1. PROJECT NAME
Strategic assessment of urban development at West Belconnen, Ginninderry, ACT/NSW

Development proponent
Riverview Projects (ACT) Pty Ltd

EPBC REFERRAL NUMBER
EPBC SA024 (West Belconnen Strategic Assessment)

Matters of National Environmental Significance impacted by this approval
Natural Temperate Grassland of the South Eastern Highlands (NTG)
White Box-Yellow Box-Blakely’s Red Gum Grassy Woodland and Derived Native Grassland (BGW)
Pink-tailed Worm-lizard (Aprasia parapulchella) (PTWL)
Golden Sun Moth (Synemon plana) (GSM)

Location of the environmental offset action
GSM: Lot 2 Wallaroo Road, Yass Valley Shire, NSW (86.8 ha)
NTG, BGW, PTWL: West Belconnen Reserve Corridor, ACT (549.9 ha)

Note: A separate Offset Management Plan has been prepared by Riverview Projects (ACT) Pty Ltd for additional MNES offset commitments within the Ginninderry Conservation Corridor.

2. PROJECT NAME
Lawson South Residential Development, Block 2 Section 5 and Block 2 Section 13, Lawson ACT

Development proponent
Land Development Agency, ACT Government (now Suburban Land Agency)

EPBC REFERRAL NUMBER
EPBC 2010/5549

Matters of National Environmental Significance impacted by this approval
Natural Temperate Grassland of the South Eastern Highlands
Golden Sun Moth (Synemon plana)

Location of the environmental offset action
Jarramlee, defined as “McGregor West offset area” in approval decision, ACT (112 ha)

3. PROJECT NAME
Macgregor West Residential Estate, Macgregor, ACT

Development proponent
Canberra Estates Consortium No. 22 Pty Ltd

EPBC referral number
EPBC 2010/5520

Matters of National Environmental Significance impacted by this approval
Golden Sun Moth (Synemon plana)

Location of the environmental offset action
West Macgregor, defined as “Macgregor West offset area” in approval decision, ACT (37 ha)

ACKNOWLEDGMENTS
The Ginninderry Conservation Trust and the ACT Parks and Conservation Service acknowledges Nggunawal people as Traditional Custodians of Gooroomon Grasslands, and the broader Nggunawal Country landscape. They also honour the cultural legacy of the Nggunawal ancestors who managed this region for more than 25,000 years prior to European settlement; and the ongoing responsibility that Nggunawal families still have to care for Country today, for the benefit of future generations.

The Ginninderry Conservation Trust and the ACT Parks and Conservation Service are committed to the protection of cultural heritage sites, the preservation of traditional ecological knowledge and an increased participation of Nggunawal families in managing the living landscape today.

The ACT Parks and Conservation Service is grateful to the stakeholders, organisations and individuals who contributed to the preparation of the Gooromon Grasslands: Offset Management Plan.
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List of abbreviations

ACT  Australian Capital Territory
BAM  Biodiversity Assessment Methodology (NSW)
BC Act Biodiversity Conservation Act 2016 (NSW Government)
BGW  White Box Yellow Box Blakely’s Red Gum Grassy Woodland and Derived Native Grassland
BSA  Biodiversity Stewardship Agreement
BSAR  Biodiversity Stewardship Assessment Report
CEMP  Conservation Effectiveness Monitoring Program
CR  Conservation and Research (EPSDD, ACT Government)
DoEE  Department of Environment and Energy (Commonwealth Government of Australia)
EPBC Act  Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth Government of Australia)
EPSDD  Environment, Planning and Sustainable Development Directorate (ACT Government)
GSM  Golden Sun Moth (Synemon plana)
Ha  Hectares
MNES  Matters of National Environmental Significance
NSW  New South Wales
NTG  Natural Temperate Grassland of the South Eastern Highlands
OEH  Office of Environment and Heritage (NSW Government)
OMP  Offset Management Plan
PCS  ACT Parks and Conservation Service (EPSDD, ACT Government)
PTWL  Pink-tailed Worm-lizard (Aprasia parapulchella)
SLA  Suburban Land Agency (previously the Land Development Agency; EPSDD, ACT Government)
RMP  Reserve Management Plan
TAM  Threat Assessment Methodology
TCCS  Transport Canberra and City Services Directorate (ACT Government)
TEK  Traditional Ecological Knowledge
WBSA  West Belconnen Strategic Assessment
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Table 2  Environmental offset conservation outcomes (Golden Sun Moth commitments only) as specified in Section 5 of the WBSA Program Report (EPBC SA024).

Table 3  Environmental offset approval conditions attached to the Lawson South Residential Development (EPBC 2010/5549).

Table 4  Details of Gooromon Grasslands: Offset Management Plan stakeholder consultation.

Table 5  Endangered ecological communities recorded on Gooromon Grasslands offset sites.

Table 6  Threatened species recorded on Gooromon Grasslands offset sites.

Table 7  Additional threatened species recorded at Jarramlee offset site.

Table 8  Priority threats to Natural Temperate Grassland and Golden Sun Moth from the ACT Native Grassland Conservation Strategy and Action Plans (ACT Government 2017a).

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Figure 16  GSM habitat condition zones (2017) – Lot 2 Wallaroo Road.

Figure 17  Interim Golden Sun Moth habitat features using the Condition Class Assessment Method (Rowell in SMEC 2018a, b, c).

Figure 18  Potential GSM habitat restoration zone – Lot 2 Wallaroo Road and Fassifern Block

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1. INTRODUCTION

1.1 Background

Formation of the Gooromon Grasslands reserve complex (hereafter: Gooromon Grasslands; Figure 1) is a commitment in the West Belconnen Strategic Assessment (WBSA; A T Adams Consulting 2017). The approved Strategic Assessment includes the extension of Ginninderra Drive, which when [if] developed in 10-20 years, will directly impact the existing environmental offset sites, Jarramlee and West Macgregor. To compensate for the approved impact, an additional environmental offset site supporting at least 1.8 hectares of Golden Sun Moth (GSM) habitat, of equivalent quality, was required. This site was purchased by the ACT Government at the adjacent Lot 2 Wallaroo Road, Yass Valley, NSW (hereafter ‘Lot 2 Wallaroo Road’).

The WBSA also commits to incorporate all outstanding commitments identified in the Jarramlee Offset Management Plan into this plan. While the WBSA recognises this as an administrative mitigation measure, the simplified approach to ongoing management will enhance the coordination of land management actions across sites that share conservation objectives, geographic connections and strategic planning linkages.

Within this context, this offset management plan (OMP) also includes new actions resulting from the scheduled review of the original Jarramlee OMP (ACT Government 2013a).
1.2 Purpose and scope

Jarramlee, West Macgregor and Lot 2 Wallaroo Road have complementary primary conservation objectives concerning Matters of National Environmental Significance (MNES), protected under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Specifically to:

1. permanently protect the critically endangered Golden Sun Moth Synemon plana (GSM) habitat and the critically endangered Natural Temperate Grassland of the South Eastern Highlands (NTG) ecological community within the offset sites
2. continue to enhance the quality and extent of GSM habitat (Jarramlee and Lot 2) and to increase the extent of NTG (Jarramlee).

Recognising that the offset sites also support other natural and cultural conservation values, the secondary objectives for the offsets sites are to:

1. maintain habitat connectivity for woodland birds
2. contribute towards the persistence of a local population of the Canberra Raspy Cricket Cooraboorama canberrae
3. manage potential Pink-tailed Worm-lizard Aprasia parapulchella habitat
4. improve protection and restoration of ecological values throughout the riparian corridor
5. respect and foster Aboriginal connection and management of Country
6. facilitate the development of a Ngunnawal Cultural Landscape Framework.

Importantly, remnant patches of NTG and GSM habitat within the Gooromon Grasslands also extend into the Dunlop Grassland Nature Reserve (102.6 ha) to the north-east. As these MNES patches are contiguous with the Lot 2 Wallaroo Road site, coordinated land management actions (such as pest plant and animal control programs) will also include this reserved area.

According to the WBSA, it is anticipated that there is in the order of 20 years’ from 2017 to the likely timing of the impacts associated with the Ginninderra Drive extension. The recent purchase and management of Lot 2 Wallaroo Road is intended to facilitate early commencement of grassland rehabilitation activities on the environmental offset site well in advance of the impact occurring. The time until ecological benefit has been set at 10 years after the impact occurring.

This is in the order of 30 years from 2017, based on the predicted impact timing. This timeframe reflects challenges associated with rehabilitating native grasslands and reintroducing GSM (A T Adams Consulting 2017).

1.3 Governance and statutory framework

Three separate EPBC Act approval decisions are linked through the consolidation of the Gooromon Grasslands. These are:

EPBC SA024, West Belconnen Strategic Development (Ginninderry). Environmental offset site: Lot 2 Wallaroo Road (86.8 ha; Yass Valley Shire, NSW). Approval decision effective until 30/06/2067.


1.3.1 Lot 2 Wallaroo Road offset site

The WBSA will be managed via a private/public joint venture between Riverview Projects (ACT) Pty Ltd and the Suburban Land Agency (SLA) within the Environment, Planning and Sustainable Development Directorate (EPSDD), ACT Government. Riverview Projects (ACT) Pty Ltd will maintain primary responsibility for delivering the approval decision (SA024). The SLA acquired Lot 2 Wallaroo Road to secure an offset site upon which the joint venture partners will deliver GSM habitat restoration projects (Table 2).

A separate Ginninderry Offset Management Plan (SMEC in prep) outlines how the additional commitments for Box Gum Woodland (BGW) and Pink-tailed Worm-lizard (PTWL) attached to the WBSA program will be delivered. These MNES commitments are attached to offset sites within the Ginninderry Conservation Corridor, adjacent to the Murrumbidgee River (also part of the WBSA). Both OMPs will be appended to the Ginninderry Conservation Corridor Management Plan (TRC Tourism Pty Ltd 2018) to satisfy approval Condition 9 of the WBSA.
1.3.2 Jarramlee offset site
The SLA (previously the Land Development Agency) is the proponent for the Lawson South development, with responsibilities for delivering the approval decision (2010/5549; Table 3) now divided between two ACT Government directorates: EPSDD and Transport Canberra and City Services Directorate (TCCS). The ACT Parks and Conservation Service (PCS) has been implementing land management actions within Jarramlee since November 2013, in accordance with the inaugural Jarramlee Offset Management Plan (ACT Government 2013a). All subsequent revisions of this OMP will now to be incorporated into the Gooromon Grasslands offset planning/implementation cycle (Figure 2).

1.3.3 West Macgregor offset site
A private development consortium, Canberra Estates Consortium No. 22 Pty Ltd, is the proponent responsible for delivering the EPBC Act approval decision 2010/5520 attached to the Macgregor West 2 development. The EPBC Act approval period for this site concludes 31 August 2020, with no outstanding commitments being carried forward into this OMP.

This OMP also contributes toward delivering commitments within other regional and national plans, strategies and policies. Figure 2 provides examples of the plans and strategies that managing the Gooromon Grasslands will contribute to deliver.

Both the Jarramlee and West Macgregor offset sites are incorporated in the Canberra Nature Park Plan of Management (ACT Government, in prep.).

1.4 Land zoning and land management arrangements

1.4.1 Jarramlee and West Macgregor offset sites
The process of applying a Pc: Nature Reserve overlay for Jarramlee and West Macgregor offset sites via a variation to the Territory Plan was completed on 19th August 2016. The offset sites now form part of Canberra Nature Park and will be managed in accordance with the relevant ACT legislation, policy, strategies and plans outlined in Figure 2.

Part of the West Macgregor offset site is also subject to a rural lease (Figure 1). This land management arrangement will remain. This part of the nature reserve is closed to the public.

Land management actions within the West Macgregor offset site will be co-ordinated between PCS and the rural lessee. PCS will continue to have full land management responsibility for the Jarramlee offset site.

1.4.2 Lot 2 Wallaroo Rd offset site
Lot 2 Wallaroo Road (Lot 2 DP1144979), located in NSW, is not subject to conservation protections under the ACT Government’s statutory land use framework. While it is owned by the ACT Government it will remain subject to statutory conservation protections under NSW State Government and Commonwealth Government frameworks.

The following will occur to facilitate and ensure the in-perpetuity protection of the significant conservation values of Lot 2 Wallaroo Road.

1. The land will be rezoned as Zone E2 Environmental Conservation under the Yass Valley Local Environmental Plan 2013.
2. A Biodiversity Stewardship Agreement (BSA) will be established over the land under the provisions of the NSW Biodiversity Conservation Act 2016 (BC Act). The key features of a BSA, which make it the most appropriate formal land management mechanism for Lot 2 Wallaroo Road are as follows:
   a. The NSW Biodiversity Assessment Method (BAM) is applied by an accredited BAM Assessor to accurately assess and quantify the biodiversity values of the land. This assessment is presented in a Biodiversity Stewardship Assessment Report (BSAR).
   b. Once finalised and formally agreed to, the management measures proposed for the land (refer ‘Section 5 – Restoration’ and ‘Section 6 – Monitoring’) can be directly inserted into the BSAR and BSA to become commitments of the BSA.
   c. The BSAR will determine the number of credits that will be generated for each entity (i.e. NTG, GSM) by the establishment and in-perpetuity management of the land as a Biodiversity Stewardship Site under the BSA.
   d. The BSA will place audit/compliance responsibility with the NSW Biodiversity Conservation Trust and OEH (in the event of breaches of the BSA).
   e. The BSA will allow for management responsibility to be transferred between parties. For example, the SLA and/or Riverview Projects (ACT) Pty Ltd could set up the BSA and then transfer responsibility to PCS.
Figure 1: Gooromon Grasslands location.
The BSAR will determine that the establishment and in-perpetuity management of the land as a Biodiversity Stewardship Site will generate biodiversity credits under the NSW Biodiversity Offsets Scheme. The usual arrangement would be that these credits would be sold to the market to offset impacts upon the relevant entities elsewhere. The funds from the sale of credits are then used to fund the committed conservation actions on the land. Regarding Lot 2 Wallaroo Road, whilst the BSAR will determine the credit value generated, this credit value will have already been realised as the offset for the impacts associated with the WBSA, thus it will not be available for sale (i.e. the same offset value cannot be realised twice).

With reference to the above, it is important to note that the purpose of the BSA for Lot 2 is to provide a formal mechanism to facilitate and ensure the in-perpetuity protection of the significant conservation values of the land, this being a commitment of the WBSA. The management measures proposed in the OMP for Lot 2 Wallaroo Road will be funded by the ACT Government (SLA) and then the Ginninderry Conservation Trust. The establishment of the BSA will not generate funds for the conservation of the land.

The above described arrangements have been endorsed by OEH.

1.4.3 Gooromon Grasslands – land management overview

The SLA will maintain land management responsibility until such time as the Ginninderry Conservation Trust is established. Land management responsibility will then be transferred to PCS, subject to funding agreements with the Trust.

To facilitate co-operative land management arrangements PCS and SLA will co-ordinate operational works across all Gooromon Grasslands offset sites.

1.5 Funding arrangements

1.5.1 Jarramlee and West Macgregor
The 2014/15 ACT Government budget (ACT Government 2014a) committed to fund $872,000 of capital funding between 2014/15 – 2018/19. In addition, $69,000 p.a. will be made available for site management in perpetuity. This amount will be in excess of the $972,000 funding requirement identified in condition 12b in the approval decision. Due to the restoration requirements for this site, additional funding to manage the values will be required. The Parks and Conservation Service will seek to secure additional funding through the ACT Budget bid process as required. This budget bid will also seek to secure funding for the West Macgregor offset site.

1.5.2 Lot 2 Wallaroo Road
The Suburban Land Agency will fund land management activities within Lot 2 Wallaroo Road site until such time as the Ginninderry Conservation Trust is established and the total offset requirements for Lot 2 Wallaroo Road are confirmed. As detailed above, the establishment of the BSA over Lot 2 will not generate funds for the conservation of the land.
Statutory framework including Commonwealth, ACT and NSW legislation, policy, and plans.

### Commonwealth Legislation, Policy & Plans
- Environment Protection and Biodiversity Conservation Act 1999
- Conservation Advices and Recovery Plans
- Threat Abatement Plans
- EPBC Act Environmental Offsets Policy

### ACT Legislation, Policy, Strategies & Plans
- Nature Conservation Act 2014
- ACT Nature Conservation Strategy 2013-2023
- ACT Ecological Community Conservation Strategies and Threatened Species Action Plans
- Canberra Nature Park Plan of Management (in prep.)
- Pest Plants and Animals Act 2005
- ACT Weeds Strategy 2009-2019
- ACT Pest Animal Management Strategy 2012-2022
- PCS Invasive Plants Operational Plan (Annual)
- PCS Vertebrate Pest Operational Plan (Annual)
- Emergencies Act 2004
- ACT Strategic Bushfire Management Plan
- ACT Bushfire Operations Plan
- Heritage Act 2004
- ACT Heritage Register
- Planning and Development Act 2007
- ACT Environmental Offsets Policy

### NSW Legislation, Policy, Strategies & Plans
- Biodiversity Conservation Act 2016 and Biodiversity Conservation Regulation 2017
- Saving our Species Program 2016–21
- NSW Biodiversity Offsets Scheme
- NSW Biodiversity Assessment Method
- Local Land Services Act 2013
- Biosecurity Act 2015
- South East Regional Strategic Weed Management Plan 2017-2022
- South East Regional Strategic Pest Animal Plan 2018-2023 (in prep.)
- Rural Fires Act 1997
- Southern Tablelands Bush Fire Risk Management Plan
- Heritage Act 1977
- Aboriginal Places & State Heritage Register
- National Parks and Wildlife Act 1974
- Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW

### Figure 2: Environmental Offset Management

**OFFSET MANAGEMENT PLANNING**
- 5 Year program review
- 5 Year OMP review
- Annual Reporting

**EVALUATION**

**IMPLEMENTATION**

**PRACTITIONERS NOTE:** This OMP covers actions to be delivered within both the ACT and NSW. When delivering this OMP all ACT Government staff must be aware of, and work within, both the NSW and ACT legislative framework (Figure 2). This includes seeking relevant approvals for any works within or impacting ACT Nature Reserves (Jarramlee and West Macgregor) and adhering to the conditions that apply according to NSW legislation and policy as applicable for Lot 2 Wallaroo Road, notably those of the Biodiversity Stewardship Agreement (BSA) once established.
2. ENVIRONMENTAL OFFSET COMMITMENTS

2.1 Approval conditions and conservation outcomes

The following section describes the approval conditions as is relevant to the management of the Gooromon Grasslands. This includes conditions attached to the West Belconnen Strategic Assessment (Table 1 and Table 2) and the Lawson South Residential Development (Table 3).
<table>
<thead>
<tr>
<th>No</th>
<th>Condition Requirement</th>
<th>Responsibility</th>
<th>OMP/Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>The approval holder must ensure that the conservation outcomes specified in Section 5 of the Program are achieved.</td>
<td>Riverview Projects (ACT) Pty Ltd</td>
<td>This OMP</td>
</tr>
<tr>
<td>7</td>
<td>Prior to the commencement of construction of the Ginninderra Drive extension, the approval holder must ensure that Golden Sun Moth Conservation Reserves are established for Jarramlee (52 ha) and West Macgregor (37 ha) and Lot 2 Wallaroo Road (86.8 ha) to offset impacts to Golden Sun Moth (GSM).</td>
<td>Riverview Projects (ACT) Pty Ltd</td>
<td>Section 1.4</td>
</tr>
<tr>
<td>9</td>
<td>The approval holder must prepare the Offset Management Plan to address the preservation and enhancement of offset areas, including the Golden Sun Moth Conservation Reserves required under condition 7, and to achieve at a minimum the conservation outcomes as outlined in Section 5 of the Program. The plan must be prepared in consultation with the Department (regarding Protected Matters), NSW Office of Environment and Heritage (regarding NSW portion of the site), endorsed by the ACT Conservator (for both the ACT and NSW portion of the site) and approved by the ACT Minister for the Environment (ACT portion). Endorsement and approval of the plan must be obtained within two years from the date of endorsement of the Program. Construction cannot commence before the plan is endorsed and approved (for all areas other than the area marked as stage 1 in the Program). The approved Offset Management Plan must be appended to the West Belconnen Conservation Corridor Reserve Management Plan required under Condition 8. The endorsed and approved plan or a later endorsed and approved plan must be implemented and made available to the public for the life of the Program.</td>
<td>Riverview Projects (ACT) Pty Ltd with PCS support</td>
<td>This OMP</td>
</tr>
<tr>
<td>15</td>
<td>The approval holder must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement the management plans required by this approval, and make them available upon request to the Department. Such records may be subject to audit by the Department or an independent auditor in accordance with Section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the Department’s website. The results of audits may also be publicised through the general media.</td>
<td>Riverview Projects (ACT) Pty Ltd, with SLA and PCS support</td>
<td>Section 9</td>
</tr>
<tr>
<td>16</td>
<td>Within two months of the end of each financial year after the commencement of the action, the approval holder must submit an Annual Report to the Department addressing compliance with the conditions of this approval over the previous 12 months, including implementation of any management plans as specified in the conditions. The Annual Report must contain at a minimum the requirements outlined in Section 7.1.1 of the Program. Non-compliance with any of the conditions of this approval must be reported to the Department as soon as the approval holder is aware of the breach and the non-compliance must be reported in the Annual Report. The report must be made available to the public.</td>
<td>Riverview Projects (ACT) Pty Ltd to co-ordinate the report.</td>
<td>Section 10</td>
</tr>
<tr>
<td>20</td>
<td>Unless otherwise agreed to in writing by the Minister, the approval holder must publish all management plans and reports referred to in these conditions of approval on their website. Each management plan and report must be published on the website within 1 month of being endorsed and approved.</td>
<td>Riverview Projects (ACT) Pty Ltd. PCS will also publish all monitoring reports on the PCS website.</td>
<td>Section 10</td>
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</table>
Table 2: Environmental offset conservation outcomes (Golden Sun Moth commitments only) as specified in Section 5 of the WBSA Program Report (EPBC SA024).

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Actions (Golden Sun Moth)</th>
<th>Responsibility</th>
<th>Timing</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection and enhancement of habitat whilst allowing for the intrusion of the Ginninderra drive alignment (refer to ACT Government 2013a) (David Hogg Pty Ltd 2011)</td>
<td>1. Vary the Territory Plan to establish conservation reserves at the Jarramlee and West Macgregor offset areas, with provision for Ginninderra Drive.</td>
<td>Riverview Projects (ACT) Pty Ltd</td>
<td>Complete</td>
<td>Section 1.4</td>
</tr>
</tbody>
</table>
| Mitigation of the impact of Ginninderra Drive extension on GSM habitat in Jarramlee and West Macgregor offset areas | 2. ACT Government to Purchase Lot 2 Wallaroo Road (86.8 Ha) from the Commonwealth catering for the following components:  
   » 1.8 hectares as replacement of impacted areas of occupied GSM habitat  
   » 11.9 hectares of occupied GSM habitat  
   » 19.4 hectares of unoccupied GSM habitat  
   » Implementation of GSM habitat restoration as a connectivity measure between Jarramlee and Dunlop Grasslands Reserve. | SLA (land purchase) and PCS (implement restoration on behalf of the approval holder) | Land purchase prior to commencement of construction of infrastructure to service the residential estate. Habitat restoration prior to commencement of construction of Ginninderra Drive extension. | Complete - Section 1.3.1 |
|                                                                          | 3. Rezone Lot 2 Wallaroo Road (86.8 Ha) as Zone E2 Environmental Conservation under the Yass Valley Local Environmental Plan 2013.  
<pre><code>                                                                      | Riverview Projects (ACT) Pty Ltd to request Yass Valley Council to implement the statutory covenant.                                                                                                                    | To be implemented concurrently with the amendment to the Yass Valley Local Environment Plan. | Section 1.4.2 |
</code></pre>
<p>|                                                                          | 4. Establish a Biodiversity Stewardship Agreement (BSA) over the land under the provisions of the NSW Biodiversity Conservation Act 2016.                                                                                   | SLA and Riverview Projects (ACT) Pty Ltd.                                                                                                                  | To be developed, approved and established prior to commencement of construction of Ginninderra Drive extension | Section 1.4.2 |</p>
<table>
<thead>
<tr>
<th>Outcome</th>
<th>Actions (Golden Sun Moth)</th>
<th>Responsibility</th>
<th>Timing</th>
<th>Section</th>
</tr>
</thead>
</table>
| Mitigation of the impact of Ginninderra Drive extension on GSM habitat in Jarramlee and West Macgregor offset areas | 5. Prepare a combined offset management plan (OMP) addressing the preservation and enhancement of GSM habitat in Jarramlee and West Macgregor offset areas and Lot 2.  
Actions in the OMP to include research and trials for Golden Sun Moth larvae translocation.  
Incorporate the OMP into the WBSA RMP (Ginninderry Conservation Corridor Management Plan).  
Lot 2 GSM habitat area to be increased from current 11.9 hectares to 33.1 hectares. | An agreement was reached for PCS to develop the initial OMP.  
Ginninderry Conservation Trust to seek approval and implement the plan.  
Plan to be endorsed by the ACT Conservator, approved by the Minister for the Environment (ACT component) and endorsed by the ACT Conservator in consultation with OEH (NSW component). | Plan to be finalised within 2 years of Ministerial endorsement of the Program, reviewed at intervals of no more than five years thereafter.  
GSM habitat area increase to be achieved prior to construction of Ginninderra Drive extension. | This OMP |
<p>| Establishment of a governance regime for reserve land (West Macgregor, Jarramlee and Lot 2). | 6. Establish a Ginninderry Conservation Trust. | Riverview Projects (ACT) Pty Ltd | Within 2 years of Ministerial endorsement of the Program and prior to construction of Ginninderra Drive extension. | Refer to WBSA RMP |
| Implementation of program for research and trials for the translocation of Golden Sun Moth larvae. | 7. Research and trials to be undertaken to assist habitat restoration and Golden Sun Moth larvae translocation. | Ginninderry Conservation Trust | Research programs and trials to begin with the commencement of the OMP plus 5 years. | Section 5.2 |</p>
<table>
<thead>
<tr>
<th>Outcome</th>
<th>Actions (Golden Sun Moth)</th>
<th>Responsibility</th>
<th>Timing</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restoration of GSM habitat.</td>
<td>8. Restore habitat area into which Golden Sun Moth larvae will be translocated, subject to concurrence by the Ginninderry Conservation Trust that sufficient evidence exists to provide confidence in a successful outcome. May include further translocation trials of Golden Sun Moth subject to consultation with the Conservator of Flora and Fauna and approval by DoEE. Restoration may also include stream bank restoration from the Murrumbidgee River along Ginninderra Creek and along Gooromon Ponds Creek up to Wallaroo Road to improve linkages along the riparian areas.</td>
<td>Ginninderry Conservation Trust. Restoration area should be a site of importance to landscape connectivity determined in conjunction with the ACT Environment, Planning and Sustainable Development Directorate.</td>
<td>Completion of restoration and then monitored for 15 years.</td>
<td>Section 5.2.3</td>
</tr>
<tr>
<td>Translocation of GSM larvae from sites that will be impacted by construction of the Ginninderra Drive extension</td>
<td>9. Translocate GSM larvae from sites that will be impacted by construction of the Ginninderra Drive extension to suitable habitat restoration sites at Lot 2 Wallaroo Road using method as refined through the program of research and trials.</td>
<td>Ginninderry Conservation Trust. Translocation research should build on existing knowledge and trials, undertaken elsewhere in the ACT.</td>
<td>Approval of the OMP plus 20 years, and prior to the construction of Ginninderra Drive extension.</td>
<td>Section 5.2.3</td>
</tr>
<tr>
<td>Ongoing monitoring of impacts on habitat</td>
<td>10. Adopt field data recorded by Rowell (Rowell 2015) as baseline data and ensure that monitoring methods are consistent with those used to measure GSM population and habitat quality and extent across the ACT.</td>
<td>Ginninderry Conservation Trust. Monitoring to be timed so that it is consistent with GSM monitoring across the ACT. The influence of seasonal variability will be considered.</td>
<td>Monitoring period to be reviewed if impacts have stabilised.</td>
<td>Section 6</td>
</tr>
<tr>
<td>Establishment of a process of independent third party review of Reserve Management Plan</td>
<td>11. Prepare an annual report addressing MNES outcomes achieved in the previous year; lessons learned; include a financial audit; report to be made publicly available. Report to be submitted to the ACT Conservator of Flora and Fauna.</td>
<td>Ginninderry Conservation Trust.</td>
<td>Within 2 months of the end of each financial year</td>
<td>Section 10</td>
</tr>
</tbody>
</table>
2.1.1 Corrective actions

Section 5.2.2 of this OMP details a potential error in the WBSA relating to the extent of unoccupied GSM habitat in Lot 2 Wallaroo Road. In summary, the total area of unoccupied GSM habitat is in doubt. To address this error, a Golden Sun Moth Habitat Restoration Strategy will be developed to increase the area of GSM habitat to levels that were originally considered present on site (an increase of 19.4 hectares). This restoration strategy will be informed by current site conditions (including constraints and associated risks). Timeframes and budgets will also be informed by risks associated with undertaking the associated restoration activities and the best forecast timing of the road development. This will include risks from seasonal weather as well as access to resources, such as the supply of sufficient seed of the key C3 grasses known to support GSM populations. Section 5.2.2 identifies options that will be considered as part of delivering this strategy. This strategy will be implemented prior to construction of the Ginninderra Drive extension.

Table 3: Environmental offset approval conditions attached to the Lawson South Residential Development (EPBC 2010/5549) as relevant to this OMP.

<table>
<thead>
<tr>
<th>No.</th>
<th>Condition Requirement</th>
<th>Responsibility</th>
<th>Section No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12b</td>
<td>Provision of not less than $972,000 (GST exclusive) to facilitate management of the McGregor West (Jarramlee) offset area including estimated timeframes, budgets and ongoing operational costs.</td>
<td>ACT Government</td>
<td>Section 1.5</td>
</tr>
<tr>
<td>13</td>
<td>To manage the McGregor West (Jarramlee) offset site, the person taking the action must develop an offset management plan (OMP), for approval by the Minister (the initial OMP was approved by the Minister December 2013). The (revised) OMP must include, but not necessarily be limited to:</td>
<td>PCS</td>
<td>This OMP</td>
</tr>
<tr>
<td>13a</td>
<td>A map that clearly defines the location and boundaries of the offset site including offset attributes and shapefiles.</td>
<td></td>
<td>Figure 1 Shapefiles supplied to the Commonwealth</td>
</tr>
<tr>
<td>13b</td>
<td>Measures to conserve, in perpetuity, the McGregor West (Jarramlee) offset site as habitat for the Golden Sun Moth and Natural Temperate Grassland.</td>
<td></td>
<td>Section 1.4</td>
</tr>
<tr>
<td>13c</td>
<td>Details of administration arrangement.</td>
<td></td>
<td>Sections 1.3 and 1.4</td>
</tr>
<tr>
<td>13d</td>
<td>Details of an appropriate monitoring program to be undertaken by a suitably qualified expert, including aims, methodology and reporting, to determine whether the Golden Sun Moth and Natural Temperate Grassland values at the McGregor West (Jarramlee) offset site are improved.</td>
<td></td>
<td>Section 6</td>
</tr>
<tr>
<td>13e</td>
<td>Details of contingency measures should the monitoring required by condition 13d determine that the Golden Sun Moth and Natural Temperate Grassland values have degraded at the McGregor West (Jarramlee) offset site.</td>
<td></td>
<td>Section 6</td>
</tr>
<tr>
<td>16</td>
<td>The person taking the action must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement the offset, offset management plan and, if required, the restoration plan and any other report, strategies, agreements however described required by this approval, and make them available upon request to the department. Such records may be subject to audit by the department or an independent auditor in accordance with Section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the department’s website. The results of audits may also be publicised through the general media.</td>
<td>PCS – as related to the management of the Jarramlee offset site. Any records associated with delivering conditions relating to the management of Reservoir Hill or the Lawson South Development site remain the responsibility of TCCS and the SLA, respectively.</td>
<td>Section 9</td>
</tr>
<tr>
<td>No.</td>
<td>Condition Requirement</td>
<td>Responsibility</td>
<td>Section No.</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>17</td>
<td>Within three months of every 12 month anniversary of the commencement of the action, the person taking the action must publish and maintain a report on their website addressing compliance with each of the conditions of this approval, including implementation of any management plans as specified in the conditions. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the department at the same time as the compliance report is published.</td>
<td>Ginninderry Conservation Trust to coordinate annual reporting for the Jarramlee offset</td>
<td>Section 10</td>
</tr>
<tr>
<td>19</td>
<td>If the person taking the action wishes to carry out any activity otherwise than in accordance with the offset strategy, offset management plan and if required, the restoration plan or additional offset strategy and any other report, strategies, agreements however described as specified in the conditions, the person taking the action must submit to the department for the Minister’s written approval a revised version of that offset strategy, offset management plan and, if required, the restoration plan or additional offset strategy and any other report, strategies, agreements however described. The varied activity shall not commence until the Minister has approved the varied offset strategy, offset management plan and, if required, the restoration plan or additional offset strategy and any other report, strategies, agreements however described. The Minister will not approve a varied offset strategy, offset management plan, and, if required, the restoration plan or additional offset strategy and any other report, strategies, agreements however described unless the revised offset strategy, offset management plan, and, if required, the restoration plan or additional offset strategy and any other report, strategies, agreements, however described would result in an equivalent or improved environmental outcome over time. If the Minister approves the offset strategy, offset management plan, and, if required, the restoration plan or additional offset strategy and any other report, strategies, agreements, however described must be implemented in place of the offset strategy, offset management plan, and, if required, the restoration plan or additional offset strategy and any other report, strategies, agreements, however described originally approved.</td>
<td>The approval holder</td>
<td>Noted</td>
</tr>
<tr>
<td>20</td>
<td>If the Minister believes that it is necessary or convenient for the better protection of listed threatened species and communities, the Minister may request that the person taking the action make specified revisions to the offset strategy, offset management plan, and, if required, the restoration plan or additional offset strategy and any other report, strategies, agreements, however described specified in the conditions and submit the revised offset strategy, offset management plan, and, if required, the restoration plan or additional offset strategy and any other report, strategies, agreements, however described for the Minister’s written approval. The person taking the action must comply with any such request. The revised approved offset strategy, offset management plan, and, if required, the restoration plan or additional offset strategy and any other report, strategies, agreements, however described must be implemented. Unless the Minister has approved the offset strategy, offset management plan, and, if required, the restoration plan or additional offset strategy and any other report, strategies, agreements, however described, the person taking the action must continue to implement the offset strategy, offset management plan, and, if required, the restoration plan or additional offset strategy and any other report, strategies, agreements, however described originally approved, as specified in the conditions.</td>
<td>PCS for the purpose of this OMP</td>
<td>Noted</td>
</tr>
</tbody>
</table>
2.2 Offset Management Plan consultation

Consultation on the Gooromon Grasslands: Offset Management Plan has been undertaken with each of the stakeholders identified in Table 4. This includes consultation with the NSW Government Office of Environment and Heritage, as the Lot 2 Wallaroo Road offset site is located within NSW.

Table 4: Details of Gooromon Grasslands: Offset Management Plan stakeholder consultation.

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Draft Version</th>
<th>Date consulted / comments received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ani Gruber, Senior Ranger, PCS Environmental Offsets</td>
<td>1</td>
<td>11th July 2018</td>
</tr>
<tr>
<td>Simon Stratford, Senior Ranger, PCS North District</td>
<td>1</td>
<td>6th July 2018</td>
</tr>
<tr>
<td>Michael Mulvaney, Senior Environmental Planner, CR</td>
<td>1</td>
<td>12th June 2018</td>
</tr>
<tr>
<td>Greg Baines, Senior Ecologist, CR</td>
<td>1</td>
<td>12th June 2018</td>
</tr>
<tr>
<td>Chris Webb, Development Director, SLA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Jason Cummings, Riverview (ACT) Pty Ltd</td>
<td>1 and 2</td>
<td>13th June 2018 &amp; 26th July 2018</td>
</tr>
<tr>
<td>NSW Rural Fire Service</td>
<td>1</td>
<td>2nd August 2018</td>
</tr>
<tr>
<td>Ross Rowe, Commonwealth Department of Environment and Energy</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>OEH</td>
<td>1</td>
<td>28th August 2018</td>
</tr>
</tbody>
</table>
3. OFFSET SITE DESCRIPTION

3.1 Conservation values

Gooromon Grasslands has been formed primarily to conserve the critically endangered (EPBC Act) ecological community Natural Temperate Grassland of the South Eastern Highlands (NTG) and the critically endangered (EPBC Act) threatened species Golden Sun Moth (*Synemon plana*) (GSM).

Section 5 identifies the current extent and quality of the NTG and GSM habitat across Gooromon Grasslands, as reflected in the results from the most recent monitoring program.

Although the ‘natural’ (climax community) context for this site is NTG (Capital Ecology 2018a), extensive planting of woodland eucalypt species in the 1970’s (Section 3.5) and incursions of invasive shrubs have established a novel ecosystem (Hobbs et al. 2009) that is now utilised by woodland birds. Jarramlee has records for nine vulnerable woodland bird species (Table 7). Seven of these species (Scarlet Robin *Petroica boodang*, Superb Parrot *Polytelis swainsonii*, Diamond Firetail *Stagonopleura guttata*, Dusky Woodswallow *Artamus cyanopterus* and Flame Robin *Petroica phoenicea*) were recorded in the 2016 monitoring program (Greening Australia 2017).

Plans for maintaining habitat amenity for woodland birds (Section 5.3), while mitigating further encroachment of these novel ecosystem features into the remaining native grassland are discussed in Section 4.1.1.
Osborne and Wong (2017) identified suitable rocky areas that provide potential habitat for the Pink-tailed Worm-lizard (*Aprasia parapulchella*) within Jarramlee. High quality potential habitat totalled 1.16 hectares, moderate quality totalled 2.62 hectares and low quality 3.58 hectares (Figure 3). Osborne and Wong (2017) also informed the threat assessment (Section 4) and associated management actions (Section 8) for this species.

Although the Pink-tailed Worm-lizard is not confirmed within Jarramlee, it is acknowledged that confirming presence is difficult. At present the only technique used to survey Pink-tailed Worm-lizard populations involves rock-turning, which is a technique that could be deleterious to the habitat and the population itself. The number of rock turns required to locate an individual lizard is also high.

The ACT Government is currently undertaking research with the aim of developing a low-impact Pink-tailed Worm-lizard survey method (R. Milner, pers. comm., 2018). Until this method has been developed, and used to confirm presence, a cautionary approach to managing and maintaining potential habitat quality will be applied.

The presence of potential Pink-tailed Worm-lizard habitat within Lot 2 Wallaroo Road will also be investigated as part of implementing this OMP.

Several active burrows of the Canberra Raspy Cricket (*Cooraboorama canberrae*) have been observed in the north-western section of Jarramlee, and the species is known to occur in the adjacent Dunlop Grassland Nature Reserve (R. Speirs pers. Obs). This uncommon and localised species is large and flightless, and usually associated with grasslands in moderate to good condition (Rowell 2013). Although not currently listed a threatened, the species’ apparent restricted geographic distribution and preference for a now critically endangered habitat type, suggests a future nomination as a threatened species could be recognised (Mulvaney 2014; Reid et al. 2018).

Refer to Appendix A and B for the current record of flora and fauna within the Gooromon Grasslands.

Gooromon Ponds Creek and Ginninderra Creek converge within the reserve, both tributaries to the Murrumbidgee River, approximately 4.2 kilometres downstream. Both creeks provide opportunities to improve regional connectivity through targeted restoration activities.

Practitioners note: For more information concerning the local ecology of these primary conservation values, land managers should refer to the most recent versions of the ACT Native Grassland Conservation Strategy and the associated Threatened Species Action Plans released by the ACT Government (2017).

### 3.2 Threatened species and endangered ecological communities

The following tables (Table 5, 6 and 7) provide information on the endangered ecological communities and threatened species that have been recorded on Gooromon Grasslands offset sites.

**Table 5: Endangered ecological communities recorded on Gooromon Grasslands offset sites.**

<table>
<thead>
<tr>
<th>Commonwealth name</th>
<th>ACT name</th>
<th>NSW Name</th>
<th>EPBC Act 1999¹</th>
<th>NC Act 2014²</th>
<th>BC Act 2016³</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Temperate Grassland of the South Eastern Highlands</td>
<td>Natural Temperate Grassland</td>
<td>Natural Temperate Grassland of the South Eastern Highlands</td>
<td>Critically Endangered</td>
<td>Endangered</td>
<td>Not Listed</td>
<td>Rowell 2013; Capital Ecology 2018a</td>
</tr>
</tbody>
</table>
Table 6: Threatened species recorded on Gooromon Grasslands offset sites.

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>Class</th>
<th>EPBC Act 1999¹</th>
<th>NC Act 2014²</th>
<th>BC Act 2016³</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synemon plana</td>
<td>Golden Sun Moth</td>
<td>Invertebrate</td>
<td>Critically Endangered</td>
<td>Endangered</td>
<td>Endangered</td>
<td>David Hogg Pty Ltd 2011; Rowell 2013; Rowell 2015</td>
</tr>
<tr>
<td>Cooraboorama canberae</td>
<td>Canberra Raspy Cricket</td>
<td>Invertebrate</td>
<td>-</td>
<td>Rare or uncommon</td>
<td>-</td>
<td>Rowell 2013</td>
</tr>
</tbody>
</table>

¹(Commonwealth) Environment Protection and Biodiversity Conservation Act
²(ACT) Nature Conservation Act
³(NSW) Biodiversity Conservation Act

Table 7: Additional threatened species recorded at Jarramlee offset site.

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>Class</th>
<th>EPBC Act 1999¹</th>
<th>NC Act 2014²</th>
<th>BC Act 2016³</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polytelis swainsonii</td>
<td>Superb Parrot</td>
<td>Bird</td>
<td>Vulnerable</td>
<td>Vulnerable</td>
<td>Vulnerable</td>
<td>Atlas of Living Australia 2018; Canberra Nature Map 2018</td>
</tr>
<tr>
<td>Melanodryas cucullata</td>
<td>Hooded Robin</td>
<td>Bird</td>
<td>-</td>
<td>Vulnerable</td>
<td>Vulnerable</td>
<td>Atlas of Living Australia 2018; Canberra Nature Map 2018</td>
</tr>
<tr>
<td>Hieraaetus morphnoides</td>
<td>Little Eagle</td>
<td>Bird</td>
<td>-</td>
<td>Vulnerable</td>
<td>Vulnerable</td>
<td>Atlas of Living Australia 2018; Canberra Nature Map 2018</td>
</tr>
<tr>
<td>Petroica boodang</td>
<td>Scarlet Robin</td>
<td>Bird</td>
<td>-</td>
<td>Vulnerable</td>
<td>Vulnerable</td>
<td>Atlas of Living Australia 2018; Canberra Nature Map 2018</td>
</tr>
<tr>
<td>Lalage tricolor (prev. sueurii)</td>
<td>White-winged Triller</td>
<td>Bird</td>
<td>-</td>
<td>Vulnerable</td>
<td>-</td>
<td>Atlas of Living Australia 2018; Canberra Nature Map 2018</td>
</tr>
<tr>
<td>Epthianura albifrons</td>
<td>White-fronted Chat</td>
<td>Bird</td>
<td>-</td>
<td>-</td>
<td>Vulnerable</td>
<td>Atlas of Living Australia 2018; Canberra Nature Map 2018</td>
</tr>
<tr>
<td>Petroica phoenicea</td>
<td>Flame robin</td>
<td>Bird</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Atlas of Living Australia 2018; Canberra Nature Map 2018</td>
</tr>
<tr>
<td>Stagonopleura guttata</td>
<td>Diamond Firetail</td>
<td>Bird</td>
<td>-</td>
<td>-</td>
<td>Vulnerable</td>
<td>Atlas of Living Australia 2018; Canberra Nature Map 2018</td>
</tr>
<tr>
<td>Artamus cyanopterus</td>
<td>Dusky Woodswallow</td>
<td>Bird</td>
<td>-</td>
<td>-</td>
<td>Vulnerable</td>
<td>Atlas of Living Australia 2018; Canberra Nature Map 2018</td>
</tr>
<tr>
<td>Aprasia parapulchella</td>
<td>Pink-tailed Worm-lizard</td>
<td>Reptile</td>
<td>Vulnerable</td>
<td>Vulnerable</td>
<td>Vulnerable</td>
<td>Potential habitat only</td>
</tr>
</tbody>
</table>

¹(Commonwealth) Environment Protection and Biodiversity Conservation Act 1999
²(ACT) Nature Conservation Act 2014
³(NSW) Biodiversity Conservation Act 2016
Figure 3: Potential Pink-tailed Worm-lizard habitat within Jarramlee (Osborne and Wong 2017).
3.3 Aboriginal heritage and connection to country

Gooromon Grasslands is located on Ngannawal Country, an ancient and varied landscape managed by Ngannawal people for more than 25,000 years prior to European settlement and establishment of the ACT. The ongoing relationship as Traditional Custodians and responsibility to care for Country is still held strong by each of the many family groups within the Ngannawal community today.

Ngannawal Country was also a significant meeting place for neighbouring language and clan groups such as the Ngambri, Ngarigu, Wolgalu, Gundungurra, Yuin and Wiradjuri people – who travelled to this region for ceremonies, trade, seasonal resources, to exchange knowledge and maintain spiritual, social and environmental connectivity between traditional caretakers.

Archaeological investigations have proven that Aboriginal occupation in this region extends to before the last Ice Age, with extensive evidence found scattered throughout the ACT such as - scarred and other modified trees, ochre quarries, stone and wooden artefacts, shelters, rock art, burial sites and clearly marked ceremonial sites. Aboriginal heritage sites link generations of Aboriginal people over time, and represent the history of a complex belief system linked to the whole environment, which in turn sustains people and culture. Aboriginal places and objects are protected under the Heritage Act 2004. Any new findings must be reported within 5 days (ACT Heritage Council 2015). They are a tangible and invaluable part of our shared history that we all have a responsibility to protect.

Gooromon Grasslands and the surrounding landscape contain a large number of registered Aboriginal sites and artefacts. There is also potential for more to be identified through further archaeological surveys with Traditional Custodians as further research and land management works are undertaken. Through this OMP, the land managers commit to a greater involvement of local Aboriginal people in the monitoring and management of these heritage sites.

Traditionally, Aboriginal people shared responsibility to manage the land and waters according to lore and the interconnectedness between species. Ngannawal Country was abundant with animal and plant resources that provided a sustainable source of food, medicines and functional items that varied with the seasons. Much of the traditional ecological knowledge used to manage Country was severed when Aboriginal people were forcibly removed from Ngannawal Country into ‘reserves’ outside the ACT.

This OMP commits the land managers to implementing programs that empowers Traditional Custodians to reframe contemporary research and land management practices back into their own language, ways of reading the landscape and ancestral ways of managing Country. Projects such as the Ngannawal Cultural Landscape Project and Ngannawal Reserve Naming Project (Sections 3.3.2 and 3.3.3) have far reaching social and economic benefits for all Traditional Custodial families, in addition to better informing PCS long term management planning and operational programs.

3.3.1 ACT Parks and Conservation Service Murumbung Yurung Murra network

Aboriginal and Torres Strait Islander people working within PCS, are based in various roles across the organisation and are part of a cross-Directorate staff network known as Murumbung Yurung Murra (Ngannawal language meaning Good Strong Pathways).

The network provides valuable peer support, mentoring and advocacy – and facilitates the involvement of Traditional Custodians in identifying and capturing cultural landscape values, protocols and contemporary aspirations in managing Country.

The ACT Parks Murumbung Yurung Murra Rangers are the operational arm of the network. They undertake a wide range of land, fire, water and heritage management activities, conduct a program of ranger guided educational activities and host a variety of community events on Country.

The Murumbung Yurung Murra network are pivotal in progressing the consultation projects with Traditional Custodians when delivering actions within this OMP.

3.3.2 Ngannawal Cultural Landscape Framework

The Ngannawal Cultural Landscape Framework (developed as part of the Ngannawal Cultural Landscapes Project) integrates traditional ecological knowledge with other scientific and environmental data to produce guidelines that can be used to inform land management and community engagement applications (amongst other things).
This project aims to respect and foster Aboriginal connection and management of Country whilst enriching contemporary reserve management practices.

This project is currently being developed by the PCS Healthy Country Program and is supported by the PCS Environmental Offsets Team.

One outcome from this project is for traditional ecological knowledge to be applied when managing the conservation values within the Gooromon Grasslands offset sites.

3.3.3 Ngunnawal reserve naming

PCS has made a commitment to work with Traditional Custodians to name all offset reserves in Ngunnawal language. This includes Gooromon Grasslands, which will be given a Ngunnawal name within the life of this OMP.

This language consultation project will also provide PCS with the opportunity to consult with Traditional Custodians on Ngunnawal names for other reserves and significant sites, and develop a Policy in regards to the use of the Ngunnawal language in the naming / dual-naming of reserves, significant sites and signage.

3.4 Historic heritage values

A squatter map by Robert Dixon indicates that by 1837 the Gooromon Grasslands was part of grazing land owned by a Mr Palmer. It has a long history of sheep and cattle grazing including the lands adjacent to the offset site such as ‘Jarramlee’ - NSW freehold land. (M. Mulvaney, pers. comm., 2016).

Interestingly, the 1884 portion papers depict Ginninderra Creek and Gooromon Ponds Creek as a grouping of discrete ponds and not the flowing watercourse that runs through the site today.

The ACT/NSW straight line border features in the offset site, running the full length of the western boundary of the site (Figure 1). Along this boundary a trig point sits atop Stony Knob (590m) the highest point in the offset site contributing to the survey line between Mount Coree to the southwest and One Tree Hill to the northeast. A timber post fence runs along the border aside the Bicentennial Trail in the north western Section of the offset site and is likely to be the original fence constructed along the border in the 1920s (ACT Government 2011). In addition, a preliminary site visit to Lot 2 Wallaroo Road in December 2017 identified a potential historic ACT/NSW boarder marker made of a stone mound, with a timber survey peg, and a directional stone arrangement (as shown in Figures 4 and 5).

Figure 4: Potential historic ACT/NSW border marker – stone mount and timber survey peg.
3.5 Recent land use history

Each of the offset sites within Gooromon Grasslands has a history of agricultural production, under dryland grazing systems. Aerial photos have also identified more recent land management practices including ripping and planting of eucalyptus trees (circa 1972) by the National Capital Development Cooperation (NCDC) within Jarramlee (Figure 6). The ripping was also significant in terms of its effect on soil disturbance across the site (except where rocky outcrops limited machinery use). This is discussed further in the 2017 Grassland Quality and Extent Mapping Report (Capital Ecology 2018a).

Previous grassland mapping and monitoring reports, including Capital Ecology (2018a) classify Jarramlee as part of a grassland system that would otherwise be absent of trees. The absence of cut tree stumps, logs or local-native regeneration further supports this classification (Rowell 2013). Earlier aerial photos (pre 1970’s) also show a treeless plain prior to the extensive ripping.

Portions of Jarramlee were also previously used for a sewage treatment facility, which has since been removed and remediated (discussed further in Section 4.1.4).

In recent years the site has been grazed by cattle with both rural lease and agistment licences over West Macgregor and Jarramlee, respectively (Figure 7). This current land management is expected to continue over the life of this OMP.

3.6 Recreational values

Recreational opportunities will largely be limited to the Bicentennial National Trail, which traverses the offset site and is accessible to horses, walkers, mountain bike riders and dogs on-leash.

PCS is developing a Landscape Classification System, which assesses the naturalness of landscape settings from a visitor use and management perspective. Appropriate recreational infrastructure for the site will be identified as part of this classification system. Interpretation showcasing the ecological management and restoration activities may form part of this.

West Macgregor is a rural lease. As such this area is considered private land and public access is not permitted without permission from the rural Lessee. If access is permitted, any recreational activity undertaken within the offset site must be consistent with the conservation objectives for the area as outlined in this OMP.

Jarramlee is subject to an on-going grazing licence and public access will not be promoted.

Lot 2 Wallaroo Road is freehold land and not open to the public.
Figure 6: Historic aerial photo (1975) showing site ripping (dark brown) in relation to remnant NTG patches (2017).
Figure 7: Gooromon Grasslands rural lease and licence livestock grazing zones.
3.7 Fire management

3.7.1 Australian Capital Territory

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 2014b). The SBMP, which is prepared in accordance with the Emergencies Act 2004, will be revised during this OMP period. Designated land managers and planners must review the revised SBMP and continue to deliver biomass management in accordance with the Regional Fire Management Zones and prescribed Bushfire Management Standards put into effect under this version.

As shown in Figure 8, Jarramlee and West Macgregor are currently covered by Agricultural Fire Management Zones, Strategic Firefighting Advantage Zones (SFAZs) and Outer Asset Protection Zones (APZs).

Existing grazing lease and licence arrangements (Figure 7), which will remain in effect during this OMP period, will ensure that the standards set out for these zones can be maintained. Slashing is a secondary management tool that will be applied to reduce fuel loads along management trails, road verges and fence lines.

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 for the Gooromon Grasslands are compatible with managing the NTG and GSM habitat.

Land managers should refer to resources such as Grazing as a tool for biodiversity conservation in temperate grassy ecosystems (CSIRO 2012) to plan and schedule appropriate biomass disturbance regimes. Strategic grazing should be scheduled to exclude livestock from nationally protected MNES areas during key seasonal periods when remnant native flora germinates, establishes and sets seed.

3.7.2 New South Wales

The NSW Rural Fire Service (NSW RFS) was contacted to provide comment on fire management prescriptions for Lot 2 Wallaroo Road, Yass Valley, NSW (DP: DP1144979). At the time of writing (June 2018), the revised Southern Tablelands Bush Fire Risk Management Plan (Southern Tablelands Zones Bush Fire Management Committee 2009) sat with the Coordinating Committee for endorsement, pending a public exhibition period. Designated land managers and planners must review the revised Southern Tablelands Bush Fire Risk Management Plan when it comes into effect.

Under this plan, the NSW OEH is authorised to establish bushfire fuel mitigation treatments for conservation lands under their custodianship, “as per their Fire Management Strategies”. In line with this framework, the NSW RFS have endorsed the ACT Government (EPSDD, PCS) to manage the Lot 2 Wallaroo Road environmental offset site in accordance with the ACT Strategic Bushfire Management Plan 2014-2019, which “is consistent” with the revised Southern Tablelands Bush Fire Risk Management Plan (NSW RFS, pers. comm., 2018).

EPSDD planners should consult with the PCS Fire Management Unit and the ACT Emergency Services Agency to establish an appropriate Regional Fire Management Zoning for the Lot 2 Wallaroo Road site within the revised SBMP. During the intervening period, biomass will be maintained to same standards as the adjacent Jarramlee and Dunlop Grasslands Nature Reserve (ACT sites), which are currently covered by Agricultural Fire Management Zones.

To provide a secure mechanism to manage biomass during the prescribed NSW Bushfire Danger Period (October-March, subject to seasonal variation), an agistment grazing licence will be put into effect for Lot 2 Wallaroo Road. This conservation focused grazing regime will be comparable to those in effect within the adjacent ACT reserve lands. In the case of burning to manage biomass, in NSW, 24 hours notification will be given to neighbours and the NSW RFS (Southern Tablelands Zone) - with the local RFS brigade being Wallaroo.
Figure 8: Gooromon Grasslands ACT regional fire management zones.
4. THREAT ASSESSMENT METHODOLOGY
4. THREAT ASSESSMENT METHODOLOGY

Each environmental offset site is exposed to a specific mix of threatening processes, which will influence both the level of risk carried forward (against delivering the environmental offset commitments) and the degree of planning and resources required to mitigate this risk.

A Threat Assessment Methodology (TAM) has been developed by the ACT Parks and Conservation Service to provide planners with a consistent framework to:

1. identify (ongoing and emerging) threatening processes within each environmental offset site;
2. align identified threats against management priorities for specific MNES values; and
3. develop management objectives and actions to mitigate identified threats to MNES values.

The TAM is structured around six Threat Management Goals: manage pest plants, manage pest animals, manage appropriate biomass disturbance regimes, manage human land use impacts, manage vegetation dieback, and manage the consequences of climate change. These goals are drawn from a review of the ACT Native Grassland Conservation Strategy and Action Plans (ACT Government 2017a); and the ACT Lowland Woodland Conservation Strategy and Actions Plans (ACT Government 2004) (Table 8). These evidence based strategies and action plans set out the conservation and restoration priorities for the respective ecological communities and the component threatened species, consistent with the ACT Nature Conservation Strategy 2012-2023 (ACT Government 2013b).

The TAM was applied to develop appropriate threat mitigation actions to ‘maintain’ MNES values within the Gooromon Grasslands environmental offset sites. The identified threats and priority management actions are covered within the following sub-sections of this plan. Importantly, the threat categories outlined above do not threaten all MNES values equally, and the level of exposure to these threatening processes varies between offset sites. Prompts were included within the assessment template to document the severity of the each identified threat and include quantitative data where available.
4.1 Priority threats identified at Gooromon Grasslands

4.1.1 Pest plants

Pest plant management is identified as a primary threat mitigation objective for both NTG and GSM within the ACT Native Grassland Conservation Strategy and Action Plans. As a consequence, continuing the existing pest plant control programs at Jarramlee and developing targeted programs for West Macgregor and Lot 2 Wallaroo Road are priority management actions within this OMP. The identified pest plant species that must be contained or suppressed at each of the Gooromon Grasslands sites are shown below in Table 9. Coordinated programs will be run across sites with common species, including Dunlop Grasslands Nature Reserve.

Land managers will continue to carry out regular field investigations to identify and suppress any declared pest plant incursions, prioritising the identified MNES patches and a minimum 30m buffer around them. As management tracks, slash lines and stock congregation points are common vectors for pest plant dispersal, these areas will also be checked regularly and treated accordingly.

Targeted chemical treatment programs, delivered by qualified contractors, during optimal seasonal windows, will remain the primary pest plant control method applied by the ACT Government (PCS). With all chemical control programs being delivered within prescribed weather conditions (Delta-T and wind speed) to minimise off-target impacts. To support land managers to evaluate program effectiveness and adapt future programs, spatial records will be maintained for all pest plant control programs (ArcGIS Collector) following standardised methods outlined in Section 6.

Specific actions targeting equipment hygiene and stock movements must also be implemented to mitigate the risk of translocating pest plant material between sites:

1. Livestock must not be transferred from Jarramlee/ West Macgregor to Lot 2 Wallaroo Road.
2. Appropriate vehicle, plant/equipment and clothing hygiene protocols must be implemented before moving between Jarramlee/West Macgregor and Lot 2 Wallaroo Road.
3. After implementing hygiene protocols (i.e. wash-down procedures) the treatment of higher quality areas must be prioritised before moving into more modified/infested areas.
Table 9: Pest plant species recorded on Gooromon Grasslands offset sites.

<table>
<thead>
<tr>
<th>Pest Plant Species</th>
<th>Jarramlee</th>
<th>West Macgregor</th>
<th>Lot 2</th>
<th>WONS*</th>
<th>Must Contain**</th>
<th>Must Suppress**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serrated Tussock <em>Nassella trichotoma</em></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Chilean Needle Grass <em>Nassella neesiana</em></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Blackberry <em>Rubus fruticosus aggregate</em></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Paterson’s Curse <em>Echium plantagineum</em></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Saffron Thistle <em>Carthamus lanatus</em></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>African lovegrass <em>Eragrostis curvula</em></td>
<td>Yes</td>
<td>Presence tbc</td>
<td>Presence tbc</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>St John’s Wort <em>Hypericum perforatum</em></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Sweet Briar <em>Rosa rubiginosa</em></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

* Weeds of National Significance; **ACT Pest Plants and Animals (Pest Plants) Declaration 2015; Orange cells = priority treatment

Jarramlee

Targeted treatment programs have been implemented at Jarramlee for each of the species listed in Table 9 since 2014/15. Treatment was prioritised to reduce the threat from within the NTG and GSM habitat patches and their adjacent buffer areas. ArcGIS spatial layers are available for these respective programs to inform operational planning. Follow-up control programs and monitoring will continue to target these areas and species throughout the subsequent 5-year implementation cycle.

Chilean Needle Grass (*Nassella neesiana*) (CNG) will remain a principal pest plant threat at Jarramlee, having established as a dominant groundcover within the Ginninderra Creek riparian zone. The geography of Ginninderra Creek catchment means that mitigating CNG colonisation along the stream bank may be unachievable, as storm water flows will continue to translocate fertile seed from the highly modified suburban up-stream catchment. A rural block to the south-west of Jarramlee will be used as a quarantine paddock to enable ‘de-seeding’ of livestock (3-5 day period) prior to entry to higher quality areas within the offset site.

Although the cover of CNG represents an historic loss of native grassland diversity, the CNG now provides a novel habitat that is compatible with targeted GSM conservation (Braby and Dunford 2006; Downey and Sea 2012).

Braby and Dunford (2006) have recorded female golden sun moths ovipositing on CNG. Richter et al. (2011) and W. Sea, pers. comm. (2013), found that larvae collected from the roots of CNG were larger than those collected from native grasses. Within the West Macgregor offset site Downey and Sea (2012) also found the highest larvae densities under CNG tussocks (5-8 individuals/m² compared to <2individuals/m² under spear grass tussocks *Austrostipa bigeniculata*).

The Ginninderra Creek riparian zone (within both Jarramlee and West Macgregor) will be managed as ‘CNG Dominant GSM habitat’ during the subsequent 5-year implementation cycle (Figure 15, Section 5.2). Any isolated patches outside of this zone must be contained.
Declared pest plant shrubs and planted non-local native trees provide novel habitat for vulnerable woodland birds within Jarramlee. Land management will continue to provide habitat amenity for woodland birds, while mitigating the threat of further encroachment into the protected grassland system.

To maintain habitat amenity for woodland birds:
1. pest plant thickets (for example Blackberry, Sweet Briar and Hawthorn) can be replaced with native shrubs in a staged process
2. the extent of native trees (historically planted or regenerated) must not increase outside the woodlot areas
3. any tree regeneration that threatens native grassland extent can be controlled using chemical treatment (‘frilled’) and left on site as standing habitat for woodland birds.

Management of priority weeds is also required to protect potential Pink-tailed Worm-lizard habitat (Figure 3). In addition to the threats to key habitat plant species, when established, the pest plants may also have a negative effect on the ants that the lizards co-occur with (Osborne and Wong 2017).

Although the Pink-tailed Worm-lizard is often found in open-forest and woodland communities, the highest densities have been recorded in areas without tree cover (Sharp et al. 2015). Habitat patches must also be managed to maintain an open grassland structure.

To maintain Pink-tailed Worm-lizard habitat:
1. weed control must also include a minimum of a 20m buffer zone around the potential Pink-tailed Worm-lizard habitat areas (Osborne and Wong 2017).
2. weed management will also include regenerating trees and shrubs. To maintain an environment suitable for the Pink-tailed Worm-lizard, regenerating trees and large shrubs (>2 metres) should be limited to 5% cover within the Pink-tailed Worm-lizard habitat (Sharp et al. 2015).

West Macgregor and Lot 2 Wallaroo Road
More detailed pest plant mapping is a priority action to inform operational programs at West Macgregor and Lot 2 Wallaroo Road. A site visit in December 2017 provided the following interim guidance:
1. Untreated Blackberry thickets were identified within Moderate Quality GSM habitat zones at West Macgregor. These thickets must be controlled to mitigate further encroachment into GSM habitat. The site also contains a small (and therefore vulnerable) patch of remnant NTG. This patch must be buffered to prevent any further pest plant encroachment.
2. The highly modified riparian zone along Ginninderra Creek will be maintained as ‘CNG Dominant GSM habitat’ during the subsequent implementation cycle (Figure 15, Section 5.2).
3. Untreated Blackberry, Briar Rose and Serrated Tussock plants were all identified in proximity to remnant NTG and GSM habitat patches at Lot 2 Wallaroo Road.
4. Control programs at Lot 2 Wallaroo Road must be equally focused towards:
   » containing the spread of the existing declared pest plant species on site; and
   » mitigating the establishment of emerging species, such as CNG and African Lovegrass. CNG in particular appears to be absent as a dominant groundcover within Lot 2 Wallaroo Road, due to its proximity to Gooromon Ponds Creek rather than Ginninderra Creek.

4.1.2 Pest and over-abundant native animals
Pest animal control is highlighted as a priority threat management objective in the Natural Temperate Grassland Endangered Ecological Community Action Plan (ACT Government 2017). This is not reflected in the respective Golden Sun Moth (Synemon Plana) Action Plan (ACT Government 2017), which does not specifically include pest animals as a conservation threat. To mitigate the threat of pest impacts to remnant NTG patches at Gooromon Grasslands, recurrent monitoring and targeted control programs will be implemented. Pest animal specific management objectives and actions are presented in this section of this OMP.

Rabbits
The European rabbit (Oryctolagus cuniculus), which is a browsing and grazing species, is identified as being the primary pest animal threat to NTG values within the Gooromon Grasslands. The impact that rabbit populations can have on native vegetation communities is well documented. In sub-alpine areas of Kosciuszko National Park for example, rabbits have been shown to reduce the diversity, cover and biomass of native forbs (broad-leaved herbaceous plants), by removing flowers and seed heads (Leigh et al. 1987). Furthermore, due to their higher nutritive value, rabbits are recorded as being preferential grazers of native forbs over native tussock grasses (Leigh et al. 1991).
Additional evidence to this effect is presented in the ACT Pest Animal Management Strategy 2012-2022 (ACT Government 2012) and Best Practice Management Guide for Rabbits in the ACT (ACT Government 2015a). These documents should be used as companion documents to this section of the OMP.

Under the previous version of the Jarramlee Offset Management Plan (ACT Government 2013a), bi-annual rabbit surveys (transect counts), warren mapping, harbour removal and warren fumigation were all recurrent actions delivered by PCS. West Macgregor and Lot 2 Wallaroo Road will be incorporated into an expanded control program from 2018-2019. As part of an agency-wide control program, investigations and required control will also include the Dunlop Grasslands Nature Reserve.

Based on the currently available data from bi-annual (autumn and spring) nocturnal spotlight transect surveys, the status of the threat posed by rabbits is low, with Jarramlee averaging between 1.2-2.2 rabbits/km since 2016. This meets a management threshold set by PCS at 3 rabbits/km (O. Orgil, pers. comm., 2018). No rabbit warrens were active within the identified NTG patches as of June 2018.

Rabbits are yet to be observed at West Macgregor, however only one season of survey data has been recorded.

As a new site, Lot 2 Wallaroo Road and has not yet been surveyed. Establishing transects for subsequent nocturnal surveys is scheduled from 2018-2019 for this site.

Numbers surveyed will provide a basis from which to determine the level of rabbit control required in the operational planning.

All treated and untreated rabbit warrens will continue to be mapped on ArcGIS Collector to support operational planning. As total eradication is unlikely, rabbit control will remain a recurrent program to maintain the threat level at low.

**Foxes**

Foxes have been sighted within the Gooromon Grasslands. Fox control is difficult however due to the issues relating to the use of 1080 baits adjacent to residential areas and the potential for effects on non-target animals such as domestic dogs and wildlife.

**Deer**

Deer have previously been sighted at Jarramlee and West Macgregor by the lease holder, however no specific impacts have been observed to trigger management action at this point in time.

**Over-abundant native animals**

Impacts to endangered ecological communities from abundant Eastern Grey Kangaroo (*Macropus giganteus*) populations have resulted in the ACT Government declaring the kangaroo a ‘controlled native species’ under the Nature Conservation Act 2014. The Conservator for Flora and Fauna subsequently prepared a statutory Controlled Native Species Management Plan (ACT Government 2017b) which sets out the policies under which kangaroos are controlled in the ACT. As of 2017-2018, the kangaroo population is not considered to be a threat to the Gooromon Grasslands sites. If land managers observe an increase in the population during this subsequent OMP period, kangaroos may then be managed in accordance with ACT Government (2017b).

4.1.3 Biomass disturbance regimes

Maintaining appropriate biomass disturbance regimes (such as grazing pressure and fire frequency) is highlighted as being a priority threat mitigation objective in the Natural Temperate Grassland Endangered Ecological Community Action Plan and Golden Sun Moth Synemon Plan and Action Plan (ACT Government 2017a). To mitigate the threat of excessive or insufficient disturbance within Gooromon Grasslands, biomass will be maintained to compatible structural thresholds for both NTG and GSM habitat. Recurrent biomass monitoring and targeted grassland disturbance interventions will be undertaken within the OMP implementation period to meet this objective.

The NTG and native pasture within the Gooromon Grasslands will require disturbance to increase inter-tussock spacing for the seed set and recruitment of native forbs and grasses. Disturbance can also be applied to positively alter grassland composition by targeting exotic grass growth and seed set during early spring. However, grazing from mid-October through to December will negatively impact seeding of native forbs (ACT Government, in prep.) hence, the timing and intensity of grazing needs to match the vegetation community and objectives as it may change from paddock to paddock. The recommended grass biomass range to conserve NTG diversity is 600-3000kgDM/ha (ACT Government, in prep.)
GSM habitat, which is a key conservation value within Gooromon Grasslands, benefits from disturbance that maintains a short open structure, with some larger tussocks and patches of bare ground (>10%), and grass biomass between 500 – 2000kg DM/ha throughout the year.

Further information regarding the relationship between biomass disturbance and ecological productivity is provided in the associated ACT Government Action Plans and the Biomass Management Guidelines (BMG) (ACT Government, in prep.), which should be used as companion documents to this OMP. As the science underpinning conservation efforts for these matters is ongoing, land managers must continue to consult with ACT Government ecologists to collaboratively plan and review disturbance regimes annually.

Existing grazing licence and lease arrangements at Jarramlee and West Macgregor (Figure 7), which will remain in effect during this plan period, will provide a secure disturbance mechanism to manage biomass within the defined thresholds for NTG and GSM. Capital works (fences and water points) have been implemented at both sites to aid strategic grazing to this end. To avoid stock grazing impacts along Ginninderra Creek, for example stream bank erosion and weed translocation, slashing is a secondary disturbance method that will be applied in place of grazing (where logistically feasible) to reduce biomass in this CNG Dominant Habitat Zone (Figure 15, Section 5.2). Ongoing monitoring of stock grazing and associated impacts on pasture structure and composition will be undertaken to refine implementation of disturbance regimes.

Land managers will consider the following CSIRO framework to appropriately schedule disturbance: Grazing as a tool for biodiversity conservation in temperate grassy ecosystems (CSIRO 2012). Under this framework livestock are excluded from MNES patches during key seasonal periods when remnant native flora germinates, establishes and sets seed. Regular on ground biomass monitoring is also crucial to appropriately schedule disturbance in response to grass growth rates.

While the numbers for kangaroos across this region are currently low, it is worth considering how kangaroo grazing will be managed if numbers increase in the future. Grazing by kangaroos is recommended under the Natural Temperate Grassland Endangered Ecological Community Action Plan, due to their lower impact on native plants, and co-evolved relationship with native ecosystems. As of 2017-2018, the kangaroo population is not considered to be a threat to the Gooromon Grasslands sites. If land managers observe an increase in the population during this subsequent OMP period, kangaroos may then be managed according to the Controlled Native Species Management Plan (ACT Government 2017b) (Section 4.1.2).

A priority management action for this OMP is the administration of a conservation focused agistment licence over the main area in Lot 2 Wallaroo Road. Capital works upgrades for internal fencing and stock water will also be required to facilitate a more strategic grazing regime. This infrastructure must be informed by the MNES condition mapping and consultation with ACT Government ecologists. As the relationship between the ACT government and the agistee must function effectively to achieve the designated environmental offset commitments, an initial short term licence may be a beneficial to trial an appropriate grazer.

To aid operational decision making, the Jarramlee Grazing Management Plan (Allcock 2018) was produced in 2017-2018. A key component of this plan is an ongoing ‘feed budgeting tool’, with field monitoring scheduled quarterly (or after significant rainfall events). This plan supports land managers to respond to variable seasonal conditions. Selecting appropriate stocking densities that are tailored to reach the defined biomass thresholds, by a defined point in time. Under the Gooromon Grasslands OMP framework, Lot 2 Wallaroo Road will be integrated into this plan from 2018-2019. Land managers must ensure that the revised Gooromon Grasslands Grazing Management Plan includes considerations for maintaining or enhancing NTG and GSM habitat composition, as well as targeting structural biomass thresholds.

As discussed in Section 3.7, the biomass thresholds for NTG and GSM are also compatible with complying with the prescribed grasslands fuel management thresholds for Gooromon Grasslands during the ACT/NSW fire season.

In terms of ecological burning, a burn is planned for Jarramlee during this OMP period to reduce biomass levels in a patch of NTG dominated by dense Kangaroo Grass (*Themeda triandra*). A second burn is recommended for Lot 2 Wallaroo Road, to reduce biomass levels and promote the emergence of native forbs within the native pasture patches.
As all planned burns are subject to additional approvals, suitable weather conditions and a wider scheduled of other ecological and hazard reduction burns, the specific year in which these burns are to be implemented is not defined at this point in time.

All burning programs will include a process to monitor and evaluate the effectiveness of the intervention towards meeting performance targets. These monitoring programs will be developed in consultation with ecologists in the PCS offsets team and ACT Conservation Research.

4.1.4 Human land use impacts

The Natural Temperate Grassland Endangered Ecological Community Action Plan (ACT Government 2017a) identifies historic habitat loss and ongoing fragmentation as primary threats to the remaining native grasslands of the ACT, with the key drivers being agricultural modification, as well as urban and industrial development. The Golden Sun Moth Synemon Plan and Action Plan (ACT Government 2017a) similarly identifies fragmentation and habitat degradation (from agriculture and urban development) as major threats for the species. Accordingly, managing the consequences of historic land use impacts at Gooromon Grasslands and mitigating future public use threats are key objectives addressed under this OMP.

The following human land use impacts were identified at Gooromon Grasslands:

Inappropriate or inadequate infrastructure

External fencing and stock water infrastructure have been upgraded within Jarramlee and Lot 2 Wallaroo Road for stock management and to secure the site from unauthorised access.

The internal fencing at Lot 2 Wallaroo Road will be replaced and stock water infrastructure installed to support strategic grazing for biomass management (Section 4.1.3).

Management tracks (slash lines) will be established within Lot 2 Wallaroo Road outside the remnant MNES patches and proposed restoration areas (Figures 14 and 18).

All remaining fences and stock water infrastructure across all the offset sites are in good working condition. No new tracks are proposed. Existing infrastructure will be maintained.

Unauthorised access and activities

To mitigate the threat from unauthorised access into the Gooromon Grasslands, external fences and gates will be maintained.

To mitigate the threat from unauthorised activities (such as firewood collection, roaming pets, fires and camping) within the Jarramlee and West Macgregor offset sites, a statutory Activity Declaration will be approved by the ACT Conservator of Flora and Fauna under the Nature Conservation Act and signposted at reserve entrances notifying of prohibited and restricted activities.

In addition, the ACT Parks and Conservation Service rangers are Conservation Officers who are authorised to collect evidence and issue penalties for offences under the Nature Conservation Act.

Section 3.6 outlines the activities permitted within each of the offset sites that form the Gooromon Grasslands.

Lot 2 Wallaroo Road is freehold land within NSW. It will remain closed to the public.

Fragmented native communities and habitat

The remaining NTG and GSM habitat patches within each site are fragmented from agricultural modification (and site ripping for tree plantings, in the case of Jarramlee). The Biomass Management, Pest Animal and Pest Plant threat sections of this OMP each outline key measures that must be implemented to mitigate further degradation of these remnants. The NTG and GSM Restoration Plan sections outline further works that will be implemented in an effort to restore connectivity between these fragmented patches.

Altered soil nutrient levels

The likely application of chemical fertilisers under the former agricultural land use has altered soil nutrient levels at Jarramlee and Lot 2 Wallaroo Road. This will continue to drive the growth of exotic pasture species at the site. Soil testing has been completed for Jarramlee to inform restoration activities and will be replicated for Lot 2 Wallaroo Road during the subsequent OMP period to support restoration planning (Section 5).
Streambank erosion

Active streambank erosion along Ginninderra Creek was identified under the previous Jarramlee Management Offset Management Plan (ACT Government 2013a). Livestock exclusion fences and additional stock water points were implemented within Jarramlee during the previous OMP implementation period to avoid further streambank destabilisation caused by livestock.

The confluence of Ginninderra Creek and Gooromon Ponds Creek remains an ongoing point of concern, as converging high volume storm flows cause eddy effects that continue to work against the streambank edge. A section of Gooromon Ponds Creek within Jarramlee was also realigned (straightened) in the past, when a water treatment facility to the east of the creek was removed and remediated. This may have also influenced the flow rate at the confluence with Ginninderra Creek.

As the riparian zone along Ginninderra Creek is an identified GSM habitat zone and active edge erosion remains a threat within both Jarramlee and West Macgregor, mitigating further streambank erosion is a priority action.

> “The WBSA proposes to undertake stream bank restoration along Gooromon Ponds Creek as part of a riparian [restoration] strategy that extends from the Murrumbidgee River, along Ginninderra Creek and further on Gooromon Ponds Creek up to Wallaroo Road. This will further enhance the environmental outcomes of the Program by addressing a regional connectivity objective to improve linkages along the western side of the ACT, between the northern woodlands and the Murrumbidgee River” (P37) (A T Adams 2017).

Flow mitigation, bank stabilisation and riparian restoration measures will be investigated and addressed in this riparian restoration strategy, which will be developed during the subsequent OMP implementation period. As stormwater flows from the upstream suburban catchment may be an ongoing threat driver, other stakeholders operating within the local catchment (within ACT and NSW) will be consulted and may need to be involved as collaborative project partners.

Land subsidence

The Jarramlee offset site includes the site of an old sewage treatment plant (refer to Figure 6 for a depiction of the STP), which was decommissioned in the 1990’s. As part of the decommissioning process, some infrastructure was buried underground. In 2016 localised subsidence was observed in the area (Figure 6). An investigation determined that this was the result of changes to the local hydrology from the West Macgregor development (SMEC 2018d).

In September 2016 the affected paddock was temporarily fenced off due to public safety concerns. No public access and minimal management access were permitted.

Detailed Site Investigations (DSI / Stage 2 works) on the scope of the subsidence and possible remediation options resulted in a clearance report being issued (SMEC 2018d). The draft clearance report has reduced the public exclusion area to approximately 3 hectares within the western side of the paddock. Full management will be re-instated to the eastern side of the paddock.

Management within the 3 hectare exclusion zone will not include vehicular access. Fencing around the known subsidence holes will be upgraded to stock proof fencing allowing grazing in the zone, subject to future clearances.

Whether the site is remediated further is subject to future ACT Government funding allocations. However, any further remediation considerations will be made in agreement with the objectives of this OMP.
5. RESTORATION PLAN

A draft NTG and GSM Restoration Implementation Plan was in-prep under the previous Jarramlee OMP. This working project planning document will be revised and updated during the subsequent Gooromon Grasslands OMP period to reflect the NTG (section 5.1) and GSM (section 5.2) Restoration Plans and intervening targets outlined within this document. The Restoration Implementation Plan will be utilised as an implementation guide for on ground works within the 5 year OMP timeframe. Restoration projects will be monitored and reviewed to track progress against the targets set out within this document. Further, on-ground restoration projects will be subject to consultation periods and approvals from EPSDD stakeholders including conservation planners, ecologists, heritage managers and the Healthy Country Team.

5.1 Natural Temperate Grassland restoration

5.1.1 Natural Temperate Grassland condition threshold assessment methods

The Commonwealth Government has released a number of auxiliary documents under the EPBC Act to (a) support ecologists to identify and assess the condition of MNES and (b) guide land managers with ongoing protection and recovery efforts. This includes ‘Policy Statements’, ‘Approved Conservation Advice’, ‘National Recovery Plans’ and ‘Threat Abatement Plans’. Of particular relevance to this section are the ‘Policy Statements’, such that for Natural Temperate Grassland of the South Eastern Highlands: a nationally protected ecological community (Commonwealth of Australia 2016), within which ‘condition threshold assessment methods’ are presented in a flow chart or decision tree style format (Figure 9).
Figure 9: Maintenance, Restoration or Enhancement Zones assigned to each NTG condition threshold - Adapted from the ‘condition threshold assessment methods’ flowchart (Commonwealth of Australia 2016).

Minimum condition threshold assessment—method ‘A’ [Applies to patches dominated by particular grasses/sedges]

- Is the patch at least 0.1 ha in size?  
  - No  
    - The patch is too small to be part of the protected ecological community
  - Yes
    - Is the patch characterised by at least 50% foliage cover of the ground of:
      - *Themeda triandra* (kangaroo grass)
      - *Poa labillardieri* (river tussock grass), (generally in flats and drainage lines where this vegetation type naturally occurs).
      - *Carex bichenoviana* (a native sedge) (or at least 50 tussocks for every 100 m²).
    - Yes
      - The patch is part of the protected nationally listed ecological community
    - No
      - PROCEED TO: Minimum condition threshold assessment—Method B (Next Page)

NOTES: Patches that qualify under Method ‘A’ are indicative of sites with little past disturbance. Often sites with a high cover of *T. triandra* will fall into the High to Very High or Excellent condition threshold categories, if further survey of non-grass or indicator species is carried out.

Intact grasslands dominated by *Poa labillardieri* or *Carex bichenoviana* can be very rare and such grasslands have very important landscape and catchment values. These grasslands generally have a lower forb diversity than the other grassland types, so are best assessed in this way in the first instance.
Minimum condition threshold assessment—method ‘B’
[Applies when cover of the grassland is not evidently dominated by the species highlighted under ‘A’]

Is the patch at least 0.1 ha in size?

No → The patch is too small to be part of the protected ecological community

Yes

Is the cover of native plants greater than the cover of perennial exotic?

No

Yes

Native Diversity Condition Thresholds - Sampling Plots of 0.04 ha (20m x 20m):

**High-Very High Condition Threshold**
- Favourable sampling times¹:
  - At least 12 non-grass native² species
  OR
  - At least 3 indicator species³
  OR
  - A floristic value score (FVS⁴) of at least 6.5

**Mod-High Condition Threshold**
- Favourable sampling times¹:
  - At least 8 non-grass native² species
  OR
  - At least 2 indicator species³
  OR
  - A floristic value score (FVS⁴) of at least 5

**The patch lacks the minimum native understorey diversity under assessment method ‘B’**
(First ensure that it does not meet the criteria under method ‘A’)

The patch is too weedy to be part of the protected ecological community

Yes

The patch is the part of the protected nationally listed ecological community
(See assigned Management Zones below)

**The patch is NOT part of the protected ecological community**
(See assigned Management Zones below)

NTG Maintain/Enhance Zone
ACT01 Zone 2 – Native Dom – Mod-High Diversity

Maintain Objectives:
- Threat management programs must be prioritised to protect and buffer patches
- Maintain appropriate disturbance regimes (such as planned burns, slashing, grazing, litter removal) to promote the natural emergence and reproduction of remnant native grasses and ‘non-grass native species or indicator species’

Enhance Objectives:
- Restore ‘non-grass native species or indicator species’ diversity to the ‘High–Very High’ condition threshold – following the Minimum condition threshold assessment—Method ‘B’ (above);
- To avoid unnecessary impact to remnant values, enhancement works must be targeted towards replacing perennial exotic groundcovers;
- Appropriate disturbance regimes (such as planned burns, slashing, grazing, litter removal, chemical treatment or physical removal) can be applied prior to planting or direct seeding, to target exotic groundcovers and/or promote the natural emergence and reproduction of any dormant/ephemeral ‘non-grass native species or indicator species’

Native Pasture Buffer/Restore Zone
ACT01 Zone 3 – Native Dom – Low Exotic Pasture Control/Restore Zone

Restore Objectives:
- Restore Themeda triandra, Poa labillardierei, or Carex bichenoviana to the minimum ‘Mod-High’ condition thresholds – following the Minimum condition threshold assessment—Method ‘A’;
- OR
- Restore native groundcovers to dominance (>50% in patches >0.1 ha)
- Restore ‘non-grass native species or indicator species’ diversity to the minimum ‘Mod-High’ condition threshold or ‘High–Very High’ threshold – following Minimum condition threshold assessment—Method ‘B’;
- Restoration works must be targeted towards replacing perennial exotic groundcovers;
- Projects can have multiple aims to a) expand the size of NTG remnants b) enhance connectivity between NTG remnants;
- Appropriate disturbance regimes (such as planned burns, slashing, grazing, litter removal, chemical treatments or physical removal) can be applied prior to planting or direct seeding, to target exotic groundcovers and/or promote the natural emergence and reproduction of any dormant/ephemeral ‘non-grass native species or indicator species’
- Restoration works must be targeted towards replacing perennial exotic groundcovers
- Projects can have multiple aims to a) expand the size of NTG remnants b) enhance connectivity between NTG remnants; and c) restore threatened species habitat
As seen on p13-14 of the associated Policy Statement for Natural Temperate Grassland of the South Eastern Highlands, the ‘condition threshold assessment methods’ provide a statutory framework to classify grassland condition against Commonwealth thresholds. These methods function to both identify high quality patches, which retain the requisite ecological features for protection under the EPBC Act as well as omit patches that are too small or too degraded to satisfy the ‘minimum condition thresholds’.

In addition to being applicable to ecologists assessing MNES condition, these flowchart style methods are also particularly relevant for land managers concerned with restoration planning and implementation, as they provide clear restoration objectives (‘condition thresholds’). This extends to the specific ecological features and level of diversity that must be restored to transition a degraded patch into one that is afforded Commonwealth protection. Commonwealth recognition/compliance can thus be achieved by working to performance thresholds defined within EPBC Act ‘Policy Statements’ and ‘Approved Conservation Advice’. This is particularly relevant when EPBC approval decisions require:

(a) an increase in MNES extent (hectares); or
(b) enhancement in MNES quality (condition). The former is the case in this instance.

5.1.2 Natural Temperate Grassland restoration plan

To bring the Gooromon Grasslands restoration plan in line with the EPBC Act Policy Statement for Natural Temperate Grassland of the South Eastern Highlands, PCS engaged qualified ecologists to map NTG ‘condition threshold’ zones across the Jarramlee, West Macgregor and the Lot 2 Wallaroo Road sites during spring - early summer 2017 (Section 6.2.1). This field based mapping applied the approved ‘condition threshold assessment methods’, resulting in the following four condition zones being identified:

1. ACT01 Zone 1 – Native Dominant – High-Very High Diversity (NTG);
2. ACT01 Zone 2 – Native Dominant – Mod-High Diversity (NTG);
3. ACT01 Zone 3 – Native Dominant – Low Diversity;
4. ACT01 Zone 4 – Exotic Dominant – Low Diversity.

The spatial data generated by this work is shown in Figures 10 and 11. The NTG Restoration Plan is directly attributed to these spatial zones. The plan assigns appropriate management objectives (maintenance, enhancement or restoration) to each of the mapped grassland condition zones. This data driven restoration approach will direct future projects towards:

a. areas of the landscape that could yield the most immediate conservation gains; (b. allocating resources towards restoring the ecological features required to comply with EPBC Act objectives;

c. placing emphasis on the maintenance of existing high quality remnants. In a strategic sense, the NTG Restoration Plan for the Gooromon Grasslands is consistent with ‘Approved Conservation Advice for Natural Temperate Grassland of the South Eastern Highlands’ (Australian Government 2016, p. 12), as outlined below:

> “Although very degraded/modified patches are not protected as the ecological community listed under the EPBC Act, it is recognised that patches that do not meet the condition thresholds may still retain important natural values and may be critical to protecting those patches that meet minimum thresholds. They may also be protected through State/Territory and local laws or schemes. Therefore, these patches should not be excluded from recovery and other management actions. Suitable recovery and management actions may improve these patches to the point that they may be regarded as part of the ecological community fully protected under the EPBC Act. Management actions should, where feasible, also aim to restore patches to meet the High to Very High or Excellent quality condition thresholds”.

ACT01 Zone 1 and ACT01 Zone 2 Natural Temperate Grassland

As ACT01 Zone 1 – Native Dominant – High-Very High Diversity and ACT01 Zone 2 – Native Dominant – Mod-High Diversity both satisfy NTG condition thresholds, restoration works are not required within these zones. The key management focus for these zones is maintaining patch condition and extent. Threat management programs should be prioritised to protecting and buffering these remnants. In line with the approved Commonwealth conservation advice quoted above, the ‘Moderate to High’ condition NTG within Zone 2 may be enhanced through a highly targeted project aiming to increase the number of ‘non-grass native species or indicator species’, as required to reach the ‘High to Very High’ condition threshold.
However, it must be noted that enhancement projects within Zone 2 will not contribute towards increasing the overall extent of NTG at Gooromon Grasslands.

**ACT01 Zone 3 Native pasture restoration zones**

Under the NTG Restoration Plan, patches attributed to ACT01 Zone 3 – Native Dominant – Low Diversity are classified as Native Pasture Restoration Zones. While these patches lack the diversity of ‘non-grass native species or indicator species’ required to meet the minimum NTG condition threshold, they retain the requisite >50% native groundcover.

Restoration projects within this zone should be developed in accordance with EPBC Condition Threshold Assessment Method ‘B’ - see the EPBC Act ‘Policy Statement’ for ‘Natural Temperate Grassland of the South Eastern Highlands’ P13 (Australian Government 2016) with the objective to increase the diversity of ‘non-grass native species or indicator species’ within the zone to achieve the minimum (or higher) NTG condition threshold.

Appendix A identifies the approved ‘non-grass native species and indicator species’ for NTG that should be used when restoring these area.

In addition to using these species, restoration efforts must aim to use a wide diversity of plant species as appropriate for the ecological community and that are proven to be successful in revegetation projects (or part of an ecological trial that tests revegetation techniques with the aim of improving the knowledge and skill set of land restoration practitioners).

**ACT01 Zone 4 Exotic pasture restoration zones**

Patches mapped to ACT01 Zone 4 – Exotic Dominant – Low Diversity are classified as Exotic Pasture Restoration Zones. These patches lack the requisite diversity of ‘non-grass native species or indicator species’ necessary to satisfy the EPBC Act ‘minimum condition threshold’ for NTG and retain <50% native groundcover - falling below the minimum threshold on both measures. As a consequence, restoration projects with objectives to reach the minimum NTG thresholds within this zone are likely to require more intensive management interventions, which can require greater financial inputs and more time to realise outcomes.

To satisfy EPBC Condition Threshold Assessment Method ‘B’ within Exotic Pasture Restoration Zones, native groundcover must be restored to dominance (>50% in patches >0.1 ha), as well as increasing the diversity of ‘non-grass native species or indicator species’ to the defined minimum thresholds.

Restoration projects within this zone can also be planned in accordance with EPBC Condition Threshold Assessment Method ‘A’ - see the EPBC Act ‘Policy Statement’ for ‘Natural Temperate Grassland of the South Eastern Highlands’ P14 (Australian Government 2016), which requires restoring only one of the three approved groundcover species.

As for above, PCS will use a wide diversity of plant species as appropriate for the ecological community and that are proven to be successful in revegetation projects – further noting that any restoration planning within the Exotic Pasture Restoration Zone must be cognisant of the altered ecological state and the associated risks, costs and limitations with undertaking restoration activities in these areas.

Intensive restoration methods such as ‘scraper’ and direct seeding techniques have been used in these zones. To derive co-benefit for multiple MNES, restoration projects within an Exotic Pasture Restoration Zone can also focus on restoring threatened species habitat, for example, focus on reintroducing C3 native grasses for GSM habitat in pursuit of the >50% native ground cover target required to meet the NTG threshold.

Restoration projects should only be planned and implemented within Exotic Pasture Restoration Zones when:

1. Native Pasture Restoration Zones are not extensive enough to achieve the required improvement, enhancement or restoration targets (in hectares) attached to EPBC Act approval decisions.
2. Works within Exotic Pasture Restoration Zones would enhance key habitat connectivity linkages.
3. Adequate resources are available to conduct works within both Native Pasture Restoration Zones and Exotic Pasture Restoration Zones - which includes sufficient resources for ongoing follow up monitoring and maintenance.
Figure 10: Grassland condition threshold zones (2017) - Jarramlee and West Macgregor.
Figure 11: Grassland condition threshold zones (2017) – Lot 2 Wallaroo Road.
5.1.3 Natural Temperate Grassland restoration targets

Table 10 shows the extent of NTG identified within the Gooromon Grasslands sites in spring/summer 2017 (Capital Ecology 2018). These figures are derived through the approved NTG condition threshold assessment methods.

Table 10: Extent of EPBC Natural Temperate Grassland within Gooromon Grasslands (Spring/Summer 2017) (Capital Ecology 2018)

<table>
<thead>
<tr>
<th>EPBC Condition Thresholds</th>
<th>Jarramlee</th>
<th>West Macgregor</th>
<th>Lot 2 Wallaroo Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT01 Zone 1 – Native Dom – High-Very High Diversity (NTG)</td>
<td>2.7 ha</td>
<td>-</td>
<td>3.51 ha</td>
</tr>
<tr>
<td>ACT01 Zone 2 – Native Dom – Mod-High Diversity (NTG)</td>
<td>4.1 ha</td>
<td>0.07 ha</td>
<td>-</td>
</tr>
<tr>
<td>Total NTG protected under the EPBC Act</td>
<td>6.8 ha (Target 7.6 ha)</td>
<td>0.07 ha</td>
<td>3.51 ha</td>
</tr>
<tr>
<td>ACT01 Zone 3 – Native Dom – Low Diversity</td>
<td>48.1 ha</td>
<td>24.19 ha</td>
<td>34.27 ha</td>
</tr>
<tr>
<td>ACT01 Zone 4 – Exotic Dominant – Low Diversity</td>
<td>45.79 ha</td>
<td>11.77 ha</td>
<td>48.92 ha</td>
</tr>
<tr>
<td>Total Site Area</td>
<td>111.5 ha</td>
<td>36.8 ha</td>
<td>86.7 ha</td>
</tr>
</tbody>
</table>

Jarramlee

The Lawson Offset Strategy was prepared by the ACT Government (2013c) for the Jarramlee offset site. The strategy commits the ACT Government to increase the extent of NTG within Jarramlee from 5 hectares to 6.5 hectares as part of the package to offset the development impact. These commitments were based on mapping undertaken using the previous definition of the NTG community (following Rehwinkel 2007). The latest measure of extent is based on the new NTG definition (following Rehwinkel 2015), resulting in an artificial increase.

An assessment of the floristic data collected within the NTG patches in Jarramlee between 2012 and 2015 has seen an overall increase in native species diversity and in the number of indicator species within both NTG patches and native pasture areas. There has also been a marked decrease in the number of exotic species and number of significant weeds in these patches (Figure 12 and 13), indicating an overall improvement in condition across the site.

Without extent mapping available using the original NTG definition, it is proposed that this information can be extrapolated to state that at the very least the patches of NTG have remained the same size. The NTG Restoration Plan for Jarramlee therefore includes a commitment to increase the current extent of NTG (measured at 6.8 hectares in spring 2017 using the new definition- Table 10) to at least 7.6 hectares over the life of the approval decision.

The NTG patches within Jarramlee remain fragmented, particularly those in the south-east of the site. A restoration project will be implemented within the dominant Native Pasture Buffer/Restore Zone (Zone 3) surrounding these NTG remnants (Figure 14). This will have the dual objectives of improving connectivity between the remnants and increasing the overall extent of NTG at Jarramlee. This designated restoration zone will not impact any identified GSM or PTWL habitat patches. The total size of the NTG restoration zone is 1.5 hectares. The target for the subsequent OMP period is a minimum 0.3 hectare increase in NTG extent, delivered by increasing the cover of ‘non-grass native species or indicator species’ in line with the approach outlined in 5.1.2. Additional ‘non-grass native species or indicator species’ can also be planted within the Zone 2 remnant patches to enhance their condition, targeting the replacement of any perennial non-native ground covers.

Lot 2 Wallaroo Road and West Macgregor

Although Lot 2 Wallaroo Road and West Macgregor contain NTG remnants, neither of these sites are attached to approval conditions for NTG. Rather, both areas are solely approved to offset GSM habitat impacts. Accordingly, there are no defined NTG maintenance or restoration targets associated with these sites. Nevertheless, threat management programs will be prioritised to maintain the extent and condition of these remnants.

Furthermore, GSM habitat restoration planned for in Lot 2 Wallaroo Road (discussed in more detail in section 5.2) should include additional ‘non-grass native species and indicator species’ from the approved NTG lists, in an attempt to derive co-benefit for NTG while restoring GSM habitat (which will be primarily focused on restoring C3 native grasses).
Figure 12: Change in vegetation condition at Jarramlee in Natural Temperate Grassland from 2012 to 2017.

Figure 13: Change in Native Pasture vegetation condition at Jarramlee from 2012 to 2017.
Figure 14: Designated NTG restoration zone – Jarramlee.
5.2 Golden Sun Moth habitat restoration

Table 11 shows the extent of GSM habitat within the Gooromon Grasslands sites in spring/summer 2017 (SMEC 2018a, b, c). These figures are derived using the interim GSM habitat condition class assessment method.

Table 11: GSM habitat extent for each Gooromon Grasslands site (SMEC 2018a, b, c).

<table>
<thead>
<tr>
<th>GSM Condition Classes</th>
<th>Jarramlee West Macgregor</th>
<th>Lot 2 Wallaroo Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘HIGH’ quality</td>
<td>0.5 ha</td>
<td>0.7 ha</td>
</tr>
<tr>
<td>‘MEDIUM’ quality</td>
<td>6.7 ha</td>
<td>21.2 ha</td>
</tr>
<tr>
<td>‘LOW’ quality</td>
<td>24.3 ha</td>
<td>0.9 ha</td>
</tr>
<tr>
<td>CNG (Chilean Needle Grass) dominated GSM habitat</td>
<td>18.8 ha</td>
<td>6.4 ha</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total GSM Habitat Extent</th>
<th>50.3 ha</th>
<th>29.2 ha</th>
<th>11 ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not GSM Habitat</td>
<td>51.1 ha</td>
<td>7.6 ha</td>
<td>55.0 ha</td>
</tr>
<tr>
<td>Not GSM Habitat - Degraded Native Pasture</td>
<td>-</td>
<td>-</td>
<td>20.6 ha</td>
</tr>
<tr>
<td>Not GSM Habitat - Dense Themeda</td>
<td>3.6 ha</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Area not surveyed (closed for subsidence)</td>
<td>5.8 ha</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total Site Area</td>
<td>111.5 ha</td>
<td>36.8 ha</td>
<td>86.7 ha</td>
</tr>
</tbody>
</table>

5.2.1 EPBC Act ‘Condition Threshold Assessment Methods’ (GSM)

While ‘condition threshold assessment methods’ provide a useful statutory guide for monitoring, managing and restoring nationally protected ecological communities, similar methods to define ‘minimum condition thresholds’ for threatened species habitat zones are not yet available. In relation to Golden Sun Moth (*Synemon plana*) habitat, there remains scope for ecologists to make divergent assessments about what constitutes an EPBC Act protected habitat patch, based on differing interpretations of the Significant impact guidelines for the critically endangered Golden Sun Moth (*Synemon plana*) (Commonwealth of Australia 2009). The following features are attributed to GSM habitat within grasslands and open grassy woodlands, however no minimum thresholds are defined:

- Presence of pupal casings
- Abundance of suitable host plants (for example Wallaby Grass *Rytidosperma spp*; Spear Grass *Austrostipa spp*; Chilean Needle Grass *Nassella neesiana*)
- Diversity and cover of other vegetation (native and exotic)
- Exposure (amount of shading from trees, buildings etc.)
- Aspect
- Amount of bare ground (inter-tussock space)
- Presence of rocky areas
- Soil characteristics
- Site history (for example grazing, cropping, biomass management, fertiliser/pesticide/herbicide use), including current management regime
- Proximity to other known populations, including on adjacent sites
- Presence of similar habitat connecting the site to occupied areas or other areas of grassland or grassy woodland.

The absence of an approved ‘condition threshold assessment method’ for GSM habitat can be a challenge for conservation planners and land managers, as there remains no quantitative method for determining when a patch of vegetation shifts between habitat classes (above or below a minimum EPBC Act threshold).
Figure 15: GSM habitat condition zones (2017) - Jarramlee and West Macgregor.
Figure 16: GSM habitat condition zones (2017) - Lot 2 Wallaroo Road.
In the context of restoration planning, ‘minimum condition thresholds’ allow land managers to set clear restoration objectives, select appropriate restoration zones, procure appropriate resources, and demonstrate, quantitatively, compliance with EPBC Act approval decisions.

To address this policy gap, PCS will engage a suitably qualified ecologist to develop a flowchart style ‘condition threshold assessment method’ for GSM habitat. The proposed ‘condition thresholds’ within the assessment method will be data driven, inferred from the response (presence/abundance) of GSM to habitat variables defined in the Significant impact guidelines for the critically endangered Golden Sun Moth (Synemon plana) (Commonwealth of Australia 2009).

The proposed ‘condition threshold assessment method’ for GSM habitat will be peer reviewed by senior ecologists within ACT Government. If the results are evaluated as providing a sound basis for the definition of habitat condition thresholds, the proposed assessment method will be submitted to the DoEE for endorsement.

Although a quantitative ‘condition threshold assessment method’ is not yet approved by the Commonwealth to define GSM habitat, a suitably qualified expert, Dr Alison Rowell, was engaged by PCS to map GSM habitat zones at the Gooromon Grasslands sites (Figures 15 and 16) during the 2017 breeding season (SMEC 2018a, b, c). Figure 17 defines the condition classes that were used to assess habitat condition across the Gooromon Grasslands sites. The spatial layers produced from this work have subsequently been used to inform restoration planning (Figure 18), discussed in further detail below.

### Interim Golden Sun Moth habitat features using the Condition Class Assessment Method

#### HIGH quality GSM habitat

Primary NTG or native pasture dominated by native larval food plants (i.e. Rytidosperma sp. and/or Austrostipa sp.), with low weed cover and some bare ground.

#### MEDIUM quality GSM habitat

Primary or secondary grassland, with a moderate component of Rytidosperma sp. and/or Austrostipa sp., and/or moderate weed cover. OR

Native-dominated grassland with a high component of Rytidosperma sp. and/or Austrostipa sp., but less than High quality habitat because of one or more of the following conditions:

- on a steep slope or hill top;
- on a south or east-facing slope;
- soil very shallow and/or stony, rock outcrops present;
- secondary grassland or contains scattered trees.

#### LOW quality GSM habitat

Larval food plants (Rytidosperma sp., Austrostipa sp. and/or Chilean Needle Grass) are a minor component of the ground layer, growing sparsely or in patches among unsuitable vegetation such as:

- exotic species, excluding Chilean Needle Grass;
- native C4 grasses (such as Themeda sp.);
- other unsuitable native ground cover (e.g. Poa labillardieri, rushes / sedges);
- trees, shrubs, regeneration, plantings.

#### Chilean Needle Grass dominated GSM habitat

Grassland dominated by Chilean Needle Grass.
5.2.2 Implementation of WBSA (EPBC SA024) GSM restoration commitments

The WBSA identifies a total of 33.1 hectares of GSM habitat to be protected within Lot 2 Wallaroo Road (this includes areas of both ‘occupied’ and ‘unoccupied’ habitat) and a commitment to undertake ‘GSM habitat restoration as a connectivity measure between Jarramlee and Dunlop Grasslands Reserve’.


SMEC (2018c) noted that Rowell (2015) did not provide habitat mapping presenting the results of the assessment to identify baseline extent. It also noted that Rowell (2015) stated that an area “previously mapped as Austrostipa native grassland in the west of the site did contain native grasses, but was very disturbed and weedy and did not appear to be GSM habitat” (Rowell 2015; p15). SMEC (2018c) supported this statement and identified areas of grasslands in the west of the site as primarily ‘degraded native pasture’ decreasing the overall area of GSM habitat (Figure 16). The total area of GSM habitat identified within SMEC (2018c) was 11 hectares (Table 11).

This recent assessment of GSM habitat extent significantly increases the overall area required for GSM habitat restoration. To address this requirement, a strategy will be developed to increase the area of GSM habitat to levels that were originally considered present on site (an increase of 22.1 hectares). This restoration strategy will be informed by current site conditions (including constraints and associated risks) as well as the commitment to implement GSM habitat restoration as a connectivity measure between Jarramlee and Dunlop Grasslands Reserve (A T Adams 2017).

Timeframes and budgets identified in the strategy will be informed by risks associated with undertaking the associated restoration activities and the best forecast timing of the road development. This will include risks from seasonal weather as well as access to resources, such as the supply of sufficient seed of C3 grasses known to support GSM populations.

Restoration options

Figure 18 identifies potential GSM Habitat Restoration Zones within the Lot 2 site. Undertaking restoration works in this zone would increase GSM habitat from 11.9 hectares to 33.1 Ha, in line with the WBSA Program report.

The potential GSM Habitat Restoration Zones (Figure 18) have been identified by analysing the GSM habitat (SMEC 2018c) and grassland condition mapping (Capital Ecology 2018) in Lot 2 Wallaroo Road. The zones are located in exotic dominant grassland areas in between (excluding) patches of identified GSM habitat (including in between patches of Native Dominant Pasture or EPBC Quality NTG).

Restoring these zones would provide opportunities to test intensive disturbance restoration methods (e.g. scraping grassland restoration methods), which have been used in other ACT offset areas. Due to the intensive nature of this method, it is most suited to areas that are dominated by exotic grasses.

Restoring the GSM Habitat Restoration Zones will enhance the extent and increase connectivity between remnant GSM habitat patches to create opportunities to extend GSM colonisation within the local landscape.

Exotic Dominant grassland outside of the restoration zone may also be utilised as a location to spread soil ‘scraped’ from within the designated GSM habitat restoration zone.

ACT Government ecologists will conduct site inspections during any proposed ‘scrape’ interventions to observe if any GSM larvae are unearthed. This restoration plan aims to avoid impacts to existing GSM habitat, and this approach will provide further oversight.

An alternative option is to oversow GSM habitat species into the area identified as Native Pasture in Figure 16 (i.e. in the area incorrectly identified as ‘unoccupied GSM habitat’ in the WBSA program report). This itself has challenges as it is unknown if the site is suitable to be restored to GSM habitat quality (i.e. whether the soil’s nutrient loads are compatible with the GSM food species).

The detailed restoration strategy will investigate all options available to increase the total area of GSM habitat across the site.
Figure 18: Potential GSM habitat restoration zone – Lot 2 Wallaroo Road and Fassifern Block
5.2.3 Golden Sun Moth larvae translocation
The WBSA Program Report also includes commitments to implement research and trials for the translocation of GSM larvae. Specifically targeting larvae from sites that will be impacted by construction of the Ginninderra Drive (see Table 2).

GSM translocation research will begin with the commencement of the OMP plus 5 years, with translocation of moths to be completed within 20 years after the approval of the OMP, and prior to the construction of Ginninderra Drive. Importantly, this project is subject to concurrence by the Ginninderry Conservation Trust that “sufficient evidence exists to provide confidence in a successful outcome”. Translocation research should build on existing knowledge from trials, undertaken elsewhere in the ACT by the ACT Government.

5.2.4 Implementation of Jarramlee (EPBC 2010/5549) GSM restoration commitments
The Lawson Offset Strategy (ACT Government 2013c) was approved by the Commonwealth Department of 11th December 2013 to satisfy condition 12 of the EPBC 2010/5549 Approval Decision.

The strategy included a minimal financial investment of $972,000 (indirect offset) that would be utilised to maintain or improve NTG and GSM habitat at Jarramlee and a commitment to form a continuous area of habitat, recognising the “strategic location of Jarramlee and the opportunities to link fragmented populations through restoration works” (ACT Government 2013b; p4).

The approved offset strategy identified 48 hectares of GSM habitat within Jarramlee and recognised that the West Macgregor offset site (EPBC2010/5520) and Jarramlee combined formed a continuous habitat area of around 96 hectares. The strategy also referenced the Dunlop Grassland Nature Reserve and adjacent NSW land (which reportedly supported approximately 86 and 50 hectares of GSM habitat, respectively).

Recognising the strategic benefits of connecting these areas, a plan to restore GSM habitat to enhance and connect these habitat areas was approved. Once connected, this would form a continuous area of habitat of around 250 hectares, making it the third largest area of GSM habitat in the ACT Region, after Goorooyarroo-Mulligans Flat and the Majura Valley (ACT Government 2013).

The 2014-15 annual report for the Lawson South offset approval decision (EPBC 2010/5549) (ACT Government 2015e) identified the postponement of planned restoration activities linking the Jarramlee/West Macgregor habitat area to the Dunlop Grasslands Nature Reserve. This was due to the excessive cost of the project compared to the potential benefits to be gained. It was also recognised that with the protection and management of Lot 2 Wallaroo Road as part of the WBSA, alternative opportunities to improve GSM habitat connectivity would be made available.

GSM habitat restoration within Lot 2 Wallaroo Road and in the adjacent Fassifern block will improve connectivity between Jarramlee and Dunlop Grasslands Nature Reserve, delivering the conservation land consolidation and connectivity enhancement objectives outlined in the Lawson Offset Strategy (ACT Government 2013b). Stage 1 of this project will aim to improve 3 hectares of GSM habitat within Fassifern block.

The Lawson Offset Strategy (ACT Government 2013) also recognised that the GSM habitat within Jarramlee could be improved with weed control and appropriate biomass management. Figure 13 identifies a decline in the number of exotic species recorded within Jarramlee as a result of active land management. Stock grazing and targeted slashing (in areas dominated by CNG) has also ensured the structure of the grasslands have been maintained to suit the GSM requirement. This is in addition to the increase in GSM habitat from 48 hectares to 50.3 hectares based on the most recent monitoring report (SMEC 2018c).

GSM habitat management and restoration within Jarramlee, as initiated under the previous Jarramlee Offset Management Plan (ACT Government 2013a), will continue in the form of weed control and biomass management (as outlined in Sections 4.1.1 and 4.1.3).

5.2.5 Golden Sun Moth restoration guidelines
To guide the restoration activities within the identified GSM habitat restoration zone, several studies have identified a strong association between GSM and the cover of specific Wallaby Grasses (in particular *Rydosperma carphoides*, *R. auriculata*, *R. setacea*, and *R. eriantha*) (O’Dwyer and Attiwill 1999, O’Dwyer and Attiwill 2000, Reid and Gibbons 2013, Richter et al. 2013).
While Spear Grasses e.g. *Austrostipa bigeniculata*, *A. scabra*; (Richter et al. 2013), and to a lesser extent Red-Leg Grass (*Bothriochloa macra*) (Braby and Dunford 2006) have also been recorded as food plants, their use by moth larvae may depend on presence of Wallaby Grass. Hence, establishing Wallaby Grasses is the prime restoration target.

Besides cover of native grasses, bare ground, tussock structure and soil nutrient levels appear to be important, with GSM favouring areas with bare ground >15% (Reid and Gibbons 2013), a mix of taller and short tussocks (Reid and Gibbons 2013), and phosphorous levels below 14 ug g⁻¹ (O’Dwyer and Attiwill 1999). Management of both composition and structure is therefore important for the conservation of the GSM. Soil testing will occur prior to the restoration program to understand what areas would require ‘scraping’ and the depth to which this would need to occur to reduce nutrient levels.

To restore habitat for the GSM, available evidence suggests Wallaby Grass cover needs to be increased (>40% cover; O’Dwyer and Attiwill 2000), with an increase in Spear Grass cover also potentially increasing habitat quality. Where Wallaby Grasses are absent, restoration work required could be intensive. For example, O’Dwyer and Attiwill (2000) found that 49 seedlings or 200 dispersal units/seeds (caryopsides) per m² were required to achieve a cover of 40% *Rytidosperm eriantha*, with weeding appearing to increase success. The evidence for cover of Spear Grasses is less clear, but given these grass species can persist as tall tussocks under high grazing intensity, they could form an important part of the restoration mix. Despite Red-Leg Grass being listed as a food plant, the evidence to support its value is limited, and thus it should be a lower priority in restoration plantings.

All native food plants listed by O’Dwyer and Attiwill (1999) have been recorded in the ACT (i.e. *R. carphoides*, *R. auriculata*, *R. setacea*, and *R. eriantha*), however *R. carphoides* is by far the most common. Therefore, planting/seeding with this species is recommended. Importantly, not all species of Wallaby Grass in the ACT are listed as food plants (i.e. *R. caespitosa*, *R. laevis*, *R. monticola* *R. penicillata*, *R. pilosa*, *R. racemosa*) and should not be included in planting for GSM without evidence of their value as food species. Both Tall Spear Grass (*Austrostipa bigeniculata*) and Corkscrew (*A. scabra*) are common throughout ACT grasslands and should be included in restoration mix along with Wallaby Grasses.

5.3 Woodland bird habitat restoration

Jarramlee is a naturally treeless area that has been planted with stands of local and non-local native trees, providing habitat for grassland and woodland birds.

Modelling of woodland bird pathways using research by Doerr et al. (2010) identified these woodlot patches has having high connectivity value and as forming part of a ‘least cost pathway’ for landscape connectivity (Figure 19).

In 2016, bird monitoring was conducted at seven sites in the reserve, over a nine-month period, twice in each season. During the surveys, 53 species were recorded including two species listed as threatened in the ACT (Scarlet Robin *Petroica boodang* and Superb Parrot *Polytelis swainsonii*), three species listed as threatened in NSW (Diamond Firetail *Stagonopleura guttata*, Dusky Woodswallow *Artamus cyanopterus* and Flame Robin *Petroica phoenicea*) and six introduced species. The results of the survey demonstrated that Jarramlee remains important habitat for woodland birds.

Despite the areas being a naturally treeless environment, for the purpose of maintaining woodland bird habitat and connectivity, regenerating trees within the woodlot patches will be protected (although not increase outside the woodlot areas) (Section 4.1.1).

Local shrubs may also be planted within the woodlots, however planting must only occur in areas identified as having low to no native understorey diversity (noting some woodlots contain understorey with high native species diversity).

Local shrub species can also be used to replace pest plant thickets (for example Blackberry, Sweet Briar and Hawthorn) in a staged manner to further maintain habitat connectivity (Section 4.1.1).

Any planting must be subject to a two (2) year post work maintenance period.
Figure 19: Least cost pathways for bird habitat connectivity.
5.4 Guidelines for restoration works

General guidelines for practitioners undertaking restoration works include:

» individual project plans will be developed for all restoration works
» always consider the risk to additional site values (natural and cultural) when planning and before implementing intensive restoration works
» engage with the Murrumbung Yurung Murra Rangers and TOs to incorporate TEK into restoration projects
» work with the Murumbung Yurung Murra network to progress consultation processes with Traditional Custodians when delivering actions within this OMP.
» recognise that Aboriginal places and objects within the ACT are protected under the Heritage Act 2004, and any new findings must be reported within 5 days to the ACT Heritage Council
» Follow the Due Diligence Code of Practice for the protection of Aboriginal Objects in NSW when undertaking restoration works in Lot 2 Wallaroo Rd
» review PCS Fire Management Unit Guidelines for Land Management Activities (ACT Government 2017c) before proceeding with any restoration activities
» recognise that any planned burns must follow the latest advice from Conservation Research and expert ecologists on appropriate seasons to burn MNES habitat or communities (noting that Kitchin and Mathews (2012) is being reviewed).
» recognise that appropriate disturbance regimes (such as planned burns, slashing, grazing, litter removal, chemical treatment or physical removal) can be applied prior to planting or direct seeding, to impact exotic groundcovers and/or promote the natural emergence and reproduction of any dormant/ephemeral ‘non-grass native species or indicator species’
» adhere to code of conduct for undertaking works near utility infrastructure (ERM 2009)
» seek all required approvals for works in accordance with both the ACT and NSW legislative framework.
6. MONITORING PLAN

The monitoring program will inform progress towards management objectives for this site and provide information on outcomes of management actions intended to achieve objectives. All monitoring will be undertaken by ACT Government staff or by suitably qualified consultants. Opportunities will also be provided to community groups and volunteers to participate in the monitoring program, where appropriate. Accurate records will be kept for all activities to ensure reporting and monitoring requirements are met.

Monitoring data will underpin continual improvement of management and restoration techniques under an evidence-based framework, and will be documented as part of annual reporting that is published on the internet. The results of the monitoring program will also be disseminated within the ACT Government to better inform the management of the conservation values within the ACT, and will feed into a process of review and adaptive management.

Monitoring data will be assessed by PCS staff and ACT Government ecologists to: (1) compare habitat quality against benchmark condition (ACT Government 2015b), and (2) monitor change from established baselines through time towards meeting committed performance targets. Vegetation benchmarks are quantitative measures of variables within vegetation communities from a reference site i.e. a site with minimal modification or disturbance (ACT Government 2016a). The benchmarks provide an indication of the quality of a site compared to an unmodified, high-quality site. In comparison, ecological baselines have been established for offsets at two time points: (1) as part of the initial offset assessment and establishment, and (2) at the commencement of ecological monitoring of the offset. The baseline established at the commencement of ecological monitoring will use the first three years of monitoring data (to incorporate environmental variability) that are collected using methods consistent across the ACT environmental offsets monitoring program.
6.1 Matters of National Environmental Significance monitoring schedule

The schedule for the MNES monitoring program is outlined in Table 12. To ensure monitoring methods are consistent across the ACT environmental offsets estate, the timing of monitoring events follows the Managed MNES Ecological Monitoring and Research Plan that is currently being finalised by ACT Government ecologists. Mapping GSM habitat within the subsidence paddock will occur in 2018.

Table 12: Matters of National Environmental Significance monitoring schedule.

<table>
<thead>
<tr>
<th>Monitoring activity</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grassland mapping</td>
<td>Jarramlee: 2017*, 2027</td>
</tr>
<tr>
<td></td>
<td>West Macgregor: 2017*, 2027</td>
</tr>
<tr>
<td></td>
<td>Lot 2 Wallaroo Rd: 2017*, 2027</td>
</tr>
<tr>
<td></td>
<td>West Macgregor: 2017*, 2018, 2019, 2022, 2025, 2028, 2031 and 2032</td>
</tr>
<tr>
<td></td>
<td>West Macgregor: 2017*, 2027</td>
</tr>
<tr>
<td></td>
<td>Lot 2 Wallaroo Rd: 2017*, 2027</td>
</tr>
<tr>
<td></td>
<td>West Macgregor: 2017*, 2018, 2019, 2022, 2025, 2028, and 2031</td>
</tr>
</tbody>
</table>

* denotes monitoring that has been completed

6.2 Mapping and monitoring methodologies

6.2.1 Natural Temperate Grassland mapping

Mapping the condition of patches will support management decisions at each offset site including targeting appropriate restoration, revegetation and weed management areas. Mapping will also be used to plan monitoring from 2018 onwards to ensure that management-targeted vegetation types are adequately monitored at each offset.

Detailed community condition mapping across the offset sites took place during December 2017. First, boundaries of vegetation types (as defined by ACT Government 2015c) were mapped on the ground using a GPS. Then, mapped vegetation types were divided into zones based on vegetation structure and composition (see Section 5.1.2- NTG Restoration Plan for detail on the zones identified). These zones were also mapped on-ground using a GPS and ground truthed with Floristic Value Score (FVS) plots (Rehwinkel 2015) and transect data (ACT Government 2015d). FVS plot and transect methodologies are further described in Section 6.2.2.

Follow up community condition mapping is not planned until 2027, except at a paddock in Jarramlee (between the Bicentennial Trail and the site’s southern boundary) that was not accessible to consultants during 2017 due to safety concerns from localised subsidence. Grassland and GSM habitat condition mapping will occur within this site in 2018.

6.2.2 Natural Temperate Grassland monitoring

Grassland condition is monitored using the floristic value score (FVS) method (Rehwinkel 2007, 2015) and step-point transects (ACT Government 2015d). The FVS method uses plant richness and cover measurements to calculate a floristic value score for a 20 x 20 m plot. The method also calculates a weed value score (WVS), highlights significant weeds and native ‘indicator’ species (species indicative of high-value grassland) within the 20 x 20 m plot. The step-point transects quantify the cover of native and exotic grasses and forbs, rocks, bare ground and litter.
Additional measurements on the step-point transects were trialled in 2017 (Capital Ecology 2018b) to quantify the cover of Golden Sun Moth (Synemon plana) (GSM) feed species and grass bulk height. The value of these measures will be assessed prior to the 2018 survey season but are intended to provide information on the quality of GSM habitat, Striped Legless Lizard (Delma impar) habitat (for other offset sites) and general grassland condition. Together, the FVS method and step-point transects provide structural and compositional indicators of vegetation condition and habitat quality (Lawley et al. 2016) that can be compared against benchmarks (ACT Government 2016).

Initially, condition monitoring will take place annually for three years (2017 to 2019) to establish a baseline for offset sites using methods that are consistent across the ACT environmental offsets monitoring program. Subsequently, monitoring will be undertaken by a suitably qualified contractor or ACT Government staff member at least once every three years, using the same methodology and – where appropriate – the same plots and step-point transects as used in 2017 (Capital Ecology 2018a).

6.2.3 Golden Sun Moth habitat mapping

Mapping of GSM habitat across ACT Environmental Offsets followed Rowell (2013) with modifications in 2017 to better represent GSM utilisation of exotic habitat (SMEC 2018a, b, c). The condition criteria developed in 2017 for different habitat classes are detailed in Section 5.2.1- GSM Habitat Restoration Plan. In addition, biomass was mapped in 2017 to complement GSM habitat mapping and assist in short-term grazing management of sites. Biomass classifications used in 2017 are detailed in Section 4.1.3- Biomass Disturbance Regimes.

In 2018, detailed GSM habitat condition thresholds will be prepared (see Section 5.2) for each condition class to enhance and direct management actions for GSM across the offset sites, and to enable robust identification of GSM habitat (in different classes) in future.

Follow up GSM habitat mapping is not planned until 2027.

6.2.4 Golden Sun Moth population monitoring

GSM surveys are conducted according to the Survey Guidelines for Golden Sun Moth (ACT Government 2014c), following the walked transect method. Surveys only take place once the GSM flying season has been confirmed in the ACT at known reference sites, and only under the following weather conditions:
1. warm to hot days (above 20°C by 10am)
2. warmest part of the day (between 10am – 2pm)
3. clear, mostly cloudless sky
4. still or relatively still wind conditions
5. no less than two days since rain (>1 mm) or an unusually cold night.

GSM populations are monitored by walking all transects at a consistent, moderate pace (i.e. 2 minutes per 100 m). Along these transects, all flying males within 25 m of a transect are counted. In addition, weather conditions, incidental sightings of males beyond transect lines, and incidental sightings of females beyond transect lines (indicative of a breeding site) are recorded.

Initially, population monitoring will take place annually for three years (2017 to 2019) to establish a population baseline for GSM at offset sites using methods that are consistent across the ACT environmental offsets monitoring program. Subsequently, monitoring will be undertaken by a suitably qualified contractor or ACT Government staff member at least once every three years, using the same methodology and – where appropriate – walked transects as used in 2017 (SMEC 2018a, b, c).

6.2.5 Golden Sun Moth habitat monitoring

Golden Sun Moth habitat monitoring is conducted using a standard 100 step-point transect. At each point, one record is taken to quantify whether the dominant ground feature is an exotic or native grass or forb, a GSM feed species (and which feed species), litter, rock, bare earth or a cryptogram. During the 2016 monitoring season, eight 100 m transects were established at Jarramlee (a subset of the 14 GSM monitoring transects) for habitat monitoring. In 2017, in consultation with ACT Government Senior Ecologists at Conservation Research (EPSDD), different methods were established that utilised existing grassland monitoring plots rather than habitat transects (as in 2016).
Starting in 2018, in each vegetation monitoring plot, two 25 m transects will be established on the north-south axes of the plot and a record taken every 50 cm. The survey will quantify grass bulk height (where a grass is present) and whether the grass is a GSM feed species (and which feed species). Utilising the existing grassland monitoring plots will increase the efficiency of the overall monitoring program by leveraging off the 100 step-point transect that is already established for grassland condition monitoring. Minimal effort will be required to collect additional information (e.g. grass height as an indicator for biomass levels and open grassland structure) that can inform GSM habitat monitoring.

Initially, GSM habitat monitoring will take place annually for three years (2017 to 2019) to establish a baseline for offset sites using methods that are consistent across the ACT environmental offsets monitoring program. Subsequently, monitoring will be at least once every three years, using the same methodology and – where appropriate – walked transects as used in 2017 (SMEC 2018a, b, c).

6.2.6 Pink-tailed Worm-lizard habitat mapping

Mapping of PTWL habitat and habitat condition across Jarramlee was undertaken in 2016 following Osborne and Wong (2017). Section 3.1 details the extent of each habitat condition class (high, moderate and low), and Figure 3 illustrates locations of PTWL habitat within Jarramlee.

Follow up PTWL habitat mapping at Jarramlee is not planned until 2026.

6.2.7 Woodland bird monitoring

The 2016 bird monitoring program confirmed and updated the birds recorded within the Jarramlee offset site. The information demonstrated that the site remains important habitat for woodland birds and, for the purpose of planning operational activities confirmed the importance of retaining the woodland patches, despite the areas being a naturally treeless environment. The woodlot areas will continue to be managed as woodland bird habitat. Targeted seasonal monitoring of woodland birds by ACT Government staff is planned for Jarramlee to investigate the effects of woody weed removal at this offset, but woodland bird monitoring is not planned for the broader Gooromon Grasslands reserve complex. Monitoring will occur in Spring 2019.

6.3 Monitoring threats

The Conservation Effectiveness Monitoring Program (CEMP) is an overarching ecosystem condition monitoring framework that will be used to inform management planning within the ACT conservation estate. The CEMP framework aims to:

» use specific indicators and metrics (measurable) to detect signs of change to ecosystem condition over time
» evaluate the effectiveness of management actions in achieving conservation outcomes (values)
» using empirical data, provide evidence to support land management decisions and
» identify knowledge gaps and aid in the prioritisation of future research (Brawata et al. 2017a)

The Lowland Native Grassland Ecosystem Condition Monitoring Plan (Brawata et al. 2017b) was the first of eight ecosystem condition monitoring plans that will be developed under the CEMP framework.

While the purpose of the Lowland Native Grassland Ecosystem Condition Monitoring Plan was to assess the effectiveness of current reserve management towards enhancing conservation values and decreasing the impact of threatening processes, the plan also identified gaps in how the ACT Government collects data, mainly on operational programs that target the threatening process (e.g. data on grazing programs and biomass management). Data from the operational programs is essential in order to measure the effectiveness of programs that aim to enhance the conservation values within the conservation estate.

PCS have committed to developing standardised methods for collecting data on operational activities and management of threatening processes. This will be undertaken during the subsequent (5-year) OMP implementation cycle and in line with the implementation of the CEMP.

Methods for monitoring for pest plants and animals may change over this period and from what is described below to ensure methods are consistent across the broader agency.
6.3.1 Monitoring pest plants
ACT Parks and Conservation Services staff and contractors will continue to utilise the ArcGIS Collector application when undertaking weed control to gather data on presence and extent of different weed species, as well as the area within which weed species are being controlled. This data is uploaded to ArcGIS to enable assessment of any changes in the extent of the weed species that are being controlled. This monitoring will be undertaken whenever weed control works occur.

Invasive plants recorded across the three sites in the 2017 surveys include:

- Chilean Needle Grass (Nasella neesiana)
- Paspalum (Paspalum dilatatum)
- St John’s Wort (Hypericum perforatum)
- Paterson’s Curse (Echium plantagineum)
- Saffron Thistle (Carthamus lanatus)
- Briar Rose (Rosa rubiginosa)
- Blackberry (Rubus fruticosus)
- Phalaris (Phalaris aquatica)

African Lovegrass (Eragrostis curvula) and Serrated Tussock (Nassella trichotoma) were also recorded at Jarramlee and West Macgregor. Appendix A provides a complete list of non-native and native plant species recorded across the three offset sites.

Additional information regarding presence and extent of invasive plants has been, and will continue to be, obtained through the broader grassland condition monitoring (both transects and plots).

6.3.2 Pest animals
Rabbit counts have been undertaken bi-annually along established transects within the Jarramlee offset site and nearby Dunlop Grasslands Nature Reserve. Warrens have also been mapped prior to fumigation.

West Macgregor and Lot 2 Wallaroo Road will be incorporated into an expanded control program from 2018-2019. This program will form part of the annual (agency wide) PCS Vertebrate Pest Operational Plan (VOP).

6.4 Photo monitoring points
Photo monitoring points have been established at the north-west corner of each vegetation monitoring plot. Photos will be taken at the same time as floristic surveys.

6.5 Water quality and frog monitoring
Water quality monitoring has been continuously undertaken at two sites in or near Jarramlee as part of the Upper Murrumbidgee Waterwatch monitoring program (Upper Murrumbidgee Waterwatch 2018). One site, located on Ginninderra Creek, has been monitored since November 2014 involving 43 surveys of water quality. Surveys in April 2017 indicated that the creek quality was good and water quality indicators (pH, dissolved oxygen, nitrates and total Phosphorus) aligned with 2014-2017 site averages. The second site, located on Gooromon Ponds Creek, has been monitored since August 2000 with 146 surveys of water quality. Surveys in April 2017 indicated that the creek quality was good and water quality indicators aligned with 2014-2017 site averages.

Frog monitoring has been undertaken at three sites on or near Jarramlee as part of the ACT Region Frogwatch monitoring program (Ginninderra Catchment Group 2018). One site, located on Ginninderra Creek, has been surveyed six times during 2016 and 2017 and three species have been recorded (Whistling Tree Frog Litoria verrauxii, Spotted Grass Frog Limnodynastes tasmaniensis and Eastern Banjo Frog Limnodynastes dumerili). The second site, located on Gooromon Ponds Creek, has been surveyed 55 times since 2002 and six species have been recorded (Common Eastern Froglet Crinia signifera, Plains Froglet Crinia parainsignifera, Whistling Tree Frog, Spotted Grass Frog, Eastern Banjo Frog and Striped Marsh Frog Limnodynastes peronii). These species have persisted since monitoring commenced in 2002. The third site, located on Fassifern Pond, has been surveyed eight times since 2016 and the same six species have been recorded as for the second site.
Water quality and frog monitoring will not be expressly undertaken by ACT Government staff but, where available, data from volunteer programs like Waterwatch and Frogwatch will inform monitoring and management of the Gooromon Grasslands sites. Where data indicate considerable deviations, as assessed by program staff and ACT Government ecologists, from historical water quality or frog richness measures, further in-depth monitoring by ACT Government staff will be triggered to explore potential causes.

### 6.6 Performance measures, benchmarks and completion criteria

#### 6.6.1 Baseline data

Three-year baselines will be established between 2017 and 2019 for grassland condition, Golden Sun Moth populations and Golden Sun Moth habitat condition. The purpose of these baselines is to capture the temporal variability in MNES (or MNES habitat) that is attributable to influences other than on-ground management (e.g. weather). Three-year baselines will represent ‘average’ conditions across this three-year period as well as ‘limits of acceptable change’ (DEWHA 2008), that is, the natural variability around this average. The most appropriate means of representing natural variability will be assessed by ACT Government ecologists using 2017-2019 baseline data, as well as other available data as it comes to hand.

Monitoring data that is subsequently collected will be compared with these baselines. If the data collected is within the range of natural variability represented by the baseline, no immediate action is required. However, should the monitoring data deviate beyond the range of natural variability (i.e. degradation is MNES values), additional action will be required. ACT Government ecologists will interrogate monitoring data from sites across the ACT to identify if wider patterns are apparent that clarify whether observed deviations are due to weather/seasonal variation or site-specific change in condition. If it is determined that the deviation is due to scheduled monitoring occurring in an extreme weather year (e.g. high rainfall, sequential heat waves), monitoring will be undertaken in the next appropriate non-extreme weather year. If this follow-up monitoring indicates that MNES values still fall below the range of natural variability, an appropriate management intervention will be scoped and actioned.

The final year of monitoring data will also be compared with the initial baseline established as part of the offset establishment, as well as the 2017-2019 baseline. This will allow us to assess: (1) whether MNES values have been managed in a way that meets commitments determined by environmental consultants; and (2) whether changes in MNES values are within or outside the range of natural variability, that is they have improved and are tracking above the range of natural variability or have declined and are tracking below the range of natural variability. To more accurately represent whether the final year of monitoring data represents ‘maintenance’, ‘improvement’ or ‘decline’, the final year of monitoring data will be contextualized by prevailing weather conditions for the year (i.e. is it an extreme weather year?), as well as previous monitoring data (i.e. short- and long-term patterns in monitoring data). In addition, careful record keeping and data curation (protocols currently in development by ACT Government ecologists) will maximize the opportunity to apply rigorous statistical analysis of monitoring data to explore (statistically significant) temporal patterns and trends in MNES that account for variability in weather and other influences external to management.

#### 6.7 Data driven performance targets

##### 6.7.1 Matters of National Environmental Significance performance targets

A measured improvement in the NTG community will be demonstrated by:

- an increase in the richness and cover of ground layer native plant species; and
- a reduction in the richness and occurrence of weed species.

These are assessed as part of: (1) the grassland monitoring program, and (2) targeted monitoring of restoration trials at Jarramlee. The restoration trials are designed to improve ground layer native plant diversity, reduce non-native plant richness and density, and increase connectivity between patches of moderate to high-quality NTG and GSM habitat.
A measured improvement in the GSM habitat will be demonstrated by:

» an increase in the richness and cover of ground layer native plant species in GSM habitat; particularly GSM native feed species (e.g. Wallaby Grass Rytidosperma sp.); and

» a reduction in the richness and occurrence of weed species in GSM habitat.

These are assessed as part of: (1) the grassland monitoring program, (2) the Golden Sun Moth habitat monitoring program, and (3) targeted monitoring of restoration trials at Jarramlee.

The performance measures for NTG community and GSM habitat condition will be assessed from the 2017-2019 baseline levels. NTG community performance measures will also be compared to benchmark level (ACT Government 2015b).

In addition, a measured improvement in NTG community and GSM habitat will be demonstrated by an increase in the extent of the community or habitat, as compared to the 2015 and 2017 mapped baselines.

For PTWL, the management objective is to maintain moderate and high-quality PTWL habitat (as mapped in 2016). Achieving this objective will be demonstrated by:

» a reduction in priority weed species in PTWL habitat; and

» preventing establishment of regenerating trees and large shrubs (>2 m) within PTWL habitat.

These are assessed as part of targeted monitoring of restoration trials at Jarramlee.

Monitoring the Pink-tailed Worm-lizard habitat is in addition to the EPBC commitments for the Gooromon Grasslands. Compliance with the EPBC commitments is not reliant upon the approval holder demonstrating performance against any objectives linked to this species.

6.7.2 Threat performance targets

A key threat performance target for this 5-year OMP is to achieve a reduction in the ‘weed score’ and ‘presence of significant weeds’ (see Rehwinkel 2015) to 2015 baseline level or below. Weeds of concern identified by the 2017 plot monitoring are identified in Section 4.1.1. PCS land managers will conduct targeted treatment programs over the 5-year OMP period to suppress and remediate weed incursions across the offset sites.

To track interim progress towards the target between grassland and GSM monitoring cycles, land managers will review the annual treated weed map and adapt the management programs where necessary to better target the species of concern.

6.7.3 Refinement of performance targets

Current performance targets are necessarily broad as there are limited monitoring data available across the three offset sites to inform performance target development. However, between 2017 and 2019, data obtained from monitoring will enable further development and refinement of data driven performance targets. In particular, the 2017-2019 data will allow ACT Government ecologists to establish ‘limits of acceptable change’ (see Section 6.6.1) for grassland condition, GSM populations and GSM habitat condition.

6.8 Limitations and uncertainties

Known limitations and uncertainties are present in the utilised monitoring methodology and are outlined below.

6.8.1 Seasonal variation

While it is specified that monitoring takes place during the optimal period for species detection, seasonal conditions vary from year to year and can influence species detection, emergence and/or germination. For example, above average rainfall in winter and early spring can result in increased occurrence of exotic annual grasses and weeds that may conceal native species.

Seasonal variation can result in depressed GSM population counts or native species diversity being recorded (or elevated weed diversity) in a year, and may not accurately reflect the actual quality of a site. The influence of seasonal variation on monitoring data can be minimised by ensuring that the personnel engaged for monitoring are highly experienced in vegetation or GSM monitoring and understand the effects of local weather conditions on local emergence, germination or flowering events. In depth understanding of local ecology allows personnel to adjust timing of monitoring to ensure surveys are undertaken during periods of maximum detectability (for plants and GSM).
Extreme weather events (i.e. excessive rainfall or lack thereof) are unavoidable and must be considered in reporting and in comparisons with baseline data. Where practical, monitoring will be undertaken in the next appropriate non-extreme weather year to obtain monitoring data that is more representative of actual site quality.

6.8.2 Observer bias

A change in surveyors between monitoring events can influence patterns in monitoring data results, depending on differing expertise levels between surveyors. For example, a less experienced botanist may underestimate species diversity in a plot.

Observer bias can be minimised by ensuring that the surveyors engaged for monitoring events are highly experienced in plant identification or GSM population surveys. Where appropriate and time permits, calibrating the difference between surveyors can provide insight into the influence of observer bias on monitoring data. For long-term analyses, keeping specific and accurate records of who surveyed plots and transects (e.g. unique surveyor codes) may also allow observer bias to be accounted for in statistical analyses.

6.8.3 Indication of increase/decrease in quality

Given the limited available (long-term) monitoring data on site condition across Gooromon Grasslands offset site, there is uncertainty regarding levels of change required in MNES to indicate an increase or decrease in site quality that is not solely attributable to seasonal variation.

To provide clarity in acceptable levels of change in MNES, three-year baselines are being developed that will represent ‘average’ conditions across this three-year period as well as ‘limits of acceptable change’ (i.e. natural variability around this average). Section 6.6.1 outlines how comparisons between these three-year baselines and monitoring data will inform management and monitoring actions.
7. ADAPTIVE MANAGEMENT AND CONTINGENCY MEASURES

A feedback loop between monitoring and management will be established to enable a flexible approach to the management requirements of the site, allowing ongoing feedback and refinement of the management strategy to achieve offset commitments. Conservation and land management actions will be revised in response to:

» legislative change
» any unforeseen or unplanned management threats
» advances in research and land management techniques and/or
» ecological data from the monitoring program.

Land management priorities and actions linked to mitigating the threatening processes (Section 4) will be updated as part of an annual review of the effectiveness of the previous year’s operational program and in response to seasonal variation.

Actions in this OMP have been included following an assessment of the risks for delivery by the land practitioners. This includes an assessment of the information needed to plan and adequately resource each action.

In the unlikely event that the monitoring program determines that the extent and/or quality of the GSM habitat and NTG has declined from baseline level, contingency measures will apply.

Depending on the cause of the decline contingency measure will include investing additional resources into addressing threatening processes (i.e. utilise alternate biomass management techniques such as burning or adjusting stock rates, increase weed control efforts etc.).

Under an adaptive management model, new techniques will be established as ecological trials with a monitoring program aimed towards measuring effectiveness against specific management objectives.
7.1 Triggers and corrective actions

The triggers and associated corrective actions within this OMP are linked to GSM habitat and NTG community parameters and priority threatening processes that influence the overall quality of the MNES.

This includes triggers and corrective actions relating to the management of habitat structure and cover of exotic plant species are also included (Table 13).

The triggers and corrective actions included align with the approved GSM habitat improvement plan (ACT Government 2014d) and the biomass management guidelines in ACT Government (in prep).

<table>
<thead>
<tr>
<th>Habitat Parameter</th>
<th>Trigger for Action</th>
<th>Action to be taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>% C3 grass cover</td>
<td>&lt; 40% cover</td>
<td>Increase grazing and/or undertake weed control (exotic grass control)</td>
</tr>
<tr>
<td>% native grass cover</td>
<td>&gt;90% cover</td>
<td>Increase grazing or undertake fuel reduction burn if appropriate (following advice from ecologist)</td>
</tr>
<tr>
<td>Grass biomass (kg/ha)</td>
<td>&gt;2000 kg/ha for GSM and NTG</td>
<td>Increase grazing*</td>
</tr>
<tr>
<td></td>
<td>&lt;600 kg/ha for GSM and NTG</td>
<td>Remove grazing*</td>
</tr>
<tr>
<td>% bare ground</td>
<td>&gt;20% cover</td>
<td>Remove grazing</td>
</tr>
<tr>
<td></td>
<td>&lt;5% cover</td>
<td>Increase grazing and/or undertake weed control or undertake fuel reduction burn if appropriate (with advice from ecologist)</td>
</tr>
<tr>
<td>% exotic plant cover</td>
<td>&gt;5% cover</td>
<td>Undertake weed control (except in Chilean Needle Grass dominated areas).</td>
</tr>
<tr>
<td>% Litter</td>
<td>&lt;5%</td>
<td>Reduce grazing</td>
</tr>
<tr>
<td></td>
<td>&gt;15%</td>
<td>Increase grazing or undertake fuel reduction burn if appropriate (with advice from ecologist)</td>
</tr>
</tbody>
</table>

*A grazing plan with associated feed budget has been developed for the Jarramlee offset site by a professional agronomist to assist staff to manage cattle to achieve the desired biomass outcomes for the MNES (Alcock 2017). A similar plan will also be developed for Lot 2 Wallaroo Road.
8. MANAGEMENT ACTION PLAN
## 8.1 Compliance and administration

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Implementation</th>
<th>Estimated timeframe for completion</th>
<th>Estimated operational costs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mitigation of public land use impacts</strong>&lt;br&gt;Section 1.4 and 3.6</td>
<td>1. Activity Declarations (which are notifiable instruments under the Nature Conservation Act) must be brought into effect for the ACT offsets sites (Jarramlee and West Macgregor);&lt;br&gt;2. Activity Declaration signage must be displayed at the entrances into these sites.</td>
<td>PCS</td>
<td>2019/20</td>
<td>$6000</td>
</tr>
<tr>
<td><strong>Integration with the Canberra Nature Park Plan of Management</strong>&lt;br&gt;Section 1.4</td>
<td>1. Manage the ACT offset sites (Jarramlee and West Macgregor) as part of Canberra Nature Park in accordance with the relevant ACT legislation, policy, strategies and plans outlined in Figure 2.</td>
<td>PCS</td>
<td>On-going requirement</td>
<td>Covered under staffing costs</td>
</tr>
<tr>
<td><strong>NSW land zoning and Biodiversity Stewardship Agreement</strong>&lt;br&gt;Section 1.4.2</td>
<td>1. The land will be rezoned as Zone E2 Environmental Conservation under the Yass Valley Local Environment Plan 2013.&lt;br&gt;2. A Biodiversity Stewardship Agreement (BSA) will be established over the land under the provisions of the NSW Biodiversity Conservation Act (BC Act).</td>
<td>Riverview Projects (ACT) Pty Ltd</td>
<td>Dependent on timeframe of commencement of Ginninderra Dr extension</td>
<td>-</td>
</tr>
<tr>
<td><strong>Engagement with local Aboriginal people</strong>&lt;br&gt;Sections 3.3.2 and 3.3.3</td>
<td>Work with the Healthy Country Programs team and Murumbung Yurung Murra Rangers to:&lt;br&gt;1. Implement the Ngunnawal Cultural Landscape Project: incorporating cultural heritage / traditional ecological knowledge and Aboriginal land management practices.&lt;br&gt;2. Implement the Ngunnawal Reserve Naming Project.</td>
<td>PCS (including the Healthy Country Program team &amp; Murumbung Yurung Murra Rangers)</td>
<td>2022/23</td>
<td>Internal costs covered under staffing costs and funding to engage with Traditional Owners.</td>
</tr>
<tr>
<td><strong>Management of heritage values</strong>&lt;br&gt;Section 3.4</td>
<td>1. Follow the guidelines outlined in the Cultural Heritage Reporting Policy (ACT Government 2015f). This document details the cultural assessment and reporting requirements for projects that may impact on places or objects with indigenous or historic heritage value.&lt;br&gt;2. Any discovery of an Aboriginal place or object will be reported to the Heritage Council within five working days.</td>
<td>PCS</td>
<td>On-going</td>
<td>-</td>
</tr>
<tr>
<td>Activity</td>
<td>Description</td>
<td>Implementation</td>
<td>Estimated timeframe for completion</td>
<td>Estimated operational costs</td>
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</tr>
</tbody>
</table>
| Bushfire risk mitigation | ACT sites (Jarramlee and West Macgregor):  
Section 3.8  
1. During the ACT fire season (October-March, subject to seasonal variation), maintain biomass to ACT Bushfire Management Standards, within the prescribed Regional Fire Management Zones, under the ACT Strategic Bushfire Management Plan 2014-2019 (SBMP)  
2. Any changes with management practices required following the review of the SBMP must be implemented.  
NSW sites (Lot 2 Wallaroo):  
3. During the NSW fire danger period (October-March, subject to seasonal variation), Manage Lot 2 Wallaroo in accordance with the ACT Strategic Bushfire Management Plan (as below)  
4. Consult with the PCS Fire Management Unit and the ACT Emergency Services Agency to establish an appropriate Regional Fire Management Zoning for the Lot 2 Wallaroo within the revised SBMP (2020)  
5. During the intervening period, biomass will be maintained to same standards as the adjacent Jarramlee and Dunlop Grasslands Nature Reserve (ACT sites), which are currently covered by Agricultural Fire Management Zones. | PCS (ACT); SLA (NSW) | On-going | - |
| Utility notifications | 1. Adhere to the Code of Practice between PCS and ActewAGL (ERM 2009) | PCS | On-going | - |
| Annual reporting | 1. Fulfil all reporting commitments as identified in the WBSA and Jarramlee offset approvals | Ginninderry Conservation Trust to co-ordinate reports for WBSA and the Lawson offset. | Annually by 30th August | - |
| Offset Management Plan review | 1. The Gooromon Grasslands OMP will be reviewed and updated in 2023 | PCS on behalf of the Ginninderry Conservation Trust | 31st December 2023 | Covered under staffing costs |

#The estimated costs and timeframes required to deliver on the proposed works are based on current information from experienced ACT Government staff and external service providers who manage reserves with similar land management issues and requirements. Some variation to these estimates could occur due to factors such as external environmental influences (e.g. climate, pest plant and animal population dynamics etc.), increased material costs, increased contractor costs, contractor availability etc. Note: items without allocated funds will be delivered using ACT Government staff or funded as part of other actions identified in this OMP.
8.2 Threat management

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Implementation</th>
<th>Estimated timeframe for completion</th>
<th>Estimated operational costs</th>
</tr>
</thead>
</table>
| Manage Pest Plants               | **Section 4.1.1** 1. Continue the existing pest plant control program at Jarramlee and develop targeted control programs for West Macgregor and Lot 2 Wallaroo Road  
2. Funding may be included to seek advice from experts on novel weed control options. | PCS to co-ordinate and fund pest plant management across Jarramlee and West Macgregor.  
SLA to co-ordinate and fund works within Lot 2 Wallaroo Road. (until the Gininderry Trust take on land management responsibility). | Annually                           | Jarramlee and West Macgregor:  
Year 1: $40,000  
Years 2&3: $40,000 p.a.  
Year 4&5: $38,000 p.a.  
Lot 2 Wallaroo Road:  
Years 1-5: $15,000 p.a. |
<p>|                                  | 3. Carry out regular field investigations to identify the location of any pest plant incursions within the Gooromon Grasslands | PCS and SLA                                                                     |                                    |                            |
|                                  | 4. Coordinate the implementation of pest plant control programs across sites that contain common species | PCS and SLA                                                                     |                                    |                            |
|                                  | 5. Maintain accurate records for all pest plant control programs.            | PCS and SLA                                                                     |                                    |                            |
|                                  | 6. PCS and SLA staff and contractors will continue to utilise the ArcGIS Collector application when undertaking weed control activities; to gather data on the presence and extent of different weed species, as well as the area within which weed species are being controlled | PCS and SLA                                                                     |                                    |                            |</p>
<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Implementation</th>
<th>Estimated timeframe for completion</th>
<th>Estimated operational costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manage Pest Animals</td>
<td>1. Continue the existing rabbit control program at Jarramlee and develop targeted control programs for West Macgregor and Lot 2 Wallaroo Road.</td>
<td>PCS to co-ordinate and fund pest animal management across Jarramlee and West Macgregor. SLA to co-ordinate and fund works within Lot 2 Wallaroo Road in the interim.</td>
<td>On-going - annual</td>
<td>Jarramlee and West Macgregor: Years 1-5: $8,000 p.a. Lot 2 Wallaroo Road: Years 1-5: $2,000 p.a.</td>
</tr>
<tr>
<td></td>
<td>2. Carry out regular field investigations to identify the location of any active rabbit warrens within the Gooromon Grasslands</td>
<td>PCS and SLA</td>
<td>On-going</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>3. Continue to conduct bi-annual (autumn and spring) nocturnal transect surveys for rabbits across all Gooromon Grassland sites</td>
<td>PCS to co-ordinate and implement nocturnal surveys across all the Gooromon Grasslands.</td>
<td>On-going</td>
<td>-</td>
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<tr>
<td></td>
<td>4. Incorporate the Dunlop Grasslands Nature Reserve within the rabbit survey and control program as is required (determined by survey results).</td>
<td>PCS</td>
<td>On-going</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>5. Programs should be co-ordinated across all offsets and the Dunlop Grasslands Nature Reserve Maintain accurate records for all pest animal control programs.</td>
<td>PCS and SLA</td>
<td>On-going</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>6. PCS staff and contractors will continue to utilise the ArcGIS Collector application when undertaking control activities; to gather data on the presence and extent of rabbit warrens, document control sites and record control methods.</td>
<td>PCS and SLA</td>
<td>On-going</td>
<td>-</td>
</tr>
<tr>
<td>Activity</td>
<td>Description</td>
<td>Implementation</td>
<td>Estimated timeframe for completion</td>
<td>Estimated operational costs</td>
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<tr>
<td>Manage appropriate biomass disturbance regime.</td>
<td>1. NTG, native pasture and GSM habitat patches will be maintained in accordance with the Jarramlee Grazing Management Plan and feed budgets developed by Alcock (2018).</td>
<td>PCS</td>
<td>On-going</td>
<td>-</td>
</tr>
<tr>
<td><strong>Section 4.1.3</strong></td>
<td>2. Develop a grazing plan with feed budget to manage the Lot 2 Wallaroo site.</td>
<td>PCS and SLA</td>
<td>2019/20</td>
<td>$10,000</td>
</tr>
<tr>
<td></td>
<td>3. SLA to co-ordinate grazing (include appropriate licences) within Lot 2 Wallaroo Road until land management responsibility transferred to the Ginninderry Conservation Trust. Grazing management will align with the Grazing Plan.</td>
<td>SLA</td>
<td>On-going</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>4. Biomass records will be maintained within the ‘feed budgeting tool’ format for management and reporting purposes; with field monitoring scheduled quarterly (or after significant rainfall events).</td>
<td>PCS and SLA</td>
<td>On-going</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>5. Grazing licence and lease arrangements at Jarramlee and West Macgregor will remain in effect during this plan period to provide a secure disturbance mechanism to manage biomass.</td>
<td>PCS</td>
<td>On-going</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>6. Slashing will be used in place of grazing (where logistically feasible) to manage biomass within the CNG Dominant GSM Habitat Zone.</td>
<td>PCS</td>
<td>On-going</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>7. Implement ecological burns (subject to appropriate approvals, weather and monitoring programs.</td>
<td>PCS</td>
<td>2018/19 (Jarramlee)</td>
<td>-</td>
</tr>
<tr>
<td>Activity</td>
<td>Description</td>
<td>Implementation</td>
<td>Estimated timeframe for completion</td>
<td>Estimated operational costs</td>
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</tbody>
</table>
| Manage identified human land use impacts | Implement land management activities adjacent to land subsidence exclusion points at Jarramlee:  
1. Reinstate management to the area (approximately 3 ha) that has been cleared for full access  
2. Continue to exclude vehicle access to the remaining (approximately 3 ha) exclusion zone (subject to future clearances)  
3. Following stock fencing upgrades around the identified subsidence holes (see Capital Works Activities) reinstate pest plant and pest animal control programs (delivered on foot) and grazing within the remaining (approximately 3 ha) exclusion zone (subject to future clearances). | PCS | On-going | Additional funding to undertake further remediation is subject to on-going investigations. Costs to be confirmed and will not be known until after the completion of the OMP. |
| Integrated threat management within adjacent reserves. | 1. Integrate Dunlop Grasslands Nature Reserve into coordinated threat management programs (pest plant control, pest animal control and biomass management). | PCS | On-going | Covered under staffing costs |

#The estimated costs and timeframes required to deliver on the proposed works are based on current information from experienced ACT Government staff and external service providers who manage reserves with similar land management issues and requirements. Some variation to these estimates could occur due to factors such as external environmental influences (e.g. climate, pest plant and animal population dynamics etc.), increased material costs, increased contractor costs, contractor availability etc. Note: items without allocated funds will be delivered using ACT Government staff or funded as part of other actions identified in this OMP.
### 8.3 Capital works

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Implementation</th>
<th>Estimated timeframe for completion</th>
<th>Estimated operational costs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grazing infrastructure</strong>&lt;br&gt;Section 4.1.3 and 4.1.4</td>
<td>1. Remove unserviceable internal stock fencing at Lot 2 Wallaroo Road</td>
<td>SLA</td>
<td>2019/20</td>
<td>$80,000</td>
</tr>
<tr>
<td></td>
<td>2. Install new internal stock fencing at Lot 2 Wallaroo Road that will support a (conservation focused) strategic grazing regime – to be informed by grazing plan and restoration program</td>
<td>PCS</td>
<td>2018/19</td>
<td>$10,000</td>
</tr>
<tr>
<td></td>
<td>3. Install stock water infrastructure at Lot 2 Wallaroo Road that will support a (conservation focused) strategic grazing regime</td>
<td>PCS and SLA</td>
<td>As required</td>
<td>Approx. $10,000 per year</td>
</tr>
<tr>
<td></td>
<td>4. Install fencing around the known subsidence holes at Jarramlee that will support livestock grazing within the 3 ha exclusion zone</td>
<td>PCS</td>
<td>2018/19</td>
<td>$10,000</td>
</tr>
<tr>
<td></td>
<td>5. Maintain all existing grazing infrastructure within the Gooromon Grasslands offset sites.</td>
<td>PCS and SLA</td>
<td>As required</td>
<td></td>
</tr>
<tr>
<td><strong>Tracks and trails</strong>&lt;br&gt;Section 4.1.6</td>
<td>1. Establish management tracks (slash lines) within Lot 2 Wallaroo Road in appropriate locations outside of remnant MNES patches and proposed restoration areas. The new management tracks will be informed by the MNES condition mapping and consultation with ACT Government ecologists</td>
<td>SLA</td>
<td>On-going</td>
<td>Covered under staff costs</td>
</tr>
<tr>
<td></td>
<td>2. Maintain all existing tracks and trails within the Gooromon Grasslands offset sites.</td>
<td>PCS and SLA</td>
<td>On-going</td>
<td>-</td>
</tr>
</tbody>
</table>

*The estimated costs and timeframes required to deliver on the proposed works are based on current information from experienced ACT Government staff and external service providers who manage reserves with similar land management issues and requirements. Some variation to these estimates could occur due to factors such as external environmental influences (e.g. climate, pest plant and animal population dynamics etc.), increased material costs, increased contractor costs, contractor availability etc. Note: items without allocated funds will be delivered using ACT Government staff or funded as part of other actions identified in this OMP.*
### 8.4 Ecological restoration

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Implementation</th>
<th>Estimated timeframe for completion</th>
<th>Estimated operational costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase the extent of Natural Temperate Grassland of the South Eastern Highlands</td>
<td>1. The extent of NTG at Jarramlee (measured at 6.8 hectares in spring 2017) will be increased to at least 7.6 hectares over the life of the approval decision. 2. A restoration project will be implemented within a designated 1.5 hectare restoration zone (Native Pasture Buffer/Restore Zone 3) surrounding existing NTG remnants. 3. The target for the subsequent OMP period is a minimum 0.3 hectare increase in NTG extent, delivered by increasing the cover of ‘non-grass native species or indicator species’ in line with the approach outlined in 5.1.3. 4. Individual project plans will be developed for all restoration works.</td>
<td>PCS</td>
<td>30/09/2032</td>
<td>$200,000 for this OMP period</td>
</tr>
<tr>
<td>Increase the extent of Golden Sun Moth ( Synemon plana ) habitat</td>
<td>1. A strategy to increase the extent of GSM habitat at Lot 2 Wallaroo Road from 11.9 hectares to 33.1 hectares will be developed by a suitably qualified consultant in consultation with PCS. Options to be considered are identified in Section 5.2.2. Restoration works will need to include the costs of sourcing seed of GSM habitat species or establishing seed production areas to service the project throughout the restoration period. Opportunities (including cost sharing options) will be investigated to also secure seed for GSM restoration projects within other offsets and reserves. 2. GSM habitat restoration within Lot 2 Wallaroo Road and in the adjacent Fassifern block will also improve connectivity between Jarramlee and Dunlop Grasslands Nature Reserve, delivering the conservation land consolidation and connectivity enhancement objectives outlined in the Lawson Offset Strategy (ACT Government 2013b). Stage 1 of this project will aim to improve 3 hectares of GSM habitat within Fassifern block.</td>
<td>Ginninderry Conservation Trust</td>
<td>2019/20</td>
<td>$25,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PCS</td>
<td>2022/23</td>
<td>$100,000</td>
</tr>
<tr>
<td>Activity</td>
<td>Description</td>
<td>Implementation</td>
<td>Estimated timeframe for completion</td>
<td>Estimated operational costs</td>
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</tbody>
</table>
| Translocation of Golden Sun Moth (Synemon plana) larvae | 1. GSM translocation research will commence 5 years from the commencement of this OMP (second implementation period 2023-2028). This work will build on existing knowledge and trials undertaken elsewhere in the ACT by the ACT Government.  
2. The translocation of larvae is to be completed within 20 years after the approval of the OMP, and prior to the construction of Ginninderra Drive extension. This timeline is consistent with the staged GSM habitat restoration project that will occur within the designated 21.2 hectare GSM habitat restoration zone.  
3. The translocation project is subject to concurrence by the Ginninderry Conservation Trust that sufficient evidence exists to provide confidence in a successful outcome. | Ginninderry Conservation Trust to develop research program in consultation with Offsets Ecologists, Planners and Rangers and CR. | 20/06/2038 | Future OMPs. |

| Riparian restoration strategy | 1. Immediate works required to address instances of streambank erosion, in particular along Ginninderra Creek, will be delivered as part of this OMP. This will include engaging a suitably qualified expert to develop a plan to address priority restoration requirements. | PCS | 2018/19 | $45,000 |
|                            | 2. Deliver the riparian restoration plan | PCS | 2022/23 | tbc |
|                            | 3. A Riparian Restoration Strategy for the tributaries for the greater Murrumbidgee River corridor complex, namely Ginninderra Creek and Gooromon Ponds Creek (up to Wallaroo Road) will be prepared within the next OMP cycle. | Ginninderry Conservation Trust to develop Riparian Strategy in consultation with Offsets Rangers and Ecologists. | Strategy : next OMP |

#The estimated costs and timeframes required to deliver on the proposed works are based on current information from experienced ACT Government staff and external service providers who manage reserves with similar land management issues and requirements. Some variation to these estimates could occur due to factors such as external environmental influences (e.g. climate, pest plant and animal population dynamics etc.), increased material costs, increased contractor costs, contractor availability etc. Note: items without allocated funds will be delivered using ACT Government staff or funded as part of other actions identified in this OMP.
### 8.5 Matters of National Environmental Significance monitoring and mapping

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Implementation</th>
<th>Estimated timeframe for completion</th>
<th>Estimated operational costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSM habitat and NTG mapping</td>
<td>GSM habitat will be mapped within the subsidence paddock following the methods outlined in Section 6.2.3. Note: Follow up NTG condition mapping across the wider Gooromon Grasslands is not planned until 2027.</td>
<td>PCS</td>
<td>Spring/Summer 2018</td>
<td>$3,000</td>
</tr>
<tr>
<td>GSM habitat condition threshold assessment method project</td>
<td>To assist GSM habitat and restoration planning, a GSM habitat 'condition threshold assessment method' will be developed (as described in Section 5.2.1).</td>
<td>PCS to engage a suitably qualified expert</td>
<td>2019/20</td>
<td>$25,000</td>
</tr>
<tr>
<td>PTWL habitat mapping</td>
<td>A suitably qualified ecologist will be engaged to determine presence of potential Pink-tailed Worm-lizard habitat within Lot 2 Wallaroo Road. Any habitat will be mapped according to the quality classes defined in Osborne and Wong (2017).</td>
<td>PCS to co-ordinate (funding from SLA)</td>
<td>Spring / Summer 2018</td>
<td>$15,000</td>
</tr>
<tr>
<td>GSM population monitoring</td>
<td>The GSM population will be monitored in accordance with Section 6.2.4.</td>
<td>PCS</td>
<td>Spring/Summer 2018, 2019, 2022</td>
<td>Jarramlee and West Macgregor: Year 1 &amp; 2: 36,000 Year 5: $20,000 Lot 2 Wallaroo Road Year 1&amp;2: $21,000 Year 5: $12,000</td>
</tr>
<tr>
<td>GSM habitat and grassland monitoring</td>
<td>The GSM habitat and NTG will be monitored in accordance with Section 6.2.2.</td>
<td>PCS</td>
<td>2018, 2019, 2022</td>
<td>To be delivered in house. Covered under staff costs.</td>
</tr>
<tr>
<td>Woodland bird monitoring</td>
<td>Woodland birds will be monitored following the methods in Greening Australia (2017).</td>
<td>PCS</td>
<td>Annually</td>
<td>To be delivered in house. Covered under staff costs.</td>
</tr>
<tr>
<td>Activity</td>
<td>Description</td>
<td>Implementation</td>
<td>Estimated timeframe for completion</td>
<td>Estimated operational costs</td>
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<tr>
<td>Monitoring threats</td>
<td>PCS are committed to refining and improving the standardised methods for collecting data on operational activities and management of threatening processes. This will be undertaken in line with the implementation of the CEMP. The monitoring activities for all threats will remain subject to further amendment, based on consultation and advice from ACT Government Ecologists and Territory Officers.</td>
<td>PCS</td>
<td>On-going</td>
<td>To be delivered in house. Covered under staff costs.</td>
</tr>
<tr>
<td>Water quality and frog monitoring</td>
<td>PCS supports water quality and frog monitoring delivered under volunteer programs including Waterwatch and Frogwatch.</td>
<td>ACT Waterwatch; ACT Frogwatch</td>
<td>Annually</td>
<td></td>
</tr>
</tbody>
</table>

#The estimated costs and timeframes required to deliver on the proposed works are based on current information from experienced ACT Government staff and external service providers who manage reserves with similar land management issues and requirements. Some variation to these estimates could occur due to factors such as external environmental influences (e.g. climate, pest plant and animal population dynamics etc.), increased material costs, increased contractor costs, contractor availability etc. Note: items without allocated funds will be delivered using ACT Government staff or funded as part of other actions identified in this OMP.

### 8.6 Staffing plan: project planning and implementation

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Implementation</th>
<th>Estimated timeframe for completion</th>
<th>Estimated operational costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staffing</td>
<td>Staff are required to deliver the actions outlined in this OMP. Staff include a Senior Ranger, Field Officer, Ecologist and Planner. Staff resources are calculated on a pro rata basis according to the level of service required to deliver the offset commitments.</td>
<td>PCS</td>
<td>On-going</td>
<td>Year 1: $175,959</td>
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<td>Year 2: $290,000</td>
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<td>Year 3: $212,000</td>
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<td>Year 4: $218,000</td>
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<td>Year 5: $225,000</td>
</tr>
</tbody>
</table>

#The estimated costs and timeframes required to deliver on the proposed works are based on current information from experienced ACT Government staff and external service providers who manage reserves with similar land management issues and requirements. Some variation to these estimates could occur due to factors such as external environmental influences (e.g. climate, pest plant and animal population dynamics etc.), increased material costs, increased contractor costs, contractor availability etc. Note: items without allocated funds will be delivered using ACT Government staff or funded as part of other actions identified in this OMP.
9. RECORDS MANAGEMENT

PCS and the SLA will maintain accurate records substantiating any activities associated with or relevant to the conditions of approval, including measures taken to implement the Plan.

10. REPORTING & PUBLICATION OF OFFSET DOCUMENTS

10.1 Reporting schedule

Responsibility for coordinating and submitting annual reports will remain with Riverview Projects (ACT) Pty Ltd in accordance with the WBSA Program Report. The ACT Government, EPSDD (PCS and SLA) will provide input to the annual reporting process upon request from Riverview Projects (ACT) Pty Ltd. Requests to provide inputs to annual reports must provide PCS and SLA with an adequate time period (a minimum of one month before the annual report submission date) to review relevant management and monitoring records and produce inputs.

Furthermore, PCS will be seeking to vary the conditions of approval for the South Lawson development to align reporting commitments for the Jarramlee offset site with West Macgregor and Lot 2 Wallaroo Road. This will be undertaken with the support of other stakeholders involved in delivering the commitments in the South Lawson approval decision, recognising that there are other conditions relating to managing the Lawson South development site and Reservoir Hill in Lawson.

All plans and reports prepared in the context of delivering on the commitments associated with managing the Gooromon Grasslands reserve complex will be published on the PCS environmental offsets website and/or the ACT Offsets Register within 30 days of being finalised.

REVIEW DATE

The management actions outlined in this OMP will be reviewed and updated in 2023. Any updates will be in response with the outcomes of the monitoring program (Section 6) and to advances in our knowledge of the habitat requirements and life cycle of the Golden Sun Moth and management requirements of the Natural Temperate Grassland ecological community.
REFERENCES


Greening Australia (2017) Bird Surveys at Jarramlee Environmental Offset: Results from the First and Second Year. Report prepared for the EPSDD, ACT, Canberra.


### Appendix A. Gooromon Grasslands flora species list

<table>
<thead>
<tr>
<th>Scientific name *exotic species</th>
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### Grasses, Rushes and Sedges

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<tr>
<td>Hordeum leporinum*</td>
<td>Barley Grass</td>
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<td>Lolium sp*</td>
<td>Ryegrass</td>
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<tr>
<td>Microlaena stipoides</td>
<td>Weeping Grass</td>
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<td>Natural and Planted</td>
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<tr>
<td>Nassella neesiana*</td>
<td>Chilean Needle Grass</td>
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<td>Weed of National Significance</td>
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<tr>
<td>Nassella trichotoma*</td>
<td>Serrated Tussock</td>
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<td>Panicum effusum</td>
<td>Hairy Panic</td>
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<td>Paspalum dilatatum*</td>
<td>Couch</td>
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<td>Phalaris aquatica*</td>
<td>Phalaris</td>
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<td>Poa bulbosa*</td>
<td>Bulbous Bluegrass</td>
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<td>Poa sieberiana</td>
<td>Snowgrass</td>
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<td><em>Rytidosperma erianthum</em></td>
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<td><em>Rytidosperma sp 1</em></td>
<td>Wallaby Grass</td>
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<tr>
<td><em>Rytidosperma sp 2</em></td>
<td>Wallaby Grass</td>
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<td><em>Sporobolus creber</em></td>
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<tr>
<td><em>Themeda triandra</em></td>
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<td><em>Vulpia sp</em></td>
<td>Rats-tail Fescue</td>
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</table>

**Mistletoe**

*Amyema miquelii*  
Box Mistletoe

**Ferns**

*Cheilanthes austrotenuifolia*  
Rock Fern  
1  
1

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### Appendix B. Gooromon Grasslands fauna species list

<table>
<thead>
<tr>
<th>Scientific name *exotic species</th>
<th>Common name</th>
<th>Notes</th>
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<tbody>
<tr>
<td><em>Acanthiza chrysocephala</em></td>
<td>Yellow-rumped Thornbill</td>
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<tr>
<td><em>Acanthiza lineata</em></td>
<td>Striated Thornbill</td>
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<tr>
<td><em>Acanthiza nana</em></td>
<td>Yellow Thornbill</td>
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<td><em>Acanthiza pusilla</em></td>
<td>Brown Thornbill</td>
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<tr>
<td><em>Acanthiza reguloides</em></td>
<td>Buff-rumped Thornbill</td>
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<td><em>Accipiter fasciatus</em></td>
<td>Brown Goshawk</td>
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<td><em>Alisterus scapularis</em></td>
<td>Australian King-parrot</td>
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<tr>
<td><em>Anas superciliosa</em></td>
<td>Pacific Black Duck</td>
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<tr>
<td><em>Anthochaera carunculata</em></td>
<td>Red Wattlebird</td>
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<tr>
<td><em>Anthochaera phrygia</em></td>
<td>Regent Honeyeater</td>
<td>EPBC Listed (MNES)</td>
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<tr>
<td><em>Ardea pacifica</em></td>
<td>White-necked Heron</td>
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<tr>
<td><em>Cacatuas galerita</em></td>
<td>Sulphur-crested Cockatoo</td>
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<tr>
<td><em>Cacatuas sanguinea</em></td>
<td>Little Corella</td>
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<td><em>Cacomantis flabelliformis</em></td>
<td>Fan-tailed Cuckoo</td>
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<td><em>Callocephalon fimbriatum</em></td>
<td>Gang-gang Cockatoo</td>
<td>Vulnerable in NSW</td>
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<tr>
<td><em>Chenonetta jubata</em></td>
<td>Australian Wood Duck</td>
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<tr>
<td><em>Chrysococcyx lucidus</em></td>
<td>Shining Bronze-cuckoo</td>
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<tr>
<td><em>Chthonicola sagittata</em></td>
<td>Speckled Warbler</td>
<td>Vulnerable in NSW, considered rare in ACT</td>
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<tr>
<td><em>Coracina novaehollandiae</em></td>
<td>Black-faced Cuckoo-shrike</td>
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<tr>
<td>Scientific name *exotic species</td>
<td>Common name</td>
<td>Notes</td>
</tr>
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<tr>
<td>Corcorax melanorhamphos</td>
<td>White-winged Chough</td>
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<td>Cormobates leucophaeus</td>
<td>White-throated Treecreeper</td>
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<td>Corvus coronoides</td>
<td>Australian Raven</td>
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<td>Cracticus tibicen</td>
<td>Australian Magpie</td>
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<td>Cracticus torquatus</td>
<td>Grey Butcherbird</td>
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<td>Dacelo novaeguineae</td>
<td>Laughing Kookaburra</td>
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<td>Dicaeum hirundinaceum</td>
<td>Mistletoebird</td>
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<td>Eolophus roseicapillus</td>
<td>Galah</td>
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<td>Glossopsitta concinna</td>
<td>Musk Lorikeet</td>
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<td>Grallina cyanoleuca</td>
<td>Magpie-lark</td>
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<td>Hirundo neoxena</td>
<td>Welcome Swallow</td>
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<td>Lathamus discolor</td>
<td>Swift Parrot</td>
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<tr>
<td>Lichenostomus chrysops</td>
<td>Yellow-faced Honeyeater</td>
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<td>Lichenostomus penicillatus</td>
<td>White-plumed Honeyeater</td>
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<td>Malurus cyaneus</td>
<td>Superb Fairy-wren</td>
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<tr>
<td>Manorina melanocephala</td>
<td>Noisy Miner</td>
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<tr>
<td>Melithreptus lunatus</td>
<td>White-naped Honeyeater</td>
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<tr>
<td>Microeca fascinans</td>
<td>Jacky Winter</td>
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<tr>
<td>Myiagra rubecula</td>
<td>Leaden Flycatcher</td>
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<td>Ocyphaps lophotes</td>
<td>Crested Pigeon</td>
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<td>Oriolus sagittatus</td>
<td>Olive-backed Oriole</td>
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<td>Pachycephala rufiventris</td>
<td>Rufous Whistler</td>
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<td>Pardalotus punctatus</td>
<td>Spotted Pardalote</td>
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<td>Pardalotus striatus</td>
<td>Striated Pardalote</td>
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<td>Passer domesticus*</td>
<td>House Sparrow</td>
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<td>Phaps chalcoptera</td>
<td>Common Bronzewing</td>
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<td>Philemon corniculatus</td>
<td>Noisy Friarbird</td>
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<tr>
<td>Platycercus elegans</td>
<td>Crimson Rosella</td>
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<tr>
<td>Platycercus eximius</td>
<td>Eastern Rosella</td>
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<td>Polytelis swainsonii</td>
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<td>Psephotus haematotonus</td>
<td>Red-rumped Parrot</td>
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<td>Rhipidura albiscapa</td>
<td>Grey Fantail</td>
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<td>Rhipidura leucophrys</td>
<td>Willie Wagtail</td>
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<td>Rhipidura rufifrons</td>
<td>Rufous Fantail</td>
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<td>Smicrornis brevirostris</td>
<td>Weebill</td>
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<tr>
<td>Strepera graculina</td>
<td>Pied Currawong</td>
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</table>
## Scientific name *exotic species | Common name | Notes
---|---|---
*Sturnus tristis* | Indian Myna* | 
*Sturnus vulgaris* | Common Starling* | 
*Todiramphus sanctus* | Sacred Kingfisher | 
*Zosterops lateralis* | Silvereye | 

### Mammals

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>Notes</th>
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</table>
*Chalinolobus gouldii* | Gould's Wattle Bat | 
*Lepus europaeus* | European Hare | 
*Macropus giganteus* | Eastern Grey Kangaroo | 
*Miniopterus schreibersii ssp. oceanis* | Australasian Bent-wing Bat | Vulnerable in NSW |
*Oryctolagus cuniculus* | European wild rabbit | 
*Tadarida triandra* | White-striped Free-Tail Bat | 
*Vespadelus regulus* | Southern Forest Bat | 
*Vespadelus vulturnus* | Little Forest Bat | 
*Vulpes vulpes* | European Red Fox | 

### Reptiles

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
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*Pogona barbata* | Common Bearded Dragon |
*Tiliqua rugosa* | Shingleback Lizard |
*Tiliqua scincoides* | Eastern Blue-tongued Lizard |

### Amphibians

<table>
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<th>Scientific name</th>
<th>Common name</th>
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*Crinia parinsignifera* | Plains Froglet |
*Crinia signifera* | Common Eastern Froglet |
*Limnodynastes peronii* | Brown-striped Frog |
*Limnodynastes tasmaniensis* | Spotted Grass Frog |
*Litoria peronii* | Peron’s Tree Frog |
*Litoria verreauxii* | Whistling Tree Frog |
*Neobatrachus sudelli* | Spotted Burrowing Frog |
*Uperoleia laevigata* | Smooth Toadlet |

### Invertebrates

<table>
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<tr>
<th>Scientific name</th>
<th>Common name</th>
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*Heteronympha merope* | Common Brown Butterfly |