wet periods to avoid adverse impacts to native vegetation and soil structure.

5.2.3 Signage

Within three months from the commencement of the GOMP, signage will be erected to alert neighbouring properties and land managers to the presence of the offset site and prohibited activities.

5.2.4 Biomass control

Biomass control aims to promote floristic diversity in native grassland vegetation and to maintain suitable habitat for the GSM and SLL.

The current cover of bare ground varies from 10-30% in HZ1 and 10-15% in HZ2. Biomass control will aim to maintain 20-40% bare ground or inter-tussock spaces by mid-late Spring each year in both HZ1 and HZ2, where achievable, for the recruitment of native herbs and grasses, and to coincide with the beginning of the GSM breeding season (October to January). Biomass control may be undertaken through strategic grazing with sheep and ecological burning.

Strategic grazing

Under a strategic grazing regime, the land manager will undertake the following activities (Biodiversity Offsets Victoria, 2024):

- Implement a grazing and rest regime using sheep;
- Allow native grasses sufficient rest and recovery time after each grazing period (ie. until all native grass species have at least three tillers);
- Reduce the grazing pressure from mid to late Spring to (eg. <6 DSE/ha) where possible to minimise impacts to native forb species and allow for their natural recruitment;
- Maintain a minimal stocking rate over Summer (0-6 DSE/ha depending on seasonal conditions) to support the natural recruitment of native grass species;

- Where possible, aim for a 3-month exclusion period in either Spring or Summer if seasonal and vegetative conditions allow (eg. if annual introduced grasses and herbaceous weeds are not out-competing native flora); and,
- Reduce or remove grazing from the offset site entirely at any other time as required (eg. during dry, low growth periods, or extreme wet conditions when site may be at risk of excess pugging), to avoid impacts to the native grassland, and GSM and SLL habitat.

Ecological burning

Ecological burning is considered an effective management tool to reduce native and non-native biomass, as well as the cover of introduced grasses. Ecological burning for this offset site will include the following activities (Biodiversity Offsets Victoria, 2024):

- Burning outside the fire danger period (generally April to November);
- Burning within the fire danger period can only be undertaken following consultation with TfN and with a permit to burn from the [redacted]
- Pre- and post-burn monitoring, including photos and observations on biomass, weed and native vegetation covers, and summarised in annual reports;
- Burning in a non-targeted mosaic pattern to a maximum of 30% of the offset site in one year, or burning one or multiple targeted areas (to a maximum of 30% of the offset site in one year) with a high cover of introduced grasses or dense swards of native grass (eg. Kangaroo Grass) that are limiting inter-tussock spaces;
- A minimum of two burns to be undertaken prior to Year 9 of the 10-year offset management period, to allow for adequate review of results in Years 9 and 10;

The reintroduction of strategic grazing should be delayed post burn to allow sufficient recovery of native perennial grass (eg. native grasses have a minimum of three tillers); and all burning must be undertaken in accordance the [redacted] and CFA planning requirements.

Weed control

The cover of introduced grasses and herbaceous weeds on the offset site varies from 40-45% in HZ1 and 50-60% in HZ2. The weeds identified onsite, as well as their method and timing for their control, are listed in Table 6, along with their status under the CaLP Act.

Weed control methods include strategic grazing, ecological burning, herbicide application, chipping or handpulling. Monitoring for new and emerging woody and herbaceous weeds will be conducted throughout the year, and any new and emerging weeds eliminated.

Table 6 Weeds recorded at Cressy Offset site, status, control method and timing

Weed group / common name	CaLP Act status	Method	Timing
Annual grasses	N/A	Strategic grazing and ecological burning.	Winter and spring

Weed group / common name	CaLP Act status	Method	Timing
Perennial grasses	Regionally controlled weed (C)	Strategic grazing, ecological burning, slashing and herbicide application prior to seedset and/or post-burning.	All year
Texas Needle-grass	N/A	Herbicide application prior to flowering.	All year
Chilean Needle-grass	Restricted weed (R)	Herbicide application prior to flowering.	All year
Toowoomba Canary-grass	N/A	Strategic grazing, ecological burning, slashing and herbicide application prior to flowering.	All year
Flatweeds	N/A	Strategic grazing, if required herbicide application prior to flowering.	Spring
Capeweed	N/A	Herbicide application prior to flowering, or chip if practical (eg. present in low numbers).	Spring
Spear thistle	Restricted weed (R)	Herbicide application prior to flowering, or chip if practical (eg. present in low numbers).	Winter, Spring and Summer
Herbaceous weeds	N/A	Strategic grazing, if required, herbicide application prior to flowering to control concentrated areas only, or chip if practical (eg. present in low numbers).	Spring
Onion Grass	N/A	If concentrated areas occur that do not comprise any native vegetation, herbicide may be applied.	Winter to spring
Bathurst Burr	N/A	Herbicide application prior to flowering, or chip if practical (eg. present in low numbers).	Summer to autumn

Pest control

Rabbits and foxes are known to occur in the offset at low numbers, with no warrens or dens being observed within the site. Rabbits and foxes will be monitored and controlled in accordance with Table 7. Annual shooting is preferred control method, with other methods such as fumigation, hand collapsing of burrows/dens and baiting to also be used if required. All carcasses must be removed to present poisoning of native predators.

Monitoring for new and emerging pest animals will also be undertaken throughout the year, and control undertaken as required.

Table 7 Pest animals control method and timing

Common name	Method	Timing
Rabbits and foxes	Fumigation and hand collapse of rabbit burrows and fox dens, if required.	Ongoing

Rabbits and foxes	Baiting (optional method)	September to January, if required
Rabbits and foxes	When baiting, collect and dispose of carcasses to prevent poisoning of native predators	September to January, if required
Rabbits and foxes	Shooting	All year
Rabbits and foxes	Removed or dispense surface harbour	Ongoing
Rabbits and foxes	Monitor and control	Ongoing
New and emerging pests and animals	Monitor and control	Ongoing

5.2.5 Monitoring and reporting

Landowner offset site monitoring will be undertaken by the landowner for the duration of the 10-year GOMP and in perpetuity. Formal annual reporting and rapid spring surveys will be undertaken for the 10-year GOMP period. All third party monitoring for EPCB Act listed NTGVVP, GSM and SLL will be undertaken for the life of the approval. Required monitoring is outlined in detail in the GOMP (Biodiversity Offsets Victoria, 2024) and will include:

- Annual reporting
- Rapid spring survey
- Vegetation Quality Assessment
- GSM monitoring
- SLL monitoring

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Appendices

Appendix A – Offset assessment guide calculations

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	NTGVVO
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	Yes	NTGVVP	Area	4.52	Hectares	APA
			Quality	3	Scale 0-10	
			Total quantum of impact	1.36	Adjusted hectares	
Threatened species habitat						
Area of habitat	Yes		Area		Hectares	
			Quality		Scale 0-10	
			Total quantum of impact	0.00	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	Yes	1.36	Adjusted hectares	Cressy Grassland HZ1A	Risk-related time horizon (max. 20 years)	20	Start area (hectares)	33	Risk of loss (%) without offset	0%	Risk of loss (%) with offset	0%	0.00	80%	0.00	0.00	1.37	100.84%	Yes		
									Future area without offset (adjusted hectares)	33.0	Future area with offset (adjusted hectares)	33.0									
					Time until ecological benefit	10	Start quality (scale of 0-10)	6	Future quality without offset (scale of 0-10)	5	Future quality with offset (scale of 0-10)	6	1.00	80%	0.80	0.41					
Threatened species habitat																					
Area of habitat	Yes		Adjusted hectares		Time over which loss is averted (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset		Risk of loss (%) with offset		0.00		0.00	0.00	0.00	#DIV/0!	#DIV/0!		
									Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0									
					Time until ecological benefit		Start quality (scale of 0-10)		Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)		0.00		0.00	0.00					
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**		**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																				
Condition of habitat Change in habitat condition, but no change in extent	No																				
Threatened species																					
Birth rate e.g. Change in nest success	No																				
Mortality rate e.g Change in number of road kills per year	No																				
Number of individuals e.g. Individual plants/animals	No																				

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0	0.00	#DIV/0!	#DIV/0!	$0.00	#DIV/0!	#DIV/0!
Area of community	1.356	1.37	100.84%	Yes	$0.00	N/A	$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	GSM
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	0.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes		Area	19.93	Hectares	
			Quality	5	Scale 0-10	
			Total quantum of impact	9.97	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	No				Risk-related time horizon (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset		Risk of loss (%) with offset										
									Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0									
					Time until ecological benefit		Start quality (scale of 0-10)		Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)										
Threatened species habitat																					
Area of habitat	Yes	9.97	Adjusted hectares	Cressy Grassland HZ1A	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	108.06	Risk of loss (%) without offset	0%	Risk of loss (%) with offset	0%	0.00	80%	0.00	0.00	8.47	85.04%	No		
									Future area without offset (adjusted hectares)	108.1	Future area with offset (adjusted hectares)	108.1									
					Time until ecological benefit	10	Start quality (scale of 0-10)	7	Future quality without offset (scale of 0-10)	6	Future quality with offset (scale of 0-10)	7	1.00	80%	0.80	0.78					
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**		**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																				
Condition of habitat Change in habitat condition, but no change in extent	No																				
Threatened species																					
Birth rate e.g. Change in nest success	No																				
Mortality rate e.g Change in number of road kills per year	No																				
Number of individuals e.g. Individual plants/animals	No																				

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	9.965	8.47	85.04%	No	$0.00	#DIV/0!	#DIV/0!
Area of community	0				$0.00		$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	GSM
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	0.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes		Area	19.93	Hectares	
			Quality	5	Scale 0-10	
			Total quantum of impact	9.97	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	No				Risk-related time horizon (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset		Risk of loss (%) with offset										
									Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0									
					Time until ecological benefit		Start quality (scale of 0-10)		Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)										
Threatened species habitat																					
Area of habitat	Yes	9.97	Adjusted hectares	Cressy Grassland HZ2	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	19.94	Risk of loss (%) without offset	0%	Risk of loss (%) with offset	0%	0.00	80%	0.00	0.00	1.56	15.69%	No		
									Future area without offset (adjusted hectares)	19.9	Future area with offset (adjusted hectares)	19.9									
					Time until ecological benefit	10	Start quality (scale of 0-10)	6	Future quality without offset (scale of 0-10)	5	Future quality with offset (scale of 0-10)	6	1.00	80%	0.80	0.78					
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**		**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																				
Condition of habitat Change in habitat condition, but no change in extent	No																				
Threatened species																					
Birth rate e.g. Change in nest success	No																				
Mortality rate e.g Change in number of road kills per year	No																				
Number of individuals e.g. Individual plants/animals	No																				

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	9.965	1.56	15.69%	No	$0.00	#DIV/0!	#DIV/0!
Area of community	0				$0.00		$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	SLL
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	0.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	SLL	Area	39.92	Hectares	APA
			Quality	6	Scale 0-10	
			Total quantum of impact	23.95	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				Risk-related time horizon (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset		Risk of loss (%) with offset									
									Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0								
					Time until ecological benefit		Start quality (scale of 0-10)		Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)									
Threatened species habitat																				
Area of habitat	Yes	23.95	Adjusted hectares	Cressy Grassland HZ1A	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	108.06	Risk of loss (%) without offset	0%	Risk of loss (%) with offset	0%	0.00	80%	0.00	0.00	16.95	70.76%	No	
									Future area without offset (adjusted hectares)	108.1	Future area with offset (adjusted hectares)	108.1								
					Time until ecological benefit	10	Start quality (scale of 0-10)	9	Future quality without offset (scale of 0-10)	8	Future quality with offset (scale of 0-10)	10	2.00	80%	1.60	1.57				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	23.952	16.95	70.76%	No	$0.00	#DIV/0!	#DIV/0!
Area of community	0				$0.00		$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

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For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
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Matter of National Environmental Significance	
Name	SLL
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	0.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	SLL	Area	39.92	Hectares	APA
			Quality	6	Scale 0-10	
			Total quantum of impact	23.95	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				Risk-related time horizon (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset		Risk of loss (%) with offset									
									Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0								
					Time until ecological benefit		Start quality (scale of 0-10)		Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)									
Threatened species habitat																				
Area of habitat	Yes	23.95	Adjusted hectares	Cressy Grassland HZ2A	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	44.94	Risk of loss (%) without offset	0%	Risk of loss (%) with offset	0%	0.00	80%	0.00	0.00	7.05	29.43%	No	
									Future area without offset (adjusted hectares)	44.9	Future area with offset (adjusted hectares)	44.9								
					Time until ecological benefit	10	Start quality (scale of 0-10)	8	Future quality without offset (scale of 0-10)	7	Future quality with offset (scale of 0-10)	9	2.00	80%	1.60	1.57				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	23.952	7.05	29.43%	No	$0.00	#DIV/0!	#DIV/0!
Area of community	0				$0.00		$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Appendix B – Supporting Information for Offset calculations

Table B1 Attribute values entered in the preliminary offset assessment guide calculations for NTGVVP

Offset assessment guide attribute	NTGVVP community	Justification
Impact calculator - Quantum of impact - Area	4.52	Removal of this TEC was calculated in this report based on results from ecological assessments conducted in the proposed impact area (see Section 8.3.3 of the EES Technical Report A - Biodiversity and Habitats Report (GHD, 2021a) and TN15 (GHD, 2021b) and updated based on the recommendations of the EES inquiry and Minister for Planning.
Impact Calculator - Quantum of impact – Quality	3/10	The patches of NTGVVP to be impacted by the Project were of moderate quality, had significant threats and were considerably isolated from large and continuous patches of the community.
Offset calculator – Time horizon –Risk related time horizon	20 years	The proposed offset site will be managed in perpetuity for conservation purposes for Natural Temperate Grassland of the Victorian Volcanic Plains under a legal covenant on title.
Offset calculator – Time horizon – Time until ecological benefit	10 years	The existing habitat condition is expected to be improved over the 10-year active management schedule detailed in the GOMP. NTGVVP is a dynamic ecological community that can respond rapidly to changes in management approaches, in particular grazing pressure, effective burning, pest animal control and weed control (Lunt and Morgan 1999; TSSC 2008). This time period is considered adequate to achieve the required gain in NTGVVP.
Offset calculator - Future area and quality without offset – Risk of loss without offset	0 %	Native grassland habitats in Victoria are declining at a very high rate (approximately 1.4% per annum), primarily due to agricultural expansion and urban development in the Volcanic Plain bioregion (VVP) (where the offset site occurs) (CES 2018). At present there are no legislative approvals for the removal of NTGVVP in the offset.
Offset calculator - Future area and quality with offset – Risk of loss with offset	0 %	There is a 0% risk that the offset site will be lost with the offset being protected and managed in accordance with the GOMP placed on title. The success of conservation works in adjacent existing offset sites on the property demonstrates the landholder's capability in managing threats and delivering the offset. Further, the presence of adjacent offset sites, further consolidates the contiguous area of NTGVVP within the property.
Confidence in result – Averted loss of offset	80 %	The high level of Confidence is due to the high vulnerability of NTGVVP to ongoing threats and the proven capacity of the landowner to manage these threats in other NTGVVP offset sites. The site will be provisionally protected through a Section 173 Agreement under the *Planning and Environment Act 1987* (Vic) with Council. Council undertakes a quality assurance process for all offset sites to ensure the landowner agreements address the management commitments in the plan. The offset site will be secured within 12 months of the approval of this Offset Strategy via a signed agreement with Trust for Nature to register an offset covenant under the *Victorian Conservation Trust Act 1972* (Vic), as per condition 8(b) of the approval EPBC 2019/8569.
Offset calculator – Start area and quality – Area	33 ha	The area of NTGVVP designated to achieve the required gains in NTGVVP, as assessed using the VQA method during a field assessment by Biosis in 2019.
Offset calculator – Start area and quality – Start quality	6/10	33 ha; 6/10. The offset site was assessed by Biosis (2019) which recorded approximately 262 ha of NTGVVP in the broader offset area. The offset site supports high quality NTGVVP. It is contiguous with larger areas of moderate to high quality NTGVVP to meet approvals for other projects under the EPBC Act. The condition of the NTGVVP area proposed to be offset is 63/100 based on the Habitat Hectare assessment completed by Biosis (2019). The patch of NTGVVP selected for the offset site is located in the northern half of the offset area, which overlaps with confirmed GSM habitat. The NTGVVP offset site Start area and habitat quality is based on :

Offset assessment guide attribute	NTGVVP community	Justification
		• Site condition: 6/10. The site supports a diversity of native grasses (Wallaby-grass., Spear-grass, Tussock Grass and Kangaroo Grass, with at least a 50% perennial cover of native species, which meets the minimum threshold criteria for NTGVVP; • Based on a review of aerial photography, predictive mapping of native vegetation extent, and knowledge of NTGVVP habitat in the region, the proposed offset site is connected to other patches of NTGVVP within the broader property. There are also isolated patches of high-quality Plains Grassland native vegetation within 10-km of the site, including in road reserves along Cressey-Shelford Road to the north of the site and within private property to the south of the site. Threats that occur to the community within and adjacent to the offset site include the loss of suitable habitat through land clearance (cropping), disturbance (heavy grazing/slashing) and weed incursion. • Specifically, the habitat (site condition) and NTGVVP community extent within the surrounding landscape at the offset site are considered to be the most influential factors contributing to offset site quality. The habitat is considered to be moderate-high quality for NTGVVP. This is based on the patch identified as NTGVVP, having a moderate diversity of native grasses and herbs with minimal weed incursion. The definition for NTGVVP of sufficient quality for listing has been based on information provided in the Nationally Threatened Ecological Communities of the Victorian Volcanic Plain: Natural Temperate Grassland & Grassy Eucalypt Woodland (DSEWPAC, 2011a). The combination of habitat factors presented has resulted in the starting quality of NTGVVP habitat being assessed at 6/10.
Offset calculator - Future area and quality without offset – Future quality without offset (1-10)	5/10	The offset site is situated in the Farming Zone and does not contain any overlays restricting land use. The projected decline in quality without the offset from 6/10 to 5/10 assumes that the historic grazing practices will continue with a goal of primary production, and not conservation. This decline would result from long-term degradation of native vegetation and habitat under detrimental grazing practices that are not targeted under biodiversity protection legislation, including over-grazing of native herbs and grasses in Spring and Summer and other dry periods, under-grazing (or lack of biomass control) of introduced grasses and herbaceous weeds during high-growth (wet) periods, soil disturbance, and fertilizer and broad-acre herbicide application. These practices have been shown to promote the spread of introduced annual grasses and herbaceous weeds (impacting 'lack of weeds' score), reduce the extent and diversity of native grassland species (impacting 'understorey' score), reduce soil crust (for recruitment and habitat) and limit native organic litter (impacting 'organic litter' score) available for decomposition (Tumble and Fraser 1932; Dorrough et al 2004 & 2008).
Offset calculator - Future area and quality with offset – Future quality with offset (1-10)	6/10	The projected maintenance in quality at 6/10 assumes that the offset site will be managed for the purposes of conservation and will be maintained in perpetuity. It will be achieved through restricting livestock and vehicle access, and undertaking targeted biomass and weed control through controlled strategic grazing, ecological burning and herbicide application. Given native grassland ecosystems are declining at a significant rate in Victoria (14% loss in extent was recorded from 2005 to 2015, CES 2018), and are under ongoing threats from the intensification and expansion of agricultural production and urban development, the protection and maintenance of remaining areas of

Offset assessment guide attribute	NTGVVP community	Justification
		NTGVVP is of significant value to the conservation of this critically endangered community.
Confidence in result – Change in quality	80 %	A high level of confidence is provided for the avoidance in habitat quality decline due to the high vulnerability of NTGVVP quality to threats and poor management, its known responsiveness to active conservation management (TSSC 2008) and the landowner's demonstrated capacity to implement the GOMP.
Percentage of impact offset	**100.84%**	

Table B2 Attribute values entered in the preliminary offset assessment guide calculations for GSM habitat

Offset assessment guide attribute	GSM habitat	Justification
Impact calculator - Quantum of impact - Area	19.93	Removal of known or potential GSM habitat as detailed in Section 8.4.3 of the EES Technical Report - Biodiversity and Habitats Report (GHD, 2021a) and TN15 (GHD, 2021b). This impact area was calculated based on the results of 2019/20 and 2020/21 targeted GSM surveys conducted by GHD and Biosis.
Impact Calculator - Quantum of impact – Quality	5/10	GSM habitat within the Project area comprises remnant native vegetation in moderate condition and non-native vegetation of introduced species. The habitat quality score (5 out of 10) was determined according to the offset assessment guide, which includes three attributes 'site condition', 'site context' and 'species stocking rate'. Details of the weighting of these three attributes is described in Section 4.3.2. Each characteristic was then scored based on the field assessment results presented within Section 8.4.3 of the EES Technical Report - Biodiversity and Habitats Report (GHD, 2021a) and TN15 (GHD, 2021b).
Offset calculator – Time horizon –Risk related time horizon	20 years	The proposed offset site would be managed in perpetuity under a legal covenant on title.
Offset calculator – Time horizon – Time until ecological benefit	10 years	Decline in the existing habitat condition will be averted over the 10-year active management schedule as detailed in the GOMP. Native grassland habitats are extremely vulnerable to ongoing threats, including weed invasion, excess biomass, pest animals, agriculture, climate change and development. An -on-title security agreement will permanently protect the offset from agricultural production and development, and management activities will control livestock and access, excess biomass, pasture grasses and herbaceous weeds and pest animals. As native grassland habitats have been shown to be highly responsive to targeted conservation management, this time period is adequate to achieve the averted loss gains in GSM.
Offset calculator - Future area and quality without offset – Risk of loss without offset	0 %	Native grassland habitats in Victoria are declining at a very high rate (approximately 1.4% per annum), primarily due to agricultural expansion and urban development in the Volcanic Plain bioregion (VVP) (where the offset site occurs) (CES 2018). At present there are no legislative approvals for the removal of GSM habitat in the offset.
Offset calculator - Future area and quality with offset – Risk of loss with offset	0 %	There is a 0% risk that the GSM population will be lost with the offset being protected and managed in accordance with the GOMP placed on-title. The success of conservation works in adjacent existing offset sites on the property demonstrates the landholder's capability in managing threats and delivering the offset. Further, the availability of GSM habitat adjacent to the offset site further consolidates habitat within the property.

Offset assessment guide attribute	GSM habitat	Justification
Confidence in result – Averted loss of offset	80 %	The high level of Confidence is due to the high vulnerability of GSM habitat to ongoing threats and the proven capacity of the landowner to manage these threats in other GSM offset sites. The site will be protected through a provisional Section 173 Agreement under the *Planning and Environment Act 1987* (Vic) with Council. Council undertakes a quality assurance process for all offset sites to ensure the landowner agreements address the management commitments in the plan. The offset site will be secured within 12 months of the approval of this Offset Strategy via a signed agreement with Trust for Nature to register an offset covenant under the *Victorian Conservation Trust Act 1972* (Vic), as per condition 8(b) of the approval EPBC 2019/8569.
Offset calculator – Start area and quality – Area	128 ha	The area and quality of GSM habitat was mapped based on targeted GSM surveys conducted by Biosis (2019) and SMEC (2019).

Offset calculator – Start area and quality – Start quality	7/10 (HZ1)
	
	6/10 (HZ2)
		The offset site was assessed by SMEC during the GSM flight season in 2018 (SMEC, 2019). The surveyed GSM habitat was high quality, with approximately 2,969 moths recorded across the broader offset area (262 ha area). GSM habitat covers the entire selected offset site, which is located within the broader 262 offset area (SMEC, 2019). The habitat quality is based on (DSEWPaC, 2012):
		• Site condition: 7/10 (HZ1) and 6/10 (HZ2). The site supports a diversity of native grasses, including key grass species associated with GSM (Wallaby-grass *Rytiodosperma* spp., Spear-grass *Austrostipa* spp.) with at least 40% cover of native grass. The starting site condition was assessed based on the following scores:
		  ○ HZ1
		  ▪ Site condition = 3/3
		  ▪ Site context = 2/3
		  ▪ Species stocking rate = 2/4
		  ○ HZ2:
		  ▪ Site condition = 2/3
		  ▪ Site context = 2/3
		  ▪ Species stocking rate = 2/4
		• The Victorian Biodiversity Atlas has multiple records of GSM scattered within 10-kilometres of the study area, indicating that other suitable habitat exits within the broader region, and the population within the offset site is not an isolated population. Threats that occur to the population within and adjacent to the offset site include the loss of suitable habitat through land clearance (cropping) or disturbance (heavy grazing/slashing).
		• The habitat at the offset site is of moderate-high quality for GSM This is due to a native vegetation cover of at least 40% including key food resources (Wallaby-grass, Spear-grass) present within the offset area.

Offset assessment guide attribute	GSM habitat	Justification
Offset calculator - Future area and quality without offset – Future quality without offset (1-10)	6/10 (HZ1) 5/10 (HZ2)	The projected decline in GSM habitat quality without the offset from 7/10 to 6/10 in HZ1 and 6/10 to 5/10 in HZ2 assumes that the continuation of historic grazing practices will degrade the quality of habitat (impacting 'site condition' score), through over-grazing native flora in dry and low-growth periods and under-grazing wet and high-growth periods, and will increase the risk of soil disturbance, and fertilizer and broad-acre herbicide use. These practices have been shown to increase introduced biomass, thereby limiting inter-tussock space for GSM breeding and reducing the extent and diversity of native grassland species, in particular Wallaby-grasses upon which the persistence of GSM populations depend (Tumble and Fraser 1932; O'Dwyer and Attiwill 1999; Dorrough et al 2004).
Offset calculator - Future area and quality with offset – Future quality with offset (1-10)	7/10 (HZ1) 6/10 (HZ2)	The current habitat quality for GSM is high at 7/10 in HZ1 and 6/10 in HZ2, and will be maintained as per the GOMP and in perpetuity in accordance with the on-title security agreement. Given native grassland ecosystems are declining at a significant rate in Victoria (14% loss in extent was recorded from 2005 to 2015, CES 2018), and are under ongoing threats from the intensification and expansion of agricultural production and urban development, the protection and maintenance of remaining native grassland habitats for the GSM is of significant value to the persistence of the species throughout the state. Hence, the protection and maintenance of GSM habitat across the entire Cressy offset area (128 hectare) is proposed to compensate for impacts to GSM habitat from the Project. The projected quality of GSM habitat will be maintained at 7/10 in HZ1 and 6/10 in HZ2, through ensuring adequate inter-tussock space (20-40%) is provided by the commencement to the GSM breeding season (typically October to January), and maintaining or reducing the current weed cover in HZ1 (40-45%) and HZ2 (50-60%). Ongoing GSM population and habitat monitoring will be undertaken throughout the offset management period.
Confidence in result – Change in quality	80 %	A high level of confidence is provided for maintaining the current habitat quality due to the responsiveness of native grassland habitats to active conservation management (TSSC 2008) and the landowner's demonstrated capacity to implement the GOMP. The landowner has not been committed to unrealistic targets. The quality of GSM was already high, predominantly due to the high cover of native tussock grasses (>40%), moderate species population density and distribution, and moderate inter-tussock space in HZ1. Accordingly, there is limited scope to improve the current quality of GSM habitat further without committing the landowner to achieving improvements beyond their control, such as increasing long term species stocking rates which are also subject to natural breeding cycles, and climatic and seasonal conditions.
Percentage of impact offset	**100.73%**	

Table B3 Attribute values entered in the preliminary offset assessment guide calculations for SLL habitat

Offset assessment guide attribute	SLL habitat	Justification
Impact calculator - Quantum of impact - Area	39.92	Removal of known or potential SLL habitat as detailed in Section 8.4.3 of the EES Technical Report - Biodiversity and Habitats Report (GHD, 2021a) and TN15 (GHD, 2021b). This impact area was calculated based on the results of 2019/20 targeted SLL surveys conducted by Environment Heritage Partners (EHP, 2019).
Impact Calculator - Quantum of impact – Quality	6/10	SLL habitat within the Project area comprises remnant native vegetation in moderate condition and non-native vegetation of introduced species. The habitat quality score (6 out of 10) was determined according to the offset assessment guide, which includes three attributes 'site condition', 'site context' and 'species stocking rate'.
Offset calculator – Time horizon –Risk related time horizon	20 years	The proposed offset site would be managed in perpetuity under a legal covenant on title.
Offset calculator – Time horizon – Time until ecological benefit	10 years	The existing habitat condition is expected to be improved over the 10-year active management schedule detailed in the GOMP. Native grassland habitats are extremely vulnerable to ongoing threats, including weed invasion, excess biomass, pest animals, agriculture, climate change and development. An -on-title security agreement will permanently protect the offset from agricultural production and development, and management activities will control livestock and access, excess biomass, pasture grasses and herbaceous weeds and pest animals. As native grassland habitats have been shown to be highly responsive to targeted conservation management, this time period is adequate to achieve the gains in SLL habitat required.
Offset calculator - Future area and quality without offset – Risk of loss without offset	0 %	Native grassland habitats are the most threatened ecosystem in Australia. A 14% decline in extent of native grassland and herbland ecosystems in Victoria was recorded between 2005 and 2015 (CES 2018). At present there are no legislative approvals for the removal of SLL habitat in the offset.
Offset calculator - Future area and quality with offset – Risk of loss with offset	0 %	There is a 0% risk that the SLL population will be lost with the offset being protected and managed in accordance with the GOMP placed on-title. The success of conservation works in adjacent existing offset sites on the property demonstrates the landholder's capability in managing threats and delivering the offset. Further, the availability of SLL habitat adjacent to the offset site further consolidates habitat within the property.
Confidence in result – Averted loss of offset	80 %	The high level of Confidence is due to the high vulnerability of SLL habitat to ongoing threats and the proven capacity of the landowner to manage these threats in other SLL offset sites. The site will be protected through a provisional Section 173 Agreement under the *Planning and Environment Act 1987* (Vic) with Council. Council undertakes a quality assurance process for all offset sites to ensure the landowner agreements address the management commitments in the plan. The offset site will be secured within 12 months of the approval of this Offset Strategy via a signed agreement with Trust for Nature to register an offset covenant under the *Victorian Conservation Trust Act 1972* (Vic), as per condition 8(b) of the approval EPBC 2019/8569

Offset assessment guide attribute	SLL habitat	Justification
Offset calculator – Start area and quality – Area	153	The area and quality of SLL habitat was mapped based on a field survey conducted by Ecology Heritage and Partners in November 2018 (EHP, 2019).
Offset calculator – Start area and quality – Start quality	9/10 (HZ1) 8/10 (HZ2)	153 ha in total, assigned a starting quality of 9/10 in HZ1 and 8/10 in HZ2. Start quality for habitat in the proposed offset site was scored as 9/10 for HZ1, comprising: • Site condition 3/3: reflecting the high diversity of native flora and life-forms present, with embedded rocks and cracking soils. • Site context 3/4: reflecting the connectivity to adjacent native grasslands within the broader property, as well as isolated patches of high-quality Plains Grassland native vegetation near the site (road reserves to the north and within private property to the south). Threats include the loss of suitable habitat through disturbance (e.g., heavy and/or continuous grazing), excess biomass and weed invasion. • Species stocking rate: 3/3, reflecting the highest number (7) of individuals encountered under one tile grid during the SLL monitoring visit undertaken in the offset area (EHP 2019) Site condition Start quality for habitat in the proposed offset site was scored as 8/10 for HZ2, comprising: • Site condition: 2/3, reflecting the only moderate diversity of native flora and life-forms present, with a higher cover of introduced flora and some embedded rocks and cracking soils. • Site context: 3/4, reflecting the connectivity to adjacent native grasslands within the broader property, as well as isolated patches of high-quality Plains Grassland native vegetation near the site (road reserves to the north and within private property to the south). Threats include the loss of suitable habitat through disturbance (e.g., heavy and/or continuous grazing), excess biomass and weed invasion. • Species stocking rate: 3/3 reflecting the highest number (7) of individuals encountered under one tile grid during the SLL monitoring visit undertaken in the offset area (EHP 2019)
Offset calculator - Future area and quality without offset – Future quality without offset (1-10)	8/10 (HZ1) 7/10 (HZ2)	The projected decline in quality without the offset from 9/10 to 8/10 in HZ1 and 8/10 to 7/10 in HZ2 assumes that the continuation of historic grazing practices (including year-round set-stock grazing) will degrade the quality of habitat (impacting 'site condition' score), through over-grazing native flora in dry and low-growth periods and under-grazing wet and high-growth periods, and will increase the risk of fertilizer and broad-acre herbicide use. These practices promote the spread of introduced annual grasses and herbaceous weeds, and reduce the structural complexity of native grassland habitat for the SLL (Tumble and Fraser 1932; Dorrough et al 2004 & 2008; TSSC 2016).
Offset calculator - Future area and quality with offset – Future quality with offset (1-10)	10/10 (HZ1) 9/10 (HZ2)	The projected improvement in quality from 9/10 to 10/10 in HZ1 and 8/10 to 9/10 in HZ2 assumes that the offset site will be managed for the purposes of conservation and will be maintained in perpetuity. It will be achieved through maintaining the current 'site condition' and 'species stocking rate', and improving the 'site context' score by removing all threats that may currently impact upon SLL, including uncontrolled, continuous grazing by sheep. The projected habitat quality with the offset has been determined based on the offset management

Offset assessment guide attribute	SLL habitat	Justification
		actions proposed to be implemented over the 10-year management period (Biodiversity Offsets Victoria 2024). These will include restricting livestock and vehicle access, and undertaking biomass, weed and pest control to maintain or reduce both the current weed cover (40-45% in HZ1, 50-60% in HZ2), and pressure on the existing SLL population. Ongoing SLL population and habitat monitoring will be undertaken throughout the offset management period.
Confidence in result – Change in quality	80 %	A high level of confidence is provided for the change in habitat quality due to the high vulnerability of native grassland and SLL habitats to threats and poor management, its known responsiveness to active conservation management (TSSC 2016) and the landowner's demonstrated capacity to implement the GOMP.
Percentage of impact offset	**100.19 %**	