

## Offset Management Plan

### Natural Temperate Grassland and Golden Sun Moth

Portion of Block 48 Wallaroo Road, Hall ACT | 6 February 2023

Prepared for the Department of Finance



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## Executive summary

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Niche Environment and Heritage Pty Ltd (Niche) was commissioned by Abiculture on behalf of the Department of Finance (DoF) to prepare an Offset Management Plan (OMP) for an Offset Site located at Block 48, Wallaroo Road Hall, NSW. The area of land being 12.7 ha (Offset Site). The Block 48 Offset Site is required for clearing of vegetation associated with the development of Blocks 3 and 15, Section 22, Barton, Australian Capital Territory (ACT), as outlined under referral (EPBC 2017 /8028).

The then Department of Environment and Energy (DoEE), which is now the Department of Climate Change, Energy, the Environment and Water (DCCEEW) determined that the development project would have a significant impact upon the following matters of national environmental significance (MNES):

- Natural Temperate Grassland of the South Eastern Highlands (NTG), listed as a Critically Endangered Ecological Community (CEEC) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and as Natural Temperate Grassland listed as an Endangered Ecological Community (EEC) under the *Nature Conservation Act 2014* (NC Act).
- Golden Sun Moth (*Synemon plana*) (GSM), listed as a critically endangered species under the EPBC Act and an endangered species under the NC Act.

Due to significant impacts, the project was determined as a controlled action with a requirement for compensatory offsets. The EPBC Approval (2017 /8028) specifies the following conditions (3, 4, 5, 8 and 9) in relation to the provision of offsets (*Offset Sites for NTG and GSM habitat may overlap as required*):

*3. To offset the impacts on 0.32 hectares (ha) of NTG, the approval holder must ensure that 2.3 ha of NTG is secured within the Offset Site prior to the commencement of the action.*

*4. To offset the impacts on 1.46 ha of GSM habitat, the approval holder must ensure that 6.2 ha of GSM habitat is secured within the offset Site prior to the commencement of the action.*

*5. Within 10 business days of securing the required offsets specified in conditions 3 and 4, the approval holder must provide the Department (DCCEEW) with evidence of the offset having been secured and the mechanism used to secure the offsets.*

*8. To offset for impacts to NTG and GSM habitat (as described in conditions 3-4), the approval holder must submit an offset management plan for the protection of protected matters at the Offset Site, for the Minister's approval within 12 months of commencement of the action. Once the Minister approves the offset management plan, then the approved offset management plan must be implemented.*

*9. The offset management plan must be consistent with the Department's (DCCEEW) Environmental Management Plan Guidelines, and must include:*

- *The offset management plan's environmental objectives relevant to protected matters, and must allow for access to the Offset Site including scientific research on protected matters*
- *A table of where the plan addresses relevant EPBC Act approval conditions*
- *A table of commitments made in the offset management plan to achieve the objectives, and a reference to where the commitments are detailed in the offset management plan*
- *Details of the parties responsible for undertaking management actions*
- *Reporting and review mechanisms, and documentation standards to demonstrate compliance with the offset management plan*

- *An assessment of risks to achieving the offset management plan's environmental objectives and risk management strategies that will be applied; Impact avoidance, mitigation and/or repair measures, and their timing*
- *A monitoring program, which must include:*
  - I. measurable performance indicators*
  - II. trigger values for corrective actions*
  - III. the timing and frequency of monitoring to detect changes in the performance indicators and trigger values*
  - IV. proposed corrective actions, if trigger values are reached.*
- *Description of long-term funding mechanism for measures outlined in the offset management plan.*

A portion of Block 48 Hall ACT (6.2 ha) was identified as a suitable GSM habitat by Umwelt (2016a). While Block 48 is approximately 57.9 ha, an area of 12.7 ha being within Block 48 (Offset site) has been identified as containing adequate NTG and GSM habitat to satisfy the offset requirement stated in the approval conditions. The property is currently owned by the Commonwealth of Australia and managed by DoF.

The Offset Site meets the quantity and quality requirements for an offset of NTG as prescribed by DCCEEW under the EPBC Act and in association with referral 2017/8028. It concurrently provides direct offset requirements for the protection of NTG and GSM habitat prescribed with that referral.

The Offset Site is located within NTG and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, and management prescriptions within this plan are consistent with the Vegetation Management Plan (VMP) for the protection of native vegetation within the broader property (KRB 2014, Biosis 2015 and Umwelt 2016c). The Offset Site has been the subject of multiple targeted surveys for GSM which have been recorded within a portion of the property, including within the defined Offset Site.

This OMP outlines how the Offset Site will provide the total required offsets for the clearing of Blocks 3 and 15, Section 22, Barton, Australian Capital Territory (0.32 ha of NTG and 1.46 ha of GSM habitat). This OMP requires conservation management actions have the primary objective aimed at the conservation and improvement of defined areas of NTG and its associated habitat values for GSM. The management actions outlined in this plan consider key management issues identified for this EPBC Act listed community and the associated fauna habitat. Gains in vegetation quality through on-ground actions are expected over the duration of the 10 year OMP, and through the ongoing land-use commitments to manage the Offset Site for biodiversity conservation.

This plan specifies a range of management actions for the Offset Site, including weed management and protection of the habitat values of the Offset Site from degradation by stock and unauthorised access. It also includes a range of management actions for the areas of Block 48 outside of the Offset site so as to supplement and improve the ability of the Offset site to achieve its objectives.

The plan documents an adaptive management framework, in which management actions are modified based on the results of monitoring and auditing activities in order to keep management focussed on the outcome of protecting and enhancing ecological values associated with NTG, and GSM habitat. The risk assessment also includes triggers for plan review, following environmental events such as bushfire and weed invasion that has the potential to significantly alter the character and condition of the Offset Site.

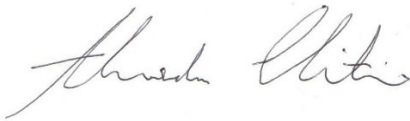
## Glossary and list of abbreviations

Term or abbreviation	Definition
ACT	Australian Capital Territory
CEEC	Critically Endangered Ecological Community
cm	Centimetres
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DoAWE	Commonwealth Department of Agriculture, Water and the Environment (predecessor to DCCEEW)
DoEE	Commonwealth Department of Environment and Energy (predecessor to DoAWE)
DoF	Commonwealth Department of Finance
DNG	Derived Native Grassland
EEC	Endangered Ecological Community
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
EPSDD	<i>Environment, Planning and Sustainable Development Directorate</i> (ACT Government)
GSM	Golden Sun Moth ( <i>Synemon plana</i> )
ha	Hectare/s
km	Kilometre/s
MNES	Matters of National Environmental Significance (from the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> ).
m	Metre/s
NC Act	<i>Nature Conservation Act 2014</i> (Territory)
NTG	Natural Temperate Grassland of the South Eastern Highlands
OMP	Offset Management Plan
Property Manager	Department of Finance's Property & Construction Division or its property service provider
WoNS	Weeds of national significance

### Declaration of accuracy

In making this declaration, I am aware that section 491 of EPBC Act makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed



Full name: Alex Christie

Organisation: Niche Environment and Heritage

Date: 8/12/2022

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## 1. Introduction

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### 1.1 The Offset Site

Niche Environment and Heritage Pty Ltd (Niche) was commissioned by AbriCulture on behalf of the Department of Finance (DoF) to prepare an Offset Management Plan (OMP) for an offset Site located at Block 48, Wallaroo Road Hall, NSW. The area of land being 12.7 ha within Block 48 (The Offset Site). The Offset Site is required for clearing of all vegetation within Blocks 3 and 15, Section 22, Barton, Australian Capital Territory (ACT), as outlined under referral (EPBC 2017 /8028).

The Offset Site is a total of 12.7 hectares (ha) in size, forms part of a larger block (57.9 ha). The 12.7 ha Offset Site is the only portion of Block 48 needed to meet the requirements under the EPBC Act. The Offset Site is located 2 kilometres (km) west of Hall and 14 km north west of the Canberra central business district (Figure 1 and Figure 2). The Offset Site is zoned (NUZ3): Hills Ridges and Buffer Areas as per the Territory Plan Land Use Zones (ACT Planning and Land Authority).

### 1.2 Offset and management plan requirement

The OMP has been prepared to meet specific requirements of the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) – formerly the Department of Agriculture, Water and the Environment - *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval decision (EPBC 2017 /8028).

The DCCEEW determined that the development project would have a significant impact upon the following matters of national environmental significance (MNES):

- Natural Temperate Grassland of the South Eastern Highlands (NTG), listed as a Critically Endangered Ecological Community (CEEC) under the EPBC Act and as Natural Temperate Grassland, an Endangered Ecological Community (EEC), under the Australian Capital Territory (ACT) *Nature Conservation Act 2014* (NC Act).
- Golden Sun Moth (*Synemon plana*) (GSM), listed as a critically endangered species under the EPBC Act and an endangered species under the NC Act.

Due to potentially significant impacts, the project was determined as a controlled action with a requirement for compensatory offsets. The DoF is required to develop an OMP to offset the clearing of 0.32 ha of NTG and 1.46 ha of GSM habitat. The identified impacts require the proponent to conserve, manage and improve NTG and GSM habitat to a specified standard (see section 3.1), with 2.3 ha of NTG and 6.2 ha of GSM habitat at the Offset Site meeting over 100% of the offset requirement.

The Offset Site has been secured and is owned by the Commonwealth of Australia, managed by DoF, and will be managed according to this OMP to conserve biodiversity values, with a focus on protecting, enhancing and improving NTG and GSM habitat.

### 1.3 Approval conditions

In accordance with Conditions of the Approval, the OMP must be consistent with the DCCEEW's *Environmental Management Plan Guidelines* (Commonwealth of Australia, 2014), and must include, but not necessarily be limited to, the following details:

- The OMP's environmental objectives relevant to protected matters.
- Outline/allow for access to the Offset Site including for scientific research on protected matters.
- A table of where the plan addresses relevant EPBC Act approval conditions.

- A table of commitments made in the OMP to achieve the objectives, and a reference to where the commitments are detailed in the OMP.
- Details of the parties responsible for undertaking management actions.
- Reporting and review mechanisms, and documentation standards to demonstrate compliance with the OMP.
- An assessment of risks to achieving the OMP's environmental objectives and risk management strategies that will be applied.
- Impact avoidance, mitigation and/or repair measures, and their timing.
- A monitoring program, which must include:
  - i. measurable performance indicators
  - ii. trigger values for corrective actions
  - iii. the timing and frequency of monitoring to detect changes in the performance indicators and trigger values
  - iv. proposed corrective actions, if trigger values are reached.
- Description of long-term funding mechanism for measures outlined in the OMP.

This plan also guides the management of other conservation values present at the Offset Site that are not listed under the EPBC Act. This includes species listed under the *Nature Conservation Act 2014*.

#### 1.4 Objectives

The primary conservation objectives for the OMP concerning MNES protected under the EPBC Act include:

- The permanent protection of at least 2.3 ha of NTG and 6.2 ha of GSM habitat within the Offset Site.
- Continued enhancement of the quality and extent of NTG and GSM habitat within the Offset Site.
- Allowance of access to the Offset Site for scientific research into protected matters.

Recognising that the Offset Sites also supports other natural and cultural conservation values, the secondary objectives of the Offset Site is to:

- Maintain habitat connectivity for woodland birds.
- Improve protection and restoration of ecological values throughout the Offset Site, in particular, the Commonwealth listed Critically Endangered White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

#### 1.5 Statutory framework, management responsibilities and funding arrangements

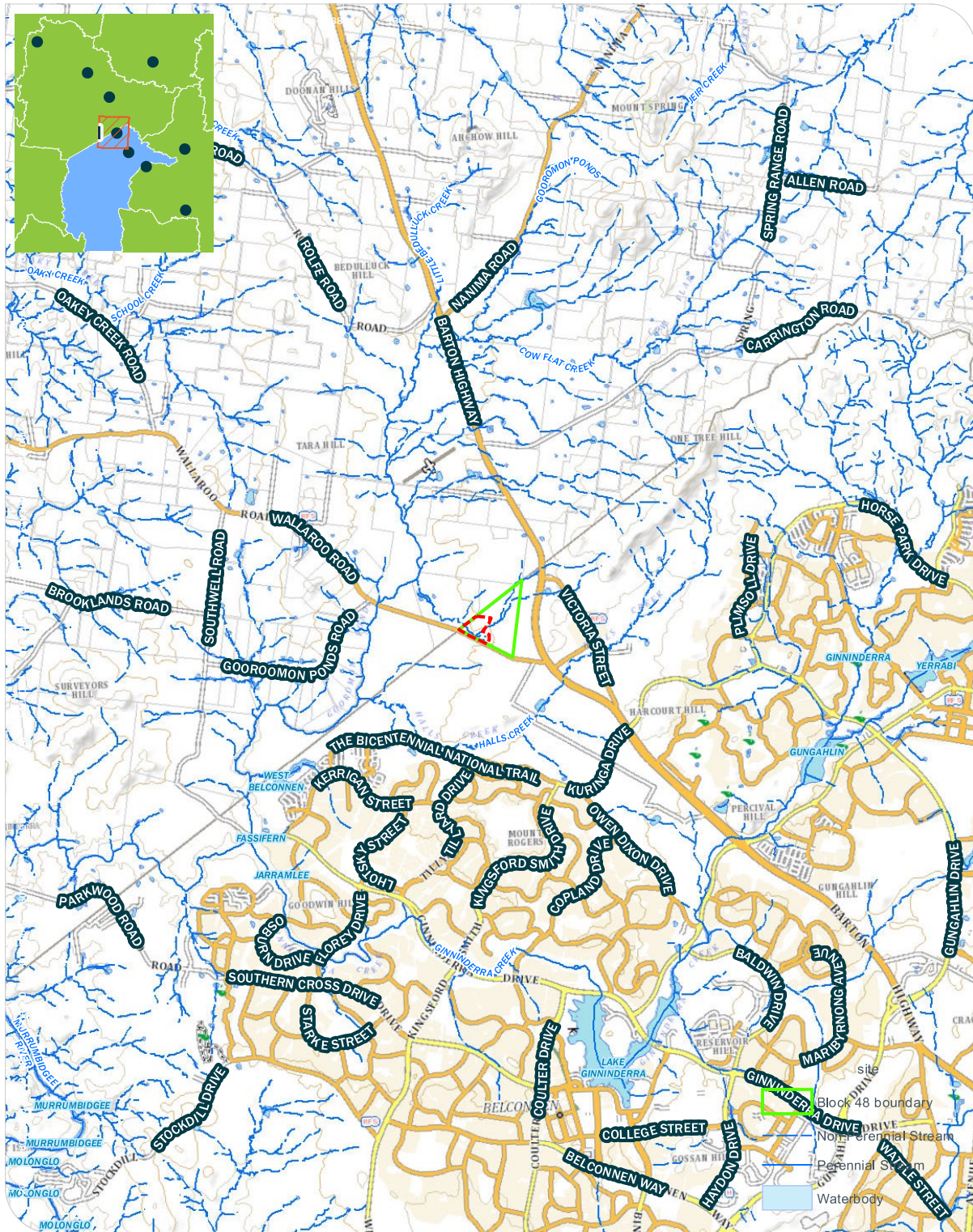
The DoF is the proponent responsible for management of the Offset Site in accordance with the EPBC Act approval decision 2017/8028. The DoF must submit an OMP for the protection of protected matters at the Offset Site for the Minister's approval within 12 months of commencement of the action (i.e. by 6 January 2021).

The Commonwealth of Australia, represented by the DoF, owns the Offset Site (Block 48) and is retaining ownership of the land for the purpose of environmental uses (i.e. offsets). The implementation of the OMP commenced on 1 July 2020 with DoF to fund all costs associated with the implementation and operation of the OMP (i.e. minimum period of 10 years) and maintenance of the offset site for the life of the approval.

The DoF will be responsible for management actions undertaken in this OMP and has a property service provider that manages Block 48 Hall and is required to provide monthly reports on its activities. The DoF will have, through the property service provider, a facility manager for the land and will also have long-term

contracts with ecologists and land maintenance companies to ensure the management actions outlined in this OMP are implemented.

Figure 1: Location map





## 2. Offset Site description

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### 2.1 Conservation values

The Offset Site contains 2.62 ha of NTG within remnant patches of native grassland in low-lying areas, along the creek line towards the south western corner of the Offset Site (Figure 3).

Block 48 contains GSM habitat in the form of Natural Temperate Grassland (NTG), White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (DNG).

As outlined in Table 14, the Offset Site has been confirmed as containing 2.62 ha of NTG and a further 5.18 ha of Derived Native Grassland (DNG). The site also contains a total of 7.82 ha of GSM habitat. This is a significant increase in the previous survey undertaken by Umwelt, attributed to continuation of the Vegetation Management Plan and favourable weather conditions. The Offset Site also has an average GSM habitat quality of 6, less than the previous Umwelt survey of 7. Condition classes for both the NTG and GSM habitat can be seen in Table 13 and Table 17 respectively.

As also outline in Table 14, Block 48 in its entirety, including the Offset Site, has been confirmed as containing 2.62 ha of NTG and a further 34.21 ha of Derived Natural Native Grassland, with a combined total of 12.45 ha in GSM habitat. Block 48 has an average GSM habitat quality of 6.

Although measures of Block 48 are not required for this report, it forms a good baseline and comparison for the management of the entire property.

The Site is located adjacent to the Hall Cemetery which contains a remnant patch of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed as a Critically Endangered Ecological Community (CEEC) under the EPBC Act and Yellow Box – Blakely's Red Gum Grassy Woodland, listed as an Endangered Ecological Community (EEC), under the ACT *Nature Conservation Act 1980* (NC Act). The cemetery also contains a population of *Prasophyllum petilum* (Tarengo Leek Orchid), listed as endangered under the Commonwealth and Territory legislation. However, no threatened flora has previously been identified on Block 48.

Threatened species which have previously been recorded on the Site include:

- Golden Sun Moth (*Synemon plana*) Listed as Critically Endangered under the EPBC Act and Endangered under the NC Act.
- White-winged Triller (*Lalage tricolor*) Listed as vulnerable under the NC Act.

### 2.2 Current and historic land use

Block 48 has historically been used for cropping and grazing domestic stock but is now partly managed for conservation values on a voluntary basis according to a Vegetation Management Plan (VMP). An area to the east of the central access road has previously been used as a CSIRO research facility for agricultural purposes including grazing and some cultivation since 1961.

Block 48 includes stockproof internal and boundary fencing which is currently used to control stock movements throughout the Site. The current movement of stock and grazing intensity is dictated by the current VMP (Umwelt 2016c).



NTG within the surrounding area is relatively isolated from other remnants of NTG as the community has largely been cleared within the region. The Offset Site is positioned to the west of the central access road and in the north eastern portion of the Site (Figure 2).

### 3. Offset implementation

#### 3.1 Offset suitability

Vegetation losses and offset requirements were calculated by Umwelt in their Offset Analysis Report of Block 3 Section 22 Sites (2016a) using the Commonwealth Offset Assessment Guide spreadsheet provided under the EPBC Act offset policy (DSEWPaC 2012). Further negotiations took place between DoF and DCCEEW to reach an agreed offset requirement based on the Offset Assessment Guide in Appendix 1.

In summary, it was determined that the Offset Site should contain a minimum of 2.3 ha of NTG and 6.2 ha of GSM habitat (concurrently if applicable) managed to ensure a condition gain of 10%. The parameters used in the offset calculator are shown in Umwelt (2016a). The detailed justification of methods used to support offset calculations is provided in the preliminary documentation for Referral 2017/8028.

The proposed Offset Site is significantly larger than required for NTG (2.62 ha versus 2.3 ha) and GSM (7.82 ha versus 6.2 ha) and further assessment of the Site has been conducted in preparation of this OMP (Table 5).

This OMP outlines for the Offset Site:

- The extent and condition of native vegetation and habitat to be protected.
- The management actions required to be implemented.
- The incremental condition targets for vegetation for a ten-year management period.
- The methodology and requirements for baseline and ongoing monitoring.
- Recommendations on the use of the Offset Site for scientific research purposes.

While there is a requirement for the Offset site to be managed and monitored for the life of the approval (twenty (20) years), condition targets have been developed for 10 year period consistent with the anticipated time until ecological benefit of the offset site used within the Offset Assessment Guide (Appendix 1).

The offset management plan specifies the requirements for the 12.7 ha offset area within Block 48; and also supplementary activities that should occur within other areas of Block 48 to support the objectives and outcomes for the offset area.

Consistency with the EPBC Act offsets policy is outlined in Table 1.

**Table 1: Compliance with EPBC Act Offset Requirements (Australian Government, 2012).**

EPBC Act Offset Principles	Current Offset Site
<p><b>Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action</b></p>	<p>Analysis conducted by Umwelt (2016a) (Table 5) during the development application calculated that protection of 2.3 ha of NTG and 6.2 ha of GSM habitat at the Offset Site would improve or maintain outcomes for impacted MNES. Offset calculations shown in Appendix 1 demonstrates that the final conservation outcome from the proposed offset meets the area required under the Commonwealth approval conditions. Future management of the Offset site will improve MNES, provided the offset is managed in accordance with this OMP.</p>
<p><b>Be built around direct offsets but may include other compensatory measures</b></p>	<p>Habitat protection and management to improve vegetation condition is a direct offset.</p>

<p><b>Be in proportion to the level of statutory protection that applies to the protected matter</b></p>	<p>Umwelt’s Offset Analysis Report from 2016 identified the land as an appropriate offset (Umwelt 2016a). The Offset Site data calculated using the Environmental Offset Assessment Guide indicated that the offset package is in proportion to the level of statutory protection that applies (Appendix 1).</p>
<p><b>Be of a size and scale proportionate to the residual impacts on the protected matter</b></p>	<p>The required NTG offset (2.3 ha) is 7.2 times the area of threatened community lost. This area also contributes to the 6.2 ha of GSM habitat to be offset. The proposed Offset Site (12.7 ha) is the required area for offsetting. Management of the Offset Site will improve surrounding areas of vegetation and expand the current areas of MNES.</p>
<p><b>Effectively account for and manage the risks of the offset not succeeding</b></p>	<p>This Offset Site will be subject to an approved OMP and the site is intended to be added to the ACTmapi as an environmental offset. The offset will be managed by DoF and subject to audit by an independent ecologist.</p> <p>This Offset Site has been long known to support areas of NTG and stable populations of GSM. Whilst the Offset Site is currently subject to a VMP which aims to sustain the current biodiversity values, the formalisation of the area as a Commonwealth environmental offset site will provide much more detailed management actions aimed to improve and enhance the MNES. The size of the proposed offset, the potential to increase the area of the offset site over time adds additional assurance against the offset not succeeding.</p>
<p><b>Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action, see section 7.6)</b></p>	<p>No other offsets for NTG or GSM have been provided under any State or Territory requirement and the proposed Offset Site is not currently part of an offset requirement for any other project.</p>
<p><b>Be efficient, effective, timely, transparent, scientifically robust and reasonable</b></p>	<p>The offset will be actively managed by the DoF according to this OMP. The proposed management actions transparently detailed within this OMP have been developed through consultation with recognised experts and experienced practitioners in relation to the identified impacted MNES.</p> <p>The timing of the management actions ensures accordance with the DCCEEW consent conditions and in the interim the OMP allows for continuation of the current management practices over the Offset Site (subject to a VMP) which seek to protect the MNES present at the Offset Site.</p> <p>The proposed Offset Site is of sufficiently high quality (i.e. has an average habitat score of 5/10 for moderate GSM habitat, 7/10 for good GSM habitat and 6/10 for NTG (Umwelt 2016a)) to be robust in terms of persistence and also capacity to improve with management. The Offset Site has a long-known confirmed population of GSM. Formal protection of the vegetation would significantly reduce potential threats to the quality of this vegetation.</p>
<p><b>Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.</b></p>	<p>Governance includes oversight by the DCCEEW, audit by an independent ecologist and formal reporting to both DoF and DCCEEW.</p>

Relevant approval conditions and how each condition has been addressed by the offset Site and associated OMP is provided in Table 2.

**Table 2: EPBC 2017 /8028 relevant approval conditions**

Condition	Condition details	OMP response	OMP section
8.	To offset for impacts to NTG and GSM habitat (as described in conditions 3-4), the approval holder must submit an offset management plan for the protection of protected matters at the Offset Site, for the Minister's approval within 12 months of commencement of the action (i.e. by 6 January 2021). Once the Minister approves the offset management plan, then the approved offset management plan must be implemented.	Prepared by Niche for submission to the Minister for approval.	All
9.	The offset management plan must be consistent with the Department's Environmental Management Plan Guidelines, and must include:	This OMP has been prepared in accordance with the Guidelines for the preparation of an offset management plan under the EPBC Act offsets policy (Commonwealth of Australia, 2014).	All
9a.	The offset management plan's environmental objectives relevant to protected matters and must allow for access to the Offset Site including scientific research on protected matters.	Each of the objectives of the OMP have been discussed, as well potential scientific research in relation the protected matter which could be conducted at the Offset Site.	Sections 1.4 and 5.8
9b.	A table of where the plan addresses relevant EPBC Act approval conditions.	A description of how the OMP addresses each approval condition and reference to the section of the report which provides more detail is set out in this Table.	Table 2 and relevant sections of the OMP.
9c.	A table of commitments made in the offset management plan to achieve the objectives, and a reference to where the commitments are detailed in the offset management plan.	Section 3.2 outlines commitments consistent with the approval conditions. This table references the section of OMP which contains details of specific commitments to achieve the objectives of the OMP.	Section 3.2
9d.	Details of the parties responsible for undertaking management actions.	Table 4 contains a list of the relevant stakeholders and their roles and responsibilities in regard to undertaking management actions at the Offset Site.	Section 3.2, Table 4
9e.	Reporting and review mechanisms, and documentation standards to demonstrate compliance with the offset management plan.	Sections dedicated to monitoring and reporting requirements.	Section 5 and Table 9
9f.	An assessment of risks to achieving the offset management plan's environmental objectives and risk	Adaptive management strategy put in place to respond to potential risks.	Section 5.10 and 5.11

Condition	Condition details	OMP response	OMP section
	management strategies that will be applied.		
9g.	Impact avoidance, mitigation and/or repair measures, and their timing.	There are no impacts associated with the OMP. Table 6 proposes management action which will improve Offset Site values.	-
9h.	A monitoring program, which must include: <ul style="list-style-type: none"> <li>i. measurable performance indicators</li> <li>ii. trigger values for corrective actions</li> <li>iii. the timing and frequency of monitoring to detect changes in the performance indicators and trigger values</li> <li>iv. proposed corrective actions, if trigger values are reached.</li> </ul>	The monitoring which addresses each one of these provisions is set out in Section 5.	Section 5, Table 6, Table 9, Table 10 and Table 20
9i.	Description of long-term funding mechanism for measures outlined in the offset management plan.	Funding for the management of the OMP will be provided by the DoF.	Section 1.5 and Table 4
3.	To offset the impacts on 0.32 ha of NTG, the approval holder must ensure that 2.3 ha of NTG is secured within the Offset Site prior to the commencement of the action.	The OMP identifies the area of 2.3 ha of NTG secured within the Offset Site.	Section 5.1 and Table 5
4.	To offset the impacts on 1.46 ha of GSM habitat, the approval holder must ensure that 6.2 ha of GSM habitat is secured within the Offset Site prior to the commencement of the action.	The OMP identifies the area of 6.2 ha of GSM secured within the Offset Site.	Section 5.7 and Table 5

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

### 3.2 Offset commitments

This section presents the actions required to implement the OMP. The OMP details methods for the management and conservation of native vegetation (including NTG) at the Offset Site and for other protected matters (GSM) for the life of the approval.

The Offset Site will be managed for an improvement in quality over the initial period of 10 years. After the first 5-year period of management, the OMP shall be reviewed and revised to ensure the objectives are achieved for the following 5-year period. These objectives for the Offset site are outlined in Table 3 below.

**Table 3: OMP management commitments**

Commitments	OMP section
<b>Management action</b>	
Retain and manage all native vegetation and GSM habitat as directed by this OMP	Section 4 and Table 6
Exclude domestic stock except as permitted by this plan	Section 4.2 and Section 4.6
Construct and remove fencing to improve livestock management	Section 4.2
Maintain fencing of the Offset site and within the broader land parcel	Section 4.2 and Section 5.1
Exclude the use of stock feed such as hay or grain that is sourced from outside the Offset Site	Section 4.6
Ensure that the cover of weeds does not increase beyond current levels and reduce weeds from 41% to less than 20% by Year 10 of management	Section 4.3 and Section 5.2
Monitoring for any new and emerging weeds and if identified eradicate or maintain at < 1% cover	Section 4.3
Ensure that pest animals are controlled	Section 4.4 and Section 5.3
Permanently exclude pasture improvement, cultivation, cropping, surface rock removal and fertilizer application	Section 4.10
Control the accumulation of ground cover biomass through either the controlled grazing of cattle or the controlled application of fire	Section 4.5, Section 4.6 and Section 4.7
Manage the surrounding areas of Block 48 as a supplementary area to assist with achieving the objectives on the Offset site	Section 5.10
An increase in species diversity to a least 8 non-grass native species, two indicator species or a floristic value score of $\geq 5$ . Non-grass species include forbs, herbs, lilies, orchids, rushes and low shrubs. A list of indicator species can be found on the ecological community profile.	Section 5.5
Remediate the erosion present on the ridge-top within the major patch of GSM habitat by re-seeding with appropriate GSM feed species. Over time this is expected to result in improved soil conditions for GSM pupae and larvae.	Section 4.8
Maintain a progressive annual works plan which caters to current conditions and prescribes ongoing management with maintenance of the native grassland community as its primary objective.	Section 5, Table 9, Table 10 and Appendix 2 – Work Plan (Year 1) Appendix 2
<b>Responsibilities</b>	
Implementation of this OMP is the ultimate responsibility of the approval holder (DoF). Direct management responsibility may be delegated to a designated Site manager and/or managing ecologist. The DoF is responsible for engaging a qualified ecologist to conduct monitoring and preparation of monitoring reports to be submitted to DCCEEW.	Section 1.5 and Table 4

**Table 4: Security and Management Responsibility and Reporting Requirements**

Responsibility	
Who is liable/responsible for meeting offset requirements?	Department of Finance
Type of security	Block 48, including the offset site, is wholly owned by the Commonwealth of Australia (as represented by Finance) since 1 October 2004. Finance will retain ownership and can confirm that no development will occur within the offset site. This meets the definition of secure as per condition 28(y) of the EPBC approval. Furthermore, Block 48 is currently zoned “NUZ3: Hills, Ridges and Buffer Areas’ which prevents the area from being developed.
Date of commencement of the OMP	To be implemented within 12 months of works commencing at Blocks 3 and 15, Section 22.
Offset Site management responsibility	Department of Finance
Offset Monitoring Responsibility	Department of Finance
Auditing	Department of Finance
Reporting responsibility (to DCCEEW)	Department of Finance
Plan review	Department of Finance

If during the life of the Project’s approval, DoF proposes or intends to divest of Block 48, in whole or part, it shall engage with DCCEEW and agree the type and extent of the obligations that shall be included in any sale or transfer of Block 48, including legal mechanisms for protecting the offset areas.

### 3.3 Future condition targets

The offset calculations used to define the size of the Offset Site (Appendix 1) specify a start quality score of 6/10 for NTG, 5/10 for Moderate GSM habitat and 7/10 for Good GSM habitat.

The future condition of NTG will be assessed using the ACT Vegwatch manual (Sharp and Gould, 2014) and the Floristic Value Scores method (Rehwinkel, 20074) as used by Umwelt (2016b) in its Year 2/Baseline Vegetation Condition Monitoring Report for Offset Site.

The habitat condition for GSM will be assessed using GSM habitat monitoring transects which record habitat features including tussock grassland structure and the abundance of known food plants such as *Austrostipa* spp. (Spear-grasses) and *Rytidosperma* spp. (Wallaby-grasses). In addition, permanent walked monitoring transects have been established for future monitoring of GSM density throughout areas of mapped GSM habitat.

Monitoring assessments will be undertaken at established transects and quadrats distributed throughout the Offset Site as described in Section 5. Maintenance of the open tussock structure across the Offset Site, the control of weeds of national significance (WoNS) and noxious weeds (including Phalaris and Cocksfoot), as well as annual exotic weeds from the previous estimate of 41% (Umwelt 2016b) to less than 20% after 10 years of management.

Habitat condition assessments relating to the diversity and cover of different lifeforms in the grassland, the presence of suitable habitat structure to provide opportunities for species recruitment, the cover of weed



species present and the abundance of organic litter, will be used to identify opportunities to improve the condition of native vegetation present within the Offset. Proposed management actions are expected to provide improvements in all of these assessment criteria.

**Table 5: Offset assessment guide calculations (updated from Umwelt 2016a for NTG and most recent Commonwealth Offsets Assessment Guide for GSM)**

Parameter	Value	Notes
<b>Impact to NTG (critically endangered ecological community)</b>		
Area of impact	0.32 ha	Total area (ha) of NTG cleared
Quality	5	Scale of 0 – 10. Score from the Umwelt (2016a) assessment) has been used as a surrogate for Offset Site quality.
Total quantum of impact	0.16	0.32 x the average condition score of 0.5
Required offset	2.3 ha	Required offset will provide 7.2 x the area of impact.
<b>Impact to GSM habitat (critically endangered species)</b>		
Area of impact	1.46	Total area (ha) of direct habitat loss
Quality	5	Scale of 0 – 10. Estimate of habitat values based on population size and isolation.
Total quantum of impact	0.73	1.46 x 0.5
Required offset	6.2 ha	Required offset will provide 4.2 x the area of impact.
<b>Offset calculations – Offset Site</b>		
Offset Site	2.62 ha for NTG 6.2 ha for GSM	12.7 ha is actual size of offset site with 2.62 ha for NTG and 7.82 ha for GSM.
Time until ecological benefit	10	Years
Risk related time horizon / time over which loss is averted	20	Years
Start quality /10	6 for NTG 5 for moderate GSM habitat 7 for good GSM habitat	Scale of 0 – 10. Score based on habitat assessment for NTG and GSM.
Future quality without offset	5 for NTG 4 for moderate GSM habitat 6 for good GSM habitat	Potential for decline in quality through weed invasion uncontrolled grazing (currently an existing permitted use) and erosion.
Future quality with offset	7 for NTG 6 for moderate GSM habitat 8 for good GSM habitat	Improvement in condition of vegetation/habitat based on improvements as prescribed.
Risk of loss (%) without offset	3% for NTG and GSM	Low risk of loss without deliberate or accidental actions. Risk of loss is slightly higher for GSM due to this representing a single species of fauna rather than a mixed community whereby the loss of certain species does not comprise the loss of the whole community.
Risk of loss (%) with offset	0% for NTG and GSM	Lower risk of loss with covenant and landowner awareness and vigilance.
Confidence in results	90%	
% of impact offset	Provides 100% or greater of the required NTG and GSM offset.	Provides all of the total direct offset requirements for NTG and GSM.

### 3.4 Performance and completion criteria

Key performance and completion criteria are:

- Improvement in average Site condition as described in Section 3.3 and Table 5.
- Successful management of threats, including the control of stock grazing, erosion, wildfire, weeds and pests as specified in Section 4.
- Completion of scheduled management actions (Section 4 and Table 6).
- Completion of scheduled monitoring activities (Section 5 and Table 9).
- Completion of scheduled reports and audits (Section 5.9 and Table 10).

The completion of management actions identified in section 4 and Table 6 will enable the offset site to achieve the completion criteria also in Table 5.

Recognising that the DCCEEW's Environment Offset Policy requires that the offsets endure and be protected for the same durations as the impacts being offset, an additional completion criteria has been established:

- The completion criteria for this OMP are not considered to have been met until after the period of effect of approval for the EPBC Act Part 9 approval has expired. The legal mechanism over the offset site must not be removed, and the land owner, land manager, approval holder, and all other persons associated with the action must not seek to remove nor consent to the removal of the legal mechanism from the offset site, until the approval expires in December 2038.

### 3.5 Limitations and uncertainty

This OMP has been formulated using information from Umwelt (2016b) and recently conducted field survey. Relevant federal and state government policies, procedures and databases have also been consulted where appropriate. To date, the proposed Offset Site supports records of GSM from targeted surveys by KRB (2014), Rowell (2015), Biosis (2015), Umwelt (2016b) and Niche (2020).

The offset calculations have been performed using conservative estimates of Offset Site improvement, and the area to be reserved satisfies the entire Offset Site requirement (refer to Section 3 and Appendix 1 for details of the calculations).

To determine whether completion criteria and performance indicators are met, the completion criteria are expressed as overall scores that reflect on-ground measurements. This creates flexibility as each score represents an overall score for all attributes measured. Habitat quality scores will be determined using the ACT Vegwatch and FVS methods unless otherwise agreed in writing by the DCCEEW. Further details on how NTG and GSM attributes will be recorded and converted into scores out of 10 is detailed in Section 5.

The completion criteria for this OMP will be met if:

- 'Future quality with offset' value of 7/10 has been reached for NTG; 6/10 for moderate GSM habitat and 8/10 for good GSM habitat.
- the period of effect of the EPBC Act approval for the project has expired.

The improvement in quality may also be complemented by an expansion of the area containing NTG or GSM habitat.

The Offset Site will be actively managed for the first 10 years of this OMP or until the performance criteria is achieved, whichever comes first. After year 10, if all the performance criteria have been met then:

- active management is no longer required
- prohibited activities remain prohibited and access restrictions obligations remain in place; and
- annual monitoring is required until year 10 and monitoring every 5 years thereafter to maintain the Offset Site.

If the offset site has not achieved the required performance criteria by the end of year 10 or suffers an incident that significantly impacts the offset site (regardless of whether that incident was contemplated in this OMP), then the approval holder must:

- implement the corrective actions listed in Table 20 (if applicable) by the timeframe established for that corrective action
- inform the DCCEEW of the incident as soon as practicable, and in any case within 10 business days of becoming aware of the incident; and
- if, following consultation with the approval holder, the DCCEEW determines that additional corrective actions are required, the approval holder will implement the specified corrective actions within the timeframe specified by the DCCEEW (or if no timeframe is specified, as soon as practicable, noting that some corrective actions may need to occur at specific times of the year or following certain events). Following consultation with the approval holder, the DCCEEW may require, as a corrective action that the approval holder make a request for an extension to the period of effect of the EPBC Act approval with regard the OMP (Note: This requirement is primarily intended to address delays caused by force majeure events, but may be used to address other areas of unforeseen impacts to the offset site (such as accidental poisoning of the offset area by a neighbouring land owner), or deficient management by the approval holder. The Department must act reasonably in requiring any corrective actions.

## 4. Management action plan

### 4.1 Ongoing management commitments

Ongoing management commitments to improve biodiversity values at the Offset Site are outlined in Table 3. Prescribed management actions to achieve these commitments are outlined below in

Table 6. These actions will be applied to the entire Offset Site (unless otherwise specified) identified in Figure 5.

**Table 6: Management plan actions timing and responsibilities**

Management action number	Management action	Timing	Management zone	Responsibility	Target/outcome	Corresponding monitoring action number (Table 9)
<b>Offset Establishment (Year 1)</b>						
1	Establishment and registration of the Offset Site.	Within 12 months of commencement of the action	Entire Offset Site (12.7 ha)	DoF and ACT Government	Offset Site registered on the ACT and Commonwealth offsets register.	None
<b>Recurrent Actions (Year 1 to Year 10)</b>						
2	DoF to develop annual works plan in consultation with the DCCEEW.	From the time of the Offset Site establishment, to be repeated each year.	Entire Offset Site	DoF and DCCEEW	Annual works plan prepared and approved for implementation by DCCEEW.	All
3	Maintain fences and gates within the Offset Site. Remove any rubbish identified within the Offset Site.	Continuous, at least once every three months (inspection and management).	Entire Offset Site	DoF	Potential threats (i.e. domestic stock, unauthorised entry) excluded.	1
4	Undertake pulse grazing to reduce biomass according to Appendix 7 (Table 22). A minimum of three pulse grazing cycles are required within the grazing period, and	Between 31st January and 31st August (see Table 30).	Management zones/paddocks 1 and 2.	DoF	Maintain an open tussock grassland with at least 30% cover of inter-tussock space. Grazing may be deferred if ecological burning is implemented. <b>If the grazing target of 50% cover or 30% inter-tussock space is reached before the two-week</b>	2

Management action number	Management action	Timing	Management zone	Responsibility	Target/outcome	Corresponding monitoring action number (Table 9)
	<p>one of these will occur immediately before the exclusion period (unless otherwise advised by the fire management plan).</p> <p>The maximum grazing length at any one time is two weeks within one paddock, with a minimum four week rest period between grazing cycles. Livestock to be removed immediately if targets are reached before 2-week period.</p> <p>There is no limit to the number of livestock which can be grazed in the Offset Site. However, the more livestock used for grazing, the more regularly the Offset Site will need to be monitored and stock removed when cover targets are meet.</p>				<p><b>period, livestock will be removed from the management zone immediately.</b></p>	
5	Control of pest animals within the Offset Site including, rabbits, hares, foxes and cats. Control should be implemented throughout the surrounding area (not only on	Pest management is required twice a year, once between February and April, and again between September and November. Inspections should be	Entire Offset Site	DoF in consultation with an ecological	Negligible ground disturbance by pest animals within Offset Site. No active rabbit warrens present within Offset Site.	3

Management action number	Management action	Timing	Management zone	Responsibility	Target/outcome	Corresponding monitoring action number (Table 9)
	the Offset Site) where possible. This can be achieved through consultation with local pest control authorities and coordinating control activities to occur during the same period.	undertaken every three months. If high numbers of pests are detected during these three-monthly inspections, additional pest management would be required.		restoration contractor	Minimal surface harbour for rabbits and hares present (but excluding natural harbour such as rocks and tussocks).	
6	Control all weeds before seed set using appropriate methods detailed in Section 4.3 to ensure a reduction of existing weed levels. Refer to Table 7 for percentage cover of high threat weeds at inception and targets. Eliminate any WoNS (see Section 4.3). Control total cover of weeds, in particular perennial grassy weeds and broadleaf weeds. Monitor for new and emerging WoNS and noxious weeds and eliminate any found.	Weed management should be undertaken twice a year between July and November, as detailed in the annual works plan. If high densities of weeds are detected during the three-monthly inspections, additional weed management would be required.	Entire Offset Site	DoF in consultation with an ecological restoration contractor	Minimise the occurrence of weeds, with a reduction in total cover of weeds, including WoNS and noxious weeds, beyond current levels.  <b>See Table 7:</b> <10% cover of perennial grassy weeds by the end of 10 years. <20% total exotic weed cover. Control new and emerging weeds to < 1% cover across Offset Site. Limiting damage such as spray drift or overspray to <10% damage to native species.	2
7	Develop burn plan and undertake ecological burn of the Offset Site to reduce plant	March-August. Conduct burns in different seasons to promote	Entire Offset Site	A qualified contractor in consultation	Medium/low intensity burn of up to 30% of the Offset Site. Areas within burn boundary left unburnt with only a small	2



Management action number	Management action	Timing	Management zone	Responsibility	Target/outcome	Corresponding monitoring action number (Table 9)
	<p>biomass and promote recruitment of native species. Ecological burns may be undertaken over up to 30% of the Offset Site in any year. Burns must also be undertaken to generate a mosaic pattern of burnt and unburnt areas. Grazing to be excluded from Burn areas for at least 6 months post-burn. Follow up weed control will be undertaken within the burn area in accordance with section 4.7.</p>	<p>regeneration of a variety of species however avoid burning from September to February. Any burn adjacent to another burn must be separated in time by at least 12 months. No area to be burnt at a frequency of more than once every fifteen years.</p>		<p>with RFS and DoF. Burn plan to be approved by Conservation Research.</p>	<p>mosaic of burns undertaken. Areas containing a build up of biomass should be targeted. Burning is to assist in meeting targets for vegetation cover as per management action 6.</p>	
8	<p>Conduct quarterly Offset Site inspections to ensure management activities are conducted as prescribed.</p>	<p>Continuous, at least once every three months</p>	<p>Entire Offset Site</p>	<p>DoF's nominated qualified ecologist (likely in conjunction with the land manager(s)).</p>	<p>Quarterly monitoring observations Included within annual reports.</p>	<p>All</p>
9	<p>A qualified ecologist is to undertake vegetation monitoring and refine management actions based on the results such as new weeds for priority control,</p>	<p>Yearly monitoring should be undertaken between October and December, with reporting to be completed and submitted</p>	<p>Management zones 1, 2 and 3.</p>	<p>DoF's nominated qualified ecologist (likely in conjunction</p>	<p>Prepare a standard monitoring report which includes the collection and analysis of monitoring data which will be used to monitor the performance measures outlined in Section 5. Vegetation monitoring report to be</p>	<p>All</p>

Management action number	Management action	Timing	Management zone	Responsibility	Target/outcome	Corresponding monitoring action number (Table 9)
	additions or alterations to biomass control methods.	to DoF by the end of January.		with the land manager(s).	incorporated into annual compliance report for DCCEEW.	
10	A qualified GSM expert is to undertake GSM population and habitat monitoring and refine management actions based on the results. Identify any subsequent management actions. The report to be supplied to DoF for review and the regulator as directed.	Yearly monitoring should be undertaken between October and December with survey for GSM to occur during the identified fly times.	Management zones 1, 2 and 3.	A qualified GSM expert to be engaged by DoF	Prepare a standard monitoring report which includes the collection and analysis of monitoring data which will be used to monitor the performance measures outlined in Section 5. The report will be used to review the success of management and level of implementation of OMP. GSM monitoring report to be incorporated into annual report.	-
11	Prepare annual report based on quarterly Site inspections conducted throughout the year. Report to be provided to DCCEEW and DoF	February each year	Entire Site	DoF	Annual report.	
12	Review and update Annual Works Plan in consultation with DCCEEW.	By May each year	Entire Site	DoF	Following year's management tailored to current s Offset Site conditions	All
<b>Year Specific Actions</b>						
13	Construction of additional fences to better exclude livestock from areas of NTG and GSM habitat.	Conducted in the first year immediately after Offset Site establishment.	Entire Offset Site	DoF to engage a fencing contractor	Offset Site fenced as per Figure 5 of this OMP.	1

Management action number	Management action	Timing	Management zone	Responsibility	Target/outcome	Corresponding monitoring action number (Table 9)
14	Revise this OMP in consultation with DCCEEW to identify management actions required to maintain the Offset Site in perpetuity.	Revisions of the OMP should be undertaken after years 1, 3, 8 and 12.	Entire Offset Site	A qualified ecologist to be engaged by DoF.	Updated OMP to aid ongoing maintenance of the Offset Site.	All
<b>Beyond Year 10</b>						
15	Maintain fences and gates within the Offset Site. Remove any rubbish identified within the Offset Site.	Continuous, at least once every three months (inspection and management).	Entire Offset Site	DoF	Potential threats (i.e. domestic stock, unauthorised entry) excluded.	1
16	Undertake pulse grazing to reduce biomass according to Appendix 7 (Table 22). A minimum of three pulse grazing cycles are required within the grazing period, and one of these will occur immediately before the exclusion period (unless otherwise advised by the fire management plan). The maximum grazing length at any one time is two weeks within one paddock, with a minimum four-week rest period between grazing cycles. Livestock to be removed immediately if	Between 31st January and 31st August (see Table 30).	Management zones/paddocks 1 and 2.	DoF	Maintain an open tussock grassland with at least 30% cover of inter-tussock space. Grazing may be deferred if ecological burning is implemented. <b>If the grazing target of 50% cover or 30% inter-tussock space is reached before the two week period, livestock will be removed from the management zone immediately.</b>	2

Management action number	Management action	Timing	Management zone	Responsibility	Target/outcome	Corresponding monitoring action number (Table 9)
	targets are reached before 2-week period.					
17	Control of pest animals within the Offset Site including, rabbits, hares, foxes and cats. Control should be implemented throughout the surrounding area (not only on the Offset Site) where possible. This can be achieved through consultation with local pest control authorities and coordinating control activities to occur during the same period.	Pest management is required twice a year, once between February and April, and again between September and November. Inspections will be undertaken every three months.  If high numbers of pests are detected during these three-monthly inspections, additional pest management would be required.	Entire Offset Site	DoF in consultation with an ecological restoration contractor	Negligible ground disturbance by pest animals within Offset Site.  No active rabbit warrens present within Offset Site.  Minimal surface harbour for rabbits and hares present (but excluding natural harbour such as rocks and tussocks).	3
18	Control all weeds before seed set using appropriate methods to ensure a reduction of existing weed levels.  Refer to Table 7 for percentage cover of high threat weeds at inception and targets.  Eliminate any WoNS (see Section 4.3).	Weed management should be undertaken twice a year between July and November. If high densities of weeds are detected during the three-monthly inspections, additional weed management would be required.	Entire Offset Site	DoF in consultation with an ecological restoration contractor	Maintain low occurrence of weeds.  <b>See Table 7:</b> <10% cover of perennial grassy weeds by the end of 10 years. <20% total exotic weed cover.  Control new and emerging weeds to < 1% cover across Offset Site.  Minimal damage to native plants away from target areas.	2

Management action number	Management action	Timing	Management zone	Responsibility	Target/outcome	Corresponding monitoring action number (Table 9)
	Control total cover of weeds, in particular perennial grassy weeds and broadleaf weeds. Monitor for new and emerging WoNS and noxious weeds and eliminate any found.					
19	Develop burn plan and undertake ecological burn of the Offset Site to reduce plant biomass and promote recruitment of native species. Ecological burns may be undertaken over up to 30% of the Offset Site in any year. Burns must also be undertaken to generate a mosaic pattern of burnt and unburnt areas. Grazing to be excluded from Burn areas for at least 6 months post-burn. Follow up weed control will be undertaken within the burn area in accordance with section 4.7.	<p>March-August.</p> <p>Conduct burns in different seasons to promote regeneration of a variety of species however avoid burning from September to February.</p> <p>Any burn adjacent to another burn must be separated in time by at least 12 months.</p> <p>No area to be burnt at a frequency of more than once every fifteen years.</p>	Entire Offset Site	A qualified contractor in consultation with RFS and DoF	<p>Medium/low intensity burn of up to 30% of the Offset Site. Areas within burn boundary left unburnt with only a small mosaic of burns undertaken.</p> <p>Burning is to assist in meeting targets for vegetation cover as per management action 6.</p>	2
20	Conduct quarterly Offset Site inspections to ensure management activities are conducted as prescribed.	Continuous, at least once every three months	Entire Offset Site	DoF's nominated qualified ecologist	Quarterly monitoring observations Included within annual reports.	All

Management action number	Management action	Timing	Management zone	Responsibility	Target/outcome	Corresponding monitoring action number (Table 9)
				(likely in conjunction with the land manager(s).		
21	A qualified ecologist is to undertake vegetation and GSM monitoring and refine management actions based on the results such as new weeds for priority control, additions or alterations to biomass control methods.	Five yearly monitoring to be undertaken between October and December, with reporting to be completed and submitted to DoF by the end of January.	Management zones 1, 2 and 3.	DoF's nominated qualified ecologist (likely in conjunction with the land manager(s).	Prepare a standard monitoring report which includes the collection and analysis of monitoring data which will be used to monitor the performance measures outlined in Section 5. Vegetation and GSM monitoring report used to inform ongoing management actions.	All

## 4.2 Fencing, information and access control

Permanent fencing able to exclude domestic stock already exists around the 57.9 ha boundary of Block 48 and the 12.7 ha Offset Site. Existing internal fences will be used as the basis for boundaries between management zones given, they already determine different management and condition zones. Additional fencing within the Offset Site has been recommended in Figure 5, which will enable better management of grazing in areas of native vegetation and GSM habitat. Dividing areas of native vegetation and GSM habitat and making paddocks smaller will allow more even grazing and help the landholder to make more accurate decisions around when livestock should be moved from a management zone.

The existing access gate and security (locked gates) arrangement is adequate to service the access management requirements of this Offset Site. No signs identifying the property as an Offset Site are proposed.

Monitoring of access and threats will be conducted on an ongoing basis (every three months) with fencing repaired or upgraded as required. Monitoring will document any evidence of unauthorised access to the Offset Site and steps will be put in place to remediate any harm caused and prevent future unauthorised access. Currently, all fences are in a condition which should prevent unauthorised access. All fencing around the perimeter of the property is to be maintained in good stockproof condition.

## 4.3 Weed control

Weed control works are required to achieve biodiversity gains for an Offset Site under the EPBC Act and required habitat improvement for NTG and GSM habitat. The emphasis for weed control is the prevention of weed seed production with the goal being the reduction in the total weed cover with specific targets for high threat species on Site.

Direct active management of native vegetation using targeted grazing is expected to have an impact on the abundance of annual introduced grass species - predominantly grasses, such as *Vulpia* sp., *Briza* sp., *Bromus* sp., *Avena* sp. and *Aira* sp. (Table 7) which are not considered a substantial threat in this environment. However, it is possible in relatively wet years that grazing may not be able to have a large enough impact on ground cover biomass and in this situation the application of ecological burning will be evaluated.

Application of fire prior to the seed set for weedy annual grasses is known to have a significant negative impact on these weeds. The timed application of fire is therefore strongly encouraged by this OMP. Note however, that the timing of any burning needs to consider the habitat for GSM and therefore burning within GSM habitat will be prohibited from anytime near or within the GSM flight season (i.e. burning only permitted between March and September). Burning outside areas of GSM habitat may be conducted provided are not impacting GSM habitat.

Target species are likely to change over time in response to seasonal conditions, the result of pulse grazing or controlled burns. Burning may stimulate the germination of broad-leaf weeds which will need to be treated post-burn. Broad leaf weed species will be treated using the most suitable removal method to suit the species. Periodic burning that is followed by spot spraying or hand pulling (depending on species) will be important for weed species that are difficult to control until they are replaced by native species. Follow up treatment may be required to effectively control some species.

Aside from spot spraying after burning, spot spraying will be undertaken regularly, particularly in spring and early summer, with a focus on killing weeds prior to seed set. Spot spraying will be completed in a manner which minimises non-target damage. Spot spraying will not occur during high wind days or in close proximity to threatened flora without protective measures in place (i.e. physical shielding). Note, that the timing of

spraying needs to consider the habitat for GSM and therefore spraying will be prohibited from anytime near or within the GSM flight season (i.e. spraying only permitted between March and September).

Weed cover and species will be monitored and management adapted in response to this management.

Weed control works will be timed appropriately in accordance with

Table 6. Weed levels will be monitored and management methods adapted over time in response to changing conditions. New and emerging high threat weeds will be monitored and controlled (to less than 1% cover) if found. Any other invasive environmental weeds identified during the ongoing Offset Site monitoring will also be controlled.

WoNS are only present at low levels within the Offset Site although they are also likely to be present in low densities in adjacent road reserves. Where WoNS are observed during Offset Site management or monitoring activities, these need to be controlled and eliminated promptly (before fruiting and seed set). The cover of WoNS will be maintained at negligible levels in perpetuity.

**Table 7: Weeds identified on the Offset Site**

Scientific Name	Common Name	% baseline cover	Control Proposed	Target Outcome <sup>^</sup>
Annuals ( <i>Vulpia</i> , <i>Briza</i> , <i>Bromus</i> , <i>Aira</i> )	Annual Grasses	10%	Controlled pulse grazing by livestock to prevent seed set. Spot spraying appropriate herbicide to prevent seeding.	5% cover
Broadleaf weeds ( <i>Hypochoeris radicata</i> , <i>Plantago lanceolate</i> , <i>Chondrilla juncea</i> , <i>Echium plantagineum</i> , <i>Gamochaeta sp.</i> )	Broadleaf weeds	5%	Spot spraying appropriate herbicide (early spring).	<2%
<i>Phalaris aquatica</i>	Phalaris	15%	Controlled pulse grazing by livestock to prevent seed set. Spot spraying appropriate herbicide (early spring).	8% cover
<i>Dactylis glomerata</i>	Cocksfoot	5%	Controlled pulse grazing by livestock to prevent seed set. Spot spraying appropriate herbicide (early spring).	<2% cover
<i>Cirsium vulgare</i>	Spear Thistle	2%	Spot spraying appropriate herbicide (early spring).	<1% cover
<i>Nassella trichotoma</i>	Serrated Tussock	2%	Spot spraying appropriate herbicide (early spring).	<1% cover
<i>Hypericum perforatum</i>	St John's-wort	2%	Spot spraying appropriate herbicide (early spring).	<1%
<i>Rubus fruticosus</i> L. agg.	Blackberry	<1%	Spot spraying appropriate herbicide (early spring).	<1%
<b>Estimated total</b>		<b>41%</b>		<b>20%</b>

<sup>^</sup> Desired outcome after 10 years of ecological management.



The Offset Site is not near any named waterways, although a number of seasonal wetlands occur within Block 48. While there may be localised surface water flows during high rainfall events, any wetland within the Offset Site is ephemeral and no specific runoff risk is identified for the application of herbicides to this area.

Monitoring for new and emerging high threat weeds will be conducted throughout the year for the term of the agreement, and any new and emerging high threat weeds eliminated. If new and emerging weeds are identified these will be eradicated or maintained at < 1% cover. Figure 5 identifies several occurrences of WoNS which should be controlled during the first treatment of weeds at the Offset Site.

DoF will contact the land owner of any public land (i.e. council managed road reserves adjacent to the Offset Site) where high threat weeds occur within the vicinity of the Offset Site, with the aim to have these weeds controlled.

#### 4.4 Pest animals

The control of vermin and other pest herbivores will be implemented in accordance with the ACT Pest animal management strategy 2012 – 2022 (ACT Government 2012). Grazing by European Rabbits (*Oryctolagus cuniculus*) and European Hares (*Lepus europeus*) is evident and is likely to have an impact within the Offset Site. However, no active rabbit warrens have been noted within the Offset Site. Pest species at the offset site to be managed in line with best practice methodology and relevant ACT Government Guidelines.

#### 4.5 Biomass / organic litter control

Biomass management is essential to maintain indigenous flora and fauna values throughout the Offset Site. Biomass management is also required to maintain inter-tussock spaces and prevent excessive competition to grassland forbs. Controlled grazing will be applied to reduce biomass and maintain an open tussock-grass structure, and where appropriate, ecological burning will also be utilised at an appropriate scale.

Where there is a sustained build up in ground cover biomass over any one year, resulting in a reduction of inter grass tussock space to an average of less than 30%, biomass will need to be actively reduced.

Inter-tussock space and the build-up of groundcover biomass will be measured by the independent ecological monitoring. Should trigger values be reached DoF will need to manage the Site in reduce biomass.

The independent ecological monitoring will assess the effectiveness of the biomass control techniques and the need for any adjustments to the management regime to provide the prescribed outcomes.

#### 4.6 Use of grazing for ecological management

Currently the Offset Site is subject to a VMP which limits grazing in some areas of native vegetation and GSM habitat at certain time of the year. Given the diversity of native species currently present within the uncultivated native grasslands of the Offset Site, grazing using practices similar to those currently employed is considered a reliable and conservative action to maintain the ecological values associated with the Offset Site. While grazing by domestic stock will continue it will be undertaken in a more controlled manner following a detailed grazing management plan (Appendix 7).

Grazing using high numbers of livestock (~50-80 head) over short periods of time will be used to maintain an open tussock grassland structure and maintain or improve the species richness of NTG areas. The timing of grazing will be strictly controlled to allow native species to grow and set seed over the spring to mid-summer period. Stock will be excluded from the end of August to the end of January annually, in perpetuity.

Table 6 provides targets to be met for ongoing management of grazing within the Offset Site.

DoF will maintain records of the number of livestock and duration of grazing within the Offset Site. This data and the resulting impact on biomass will provide the basis for any changes or adaptation to the strategy. The grazing exclusion period may be varied by DoF in response to seasonal conditions.

Grazing will occur over a short duration (to allow for periods of grazing exclusion) and significantly exceed the standard stocking rate (to prevent selective grazing). The maximum length of continuous grazing is 2 weeks with at least 6 weeks rest between cycles. Biomass management objectives are that inter-tussock space will be maintained to an average of 30% and the total vegetation cover will not fall below 50%. At least 3 pulse grazing cycles will occur within the grazing period, one of which will occur immediately prior to the exclusion period (weather permitting).

**Table 8: Requirements and limit of grazing activities within the Offset Site.**

<b>Period where grazing by domestic stock is not permitted</b>	31st August to 31st January annually
<b>Pulse grazing cycles required</b>	3 (maximum)
<b>Grazing required prior to exclusion period</b>	15th August to 30st September
<b>Minimum rest from grazing between pulse grazing</b>	6 weeks
<b>Maximum continuous pulse grazing</b>	2 weeks
<b>Biomass management thresholds</b>	Total vegetation cover of no greater than 70%
<b>Target inter-tussock space</b>	Minimum 30% of total Site cover
<b>Grazing monitoring</b>	Groundcover to be recorded before and after each grazing event

\* Note that the times where grazing is permitted can be varied based on advice from an ecologist in response to atypical seasonal conditions.

The only exception to requirements specified for pulse grazing (Table 7) is if an ecological burn is planned during or following the pulse grazing period. In this instance a fire management plan produced by a qualified contractor will inform when grazing will be removed to allow for a build-up in biomass to establish a burn. Stock transfer into the GSM/NTG management zones will be timed to minimise the potential for weed seed transport via mud. Stock movements into the Offset Site will be excluded after any high rainfall (>20mm within a 72 hour period) until ground conditions are sufficiently dry to prevent soil compaction. The Offset Site will need to be monitored during wet periods to prevent excessive soil disturbance in seasonally wet areas. Following any high rainfall events, stock will be removed immediately.

The use of stock feed such as hay or grain that is sourced from outside the Offset Site is prohibited. The DoF will notify livestock managers to ensure that the transportation of weeds via stock feed does not occur. In the unlikely event that feed is bought onto the Offset Site, all efforts should be made to clean the area and remove all seeding material. The area will continue to be monitoring to ensure weeds are controlled immediately after germination.

#### 4.7 Fire for ecological management

During the ACT fire season (October-March, subject to seasonal variation) land managers are required to maintain grassland biomass to ACT Bushfire Management Standards, within prescribed Regional Fire

Management Zones, under the ACT Strategic Bushfire Management Plan 2014-2019 (SBMP) (ACT Government 2014).

Where native grazing/browsing animals cannot maintain biomass to the required standards, land managers must ensure that appropriate disturbance is scheduled prior to the fire season to comply with the prescriptions. Following the current SBMP, the grassland fuel management requirements are compatible with managing the NTG and GSM habitat. Burning within the Offset Site will be undertaken only with due consideration to relevant health and safety issues, including consultation with the Rural Fire Service and the development of a fire management plan.

The guideline for use of burning within this document pertains only to ecological management. DoF is responsible for ensuring the requirements of this OMP can be carried out in a compliant manner with all other government planning requirements and permits.

Importantly, burning (c.f. grazing or slashing) allows greater access and efficiency for weed control and increased natural regeneration of indigenous plant species. While burning may enhance germination of indigenous species, it can also be expected to promote certain exotic species and as such post-burning weed-control will be vital in maintaining remnant vegetation. However, stimulating the soil stored weed seed bank is seen as positive as this allows this seed bank to be exhausted through active management.

The controlled application of fire will be used for biomass reduction in all or parts of the Offset Site. However, no area is to be burnt more frequently than every fifteen years.

The application of a mosaic burning regime is also considered advantageous and therefore any individual burn will not burn the entire Offset Site. The landowner will prepare maps identifying the fire history of the Offset Site to ensure biomass control efforts are well documented. The extent, intensity and timing of burns must consider the presence of threatened species, in particular GSM. Fire may kill individuals of this species during the warmer months of the year when they are active above the soil surface. Timing of burns should only be undertaken between March and August, outside the GSM flight season.

Late summer or autumn burning is preferred. Late spring burns can be implemented if less than 20% of the Offset Site is impacted and burning is conducted outside the GSM habitat or flying period. Any ecological burns will be conducted during suitable (low wind and mild temperature) weather conditions and may be patchy (i.e. not result in the uniform burning of all areas). Patchy burns are a desirable outcome and an array of small patches covering up to a hectare is an appropriate target. Given a requirement to maintain adequate fauna habitat within the defined Offset Site, a restriction of burning no more than 30% of the Offset Site within any 12 month period is considered an effective strategy in providing an adequate cover for fauna while still providing for the ecological requirements of the vegetation community and its constituent species.

Ecological burning may only occur outside the prescribed declared fire danger period for this region. Burnt areas will be protected from grazing for at least 6 months to allow species regeneration and recruitment to occur. Temporary fencing should be erected around burn areas if grazing is to be implemented in the surrounding areas.

#### **4.8 Erosion management**

The Offset Site contains some minor gully erosion along the ephemeral creekline which runs through the southern portion of the Offset Site and eventually flows into Gooromon Ponds to the west. This erosion is likely due to historic overgrazing which, through the reduction of ground cover, has resulted in channel incision and slumping of the side walls. Improved grazing management implemented as part of the current VMP has enhanced ground cover, slowing the active erosion process and stabilising the sidewalls. For this

reason, it is not recommended that remediation methods be utilised apart from appropriate ongoing grazing management. Over time, the natural process of sedimentation will raise the channel floor and flatten out the sidewalls, returning the creekline to a more natural cross section.

An additional area of erosion on the ridgetop within GSM habitat was identified during preliminary investigations. This area is thought to be the result of an old gravel quarry and whilst the areas which have been excavated are still obvious, regeneration of native groundcover, including GSM preferred species, has already begun. Preliminary documentation stated the OMP would commit to the remediation of the erosion by re-seeding with appropriate GSM feed species and that measure over time is expected to result in improved soil conditions for GSM pupae and larvae. Therefore, targeted re-seeding of areas will be conducted to help improve GSM habitat.

#### **4.9 Supplementary planting, seeding and revegetation**

There is currently no need to conduct any supplementary planting or revegetation within the Offset Site in addition to the seeding of the erosion area on the ridgetop. There is a high diversity of understorey species throughout the Offset Site and improvement will mainly be achieved through weed control. Decisions regarding advanced regeneration measures will be reviewed by the independent ecologist after five years of active management and any recommendations made will be implemented.

#### **4.10 Other prohibited activities**

Activities such as pasture improvement, cultivation, cropping, surface rock removal and fertilizer application will be permanently excluded from the Offset Site.

## 5. Offset monitoring

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Monitoring of the Offset Site is an integral component of the regular Offset Site management activities. Monitoring will identify changes in conditions at the Site and allow for appropriate and timely management responses to any undesirable conditions that compromise the objectives of the OMP. Monitoring will include observations by the landowner during normal activities within the Offset Site. Such observations are important for maintaining things such as the integrity of fencing and Offset Site security. While these are normal land management activities, they have also been formalised in this OMP (See Management actions in Table 8).

At a minimum the landowner must keep a diary of any works conducted within the Offset Site and record any observations which could influence or initiate a management response. These details provide valuable information on the management of the Offset Site and detail the commitment of the landowner to the OMP.

The progress of management works will be monitored by the DoF on a regular basis (at a minimum once every 3 months). Management reports will be provided to the DoF, as per the EPBC Act offset decision (2017/8028), and to the DCCEEW where required. Records of all management actions will be kept providing evidence of completed works and management tasks.

Annual vegetation monitoring assessments will include a broad assessment of the Offset Site including the floristic assessment to document the general overall condition of the Offset Site and the ability of management works to maintain the general vegetation and habitat condition as assumed in the offset calculations provided in Appendix 1. A list of plant species observed, noting which, if any, weed species have become absent will be maintained for the Offset Site.

In addition, an audit at the end of each 5 year management period will be required until performance criteria for NTG and GSM has been met. Audits will be conducted at the end of each 5 year management period, being year 5 and 10, and supplied to the DCCEEW for review.

**Table 9: Monitoring schedule**

Monitoring action number	Monitoring activity	Parameter/s measured	Survey / monitoring guidelines	When
1	Fence condition	Condition of boundary fences.	Survey the Offset Site to ensure fences are intact and identify any evidence of unwanted domestic stock entry, vehicle access or firewood harvesting.	Quarterly
2	Weed and biomass	Cover of biomass and weed species present.	<p>Weed survey to be conducted twice a year before each weed management event. This will assist with identifying weed species present and determining the cover of each species so that weed management can be targeted towards specific weed species and areas of the Site. WoNS are to be mapped using GPS. Percentage weed cover to be estimated for defined sections of the Offset Site. All weed species present identified to species level.</p> <p>Vegetation monitoring quadrats (Table 12) will be used to assess and record vegetation parameters.</p> <p>Vegetation monitoring quadrats will also serve as permanent photo points. These photo points will be used to monitor the vegetation for the life of the approval and 10 year period covered by this plan.</p> <p>Visual inspections of biomass should be regularly conducted to determine grazing requirements. If grazing is to be implemented, the average groundcover of the paddock should be recorded before and after grazing is conducted.</p>	<p>Twice a year before each weed management event.</p> <p>Groundcover recorded before and after each biomass control event (grazing and controlled burn).</p>
3	Pest animal monitoring (Rabbits, Hares and Foxes, and new and emerging pest animals).	Presence of pest animals or signs e.g. scats, diggings, browsing or grazing.	Signs of pest animals to be recorded during vegetation surveys. Locations of any rabbit warrens to be mapped using GPS.	Annually – Spring during vegetation condition survey
4	GSM population and habitat condition monitoring	Number of GSM observed along the established walked transect. Collection of data at established habitat monitoring transects	Refer to Section 5.7 for details.	Annual – October to December for the first 10 years and every 2-3 years for the next 10 years.

**Table 10: Reporting schedule**

#	Type of report	Responsibility	Timing	Reporting authority	Trigger (if any)
1	Annual management actions report. Tabulates management actions completed within the Offset Site.	Property Manager	Report to be completed by the end of June so information is available prior to spring/summer monitoring.	DoF	N/A
2	Annual vegetation and weed and pest monitoring report. Presents results of Offset Site monitoring activities.	Property Manager	Annual vegetation monitoring to be completed between October and December. Report completed by the end of January. Monitoring is to be undertaken every year until year 10 and monitoring every 5 years thereafter to maintain the Offset Site.	DoF	None
3	GSM population and habitat monitoring report.	Property Manager	Annual monitoring to be completed between October and December. Report completed by the end of January.	DoF	Completion of GSM monitoring
4	Review of OMP.	Property Manager	Once every five years or as required.	DoF	Every five years or after a significant environmental event causing widespread impact to habitat within the Offset Site e.g. Bushfire.
5	Annual compliance report as required under EPBC Act approval conditions.	Approval holder (DoF)	Required every 12 months following commencement of the action.	DoF / DCCEEW	N/A
6	Annual audits at the end of each 5 year management period until performance criteria for NTG and GSM has been met.	Approval holder (DoF)	Audit at the end of each 5 year management period, being year 5 and 10.	DoF / DCCEEW	After completion of annual monitoring

### 5.1 Fence condition

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

### 5.2 Weed and biomass monitoring

Weed monitoring will be conducted twice a year, once in early spring (August/September) and once in summer (December/January). There will be three components to the monitoring of weeds:

- Inspection of the entire Offset Site for weeds, by walking throughout the area such that a visual inspection (including with binoculars) would detect the presence of any weeds. Complete coverage of the Offset Site will likely require at least two hours of survey. All weed infestations will be mapped with a GPS, and the locations will be supplied to the weed management contractor/landholder for treatment. Subsequent monitoring will then revisit previously mapped infestations to evaluate the success of weed control, as well as inspecting the entire Offset Site for new infestations.
- While conducting the weed surveys, notes will be taken regarding the cover of weed species, and cover will be estimated to the nearest five percent cover as shown in Table 11. Species and areas suitable for targeted treatment (such as spot spraying), will be mapped and supplied to the weed management contractor/landholder for treatment.
- The vegetation monitoring quadrats will serve as permanent photo points established by the ecologist. Photo points will be located at the coordinate locations shown in Appendix 9. These monitoring quadrats adequately characterise the current vegetation condition and include a range of weed species. At the start marker point for the vegetation monitoring quadrat, a photo will be taken facing the four points of the compass (N, S, E & W). These photo points will be used to monitor the vegetation for at least the life of the approval.

**Table 11: Key weed species density classes for monitoring (KRB 2014).**

Class	Class description
1	Absent
2	Less than 1 per cent cover
3	1 to 5 per cent cover
4	6 to 10 per cent cover
5	11 to 20 per cent cover
6	21 to 30 per cent cover
7	31 to 40 per cent cover
8	41 to 50 per cent cover
9	Greater than 50 per cent cover

### 5.3 Pest animal monitoring

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



## 5.4 Baseline vegetation monitoring 2019/2020

### 5.4.1 Database and literature sources

Relevant databases and literature were reviewed prior to field survey to identify data gaps and inform survey design. Previous vegetation and GSM habitat monitoring KBR (2014), Biosis (2015) and Umwelt (2016) was reviewed to assist with development of a future monitoring methodology to measure changes in condition for key conservation items in response to management. The extent of native vegetation types within the Site is tabled below and illustrated in Figure 3.

The following databases and literature were also reviewed:

- ACTmapi database (ACT Government 2015)
- EPBC Act Protected Matters Report (DoE 2019a)
- Species Profile and Threats Database (DoE 2019b)
- Biosis (2015) Block 48, Hall ACT – Year 1 Vegetation Condition Monitoring Report
- KBR (2014) Block 48 Wallaroo Road, Vegetation Management Plan
- Umwelt (2016a) Offset Analysis Report for Block 3 Section 22 and Proposed Offset Sites
- Umwelt (2016b) Year 2 / Baseline Vegetation Condition Monitoring Report Block 48 Wallaroo Road, Hall, ACT
- Umwelt (2016c) Vegetation Management Plan: Block 48 Wallaroo Road.

### 5.4.2 Field survey

A meeting and preliminary site walk-over was conducted on the 2<sup>nd</sup> October 2019 by Niche Ecologists. This was followed by vegetation and GSM habitat mapping conducted on the 10<sup>th</sup> October 2019. Subsequent GSM surveys were conducted on the 19<sup>th</sup> November and the 6<sup>th</sup> December, with GSM habitat transect data conducted on 30<sup>th</sup> January 2020. Vegetation plots were conducted on the 3<sup>rd</sup> April 2020.

As part of the baseline analysis (Niche 2020), vegetation quadrats and transects previously established by Umwelt (2016b) were repeated at the same sites to collect a second round of data allowing for a robust set of baseline data from which changes by improved management (or unanticipated disturbance) can be detected. Baseline data collected by Umwelt was collected in November and data was collected by Niche was conducted in April 2020. Repeated comparisons on an annual basis will be used to determine trends in NTG quality over time. Whilst the Niche data was collected in Autumn, future data should be collected in late Spring to ensure species are easily detected and accurately identified.

### 5.4.3 Vegetation monitoring methodology

Vegetation monitoring surveys were undertaken between October and December each year. Vegetation monitoring quadrats have previously been established by Umwelt (2016b). Quadrats have been relocated using a handheld GPS and a permanent marker established (e.g. star picket) to allow for repeatable survey. Locations for each quadrat are provided in Appendix 9 , Table 25. A 50 m transect was set out along the bearing provided in Table 25. A nested 20 x 20 m quadrat was laid out within the 50 m transect as shown in Plate 1.

Detailed methodology for the collection of each data variable has been provided in Table 12 below.

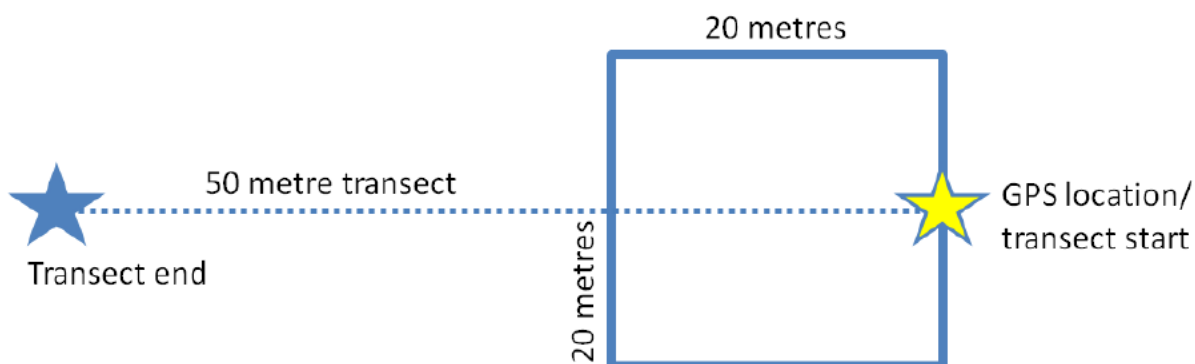


Plate 1: Quadrat and transect design (Umwelt 2016b)

Table 12: Data Collected for Each Quadrat and Transect (Umwelt 2016b)

Variable	Method
<b>20 x 20 metre quadrat</b>	
<b>Native plant species richness</b>	Native plant species refers to vascular species local to the area which, if planted, come from a local seed source. Systematically walk the plot counting the number of native plant species for all vascular plants (i.e. the species do not have to be identified).
<b>Native midstorey cover</b>	<p>The mid-storey contains all vegetation between the overstorey stratum and 1m in height (typically tall shrubs, under-storey trees and tree regeneration) and includes all species native to the ACT (i.e. native species that are not endemic to the area cannot contribute to mid-storey structure). Foliage cover of the mid-storey is expressed as a % and can be measured using the following method:</p> <p>At 10 points along the 50m transect (i.e. every 5m) estimate per cent foliage cover in the mid-storey. Divide the total by the number of points (i.e. 10) measured along the transect (e.g. 50%, 0%, 0%, 40%, 0%, 45%, 50%, 55%, 0%, 0% = 240/10 = 24% foliage cover).</p>
<b>At 10 points along 50 metre transects</b>	
<b>Native overstorey cover</b>	<p>Native over-storey is the tallest woody stratum present (including emergent trees) above 1m and includes all species native to the ACT (i.e. native species that are not endemic to the area cannot contribute to overstorey structure). In a woodland community the over-storey stratum is the tree layer, and in a shrubland community the over-storey stratum is the tallest shrub layer. Some vegetation types (e.g. grasslands) may not have an over-storey stratum.</p> <p>Over-storey cover is estimated as per cent foliage cover, which is equivalent to the amount of shadow that would be cast on the ground if there were a light source directly overhead and can be estimated using the following method: At 10 points along the 50 m transect (i.e. every 5 m) estimate per cent foliage cover directly overhead using the images provided on Page 4. Divide the total by the number of points (i.e. 10) measured along the transect (e.g. 50%, 0%, 0%, 40%, 0%, 45%, 50%, 55%, 0%, 0% = 240/10 = 24% foliage cover).</p>
<b>At 50 points along 50 metre transects</b>	
<b>Native ground cover (grasses)</b>	The ground stratum contains all native vegetation below 1m in height and includes all species native to the ACT (i.e. is not confined to species indigenous to the area).

<b>Native ground cover (shrubs)</b>	The ground stratum (grasses) refers to native grasses (i.e. plants belonging to the family Poaceae).
<b>Native ground cover (forbs)</b>	The ground stratum (forbs) refers to native forbs. The ground stratum (sedges) refers to native sedges.
<b>Native ground cover (sedges)</b>	The ground stratum (rushes) refers to native rushes. The ground stratum (ferns) refers to native ferns.
<b>Native ground cover (rushes)</b>	Foliage cover of the ground stratum (grasses) is expressed as a % and can be measured using the following method: At 50 points along the 50m transect (i.e. every 1 m) record whether native grass intersects that point. Divide the total of 'hits' by the number of points measured along the transect (i.e. 50).
<b>Native ground cover (ferns)</b>	
<b>Perennial Exotic plant cover</b>	Perennial exotic plants are vascular perennial plants not native to Australia. Perennial exotic cover is measured as a % of total ground cover vegetation.
<b>Annual Exotic plant cover</b>	Annual exotic plants are vascular annual plants not native to Australia. Annual exotic cover is measured as a % of total ground cover vegetation.
<b>Additional Variables (not collected, may be relevant pending future restoration of Box Gum Woodland)</b>	
<b>Over-storey regeneration</b>	<i>Collected across entire zone.</i> Regeneration is measured as the proportion of overstorey species present at the Offset Site that is regenerating (i.e. with dbh < 5cm). For example, if there are three tree species present at the Offset Site but only one of these species is regenerating, then the value is 0.33. The maximum value for this measure is 1.
<b>Total length of fallen logs</b>	<i>Collected in 20 x 50 metre quadrat.</i> This is the total length of logs at least 10cm diameter and at least 0.5 metres long. The diameter is estimated with a measuring tape (or callipers if available) held horizontally immediately above the log and the length is estimated to the nearest metre by measuring with a tape, or pacing, along the part of the log that is at least 10cm diameter. If estimating length by pacing, then the actual length of a sample of logs should be measured regularly with a tape so the assessor can calibrate their estimate derived from pacing. Only those parts of logs lying within the plot are measured.
<b>Number of large trees</b>	<i>Collected in 20 x 50 metre quadrat.</i> This is a count of the number of living and dead trees within a 50m x 20m plot which have a circumference of 150cm, 1m above ground height.

Additional qualitative assessment of vegetation was conducted in the form of a site walk over and condition assessment according to attributes in Table 13 below, upon which vegetation mapping throughout the Study area was based.

**Table 13: Vegetation condition assessment**

	Resilience rating	Description of vegetation condition
<b>RESILIENT AREAS</b>  <i>Soil profile intact. Natural regeneration pathways facilitated.</i>	Good	<ul style="list-style-type: none"> <li>Minor infestations of weeds or virtually weed free</li> <li>High species richness</li> <li>Low perimeter to core ratio and large adjacent patches</li> <li>All structural layers essentially intact or minor artificial modification has occurred but is not substantially impacting on ecological function</li> <li>Patch in benchmark condition or stable after disturbance</li> <li>Minimal input management required to facilitate regeneration.</li> </ul>
	Moderate	<ul style="list-style-type: none"> <li>Minor infestations of weeds</li> <li>Moderate species richness</li> <li>Moderate perimeter to core ratio, large adjacent patches</li> <li>Structural absence or strong decline in condition of at least one vegetation layer due to previous artificial disturbance (e.g. regrowth from recent clearing event and subsequent loss of hollow-bearing trees)</li> <li>Patch approaching benchmark condition</li> <li>Minimal input management required to facilitate regeneration.</li> </ul>
	Poor	<ul style="list-style-type: none"> <li>Moderate to severe infestations of weeds</li> <li>Low species richness</li> <li>High perimeter to core ratio. Patches isolated or adjacent native vegetation fragmented</li> <li>Structural absence or strong decline in at least 2 vegetation layers (e.g., derived native pasture or grassland). Remaining native components under stress</li> <li>Original soil profile intact but patch well outside of benchmark condition</li> <li>Moderate levels of management required to facilitate regeneration.</li> </ul>
<b>NON-RESILIENT AREAS</b>  <i>Soil profile permanently altered. Natural regeneration pathways unlikely.</i>	Poor (maintained rehabilitation area)	<ul style="list-style-type: none"> <li>Moderate level of weed invasion</li> <li>Rehabilitation area – re-vegetation or previous soil translocation</li> <li>Soil profile may exhibit some regenerative potential though structure and composition unlikely to reach benchmark after treatment</li> <li>Limited natural regeneration capacity after treatment and high on-going inputs to achieve sustainable outcome.</li> </ul>
	Very Poor (un-managed and degraded vegetation)	<ul style="list-style-type: none"> <li>Native vegetation almost totally replaced by weed species and, at best, a single structural layer intact (e.g., large trees in degraded riparian zone)</li> <li>Soil profile disturbed and permanently altered resulting in loss of soil seed bank</li> <li>No regeneration capacity, natural regeneration pathways lost</li> <li>Management requires high input reconstruction and commitment to on-going maintenance.</li> </ul>
	Not native	<ul style="list-style-type: none"> <li>Potential regeneration suppressed by management practices (e.g., parkland, cropping or exotic pasture).</li> </ul>

#### 5.4.4 Vegetation baseline survey results

Despite unseasonably dry conditions, vegetation throughout the Offset Site maintained a reasonably high (~70%) level of vegetation cover. A diverse range of grasses and forbs were identified throughout areas of native vegetation including a range of more sensitive native forbs such as *Eryngium ovinum* (Blue devil), *Plantago varia* (Variable plantain), *Triptilodiscus pygmaeus* (Common sunray) and *Goodenia* sp.

Areas inside the Offset Site which have not been mapped as native vegetation were mainly dominated by Phalaris, Cocks-foot or other broadleaf or annual weed (Table 7). These areas contained a small component (20% or less) of native grasses and will be able to be reduced with an appropriate management regime such as pulse grazing, burning and weed management.

Table 14 below shows the areas of native vegetation identified and mapped within the Offset Site (Figure 3).

**Table 14: Native vegetation recorded within the Offset Site (April 2020)**

Vegetation Type	Block 48 57.9 hectares	Offset Site# 12.7 hectares	
	Baseline (ha)	Baseline (ha)	Umwelt 2016 (ha)
Box Gum Grassy Woodland Derived Native Grassland (Good)	9.96	3.63	3.90
Box Gum Grassy Woodland Derived Native Grassland (Moderate)	24.25	1.55	
Natural Temperate Grassland	2.62	2.62	2.30
<b>Total</b>	<b>36.83</b>	<b>7.80</b>	<b>6.20</b>

# the Offset Site sits within Block 48

Table 15 below shows baseline vegetation plot data which will be used to measure changes in vegetation condition over time. Plot data collected by Umwelt at the same locations in 2016 can be seen in Appendix 4.

**Table 15: Vegetation baseline data collected by Niche**

Variable	Q3	Q5	Q6	Q9	Average
Floristic Value Score	11	17	8	5	10.25
Native plant species richness	18	16	13	17	16
Native overstorey cover	0	0	0	0	0
Native midstorey cover	0	0	0	0	0
Native ground cover (grass)	76	50	78	44	62
Native ground cover (shrubs)	0	0	0	0	0
Native ground cover (forbes)	10	0	4	2	4
Native ground cover (sedges)	0	0	0	0	0
Native ground cover (rushes)	2	0	0	2	1
Native ground cover (ferns)	0	0	0	0	0
Perennial Exotic plant cover	0	0	0	0	0
Annual Exotic plant cover	12	50	10	42	28.5

## 5.5 Vegetation performance targets

Quantifiable performance targets at five yearly intervals are shown in Table 16 for NTG. These performance targets will ensure the offset site is on track to meet the completion criteria in Year 10.

**Table 16: Five yearly average vegetation performance targets**

Variable	Year 5 Average	Year 10 Average
Floristic Value Score	15.38	20.50
Native plant species richness	18.00	20.00
Native overstorey cover	0.00	0.00
Native midstorey cover	0.00	0.00
Native ground cover (grass)	66.00	70.00
Native ground cover (shrubs)	0.00	0.00
Native ground cover (forbes)	4.50	5.00
Native ground cover (sedges)	0.50	1.00
Native ground cover (rushes)	1.50	2.00
Native ground cover (ferns)	0.50	1.00
Perennial Exotic plant cover	0.00	0.00
Annual Exotic plant cover	14.96	1.43

## 5.6 Future vegetation monitoring requirements

Vegetation monitoring will be conducted using methods outlined in the ACT Vegwatch manual (Sharp and Gould, 2014) and the Floristic Value Scores method (Rehwinkel, 2007). This method has been used previously by Umwelt (2016b), as part of the previous VMP monitoring at the Offset Site and is detailed in Section 5.4.3 above. Repeated comparisons on an annual basis will be used to determine trends in NTG quality changes over time. Specific commitments are outlined in Table 3 to reach set targets. For example, an increase in the average number of native species within a 20 x 20m quadrat to more than 20 species throughout the NTG area shown in Table 16. These targets will be checked upon future monitoring to ensure improvement in biodiversity at the Offset Site and appropriate trajectory towards the 10 year targets. Vegetation condition performance targets are shown in Table 16 in Section 5.5.

## 5.7 Golden Sun Moth Monitoring

### 5.7.1 Baseline GSM monitoring 2019/2020

A comprehensive baseline survey for GSM was conducted in the 2019/20 flight season according to the methods outlined in the section 5.7.3. The results of the 2019/2020 survey will act as baseline data on the distribution and abundance of GSM within the Offset Site and are detailed in Section 5.7.5 and Appendix 5.

### 5.7.2 GSM monitoring requirements

Monitoring during the flight season for GSM is considered essential to determine the effectiveness of management actions taken to protect and offset impacts to this species. GSM population monitoring will occur every year in the flight season (October-December) once the OMP is implemented (next expected to be the 2020/21 flight season) for a period of 10 years and every five years thereafter for the life of the approval. GSM monitoring has two main aspects and will record:

1. GSM abundance - the number of individuals observed from a series of walked monitoring transects and
2. Habitat quality - recording data along established GSM habitat transects (Figure 4).

Monitoring methods for GSM have been established in accordance with the requirements of DEWHA (2009), Rowell (2013) and outlined in Section 5.7.3 below. The results of these surveys will be compared to the original baseline surveys (2019/20 flight season).

Reporting to DCCEEW will include the results of monitoring prescribed below, a general assessment of changes or trends in habitat condition or population size, trajectory towards performance targets and any management issues identified. This will be supported by relevant photos of habitat and management issues identified.

### 5.7.3 GSM monitoring methodology

#### ***GSM abundance surveys***

Surveys will be undertaken during the GSM flight season, which in the ACT region is typically expected to be between October and December each year. As the timing of the flight season varies annually and geographically, surveys need to be initiated from when warm weather is considered likely to stimulate emergence (from early October onwards). Prior to surveys being conducted, reports of GSM flying in or around ACT are likely to provide a useful indicator to identify the start of the flight season around the Offset Site. Surveys within the flight season are to be spaced at least one week apart to allow for variations in emergence patterns. Survey will take place when conditions are suitable for male flight (generally >20°C, bright, clear days, full sun, absence of rain and wind other than a light breeze) between 10:00 hrs and 15:00 hrs.

A monitoring event for abundance surveys includes a minimum of two GSM walked transect surveys (i.e. the Offset Site is assessed two times during a flight season) to document the occurrence and abundance of GSM within the Offset Site. Each survey will systematically walk the permanent monitoring transects shown in Figure 4 as well as random meanders over other areas of mapped GSM habitat. Permanent monitoring transects have been established in areas of good GSM habitat which have previously recorded high numbers of GSM. The coordinates of the abundance monitoring transects are shown in Appendix 4.

Random meanders will also be used to record GSM in lower density areas of moderate to low habitat throughout the remainder of the Offset Site. Each permanent monitoring transect is expected to take approximately 10 to 15 minutes to complete, with an additional 1 to 2 hours for the random meandering

transects. GSM numbers will be recorded for each monitoring transect. Tracks located away from the permanent monitoring transects will be recorded using a GPS and a waypoint taken for each location where GSM are observed.

### ***GSM habitat surveys***

In addition to walked monitoring transects, six GSM habitat monitoring transects have been established within GSM habitat throughout the Offset Site (Figure 4). GSM habitat monitoring transects have been used to quantitatively measure the quality of GSM habitat within the Offset Site. Monitoring of GSM habitat transects should be conducted once in December or as close as possible to the GSM flying period.

Monitoring transects have been established at representative locations within GSM habitat throughout the Offset Site. The coordinates of the habitat monitoring transects are shown in Appendix 5.

A 50 m transect is set out with a 1 x 1 m quadrat placed at the start point of the 50 m transect (See Figure 4). The start and end point of the 50 m transect are recorded, along with a landscape photo looking along the transect from the start point and another photo of the 1 x 1 m quadrat from directly overhead.

Categorised attributes are recorded every 50 centimetres along the 50m transect to give a total out of 100. Attributes recorded as part of the habitat monitoring transects include:

- Bare Earth
- Rock
- Cryptogams (Moss/Lichen)
- Litter/Dead Vegetation
- Perennial Native Grass (GSM foods)
- Other native grass (non GSM food)
- Native forb
- Chilean Needlegrass/ Serrated Tussock
- Perennial Exotic grass
- Annual Exotic Grass
- Exotic Forb

Flora species recorded at any of the 50 cm intervals along the tape are recorded on the datasheet with a tally of the number of times it was recorded along the 50 m transect. Each attribute is then tallied, with the total giving the percentage cover of each attribute along the transect. Species which were not recorded along the 50 m transect but which occur within 50 cm either side of the 50 m transect are also recorded.

Any observations of GSM during monitoring for vegetation condition and during inspections will also be recorded. As GSM are known to occur at this Offset Site, the inspection of a reference site prior to GSM survey is not required.

#### **5.7.4 GSM condition scoring**

Results from GSM monitoring will inform scoring of GSM habitat across the site according to Table 17 below within areas of good and moderate habitat. As habitat expands it may be necessary to add zones which would be scored independently of existing zones until a consistent quality is reached with the established zones. The scoring system below is transformed (see Table 19) so that each of eight factors receives a final score out of 3 (all factors becoming evenly weighted). Transformed scores are then summed to provide a final score



out of 24 and converted back to a score out of 10 to maintain consistency with the DCCEEW Offsets Assessment Guide.

**Table 17: Habitat quality scoring for GSM on the Block 48 Offset Site**

	Condition (transformed score)			
	Poor (0)	Low (1)	Moderate (2)	Good (3)
<b>Condition Attribute and raw scoring</b>				
<b>Site Condition</b>				
Structure – (score 0-3)	No suitable GSM habitat present.	Ground layer subject to considerable shading and/or litter deposition. High grass swards >50cm in height and living and dead cover >70%.	Moderately dense ground layer of >70% cover with some inter-tussock spaces, may contain some dense grass swards ~50cm in height.	Low biomass ground layer of ~50%, with >30% inter-tussock space.
Condition – (score 0-3)	Forest, woodland or secondary grassland.	Open woodland with >15% canopy cover.	Native grassland with moderate to high rock cover and/or poor soil depth and/or poor aspect and/or moderate to steep slope.	Native grassland with little to no rock cover, good aspect or flat/gently sloping and good soil depth.
Species Diversity – (score 0-3)	Dominated by unsuitable grass species (<1% food plants and low diversity (≤1 feed species).	Exotic or native dominated with low cover of food plants (1-5% <i>Rytidosperma</i> spp./ <i>Austrostipa</i> spp.) and low diversity (≤1 feed species).	Native dominated with a low cover of native food plants (5-10% <i>Rytidosperma</i> spp./ <i>Austrostipa</i> spp.) and moderate diversity (≤2 feed species).	Native dominated with high cover of native food plants (>10% Wallaby Grass or >21% <i>Rytidosperma</i> spp./ <i>Austrostipa</i> spp. combined) and high diversity (≥3 feed species).
<b>Site Context</b>				
Importance/patch size/connectivity – (score 0-3)	Patch is <0.25 ha No known habitat located nearby	Patch is <1 ha Other known habitat within 100 - 200m but isolated due to presence of barriers to GSM movement (i.e. presence of concrete, roads, structures, trees).	Patch is >3 ha Other known habitat within 1000m and connected by lands that do not present a barrier to GSM movement (i.e. concrete, roads, structures, water bodies are generally absent).	Patch is > 5 ha Other known habitat immediately adjacent (i.e. within 5m)

<p>Threats – (score 0-10)</p> <p>Each threat is considered and given a score between zero and two for each threat (possible total score between 0-10):</p> <p>0 = threat high 1 = threat moderate 2 = threat absent</p> <p>The final total score is adjusted to a score between 0 and 3. Threats include:</p> <p>Weed invasion (non-forage) Under/over-grazing Pesticide use Inappropriate fire regime Fertiliser use</p> <p><i>Weed invasion:</i> Weed cover remaining stable or increasing, and not actively managed.</p> <p><i>Under/over grazing:</i> Grazing to be managed as per the grazing management plan to ensure stock are used to maintain vegetation between 50% and 70% cover.</p> <p><i>Pesticide use:</i> Present at site Site measurably impacted by pesticide use in adjacent areas Absent at site</p> <p><i>Inappropriate fire regime:</i> Burning no more than 30% of the Offset Site within any 12 month</p>	<p>Raw threat (total) score between 0 – 2.5</p>	<p>Raw threat (total) score between 2.5 - 5</p>	<p>Raw threat (total) score between 5-7.5</p>	<p>Raw threat (total) score between 7.5-10</p>

<p>period outside the late summer or autumn recommended burning period. Wildfire to be excluded.</p> <p><i>Fertiliser use:</i></p> <p>Present at site</p> <p>Site measurably impacted by pesticide use in adjacent areas</p> <p>Absent at site</p>				
<b>Species Stocking Rate</b>				
Presence and abundance (score between 0-5)	No GSM present	Potential for low numbers of male GSM to be recorded ( $\leq 1/100\text{m}^2$ ), females or pupal cases unlikely to be observed.	Low-moderate numbers of GSM observed (1-10/100 m <sup>2</sup> ) and breeding likely (females and pupal cases may be observed).	Moderate-high numbers of GSM observed (>10/100 m <sup>2</sup> ) and breeding likely (females and pupal cases likely to be observed)

Note – None = 0, Low = 1, Moderate = 2, Good = 3

### 5.7.5 GSM baseline survey results (2019/2020)

The extent and condition of GSM habitat mapped within the Offset Site as recorded during baseline monitoring is tabled below and illustrated in Figure 4Table 18.

**Table 18: GSM habitat recorded within the Offset Site**

GSM habitat	Block 48 57.9 hectares	Offset Site* 12.7 hectares	
	Baseline (ha)	Baseline (ha)	Umwelt 2016 (ha)
Good	6.60	6.60	6.20
Moderate to low	5.85	1.22	
<b>Total</b>	<b>12.45</b>	<b>7.82</b>	<b>6.20</b>

\* The Offset Site has been confirmed as containing 2.62 ha of NTG and a further 5.20 ha of Derived Native Grassland (DNG), with a combined total of 7.82 in GSM habitat. This is a significant increase in the previous survey undertaken by Umwelt, attributed to continuation of the Vegetation Management Plan and favourable weather conditions.

High densities of GSM were recorded in the areas of good habitat, with greater than 150 individuals recorded along a single transect. Low densities of GSM were recorded in moderate habitat on the eastern side of the central lane.

Several female GSM were recorded throughout the Offset Site indicating that GSM are actively reproducing at the Offset Site.

### 5.7.6 GSM performance targets

Performance targets have been created for GSM habitat and density are shown in Table 19. These performance targets will ensure the offset site is on track to meet the completion criteria in Year 10. Performance targets include:

- Improving current GSM habitat by:
  - Reducing overall exotic weed cover
  - Increasing the cover of GSM feed species
  - Maintaining at least 20% cover of inter-tussock space through grazing or controlled burning
- Current population densities should be maintained with the aim of expanding GSM habitat into areas within the Offset Site which have not been mapped as GSM habitat. Habitat expansion can be achieved through the removal of nutrient loads in areas currently dominated by exotic grasses.

Table 19 demonstrates how these performance targets will be met over the 10 year management period for both moderate and good habitat. Values in red demonstrate where gains can be made, improving the overall condition of GSM habitat at the Offset Site. The following sections outline how these gains will be achieved.

#### **Site Condition**

Site condition is where the largest improvements can be made for moderate condition habitat. An additional two points on any of the site condition attributes (structure, condition, or species diversity) will increase the habitat quality score from a value of 5 to 6 and achieve the required gain over the 10 year management period. These additional improvement in site condition attributes will be meet by achieving two of the following outcomes:

- Improving inter-tussock space to an average of 20% cover through fire and/or grazing management

- Reducing the dominance of exotic species in the moderate GSM habitat areas to less than 20%, including reducing perennial weed cover to less than 10%
- Increasing species diversity of GSM forage species in the moderate condition GSM habitat from moderate ( $\leq 2$  feed species) to high diversity ( $\geq 3$  feed species). As well as improving the cover from 5-10% *Rytidosperma* spp./ *Austrostipa* spp. to  $>10\%$  *Rytidosperma* spp or  $>21\%$  *Rytidosperma* spp./ *Austrostipa* spp. combined.

### **Site Context**

In addition, threat level will be reduced once management of the Offset Site begins, ensuring that the following threats are no longer present within the Offset Site:

- weed invasion (i.e. non-forage species, not necessarily exotic plants)
- under or over grazing
- pesticide use
- inappropriate fire, and
- fertiliser use.

Each of the five threats above is assigned a score out of 2 based on the presence and intensity of threats at the site, the criteria for which is outlined in Table 17. The overall threat sub-score is the sum of scores for each threat and has a maximum of 10 as shown in Table 19.

The Offset Site has been allocated a starting score of 3 for the threats section, a score of 2 for high intensity weed invasion and a score of 1 for an inappropriate grazing regime. Weed invasion has been allocated a high intensity threat due to the potential for the replacement of forage species by invasive non-forage species, including the reversion of derived grassland back to woodland. Grazing regime has been allocated a low intensity threat as the current use of grazing as a biomass management tool is loosely implemented and has the potential for the vegetation, especially in higher nutrient areas, to become rank and densely thatched.

It is anticipated that once the threats currently present within the Offset Site, weed invasion and inappropriate grazing regime are removed through improved management practices, the threat level will also be reduced increasing the raw threat score from 7 to 10.

### **Species Stocking Rate**

As management at the Offset Site improves, it is expected that habitat quality and therefore GSM density of the moderate condition GSM habitat will improve, increasing from a quality score of 1.2 to 2. This will be achieved by improving GSM density to levels similar to that of the good GSM habitat areas.

Population Importance may be increased to a value of two after management improves and GSM habitat is secured in perpetuity. The improvement to a value of two could be justified as the Offset Site would then meet both the following criteria for 'important habitat':

- Key source population for either breeding or dispersal and;
- Population that is necessary for maintaining genetic diversity.

Therefore, an increase in population importance and threats would increase the Habitat Quality Score for the good condition habitat from a value of 2 to 3.

All management actions required to achieve these targets are addressed in previous sections of this OMP.

**Table 19: Habitat Quality Scores and predicted future scores (10 years) with management for GSM within the Block 48 Offset Site**

Variable	Moderate current score (raw)	Moderate current score (transformed)	Moderate future score (transformed)	Good current score (raw)	Good current score (transformed)	Good future score (transformed)	Max score (raw)	Max score (transformed)
<b>Site Condition</b>								
Structure	2	2	3	3	3	3	3	3
Condition	2	2	3	3	3	3	3	3
Species Diversity	2	2	3	3	3	3	3	3
<b>Site Context</b>								
Importance/patch size/connectivity	1	0.6	0.6	1	0.6	0.6	5	3
Threats	7	2.1	3	7	2.1	3	10	3
<b>Species Stocking Rate</b>								
Presence	2	2	2	2	2	2	3	3
Density	2	1.2	2	4	2	3	5	3
Population Importance	1	1	2	1	1	2	3	3
	19	12.9		24	16.7		34	23
<b>Current Habitat Quality Score</b>	7.9	5.4		10.0	7.0		14.8	10.0
<b>Future Habitat Quality Score</b>			7.8			8.2		

Note – values in red are those attributes which are predicted to be improved under management of the offset site

Figure 3: Vegetation Mapping



**Vegetation and GSM habitat  
Ecological Assessment and Offset Management Plan**

Figure 3

Niche Pty Ltd, Christelle Niche Pty Ltd, 15/06/2023  
Client: Agriculture

GDA 1984 MGA Zone 55



Figure 4: GSM Habitat

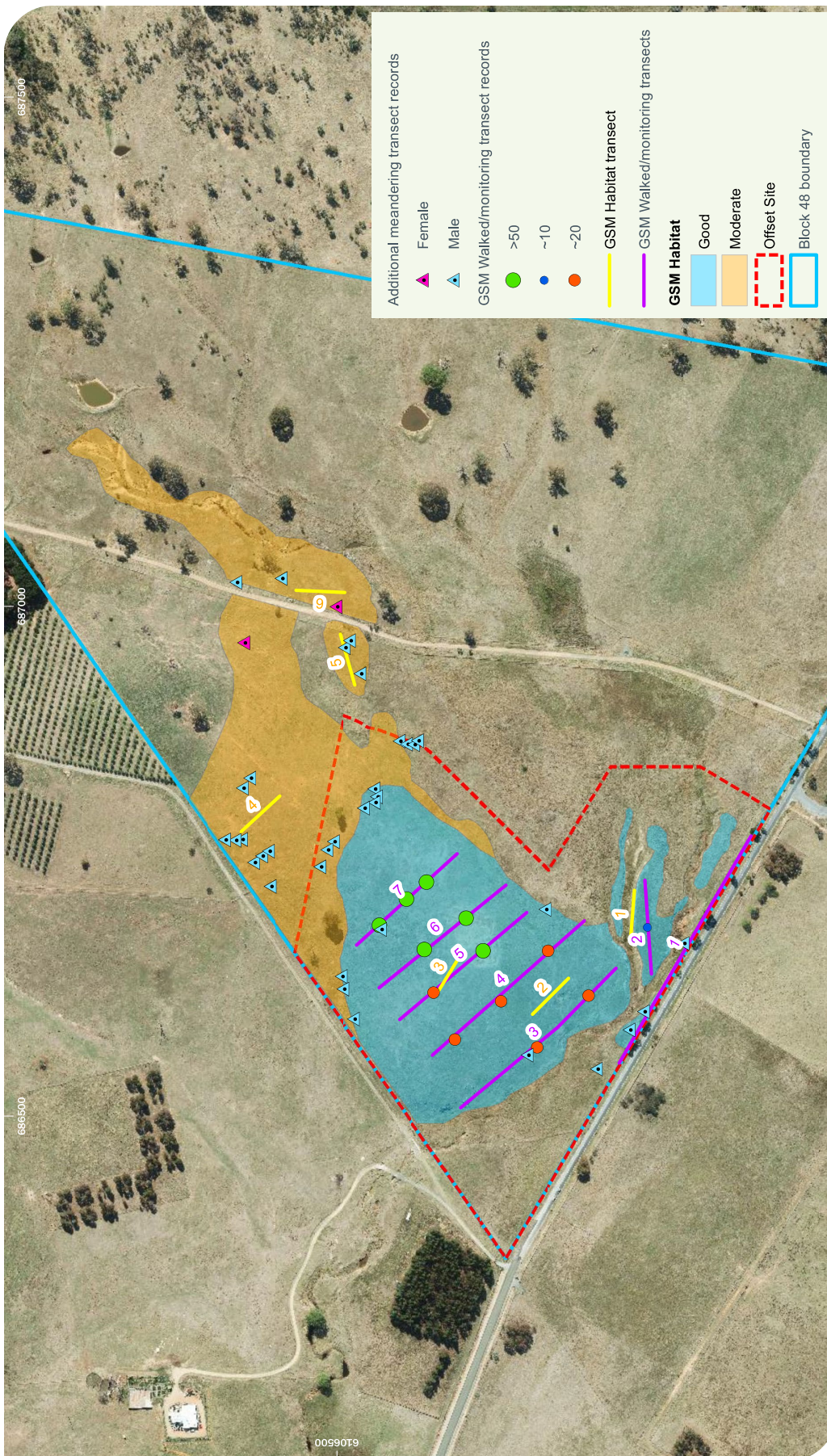


Figure 5: Management Actions



## 5.8 Research, education, and training

Approval condition 9a states that access to the Offset Site must be allowed for scientific research on protected matters such as GSM or NTG. While monitoring of protected matters will be conducted as part of adaptive management at the Offset Site, a number of more specific research activities could be undertaken to add value to the conservation already being undertaken.

Research trials such as the relocation of GSM pupae from nearby impact Sites or research into vegetation rehabilitation or fire management practices increasing and enhance areas of native vegetation in the Offset Site could be undertaken in partnerships with Universities, Non-Governmental Organisation or government departments undertaking research.

The DoF will make the site available for scientific research, at all times, with access being managed in coordination between the DoF Property Management team and the contracted ecologist. A site induction will be performed with any research group to ensure access, safety and environmental values are known and understood.

## 5.9 Auditing

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

- At the end of the first year of Offset Site management - this is to ensure that initial management actions are conducted to the satisfaction of the approval holder, ensuring the property is securely fenced, and that other initial management actions have commenced.
- At the end of the fifth year of Offset Site management – this will involve a review of five annual monitoring and management reports, as well as an independent review and update of the current OMP.
- An audit of the Management Plan will be undertaken at each 5 year management period and the plan will be revised where necessary.

The timing of scheduled audits is detailed in Table 9. Additional audits may be triggered as a result of a plan review or following an environmental incident resulting in significant change to Offset Site conditions, as identified in the risk assessment (Table 20).

## 5.10 Risk assessment and adaptive management

Active ecological management is reasonably expected to provide a high probability of generating improvements in the condition of the vegetation present. The management actions proposed in this plan are based on a combination of experience in the management of native grasslands, the previous VMP and monitoring conducted at the Offset Site (KBR 2014, Biosis 2015 and Umwelt 2016) and other publications (ACT Government 2017). The surrounding areas, within Block 48 but outside the Offset Site, will still be managed for conservation consistent with the VMP (Umwelt 2016c).

The proposed strategies for the management of this Offset Site are consistent with established practices for the management of NTG elsewhere including ACT nature reserves and Offset Sites. The proposed management strategies are therefore considered best practice.

The DoF has a property service provider that manages Block 48 Hall and is required to provide monthly reports on its activities. The DoF will have, through the property service provider, a facility manager for the land and will also have long term contracts with ecologists and land maintenance companies to ensure the management actions outlined in this OMP are implemented and risk minimized.

The monitoring protocols documented in this plan are considered adequate to detect changes in the condition of the NTG and GSM habitat. The plan includes a basic strategy (pulse grazing) for ground-cover biomass control which is considered a major ecological management requirement for the Offset Site. Where this fails to deliver the prescribed outcome in any one year, an additional management action, ecological burning, provides an option to achieve the required biomass management target (i.e. maintaining an open grassland environment dominated by native species). The application of one or both of these strategies will provide the prescribed biomass control outcome required.

It is acknowledged that the management of natural environments can be unpredictable and management activities need to be flexible to respond to changing conditions and unpredictable events. Examples of potential risks are outlined in Table 20 and discussed below.

There is a small risk that biomass control is not properly managed in any one year. This has the potential to occur in response to above average rainfall years when ground cover growth is persistently high and wet conditions restrict stock access and the potential use of ecological burning. If such events occur, DoF will ensure additional efforts are made where possible in subsequent years to maintain the rate of improvement required. This may include additional grazing, burning or weed control. This will be assessed during the annual monitoring report and recommendations made to rectify any problems.

Another major ecological management requirement is weed control, with the objective of reducing the overall presence of weeds. Given the management actions proposed are taken, weed control should be a relatively straight forward exercise. However varying seasonal conditions will provide triggers for changes in the abundance of different species, particularly weeds. The greatest risk to achieving the required outcomes include a failure to conduct an appropriate level of work at an appropriate time or the occurrence of persistent adverse conditions restricting an appropriate management response.

Quarterly Offset Site inspections will allow land managers to anticipate changes in seasonal conditions and respond accordingly. Persistent, well timed management actions will be able to take advantage of seasonal fluctuations to achieve the prescribed condition outcomes.

WoNS in particular are currently only present at low levels within the Offset Site and it will be relatively simple management exercise to eliminate these species. While WoNS will probably colonise the Offset Site from near-by infestations, seedlings will be detected by monitoring exercises and controlled by the proposed on-going works. If mature WoNS are present in Year 2 of the management plan, then it could be assumed that reasonable action was not taken to control these species or conditions were so adverse that works could not be completed (unlikely). If WoNS are evident in Year 2 of the plan, corrective action would be required and the OMP amended to adequately address weed eradication.

Similarly, control works will target perennial weeds such as Phalaris, Cocksfoot and African lovegrass. The application of control should be focused around the fringes of native grassland in an attempt to control the encroachment of these perennial weeds. By targeting the fringes and reducing competition from these aggressive perennial weeds, native grassland may even begin to recolonise new areas. Persistent herbicide application is an effective control measure for these species and while these species are likely to reinvade from surrounding infestations, ongoing works are planned to cope with the associated management requirements. If adequate resources are not allocated to these tasks, the cover of these species may remain static or increase. This would trigger a requirement for a greater management input.

Monitoring and Site observations are essential in providing feedback on the efficacy of management. The most significant risk associated with the management of this Offset Site is not allocating enough resources

to the control of weeds and the occurrence of climatic triggers. In the first instance management should always over allocate resources to weed control. The more comprehensive control achieved in the early years of the management plan, the lower the ability of these species to recover and recolonise, reducing workload and management costs in the future.

Herbicide control works integrated with biomass control works (grazing and/or fire), increases the efficacy of both actions. Given the persistent management prescribed for the Offset Site, it is considered a relatively low risk that vegetation and habitat condition improvements will fail to eventuate.

Active management to target the control of weeds and manage the accumulation of ground-cover biomass is advantageous to both the health of NTG but also to the ability of GSM to persist within this environment. As a result, the proposed management regime is considered unlikely to negatively impact on GSM. If GSM monitoring detects significantly fewer GSM observations in successive years, potential causes for such a decline would be investigated in the annual monitoring report. Annual monitoring of GSM will allow for early detection of decline and make recommendations to reverse the trend. The Decline of GSM numbers resulting from the implementation of this OMP is considered highly unlikely (low risk).

This Plan provides actions for a period of 10 years. The timing of actions and whether they occur is based on adaptive management. By monitoring the outcomes of actions, management will be adapted to ensure the stated commitments in the OMP are adhered to. Over time, new management techniques may become available, or further information on the ecology and status of the vegetation communities on site may necessitate adjustment to management actions.

Seasonal conditions can also vary greatly from year to year and influence Offset Site management actions in any single year. This seasonality is recognised in this OMP by incorporating flexibility around timing of actions at the discretion of the land manager in consultation with DCCEE and based on advice provided by an experienced grassland ecologist.

Key risks associated with monitoring (Table 9) and reporting (Table 10) programs are identified in Table 20 below, and include:

- Unauthorised entry of domestic stock or vehicles into the Offset Site
- WoNS infestations
- Expansion of new or existing weeds at uncontrollable levels
- Unpredictable disturbance events such as bushfire, drought or flood
- Rabbit infestations
- An unknown decline in the abundance of GSM.

Failure of the adaptive management approach to adequately respond to risks, as identified in monitoring reports or audits, may warrant a review of this plan, as discussed above and in Table 20.

**Table 20: Risk assessment and management (This risk assessment uses the risk framework from the DCCEEW’s Environmental Management Plan guidelines (Commonwealth of Australia 2014). The likelihood and consequence classification are summarised in Appendix 3).**

Action (refer to Table 5)	Event or circumstance	Likelihood	Consequence	Risk level	Trigger	Contingency/s	Related monitoring activity
3, 13 and 15	Unauthorised entry of domestic stock to the Offset Site. Grazing, browsing and trampling damage to vegetation. Damage to or loss of native herbs and grasses. Increased opportunities for weed invasion.	Unlikely	Minor	Low	Domestic stock sighted on Offset Site outside approved timeframe. Signs of recent stock access.	Immediate removal of stock. Fencing repaired and made stock proof within a week of identifying the issue. Vegetation monitoring report to address issues identified and measures implemented to rectify the problem.	Quarterly inspection and management.
3, 13 and 15	Entry of vehicles or unauthorised access to Offset Site. Damage to vegetation, soil compaction.	Unlikely	Minor	Low	Vehicle observed on Offset Site. Evidence of recent vehicle access. Evidence of dumping.	Fencing repaired within a week of identifying the issue. Assess adequacy of fencing and implement stronger deterrents (i.e. lock gates). Remove dumped materials (if any) within a week of being identified.	Quarterly inspection and management.
6, 8 and 18	Current weeds present within Offset Sites cover exceeds current levels (41%). New high threat weeds identified on the Offset Site.	Possible	High	Medium	Weed cover exceeds current levels (41%). WoNS cover exceeds 3%. Weeds appear to be degrading NTG and GSM habitat values. Introduction of new high threat weed.	Increase weed control efforts during control events. Minimise off-target damage (only spray during still conditions). Undertake control works for new and emerging high threat weed as appropriate within a month of initial identification.	Vegetation condition assessments.
5, 8 and 17	Pest animals observed within Offset Site. Damage to ground	Possible	Moderate	Medium	Fresh ground disturbance or scats of pest animals observed in the Offset Site. Active rabbit warrens	Destroy fox dens and rabbit warrens through fumigation and hand collapse. Inspect	Quarterly inspection and management.

Action (refer to Table 5)	Event or circumstance	Likelihood	Consequence	Risk level	Trigger	Contingency/s	Related monitoring activity
	cover vegetation, spread of weeds.				observed within the Offset Site. Active fox dens or evidence of fox kills (i.e. scatter of bird feathers) observed within the Offset Site. New and emerging pest observed within the Offset Site.	fencing and rectify any damage within a week of identification. Undertake control works (baiting and habitat removal) for new and emerging pests as appropriate within a month of initial identification.	
4, 7 and 19	Bushfire may temporarily impact ground cover condition and natural regeneration. May impact upon weed recruitment patterns, destroy fencing and impact on threatened species (e.g. GSM).	Possible	Major	Low	Bushfire observed within Offset Site.	Review weed control program and prepare for elevated level of control works. Inspect fence condition and repair any damage within a week of identification. Exclude grazing as for planned ecological burn. Assess impacts to threatened fauna as part of monitoring program.	Inspection and management, Vegetation condition assessments and GSM monitoring.
4, 6, 8, 9, 10, 16, 17 and 18	Two or more drought / wet Years may impact upon weed abundance and condition of NTG and habitat suitability for GSM.	Possible	Moderate	Medium	Fluctuation in ground cover biomass >40%.	Monitor vegetation condition in line with defined protocols. Exclude or increase grazing as appropriate based on monitoring. Consider burning if biomass levels are excessive (≥80% cover). May require review of the OMP prior to the 5 year review period to adjust actions and targets.	Vegetation condition assessments and GSM monitoring.

### 5.11 Plan review

This plan includes an adaptive management framework, where management actions may be triggered by events occurring within the Offset Site, or the results of monitoring activities. A review of the OMP will only be necessary every five years or in the event of a major incident that makes a significant change to the character or condition of the Offset Site. The most likely event to trigger a plan review is a major bushfire, as described in Section 5.10. If a plan review is triggered, this will be conducted by DoF in consultation with DCCEEW.

Any future adaptive management changes will be incorporated into the OMP and an updated version of the OMP will be supplied to DCCEEW. The OMP review will involve changes to any part of the OMP, in order to adequately respond to the trigger and re-direct management actions towards achieving the environmental outcomes under potentially altered Site conditions. This could involve changes to:

- Specific details of Offset Site management methods
- Schedules of monitoring, reporting and auditing.

### 5.12 Emergency contacts and procedures

Should any environmental emergency occur on-Site that poses a risk to the objectives of this plan, the relevant contacts (listed below) must be notified as soon as possible, and no later than 12 hours following any emergency event. DoF must be notified; RFS and the Federal Police should be notified if assistance is required from these emergency services. Emergency services must be advised of the on-Site protections to avoid inadvertent damage to ecological values (e.g. creation of graded earthen fire breaks within the Offset Site, which unless absolutely necessary, must be avoided).

#### ***Emergency Contact Details***

ACT Rural Fire Service (RFS) (Bushfire emergency) - Phone 000

Australian Federal Police (Various issues i.e. illegal dumping or trespass) - Phone 000

Land Owner: Department of Finance (DoF) - Phone +61 2 6215 2222



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## Appendices

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## Appendix 1 – EPBC Act offset calculator output for clearing NTG and GSM habitat

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# Offsets Assessment Guide

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

Matter of National Environmental Significance	
Name	Natural Temperate Grassland
EPBC Act status	Critically Endangered
Annual probability of extinction <small>Based on IUCN category definitions</small>	6.8%

Impact calculator					
Ecological communities					
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	Yes		Area (Hectares)	0.32	
			Quality (Scale 0-10)	5	
			Total quantum of impact (Adjusted Hectares)	0.16	
Threatened species habitat					
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	No		Area (Hectares)		Island 2016
			Quality (Scale 0-10)		
			Total quantum of impact (Adjusted Hectares)		
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Number of features <small>e.g. Nest hollows, habitat trees</small>	No				
Condition of habitat <small>Change in habitat condition, but no change in extent</small>	No				
Threatened species					
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Birth rate <small>e.g. Change in nest success</small>	No				
Mortality rate <small>e.g. Change in number of road kills per year</small>	No				
Number of individuals <small>e.g. Individual plants/animals</small>	No				

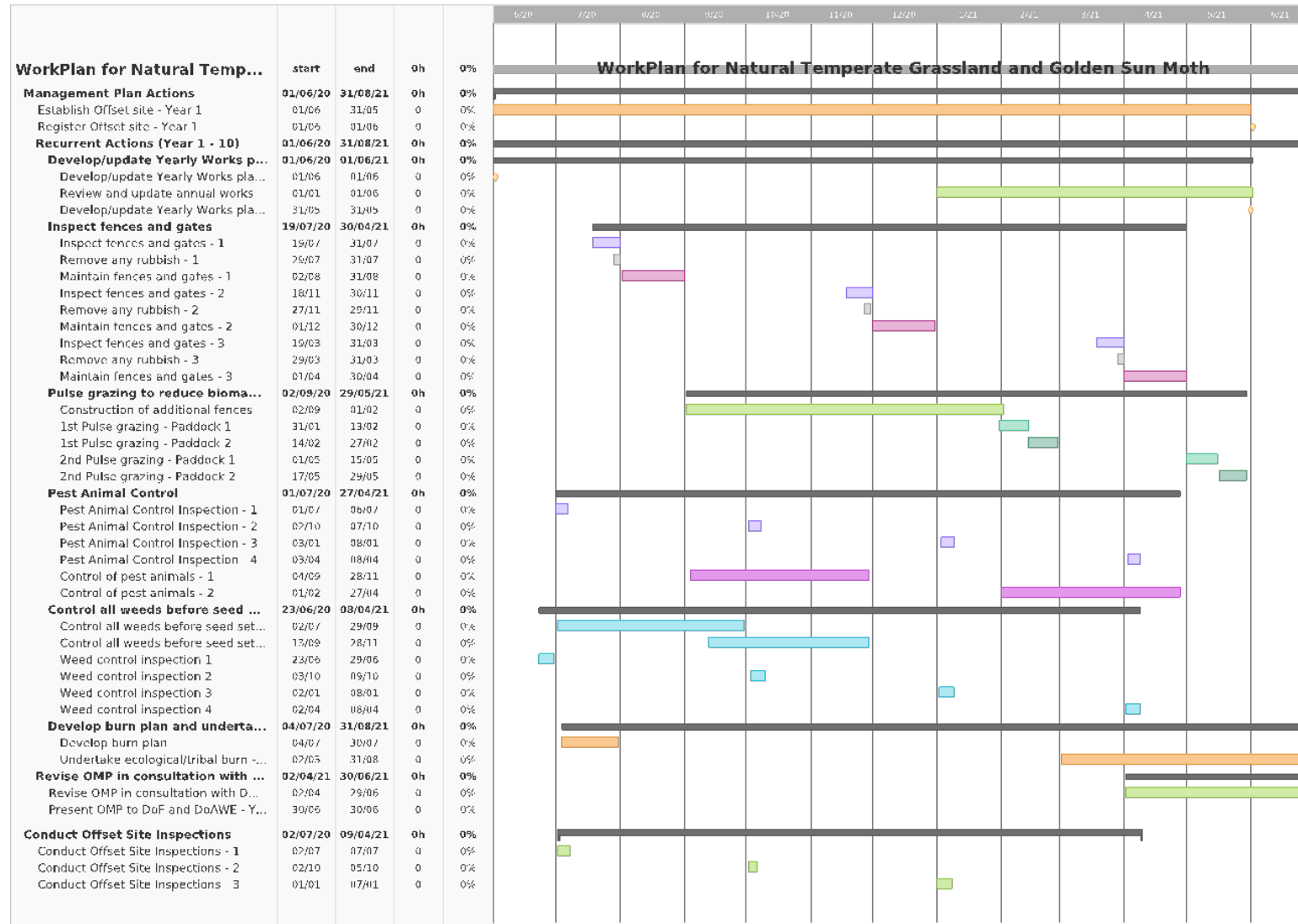
Offset calculator																			
Ecological Communities																			
Protected matter attributes	Attribute relevant to case?	Total quantum of impact (Adjusted Hectares)	Proposed offset	Time Horizon (Years)		Start area and quality		Future area and quality without offset (adjusted hectares)		Future area and quality with offset (adjusted hectares)		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	Offset Result		Cost (\$ total)	Information source
				Risk-related time horizon (max. 20 years)	20	Start area (hectares)	2.62	Risk of loss without offset (%)	3%	Risk of loss with offset (%)	0%					0.08	90%		
Area of community	Yes	0.16	Block 48																
				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)	7	2.00	90%	1.80	0.93	% of impact offset	156.39%		
								Future area without offset	2.5	Future area with offset	2.6				Minimum (90%) direct offset requirement met?	TRUE			
Threatened species habitat																			
Protected matter attributes	Attribute relevant to case?	Total quantum of impact (Adjusted Hectares)	Proposed offset	Time Horizon (Years)		Start area and quality		Future area and quality without offset (adjusted hectares)		Future area and quality with offset (adjusted hectares)		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	Offset Result		Cost (\$ total)	Information source
Area of habitat				Risk-related time horizon (max. 20 years)		Start area (hectares)		Risk of loss without offset (%)		Risk of loss with offset (%)						0.00			
				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	% of impact offset	0.00%		
								Future area without offset	0.0	Future area with offset	0.0				Minimum (90%) direct offset requirement met?	FALSE			
Protected matter attributes	Attribute relevant to case?	Quantum of impact	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 <small>e.g. Nest hollows, habitat trees</small>	No							0.00		0.00	0.00	0.00%	FALSE						
Condition of habitat <small>Change in habitat condition, but no change in extent</small>	No							0.00		0.00	0.00	0.00%	FALSE						
Threatened species																			
Protected matter attributes	Attribute relevant to case?	Quantum of impact	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				
Birth rate <small>e.g. Change in nest success</small>	No							0.00		0.00	0.00	0.00%	FALSE						
Mortality rate <small>e.g. Change in number of road kills per year</small>	No							0.00		0.00	0.00	0.00%	FALSE						
Number of individuals <small>e.g. Individual plants/animals</small>	No							0.00		0.00	0.00	0.00%	FALSE						

Summary						
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Cost (\$)	
					Direct offset	Other compensatory measures
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A
Area of habitat	0.00	0.00	0.00	FALSE	0.00	N/A
Area of community	0.16	0.25	1.56	TRUE	0.00	N/A
					\$0.00	\$0.00
					\$0.00	\$0.00

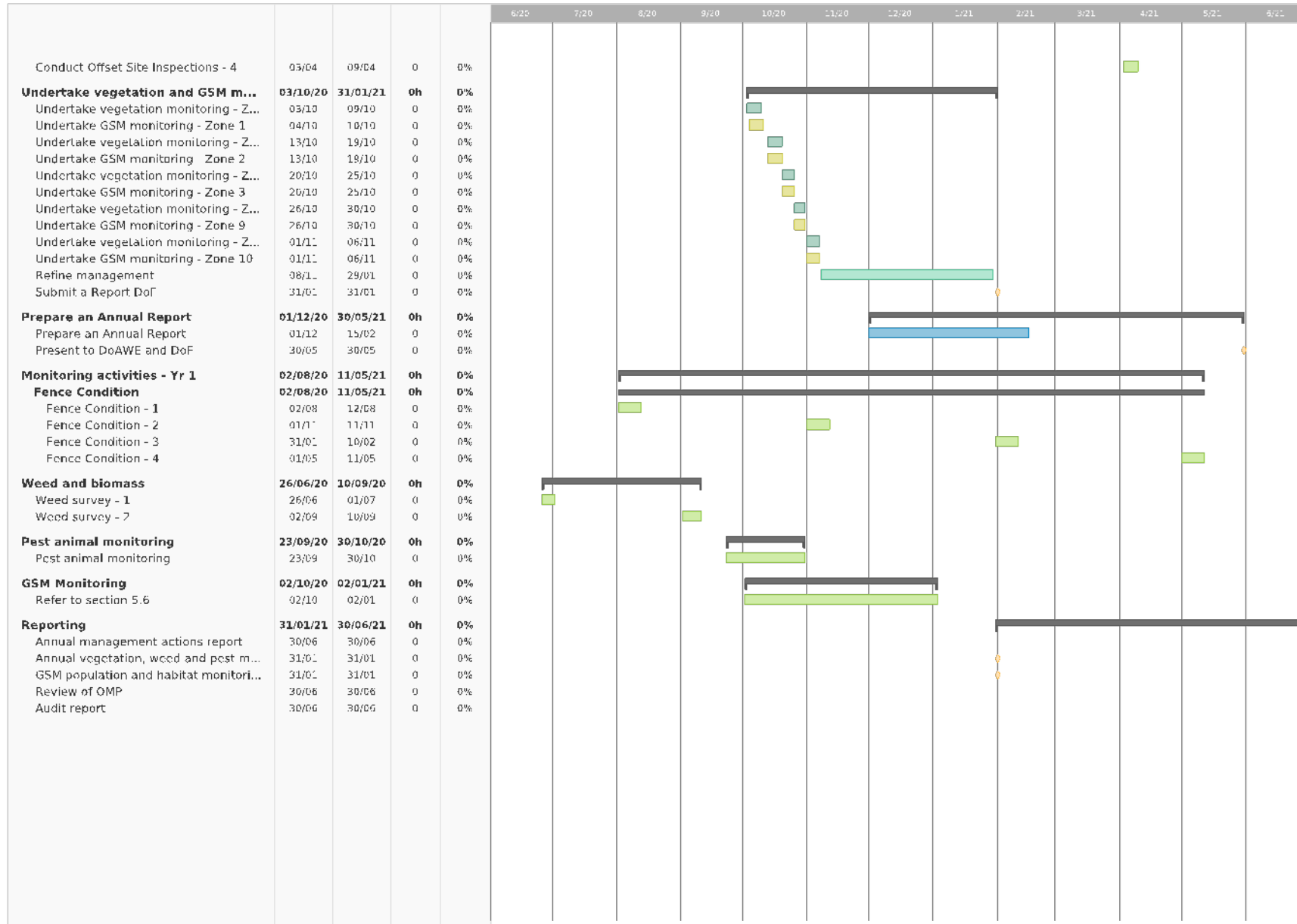




## Appendix 2 – Work Plan (Year 1)







## Appendix 3 – DoEE EMP Guidelines Risk Assessment and Management Framework (Commonwealth of Australia 2014)

Table 21: Risk framework

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

Table 22: Likelihood and consequence

Qualitative measure of likelihood (how likely is it that this event/circumstances will occur after management actions have been put in place/are being implemented)	
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances
Qualitative measure of consequences (what will be the consequence/result if the issue does occur)	
Minor	Minor risk of failure to achieve the plan's objectives. Results in short term delays to achieving plan objectives, implementing low cost, well characterised corrective actions.
Moderate	Moderate risk of failure to achieve the plan's objectives. Results in short term delays to achieving plan objectives, implementing well characterised, high cost/effort corrective actions.
High	High risk of failure to achieve the plan's objectives. Results in medium-long term delays to achieving plan objectives, implementing uncertain, high cost/effort corrective actions.
Major	The plan's objectives are unlikely to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies.
Critical	The plan's objectives are unable to be achieved, with no evidenced mitigation strategies.

## Appendix 4 – Baseline Vegetation Monitoring Data

Table 23: Vegetation baseline data (Niche 2020)

Variable	Q3	Q5	Q6	Q9	Average
Floristic Value Score	11	17	8	5	10.25
Native plant species richness	18	16	13	17	16
Native overstorey cover	0	0	0	0	0
Native midstorey cover	0	0	0	0	0
Native ground cover (grass)	76	50	78	44	62
Native ground cover (shrubs)	0	0	0	0	0
Native ground cover (forbes)	10	0	4	2	4
Native ground cover (sedges)	0	0	0	0	0
Native ground cover (rushes)	2	0	0	2	1
Native ground cover (ferns)	0	0	0	0	0
Perennial Exotic plant cover	0	0	0	0	0
Annual Exotic plant cover	12	50	10	42	28.5

Table 24: Vegetation baseline data collected by Umwelt (2016b)

Variable	Q3	Q5	Q6	Q9	Average
Floristic Value Score	24	14	17	15	17.5
Native plant species richness	21	14	20	17	18
Native overstorey cover	0	0	0	0	0
Native midstorey cover	0	0	0	0	0

Native ground cover (grass)	58	48	74	50	57.5
Native ground cover (shrubs)	0	0	0	0	0
Native ground cover (forbes)	4	4	0	6	3.5
Native ground cover (sedges)	0	0	0	0	0
Native ground cover (rushes)	0	0	0	0	0
Native ground cover (ferns)	0	0	0	0	0
Perennial Exotic plant cover	8	4	4	10	6.5
Annual Exotic plant cover	24	28	20	28	25

**Table 25: Vegetation quadrat and photo monitoring locations**

Quadrat	Easting	Northing	Bearing
Q1	687024	6106563	09°
Q2	687137	6106782	215°
Q3	686588	6106418	195°
Q4	686796	6106583	157°
Q5	686662	6106246	265°
Q6	686653	6106194	67°
Q7	687258	6106770	195°
Q8	687268	6106889	10°
Q9	686740	6106431	95°
Q10	686943	6106589	51°

## Appendix 5 – Baseline Golden Sun Moth Monitoring Data

Table 26: GSM Walked transect survey (19<sup>th</sup> November 2019)

Transect Number	Number of GSM Recorded	Start time	Finish time	Weather
1	3	1040	1143	Temp: 27° Windspeed: 25-40km/h light winds
2	9			
3	43			
4	59			
5	74			
6	101			
7	176			
<b>Total</b>	<b>465</b>			

Table 27: GSM Walked transect survey (6<sup>th</sup> December 2019)

Transect Number	Number of GSM Recorded	Start time	Finish time	Weather
1	3	1100	1215	Temp: 26° Windspeed: 30-45km/h very windy
2	1			
3	2			
4	4			
5	1			
6	3			
7	2			
<b>Total</b>	<b>16</b>			

**Table 28: GSM habitat transect locations**

Transect	GPS datum	Start easting	Start northing	End easting	End northing
T1	GDA94	686721	6106209	686672	6106212
T2	GDA94	686635	6106273	686600	6106308
T3	GDA94	686662	6106377	686619	6106403

**Table 29: Baseline GSM habitat transect data**

Transect	Bare ground	Rock	Cryptogam	Litter	Austro-stipa	Rytido-sperma	Other Perennial Native Grass	Other Native	Chilean Needle Grass	Serrated Tussock	Other Perennial Exotic Grass	Annual Exotic Grass	Exotic Broadleaf
<b>T1</b>	22	0	0	22	1	9	41	4	0	0	0	0	1
<b>T2</b>	18	5	2	16	3	12	26	1	0	0	0	12	5
<b>T3</b>	21	2	9	13	12	13	15	15	0	0	0	0	0

## Appendix 6 – Golden Sun Moth Habitat Quality Datasheet

Golden Sun Moth monitoring - vegetation step-point datasheet.

Site: Hall Block 48		Date: 30/1/2020	Observer:	Photos:
Transect:		Location:		Av. Tuss. Ht.
soil type – grazing/slashing type/pressure – site damage, fire, erosion – pupal case locations - presence of trees/shrubs etc –			Notes: Start: Finish:	
Type	Details/Tally			Total
Bare Earth				
Rock				
Cryptogams (Moss/Lichen)	Moss		Lichen	
Litter/Dead Vegetation				
Perennial Native Grass (GSM foods)	Austrostipa -		Rytidosperma	
Other native grass (non GSM food)				
Native forb				
Chilean Needlegrass/ Serrated Tussock	CNG		Serrated Tussock	
Perennial Exotic grass				
Annual Exotic Grass				
Exotic Forb				

## Appendix 7 – Grazing management plan

**Table 30: Grazing management plan**

Management zone	Required monitoring frequency	January	February	March	April	May	June	July	August	September	October	November	December
1	Each day		Permitted grazing period (at least 80 % ground cover, remove stock before <50 % cover)										
2	Each day		Permitted grazing period (at least 80 % ground cover, remove stock before <50 % cover)										
3	N/A	Grazing permitted all year, No NTG or GSM											



**Table 31: Livestock grazing monitoring record**

Manage ment zone	Permitted grazing period (Feb-Aug/All year)	Monitoring Frequency (daily/weekly) *	Date of stock entry	Date of stock exit	Count of livestock in paddock	Evidence of new erosion? (Y/N)	Evidence of compaction? (Y/N)	Estimate of vegetative cover present (%)	Have any thresholds been met? (Y/N) Have livestock been removed.
1									
2									

*\*Additional monitoring may be required in response to unplanned events, such as flooding, fire or drought*

## Appendix 8 – Weed Control Calendar

Species or Group	Treatment	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Serrated Tussock	Spraying	hatched									hatched	hatched	hatched
	Chipping	hatched									hatched	hatched	hatched
Chilean Needle Grass	Spraying	hatched									hatched	hatched	hatched
	Grazing	hatched									hatched	hatched	hatched
African Lovegrass	Spraying	hatched									hatched	hatched	hatched
	Grazing	hatched									hatched	hatched	hatched
St John's Wort	Spraying	hatched									hatched	hatched	hatched
Blackberry	Spraying	hatched									hatched	hatched	hatched
Broom / Gorse	Spraying	hatched									hatched	hatched	hatched
	Cut / dab	hatched									hatched	hatched	hatched
Willows	Spraying	hatched									hatched	hatched	hatched
	Cut / dab or frill / inject	hatched									hatched	hatched	hatched
Other woody weeds (e.g. Sweet Briar)	Spraying	hatched									hatched	hatched	hatched
	Cut / dab	hatched									hatched	hatched	hatched
Broadleaf (e.g. Paterson's Curse, Nodding Thistle)	Spraying or wick wiper	hatched									hatched	hatched	hatched
	Chip	hatched									hatched	hatched	hatched

**Note:** Avoid weed management during the golden sun moth flying season, i.e. October – January (hatched).

**Source:** Rural Lands and Invasive Species Unit, ACT Parks and Conservation Service, Parks and City Services Division, Territory and Municipal Services Directorate, ACT Government.

## Appendix 9 – Floristic species list

Family	Species	Common Name	Q3	Q5	Q6	Q9
Anthericaceae	<i>Tricoryne elatior</i>	Yellow Autumn-lily	0.1	0.1	0.1	
Asteraceae	<i>Arctotheca calendula*</i>	Capeweed				
Asteraceae	<i>Carthamus lanatus*</i>	Saffron Thistle				
Asteraceae	<i>Chondrilla juncea*</i>	Skeleton Weed	0.2	0.5		0.1
Asteraceae	<i>Chrysocephalum apiculatum</i>	Common Everlasting	10		1	2
Asteraceae	<i>Cirsium vulgare*</i>	Spear Thistle				0.1
Asteraceae	<i>Cymbonotus lawsonianus</i>	Bear's Ear	0.1			
Asteraceae	<i>Hypochaeris radicata*</i>	Catsear	1	1		0.5
Asteraceae	<i>Hypochaeris radicata*</i>	Catsear			0.5	
Asteraceae	<i>Sonchus oleraceus*</i>	Common Sowthistle				
Boraginaceae	<i>Cynoglossum suaveolens</i>	Sweet Hound's-tongue	0.1			
Boraginaceae	<i>Echium plantagineum*</i>	Patterson's Curse		1		0.1
Campanulaceae	<i>Wahlenbergia communis</i>	Tufted Bluebell		0.1		
Campanulaceae	<i>Wahlenbergia spp.</i>	Bluebell	0.2		0.3	0.2
Caryophyllaceae	<i>Paronychia brasiliana*</i>	Chilean Whitlow Wort, Brazilian Whitlow				
Chenopodiaceae	<i>Chenopodium pumilio</i>	Small Crumbweed				0.1
Clusiaceae	<i>Hypericum perforatum*</i>	St. Johns Wort				
Convolvulaceae	<i>Convolvulus angustissimus</i>					0.1
Cyperaceae	<i>Carex appressa</i>	Tall Sedge				
Cyperaceae	<i>Carex inversa</i>	Knob Sedge			0.2	
Fabaceae (Faboideae)	<i>Desmodium varians</i>	Slender Tick-trefoil	0.1	0.2		0.1
Fabaceae (Faboideae)	<i>Glycine tabacina</i>	Variable Glycine		0.1		
Fabaceae (Faboideae)	<i>Medicago minima*</i>	Woolly Burr Medic	0.2	0.2		0.1
Fabaceae (Faboideae)	<i>Trifolium repens*</i>	White Clover	1			
Geraniaceae	<i>Erodium botrys*</i>	Long Storksbill	0.2	0.1		3
Geraniaceae	<i>Geranium solanderi</i>	Native Geranium				
Goodeniaceae	<i>Goodenia hederacea</i>	Ivy Goodenia	0.1			
Hypoxidaceae	<i>Hypoxis hygrometrica</i>	Golden Weather-grass				
Juncaceae	<i>Juncus spp.</i>	A Rush				
Lamiaceae	<i>Salvia verbenaca*</i>	Vervain				
Lomandraceae	<i>Lomandra bracteata</i>	Mat-rush	0.1	0.1		0.2
Lomandraceae	<i>Lomandra filiformis</i>	Wattle Matt-rush	0.2			
Lomandraceae	<i>Lomandra multiflora subsp. multiflora</i>	Many-flowered Mat-rush		0.1		0.2
Myrtaceae	<i>Eucalyptus bridgesiana</i>	Apple Box				
Onagraceae	<i>Epilobium ciliatum*</i>					
Oxalidaceae	<i>Oxalis perennans</i>		0.1			0.1
Plantaginaceae	<i>Plantago lanceolata*</i>	Lamb's Tongues			0.1	

Family	Species	Common Name	Q3	Q5	Q6	Q9
Plantaginaceae	<i>Plantago varia</i>					0.1
Poaceae	<i>Aristida ramosa</i>	Purple Wiregrass		0.1		
Poaceae	<i>Austrostipa bigeniculata</i>	Yanganbil	5	0.5	0.1	5
Poaceae	<i>Austrostipa scabra</i>	Speargrass	0.5	0.2	0.2	2
Poaceae	<i>Avena barbata*</i>	Bearded Oats		1		
Poaceae	<i>Bothriochloa macra</i>	Red Grass	5	0.5	0.5	10
Poaceae	<i>Bromus spp.*</i>	A Brome		1		
Poaceae	<i>Chloris truncata</i>	Windmill Grass	0.5	0.5		0.2
Poaceae	<i>Cynodon dactylon</i>	Common Couch				
Poaceae	<i>Eleusine indica*</i>	Crowsfoot Grass				
Poaceae	<i>Enneapogon nigricans</i>	Niggerheads	0.5	0.1		0.2
Poaceae	<i>Eragrostis brownii</i>	Brown's Lovegrass				
Poaceae	<i>Eragrostis cilianensis*</i>	Stinkgrass				
Poaceae	<i>Lolium multiflorum*</i>	Italian Ryegrass				
Poaceae	<i>Microlaena stipoides</i>	Weeping Grass				
Poaceae	<i>Nassella trichotoma*</i>	Serrated Tussock				
Poaceae	<i>Panicum effusum</i>	Hairy Panic	1	5		2
Poaceae	<i>Paspalum dilatatum*</i>	Paspalum				
Poaceae	<i>Phalaris aquatica*</i>	Phalaris				
Poaceae	<i>Poa sieberiana</i>	Snowgrass			0.1	
Poaceae	<i>Rytidosperma spp.</i>		15		15	45
Poaceae	<i>Themeda triandra</i>		25	10	60	2
Polygonaceae	<i>Acetosella vulgaris*</i>	Sheep Sorrel		0.2		
Polygonaceae	<i>Persicaria decipiens</i>	Slender Knotweed				
Polygonaceae	<i>Rumex brownii</i>	Swamp Dock			0.1	
Rosaceae	<i>Rosa rubiginosa*</i>	Sweet Briar				
Rosaceae	<i>Rubus fruticosus*</i>	Blackberry complex				
Rosaceae	<i>Sanguisorba minor subsp. muricata*</i>	Sheep's Burnet				
Rubiaceae	<i>Asperula conferta</i>	Common Woodruff			0.1	
Solanaceae	<i>Solanum nigrum*</i>	Black-berry Nightshade				

## Contact Us

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Sydney  
Brisbane  
Cairns  
Port Macquarie  
Illawarra  
Coffs Harbour  
Central Coast  
Gold Coast  
Canberra



## Our services

### Ecology and biodiversity

Terrestrial  
Freshwater  
Marine and coastal  
Research and monitoring  
Wildlife Schools and training

### Heritage management

Aboriginal heritage  
Historical heritage  
Conservation management  
Community consultation  
Archaeological, built and landscape values

### Environmental management and approvals

Impact assessments  
Development and activity approvals  
Rehabilitation  
Stakeholder consultation and facilitation  
Project management

### Environmental offsetting

Offset strategy and assessment (NSW, QLD, Commonwealth)  
Accredited BAM assessors (NSW)  
Biodiversity Stewardship Site Agreements (NSW)  
Offset site establishment and management  
Offset brokerage  
Advanced Offset establishment (QLD)