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**ACT GOVERNMENT**

**YARRALUMLA EQUESTRIAN  
PARK**

**OFFSET MANAGEMENT PLAN**

**April 2014**



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## 1 INTRODUCTION

### 1.1 Overview

The Yarralumla Equestrian Park Offset Management Plan (the OMP) has been prepared to meet specific requirements of the Commonwealth Department of Environment (DoE) *EPBC Act* approval decision (*EPBC 2012/2692*, [the Approval], Appendix A), for mixed-use development proposed for Campbell Section 5, Constitution Avenue, ACT (Campbell Section 5).

The proposed action involves the construction of a mixed-use development comprising commercial, residential and public use areas in Campbell Section 5.

The proponent, i.e. the ACT Government, is required to develop an OMP to conserve, manage and improve habitat in the Yarralumla Equestrian Park (YEP) (Figure 1) to compensate for residual adverse impacts from the proposed action on golden sun moths (*Synemon plana*) (GSM) and natural temperate grassland (NTG) in Campbell Section 5.

### 1.2 Approval Conditions

In accordance with Condition 1 of the Approval (Appendix A), the OMP must include, but not necessarily be limited to, the following details:

1. *To compensate for residual impacts from the action to the golden sun moth and natural temperate grassland, the person taking the action must develop an Offset Management Plan (OMP) to conserve, manage and improve habitat within the Yarralumla Equestrian Park offset area. The OMP must include:*
  - a) *map(s) and shapefiles that clearly defines the location and boundaries of the Yarralumla Equestrian Park offset area including offset attributes;*
  - b) *details of the quality of habitat on site (supported by maps), including the results of baseline surveys undertaken by a suitably qualified expert at an optimal ecological time to demonstrate the extent of golden sun moth habitat and natural temperate grassland habitat within the Yarralumla Equestrian Park offset area;*
  - c) *measures to manage and improve no less than 4.6 hectares (ha) of habitat within the Yarralumla Equestrian Park offset area for the better protection of the golden sun moth and natural temperate grassland including, details of: the duration, timing, level of effort, methodology, and the person(s) responsible for undertaking the management actions. Management actions must include (but need not be limited to):*
    - i. *mowing and biomass control;*
    - ii. *weed management;*
    - iii. *waste management (including both general rubbish and waste associated with the operation of surrounding areas as an equestrian park, for example horse manure); and*



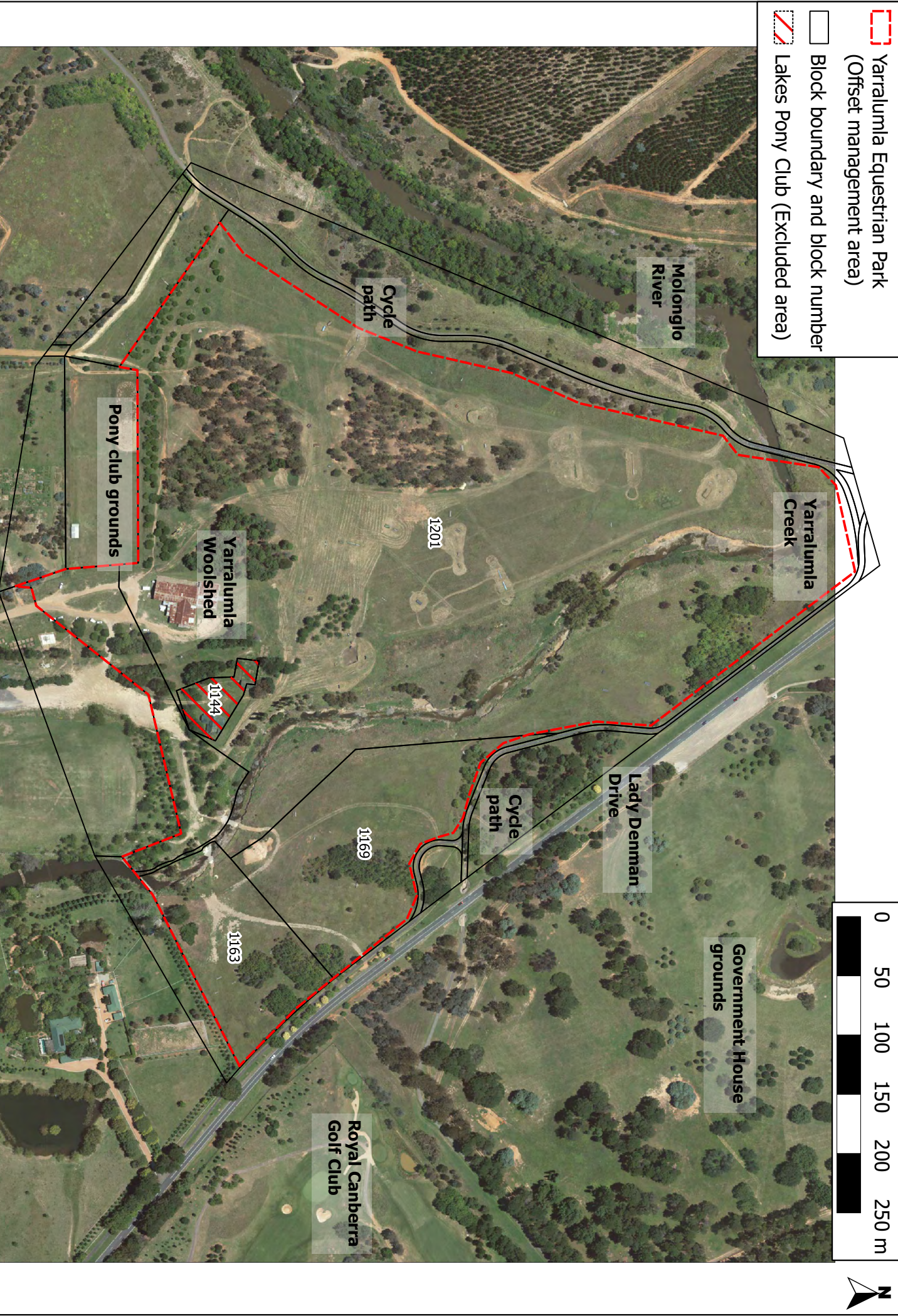


Figure 1. Yarralumla Equestrian Park and surrounds.



iv. *measures to avoid or minimise the risk of soil compaction.*

*For the avoidance of doubt, the Yarralumla Equestrian Park offset area must include no less than 4.6 ha of habitat suitable for the golden sun moth and no less than 0.5 ha of natural temperate grasslands.*

- d) *a commitment that management actions will continue to be implemented until such time that monitoring indicates the Yarralumla Equestrian Park offset area has become self-sufficient for the values which it is intended to protect;*
- e) *measures that prevent the Yarralumla Equestrian Park offset area from being subject to uses that are incompatible with the conservation of the area as habitat for the golden sun moth and natural temperate grassland (including the provision of signage which provides information on the Yarralumla Equestrian Park offset area and why it is being managed);*
- f) *details of an appropriate monitoring program to be undertaken by a suitably qualified expert, including aims, methodology reporting, and benchmarks for success, to determine whether the golden sun moth and natural temperate grassland values at the Yarralumla Equestrian Park offset area are improved. The monitoring must address (but need not be limited to):*
  - i. *numbers of golden sun moth; and*
  - ii. *extent and quality of habitat for both the golden sun moth and natural temperate grassland.*
- g) *a commitment that monitoring will continue to be undertaken until such time as the person taking the action can provide demonstrable evidence that the offset area has become self-sufficient;*
- h) *provisions for making the results of any monitoring programs available on the person taking the action's website, within 12 months of implementation, and then annually until the Minister agrees in writing that monitoring can cease;*
- i) *details of contingency measures should the monitoring required by condition 1) f) determine that the golden sun moth and natural temperate grassland values have either degraded, or not improved at the Yarralumla Equestrian offset area;*
- j) *details of administration and funding arrangements with the relevant parties who will be responsible for managing the Yarralumla Equestrian offset area; and*
- k) *a schedule of anticipated costs associated with the management of the Yarralumla Equestrian Park offset area.*

*The OMP must be submitted to the Minister for approval at least three months prior to the sale of any individual blocks or within 12 months of the date of this approval, whichever is sooner. The OMP must be implemented from the date of its approval.*

This OMP has been prepared in accordance with the Approval conditions listed above and is based on the YEP conservation management plan prepared by Nash

and Hogg (2013) and the YEP offset area interim management actions prepared by the ACT Government (2013a) in response to Approval Condition 2 (Appendix A), which is:

2. *Until such time as the OMP is approved, the person taking the action must undertake interim measures for managing the Yarralumla Equestrian offset area for the better protection of the golden sun moth, including (but not necessarily limited to): mowing and biomass control, weed management, removal of waste and litter, and measures to avoid / minimise the risk of soil compaction. Within 90 days of this notice, an outline of the interim management actions to be undertaken (including timing, duration and level of effort) must be endorsed by a suitably qualified expert and submitted to the Minister.*

Figure 2 shows the YEP offset management area in relation to the offset area and site boundary included in the Approval Conditions (Appendix A). Approximately 0.1 ha of the offset area identified in the Approval Conditions is located outside the boundary of YEP and is not covered by this monitoring plan. The offset area identified in the Approval Conditions was determined based on preliminary mapping of GSM habitat and NTG. The updated habitat assessment conducted in 2013 for this OMP determined that the offset management area contains 7.6 ha of GSM habitat and 0.5 ha of NTG (refer Table 2 and Table 3, Section 4.3.2). The proposed offset management area outlined in this monitoring plan is therefore fully compliant with, and exceeds, the area requirements specified in Approval Condition 1c.

## **2 EQUESTRIAN PARK DESCRIPTION**

### **2.1 Land Management**

The YEP is a tract of unleased Territory Land comprising approximately 52 ha set aside for public equestrian use and is the main base in the ACT for horse trials and other equestrian events. While the land is classified under the National Capital Plan, as designated land and is the responsibility of the National Capital Authority, the ACT Equestrian Association (ACTEA) manages the Park under licence from the Sport and Recreation Services Branch, an administrative unit of the Economic Development Directorate of the ACT Government. The Equestrian Park Management Group (EPMG), a sub-committee of ACTEA, is responsible for day to day park management. The YEP offset area applies to the northern parts of the YEP only, which are generally those areas used for cross-country riding. These northern parts of the YEP are hereafter referred to either as the YEP or the project area, which includes the offset area (Figure 1).

#### **2.1.1 Strategic Planning**

In 2001-2002, the ACTEA prepared a '*Strategic development and management plan for equestrian sport and recreation facilities in the ACT discussion paper*' (Hogg 2002) and '*Strategic plan*' (ACTEA 2002). These documents identified the YEP's importance as part of ACT equestrian sport, and discussed general requirements for its upkeep and improvement.



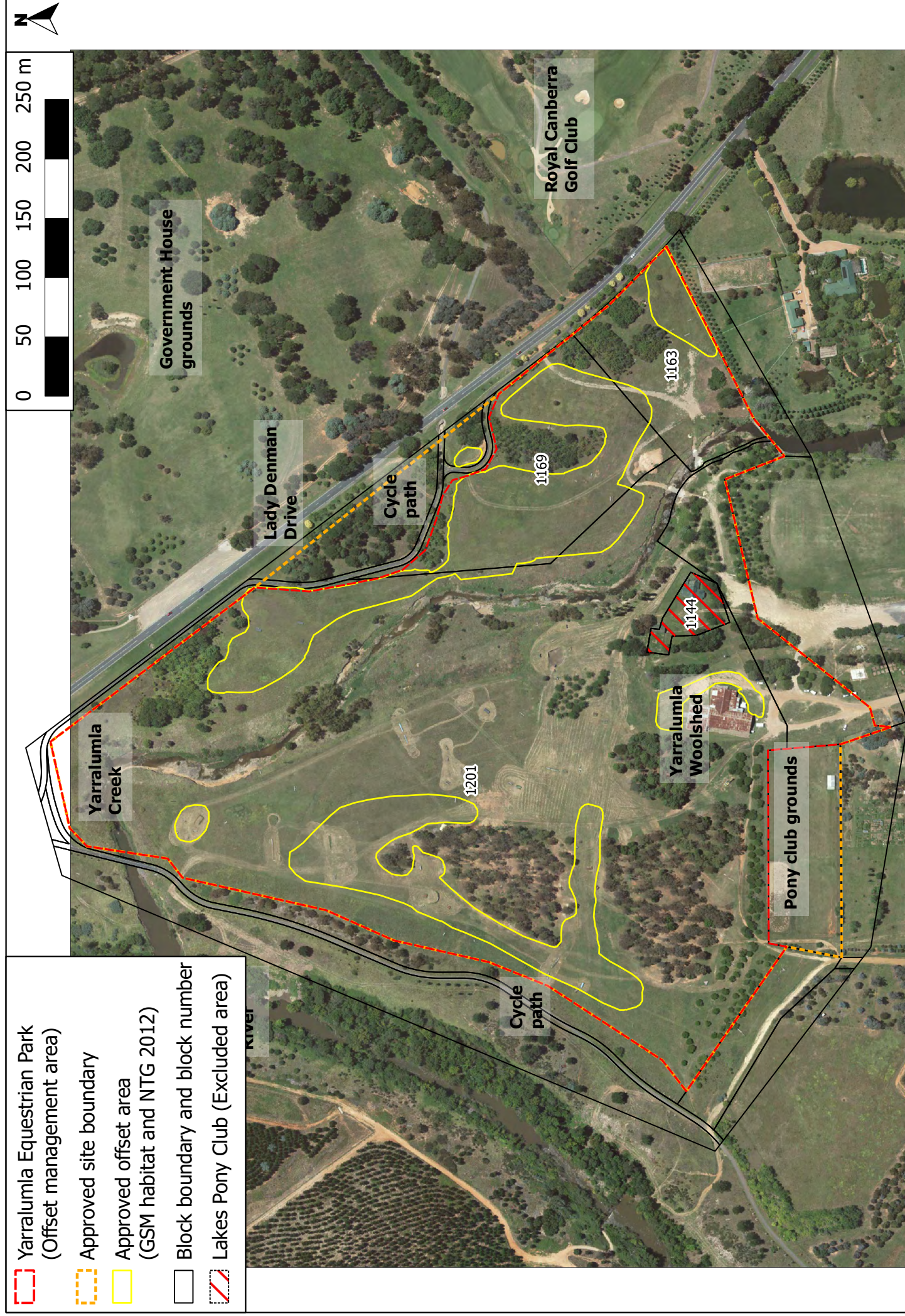


Figure 2. Yarralumla Equestrian Park offset management area in relation to the approved offset area and site boundary.



In February 2002 the ACTEA commissioned a Master Plan (Creber 2002) for the development of the YEP in a planned and strategic way. The Master Plan states that “...its present condition [in 2002] offers a modest low to medium competition and training facility to several equestrian disciplines... and provides a venue for recreational riding.” but that “The YEP has the necessary intrinsic qualities to host major international class competitions in at least four equestrian disciplines and the potential to do so with great success. This capacity is combined with its continuing usage as a wonderful parkland in which to go horse riding.”

Master Plan Section 10.1.8 Cross Country Competition Course outlines the following maintenance tasks for the cross country course:

- *Ensure that all take-off and landing areas at the obstacles will remain consistent and suitably yielding throughout the competition.*
- *Ensure that the footing of the whole track is of a suitable consistency by irrigating, sanding, top-dressing or rotovating as may be appropriate.*
- *Restoration of sites and track after the competition.*

## **2.2 Site Description**

### **2.2.1 General**

The YEP is used for cross-country riding and is generally bounded by cycle paths that are adjacent to Lady Denman Drive to the east and parallel to the Molonglo River to the west. The southern part of the YEP and other rural lands form the southern boundary. Yarralumla Creek flows through the park and forms part of the northern boundary. Figure 1 shows the YEP location.

The project area is approximately 22 ha, comprising a variety of grasslands and pasture, and patches of planted trees and other areas unsuitable for management as grassland. Yarralumla Creek divides the project area into western and eastern parts, the former comprising two thirds and the latter one third of the total area. The YEP is ungrazed and no horses are agisted in the YEP.

The project area supports several weeds of national and state significance (Table 1)

**Table 1. Significant weeds in the project area.**

<b>Scientific Name</b>	<b>Common Name</b>	<b>E/N</b>	<b>Plant Status</b>
<i>Lycium ferocissimum</i>	Boxthorn	E	ACT S,P; WONS
<i>Nassella neesiana</i>	Chilean needle grass	E	ACT P,C; WoNS
<i>Rubus fruticosus</i> agg.	Blackberry	E	ACT P,C; WoNS
<i>Salix</i> spp.	Willow species	E	ACT C; WoNS

Note: E - Exotic species, N - Native species  
 ACT C - Must be contained, P - Prohibited, S - Must be suppressed  
 WoNS - Weed of National Significance

### **2.2.2 Eastern part**

The eastern part is located on a gentle west facing slope that falls towards Yarralumla Creek, although the northern tip of the site contains a relatively steep south facing slope. Grassland areas cover approximately 5 ha, with the remaining area covered by scattered clumps of exotic deciduous trees (e.g. pines, oaks, elms)



that have been planted or have otherwise become established as copses. Woody weeds are present including briar rose (*Rosa rubiginosa*) and African boxthorn (*Lycium ferocissimum*). The open grassland areas contain patches dominated by native species but also patches where exotic grasses and weeds are dominant.

Native grasses recorded incidentally in the September 2012 preliminary survey (Rowell 2013) include wallaby grasses (*Rytidosperma* spp.), spear grasses (*Austrostipa* spp.), redleg grass (*Bothriochloa macra*), kangaroo grass (*Themeda australis*) and hairy panic (*Panicum effusum*), while native forbs include common everlasting (*Chrysocephalum apiculatum*), native plantain (*Plantago varia*), austral bears-ear (*Cymbonotus lawsonianus*), yellow rush lily (*Tricoryne elatior*) and sheep's burr (*Acaena ovina*). Additional native species of note recorded during the December 2012 GSM survey (Rowell 2013) include bluebell (*Wahlenbergia communis*), nodding chocolate lily (*Dichopogon fimbriatus*), blue devil (*Eryngium rostratum*) and mat-rush (*Lomandra multiflora*).

The native forbs are generally restricted to NTG and / or native pasture areas, but the more disturbance tolerant grasses and forbs are also found in low abundance in isolated patches scattered throughout the project area.

The perennial weeds and grasses, Chilean needle grass (*Nassella neesiana*), St John's wort (*Hypericum perforatum*), paspalum (*Paspalum dilatatum*) and African love grass (*Eragrostis curvula*) dominate the non-native parts of the site, with Chilean needle grass forming large swaths along the creek banks. Other introduced species include goose grass (*Eleusine tristachya*), couch (*Cynodon dactylon*), wild oats (*Avena* sp.), brome grasses (*Bromus* spp.), phalaris (*Phalaris aquatica*), great mullein (*Verbascum thapsus*), capeweed (*Arctotheca calendula*) and catsear (*Hypochaeris radicata*), although the distribution of these species is variable and associated with specific site disturbances and land use history.

### **2.2.3 Western part**

The western part comprises a broad flat spur located between Yarralumla Creek and the Molonglo River. The grassed areas cover approximately 7 ha. Plantations dominated by yellow box (*Eucalyptus melliodora*) are present on the top of the spur while stands and / or rows of exotic trees have been planted or have established along the cycleway, the creek corridor, and in the southern part of the project area.

The groundcover vegetation is similar to that described for the eastern part although the native dominated areas tend to be restricted to the upper slopes surrounding the planted eucalypts, with smaller patches on the eastern slope.

Native grass diversity appears to be lower in the western part, while introduced grass and weed diversity and abundance appears to be higher, with the exception of St John's wort, which is common to the east but restricted in distribution in the western part. Of particular note is caltrop (*Tribulus terrestris*), a noxious weed, found in large patches on the western part of the site.

## **2.3 Ecological Values**

The ecological values of the project area include:

- a population of GSM, listed as a critically endangered species under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* and as endangered under the ACT *Nature Conservation Act 1980 (NC Act)*; and
- patches of Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory, which is listed as an endangered ecological community under the *EPBC Act* and the *NC Act*.

### **2.3.1 Golden sun moths populations and habitat**

GSM were observed within the project area during 2008 as part of surveys undertaken for the *Community monitoring of golden sun moths in the Australian Capital Territory Region 2008-2009* project (Richter *et al.* 2009). Rowell (2013a) conducted a quantitative survey of the YEP and adjacent areas, and recorded 54 male moths over four survey days scattered across the project area. Rowell (2013a) concluded that a low to moderate GSM population occupies the project area, but that monitoring in future seasons was needed to confirm this conclusion.

Previous GSM habitat surveys (Rowell 2013a; Nash and Hogg 2013) consider that the YEP supports approximately 4.5 ha of low to moderate GSM habitat.

The YEP is located at the western end of a loosely connected corridor of grassland remnants known to support GSM within the Central Canberra (Yarralumla) area, including road verges and open areas along Cotter Road, Dudley Street and Guilfoyle Street. These sites are sufficiently connected to allow flying male moths to potentially move between them (Rowell 2013).

### **2.3.2 Natural temperate grassland**

Several small patches of native grassland likely to meet NTG criteria were identified in the YEP during the 2012 GSM survey (Rowell 2013), and a preliminary survey on 17 September 2012 and subsequent review undertaken in March 2013 (Nash and Hogg 2013). The total NTG area was approximately 0.5 ha although the NTG was considered to be of low to moderate quality. Native grasses and forbs were also present in other native pasture and exotic pasture areas.

## **2.4 Equestrian Activities**

Sport and Recreation Services and ACTEA understand the YEP to be the ACT's premier equestrian sporting and competition facility. The area has been used for equestrian pursuits since the 1970s and, more recently ACTEA, through the EPMG, has managed the YEP under licence since 1997. Park management is funded largely through Government grants and large equestrian event income.

YEP supports general equestrian recreational pursuits and official competitions including Olympic level dressage, show jumping and horse trials. The National Capital Horse Trials Association (NCHTA) manages the cross-country course and ongoing course building in the YEP. The NCHTA has developed the cross-country area over the years by adding features typical of a cross-country course and by cultivating the ground to an acceptable standard for cross-country horse riding. Riders expect the ground conditions to be of a consistently safe standard for their horses. As such the cross-country area requires on-going management to maintain these cross-country course standards.

The YEP offers eight horse trial courses ranging from ‘encouragers’ (i.e. jumps up to 0.45 m high) to ‘3-star’ (i.e. jumps up to 1.2 m high) courses.

At present approximately 145 horse jumps, including log fences, brush fences, ditches, drop fences, skinnies and tables, are present in the project area. A water jump complex is also under construction. Cross-country events are timed distance events. The spaces between jumps are as important as the jumps themselves. Long areas of clear running (i.e. gallops) over specified distances are an integral course component and must be maintained to a high design and safety standard. Obtaining the required course distances of up to 4 km is challenging at the YEP due to various spatial constraints but due to grooming and ground development over many years, medium to good quality gallop areas are now present.

Australian and international riders seeking Olympic qualification can and have used the YEP due to its 3-star rating. To maintain its international standing, the cross-country course has to continually improve and change in accordance with the equestrian sport’s expectations.

The YEP is one of few such facilities in Australia not on private property. It is therefore available to the public throughout the year for small and large events, and for training.

The cross-country course is used for several large events each year with up to 300 horses using the course over a long weekend and smaller, local events over approximately 15 days a year with 30 - 100 horses participating. For these events the course is booked for exclusive use. Australia’s elite riders regularly train at the YEP. Local riding schools, pony clubs and individual riders also come on a weekly basis at weekends and in the evenings to use parts of the YEP on an *ad hoc* basis for recreation and training. According to Creber (2002):

*“There are very few places in the world that allow an equestrian to ride for pleasure in a wonderful environment, take part in enjoyable competition or compete at serious elite level, all in the one site. As such the Equestrian Park should be treasured.”*

### **3 CURRENT MANAGEMENT PRACTISES**

#### **3.1 Mowing**

Sport and Recreation Services indicate that the project area is mown annually with a slasher mower generally during April / May and October / November each year and for fire reduction on an as-needed basis depending on seasonal weather and grass growth. The later mow occurs prior to major equestrian events held each year in October / November.

In practice, aerial imagery analysis shows that mowing has been employed from at least December 2002 and the regime is variable (Nash and Hogg 2013). Various areas are mown or not mown at different times of the year or with varying frequency. The areas adjacent to the creek are mown the least and, in general, the eastern part is mown less frequently than the western part.

ACTEA members undertake their own mowing prior to major equestrian events in October / November. This mowing is targeted towards specific routes through the cross-country area and around jumps intended for the upcoming competition.

### **3.2 Weed Control**

ACTEA members undertake weed control on an *ad hoc* basis using broad-scale boom spray and small-scale spot spray methods. Weeds targeted include serrated tussock (*Nassella trichotoma*), African lovegrass and Chilean needle grass, Paterson's curse, St John's wort, caltrop, briar rose, African boxthorn and wilding pines. The pre-1980 CSIRO plant trials in the adjacent 'Cotter Plots' are potentially an ongoing centre of dispersal for several weeds species in the YEP.

The lack of common weeds such as Paterson's curse (*Echium plantagineum*) and the low incidence of serrated tussock across the project area indicate that targeted control of these species is effective. St John's wort appears to be controlled on the western part but is widespread in the eastern part, while African lovegrass and Chilean needle grass are locally common in both parts of the project area, particularly in low lying areas.

### **3.3 Stable Waste and Sand Spreading**

Stable waste (e.g. straw and horse manure) and sand in some places has been spread around the trees on top of the ridge in the western part of the project area, along some cross-country routes and around the take-off and landing areas of many of the horse jumps. Sand also is used on top of the two concrete Yarralumla Creek crossings. The stable waste and sand aids in providing a softer ground for horses and the former is likely to benefit tree and grass growth; however stable waste may also contribute thatch, which could smother GSM and native plant species, introduce weed species and add sufficient nutrient to favour exotic species growth. Sand may also smother GSM and native plant species.

### **3.4 Soil Cultivation**

Soil cultivation, e.g. ploughing, rotovating, spike and core aeration, may have been undertaken in the past but historical information is unclear. Such actions do not favour GSM survival.

## **4 GSM AND NATURAL TEMPERATE GRASSLAND MONITORING**

### **4.1 Objective**

The GSM and NTG monitoring program objective, as specified in Approval Condition 1(f), is to:

*... determine whether the golden sun moth and natural temperate grassland values at the Yarralumla Equestrian Park offset area are improved.*

The monitoring program describes ongoing monitoring practises and is designed to capture appropriate data to enable detection of any negative trends in GSM numbers and, condition and extent of GSM habitat; and condition and extent of NTG arising from YEP management and recreational activities.

### **4.2 Approach**

The approach used to meet the objective has four main components:



- 
- Review the extent of vegetation and GSM habitat, e.g. native pasture, NTG and Chilean needle grass (Sections 4.3.1, 4.3.2, 4.3.3);
  - Monitor GSM flying activity in the YEP (Section 4.3.4);
  - Monitor the condition and extent of GSM habitat (Section 4.3.5); and
  - Monitor the condition and extent of native pasture and NTG (Sections 4.3.1, 4.3.2, 4.3.3).

In addition to the above data, the following information would be collated annually to assist in the interpretation of results:

- meteorological data from Canberra Airport; and
- regional GSM information (Section 4.2.2).

#### **4.2.1 Survey area**

The YEP project area, as defined in Figure 1, includes the offset areas identified in the Approval (Appendix A). The YEP project area excludes the area to the south known as the Cotter Plots, the Pony Club field, and the show jumping / dressage rings.

#### **4.2.2 Regional GSM Information**

Regional GSM information would be obtained from the ACT GSM monitoring network, which is an informal group coordinated by the Conservation Planning and Research Department (CPR), Environment and Sustainable Development Directorate, ACT Government. This group includes consultants, ACT and NSW Government officials, and academic researchers.

CPR collates GSM monitoring data annually from ongoing and single GSM monitoring programmes throughout the ACT and adjacent NSW regions. Collectively, the information on GSM distribution, abundance and activity can be correlated with broad-scale climatic (e.g. rainfall, temperature) and ecological (e.g. predation, weed invasion, fire) influences to provide a qualitative measure of GSM activity from year to year.

Interpreting this general biological information with the statistical analysis proposed would limit potential external confounding influences and isolate the potential impacts of equestrian activities at the YEP.

### **4.3 Data Collection**

#### **4.3.1 Vegetation and golden sun moth habitat assessment**

The previous vegetation and GSM habitat areas of Rowell (2013), and Nash and Hogg (2013) have been revised after a qualitative field assessment during the spring / early summer of Year 0, i.e. 2013. This assessment is to be repeated each year by a suitably qualified professional.

The assessment is to confirm and revise the extent, measured in hectares, of the following vegetation communities and habitat areas to provide a quantitative comparison of spatial extent from year to year:

- native pasture,

- natural temperate grassland,
- Chilean needle grass; and
- GSM habitat.

Revised vegetation and GSM habitat maps are to be produced.

#### **4.3.2 Year 0 Vegetation and golden sun moth habitat assessment results**

Table 2 presents a summary of grassland and pasture areas in the project area compiled from the 2012-2013 season survey data of Rowell (2013), and Nash and Hogg (2013), and from the Year 0 vegetation assessment, undertaken on 14/11/2014 as part of this monitoring plan. This vegetation assessment comprised a more comprehensive coverage and detailed vegetation assessment of the YEP than was conducted previously. Figure 2 shows vegetation types and extent across the YEP.

**Table 2. Natural temperate grassland, and native and exotic pasture areas.**

<b>Vegetation type / land use</b>	<b>2012 (ha)</b>	<b>2013 (ha)</b>
Natural temperate grassland	0.5	0.5
Native pasture	-	1.7
Mixed native and exotic pasture	-	5.0
Exotic pasture	-	5.4
Chilean needle grass	0.5	1.2
(Construction area)	-	0.8
(Non-grassland areas (e.g. buildings, riparian margins, woodland))	-	8.0
<b>Total Provisional Project Area (approximate)</b>		<b>22.6</b>

Table 3 presents a summary of GSM habitat in the project area compiled from the 2012-2013 season survey data of Rowell (2013), and Nash and Hogg (2013), and from the Year 0 habitat assessment, undertaken as part of this monitoring plan. This habitat assessment comprised a more comprehensive coverage and detailed habitat assessment of the YEP than was conducted previously. Results indicate that the YEP supports more extensive GSM habitat than formerly thought, but that the habitat quality is relatively low. Figure 3 shows the quality and extent of potential GSM habitat across the YEP.

**Table 3. Golden sun moth habitat.**

<b>GSM habitat area</b>	<b>2012* (ha)</b>	<b>2013 (ha)</b>
Low quality	3.4	4.8
Low quality habitat dominated by Chilean needle grass	-	0.6
Moderate quality	1.1	2.2
High quality	0.0	0.0
<b>Total</b>	<b>4.5</b>	<b>7.6</b>

\* Compiled from Rowell (2013), and Nash and Hogg 2013.

A more comprehensive discussion of the Year 0 vegetation and habitat assessment shall be provided in the Year 0 monitoring report (Robert Jessop Pty Ltd *In prep*).

#### **4.3.3 Native pasture and natural temperate grassland monitoring**

The quality of native pasture and at least 0.5 ha of NTG (refer Approval Condition 1(c)), in the YEP is to be monitored annually. A detailed native pasture and NTG

assessment is to be undertaken during the GSM monitoring period, ideally in early to mid-November.

A modified version of Rehwinkel (2007) is to be used to determine relative floristic value scores for native pasture and NTG. Native species cover abundance is to be measured in 12\*4 m<sup>2</sup> quadrats placed generally in native vegetation patches, as determined by the Year 0 vegetation survey (Sections 4.3.1, 4.3.2). Twelve survey points would provide adequate habitat and spatial coverage across the site. Coordinates for each quadrat would permit approximate relocation and measurement for subsequent annual surveys\*.

In the absence of specific Commonwealth offset assessment guidelines for assessing changes in NTG quality, NTG patches shall also be qualitatively assessed using the NTG quality scale of Nash and Hogg (2013, Appendix E). Nash and Hogg's (2013) criteria for the quality scale are based on criteria used for identifying NTG, as set out in the Commonwealth listing advice for natural temperate grassland (Australian Government 2011) and the NTG National Recovery Plan (Environment ACT 2005).

Repeated comparisons on an annual basis are to be used to determine trends in native pasture and NTG quality changes over time.

Appendix B presents a step-wise survey procedure and Appendix C presents a sample vegetation survey data recording sheet.

#### **4.3.4 *Flying golden sun moth numbers***

Annual flying GSM surveys shall be conducted in a manner consistent with the draft monitoring guidelines (Rowell 2013) and survey guidelines (ACT Government 2010).

Flying GSM are to be counted using two methods, as follows:

- rotational point counts in the same locations as the 12 native pasture and NTG monitoring quadrats (Section 4.3.3, Figure 4); and
- counts along a specified traverse route through potential GSM habitat areas (Sections 4.3.1, 4.3.2, Figure 4).

Rotational point counts comprise 10 repeated rotational counts conducted 30 seconds apart, as specified by the survey guidelines (ACT Government 2010). GSM numbers are averaged at each site to provide a semi-quantitative comparison of flying moth activity at each point from year to year.

Traverse surveys involves recording numbers of flying GSM, GPS locations and representative site vegetation for all GSM observed during the traverse. To permit a semi-quantitative comparison of flying moth activity between surveys, the cumulative counts of GSM observed during the traverse would be represented as the number of moths observed per minute (Hogg 2010).

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\* Permanently marking quadrats may cause injury to horses and riders, and is inappropriate.

Female moths and opportunistic moth sightings are to be recorded separately for general distribution information.

Appendix F presents a step-wise survey procedure and Appendix G presents a sample flying GSM data recording sheet.

GSM flying surveys are to be undertaken on three occasions (weather permitting) throughout the GSM flying period to accommodate the variability of GSM activity on a given day and during their flying period. Surveys are to be staggered by at least a week if practicable to accommodate the limited and variable timing of adult emergence. In practice, suitable daily weather conditions would drive repeat survey timings and shorter survey return times of no less than 3 days may be applied.

On-site weather data shall be recorded during all field surveys. The following data shall be recorded:

- cloud cover (qualitative assessment);
- wind speed and direction; and
- air temperature.

Although survey guidelines state that the GSM flying season in the ACT is usually October to December, the start of the season varies year to year subject to weather conditions. GSM reliably commence flying around mid-November. Advice from the ACT GSM monitoring network would be sought to confirm the start of the flying season.

#### **4.3.5 GSM habitat monitoring**

NTG, native pasture and areas of Chilean needle grass comprise potential GSM habitat.

Monitoring of the floristic quality of areas of native pasture, NTG and Chilean needle grass as habitat for GSM would be captured with the native pasture and NTG monitoring previously described in Section 4.3.3. In the absence of specific Commonwealth offset assessment guidelines for changes in GSM habitat quality, a qualitative GSM habitat assessment in each of the 12 native pasture and NTG monitoring quadrats would also be undertaken using the GSM habitat quality scoring system of Hogg (2012) to determine habitat quality changes.

Repeated comparisons on an annual basis would be used to determine trends in GSM habitat quality changes over time.

GSM habitat monitoring would be undertaken on one occasion during each annual GSM monitoring period, ideally in early to mid-November each year.

#### **4.3.6 Year 0 Quadrat and Traverse Establishment**

The 12\*m m<sup>2</sup> monitoring quadrats for the native grassland and GSM habitat monitoring, and the traverse for the site-wide flying moth counts were established on 10/12/2014. Figure 4 shows the quadrat locations and the traverse route.



### **4.3.7 Meteorological data**

Daily meteorological data (e.g. rainfall and air temperature) for the previous 12 months, recorded at the closest comprehensive meteorological station, i.e. Canberra Airport, would be obtained from the Bureau of Meteorology after each GSM flying season, to calibrate on-site weather records and to assist with interpreting monitoring results on a year to year basis.

### **4.3.8 Regional golden sun moth information**

Regional GSM information would be obtained from the ACT GSM monitoring network, to assist with interpreting monitoring results on a year to year basis.

## **4.4 Statistical Analysis**

### **4.4.1 Vegetation and habitat extent**

Annual spatial measurements of vegetation communities and GSM habitat would be presented graphically.

### **4.4.2 Vegetation condition and GSM habitat condition**

Trends in floristic values derived for native pasture and NTG in each quadrat would be statistically analysed using the Coefficient of Determination ( $R^2$ ) and presented graphically.

Trends in the ranking score derived from the NTG quality scale assessment of Nash and Hogg (2013, Appendix E) would be represented graphically.

Trends in the ranking score derived from the GSM habitat quality scale assessment of Hogg (2012, Appendix H) would be represented graphically.

### **4.4.3 Golden sun moth numbers**

Trends in GSM numbers for each rotational point count site and the aggregate of all 12 sites would be statistically analysed using the Coefficient of Determination ( $R^2$ ) and presented graphically.

Trends in the rate of GSM detection along the traverse would also be analysed using the Coefficient of Determination ( $R^2$ ) and presented graphically.

## **4.5 Trend Interpretation**

Trends identified in native pasture and NTG quality, GSM habitat quality and GSM numbers would be interpreted using Bureau of Meteorology data and GSM information from the Canberra GSM monitoring network.

## **4.6 Reporting**

An annual monitoring report would be prepared by February each year meeting the *EPBC Act* approval requirements by:

- providing and assessing the monitoring data for the previous twelve months against the previous monitoring results;
- concluding whether or not there has been a lack of increase or a decline in GSM population numbers in the YEP due to equestrian activities, taking into account regional population trends and local ecological conditions; and

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- concluding whether or not there has been no improvement or a decline in GSM habitat and NTG quality and extent in the YEP due to equestrian activities, taking into account local ecological conditions.

This OMP would be made available on the ACT Government's website within 12 months of implementation.

Annual monitoring reports would also be made available on the ACT Government's website around March following monitoring activities in November-December of the preceding year.



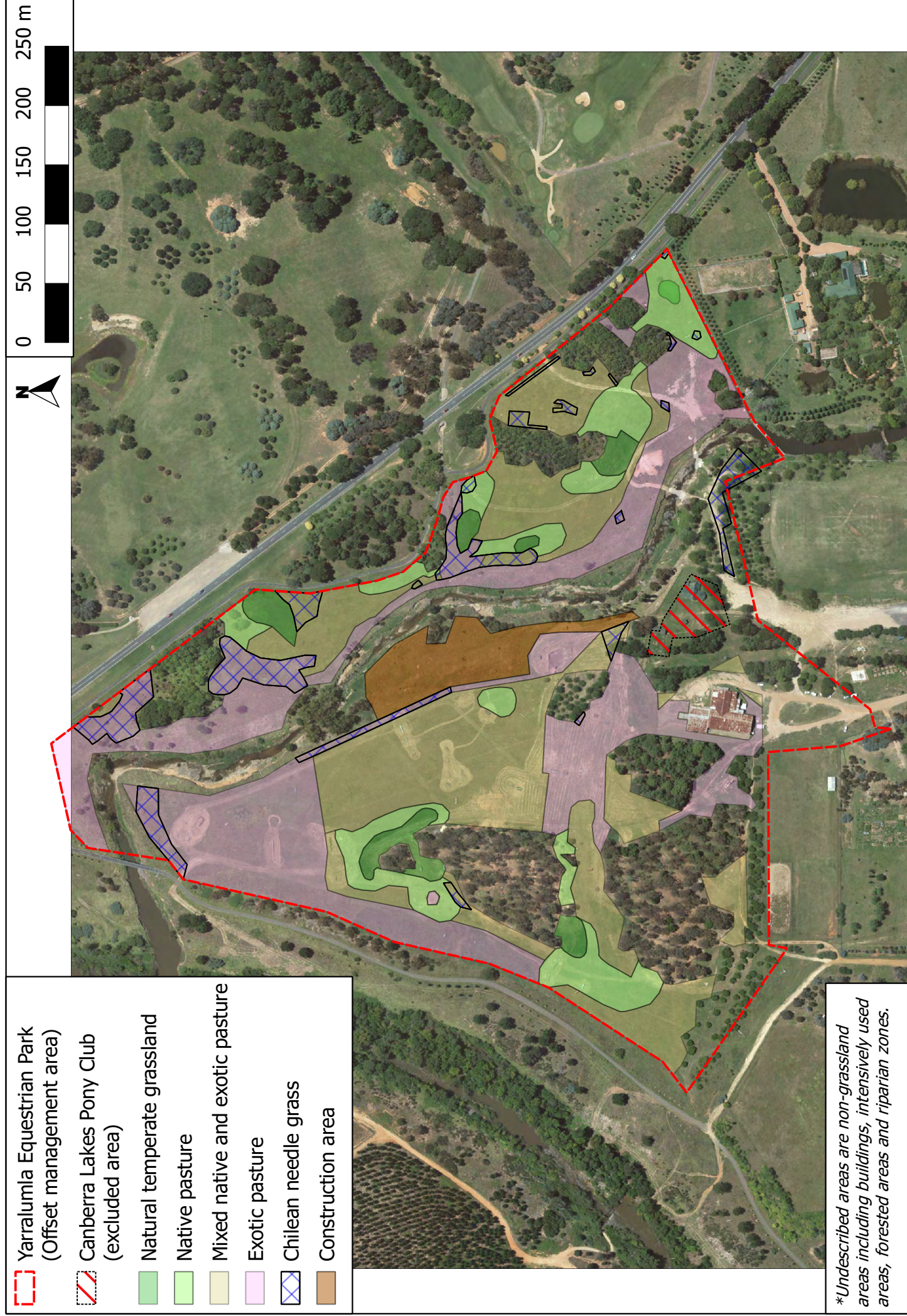


Figure 3. Vegetation types in Yarralumla Equestrian Park.



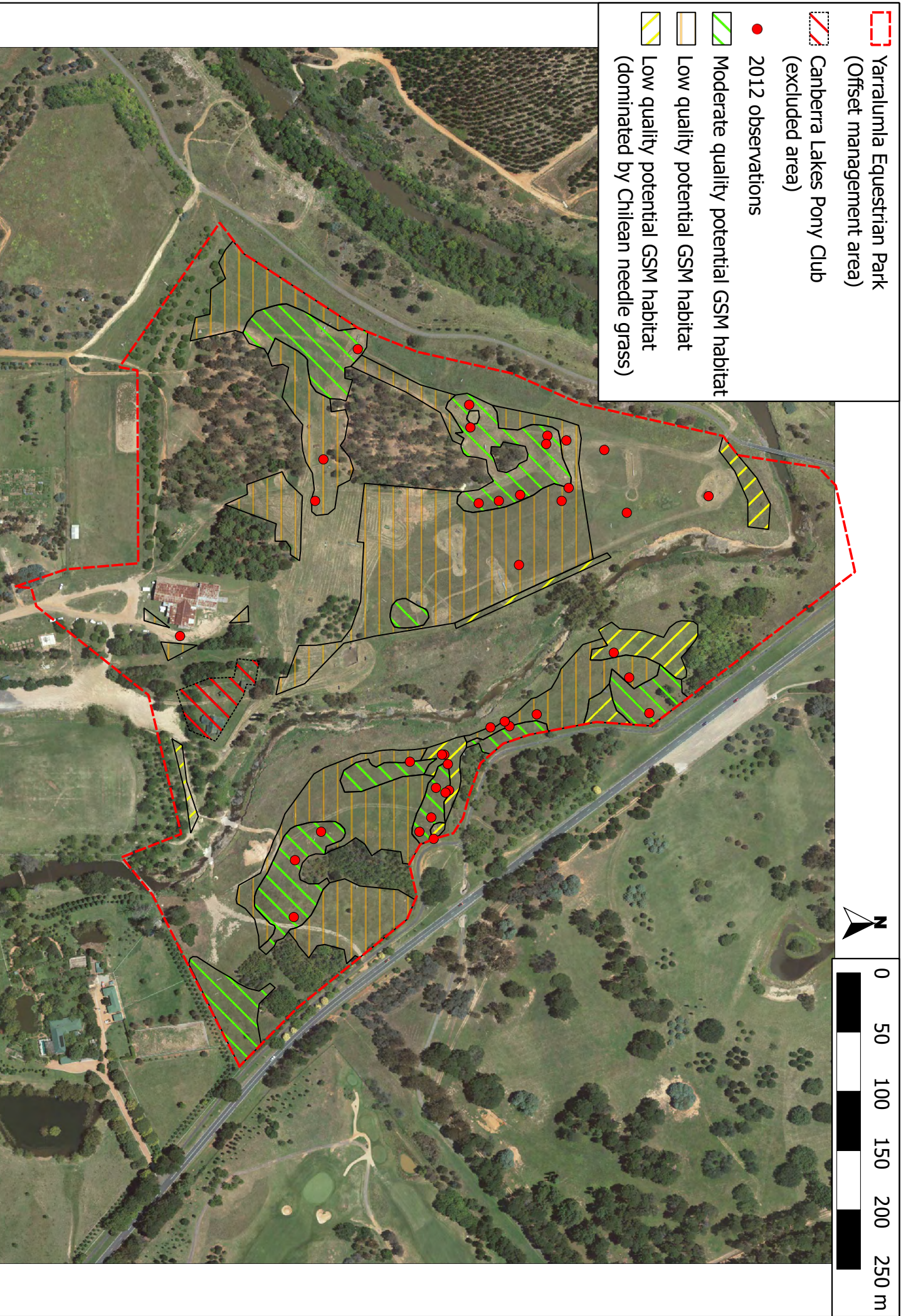


Figure 4. Potential golden sun moth habitat in Yarralumla Equestrian Park.



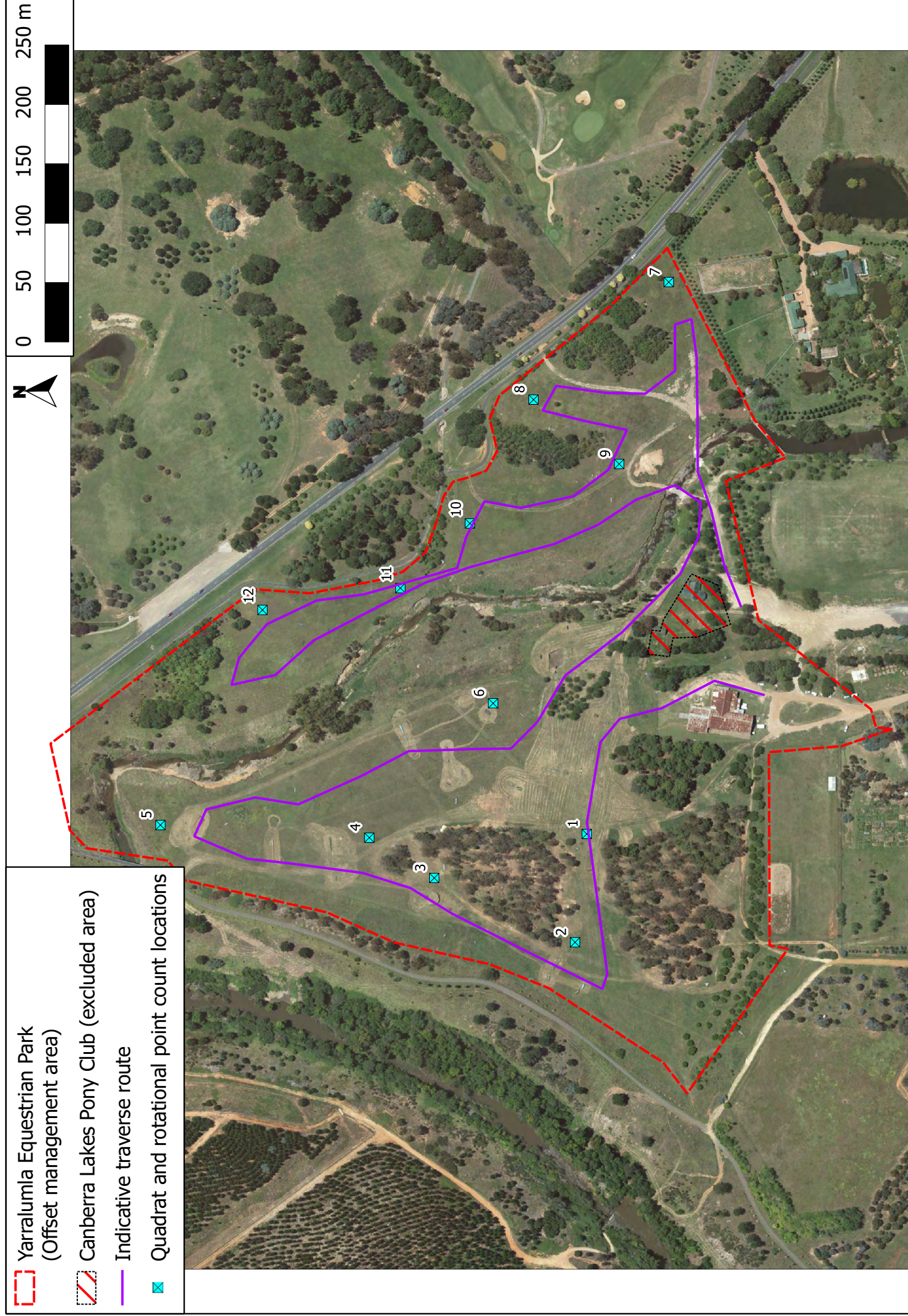


Figure 5. Annual golden sun moth and natural temperate grassland monitoring plan.



## 5 YARRALUMLA EQUESTRIAN PARK MANAGEMENT

### 5.1 Ongoing Management Actions

Ongoing management actions comprise the various day to day management activities undertaken at the YEP, which are coordinated by the ACT Government and implemented by Sport and Recreation Services and equestrian user groups. The management actions are designed to permit equestrian activities to continue and develop in parallel with GSM and NTG conservation. Ongoing management actions may be revised following the outcome of the annual GSM and NTG monitoring undertaken as part of this OMP (Section 5.2).

Table 4 details the ongoing management actions for the sustainable management of GSM, GSM habitat and NTG in the YEP in accordance with the Approval and in association with ongoing equestrian activities.

### 5.2 Active Management Response

Ongoing management actions may need to be revised and an active management response undertaken following a negative outcome from the annual GSM and NTG monitoring program.

#### 5.2.1 Impact Response Thresholds

The key thresholds of potential concern that would trigger ACT Government consultation with the Commonwealth and potentially an active management response would be the detection of:

- *'no increase or a decline in spatial extent of NTG and/or GSM habitat over at least three consecutive seasons, that cannot be attributed to biological influences and seasonal conditions.'*
- *'a statistically significant lack of increase or a decline in native grassland and NTG floristic values over at least three consecutive seasons that cannot be attributed to biological influences and seasonal conditions.'*
- *'no increase or a decline in NTG ranking scores and GSM habitat ranking scores over at least consecutive three seasons that cannot be attributed to biological influences and seasonal conditions.'*
- *'a statistically significant lack of increase or a decline in flying moth numbers over at least three consecutive seasons that cannot be attributed to biological influences and seasonal conditions.'*

Biological and seasonal conditions must be considered in association with a statistically significant decline, because statistical results alone do not fully address the mechanism of the decline. Potential biological and seasonal factors, such as land management changes; exotic weed invasion; unseasonable climate, excessive predation and fire, may influence GSM activity and NTG growth in the YEP in addition to equestrian activities.

Whether or not a management response is warranted would be determined, in consultation with the Commonwealth, on the basis of the magnitude of the statistically significant relative change and interpretation of contextual biological information including meteorological data and regional moth activity.



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The ACT Government would determine whether or not a management response is warranted, in consultation with the Commonwealth, on the basis of the magnitude of the relative change and interpretation of contextual information including meteorological data and regional GSM activity.

A management response may involve a review of ongoing management actions (Section 5.1), consideration of an alternative offset or a course of action not yet described.

### **5.3 *Additional Offset Management Plan***

If, after five years or anytime thereafter, ongoing management actions and any subsequent changes to such actions fail to conserve, manage and improve habitat in the YEP, as demonstrated through the annual monitoring program, DoE may determine that an Additional Offset Management Plan (AOS) be prepared in accordance with Condition 3 of the Approval.

Table 4: Ongoing management actions.

Activity	Description	Responsibility	Timeframe
<b>Offset Management Plan Preparation</b>	This document. Prepare an offset management plan to meet the specific requirements of the <i>EPBC Act</i> approval decision (EPBC 2012/2692) that is designed to capture appropriate data to enable detection of any negative trends in GSM numbers and, condition and extent of GSM habitat; and condition and extent of NTG arising from YEP management and recreational activities.	LDA to engage a suitably qualified consultant	Spring 2013 ( <i>in progress</i> )
<b>Site Monitoring</b> <ul style="list-style-type: none"> <li>Vegetation survey</li> </ul>	Undertake a vegetation survey of the project area, as specified in the offset management plan to more accurately identify and map the extent and quality of the native pasture, natural temperate grassland and golden sun moth habitat.  The survey should be undertaken at a time that minimises conflict with YEP use, e.g. during work hours on week days. Surveyors should check with ACTEA for YEP use prior to surveying.	LDA to engage a suitably qualified consultant	Spring 2013 ( <i>completed</i> )
<b>Site Monitoring</b> <ul style="list-style-type: none"> <li>Golden sun moth numbers</li> <li>Golden sun moth habitat condition and extent</li> <li>Native pasture and Natural Temperate Grassland condition and extent</li> </ul>	Undertake targeted monitoring of golden sun moth and Natural Temperate Grassland, as specified in the offset management plan, to assess golden sun moth numbers, and the condition and extent of vegetation.  Monitoring should be undertaken at a time that minimises conflict with YEP use, e.g. during work hours on week days. Surveyors should check with ACTEA for YEP use prior to monitoring.	LDA to engage a suitably qualified consultant	2013 Spring / summer GSM flying season ( <i>completed</i> )
<b>Mowing</b>	Sport and Recreation Services to mow annually with a slasher mower during April / May and October / November each year, and for fire reduction on an as-needed basis depending on seasonal weather and grass growth.  The ACTEA to continue competition-specific mowing.  The October / November mow shall take place as early as possible and preferably not in November or December to avoid the GSM flight season; however the ACT Government shall liaise annually with the ACTEA and Sport and Recreation Services	Sport and Recreation Services  ACTEA	Annually during April / May and October / November

Activity	Description	Responsibility	Timeframe
	to determine the most appropriate mowing date subject to seasonal weather and the equestrian timetable.		
<b>Weed Control</b>	<p>ACTEA members to continue weed control practises provided they comply with ACT Government legislation regarding chemical (e.g. herbicide) handling and storage, and weed control proficiencies and practices.</p> <p>ACTEA members to continue weed control in accordance with the weed control calendar (Appendix J). The calendar lists suitable weed control periods for most problem weeds in the YEP that avoid the GSM flying period of October – December.</p> <p>The ACTEA to liaise with the ACT Government for additional weed control in response to, e.g. ongoing weed invasion from the Cotter Plots, weed invasion from seeds in stable waste, weed spread from already established weed populations.</p> <p>Chilean needle grass and African lovegrass control, especially in areas of NTG, is an essential management action to prevent the further degradation of native pasture and NTG, and GSM habitat. Sport and Recreation to undertake Chilean needle grass and African lovegrass spot control in areas of NTG.</p>	<p>ACTEA</p> <p>ACT Government to co-ordinate with Sport and Recreation Services</p>	Ongoing
<b>Tree and Shrub Removal</b>	<p>All regenerating trees and shrubs in native pasture and NTG areas, i.e. GSM habitat areas, as identified on the latest GSM habitat maps, are recommended to be removed.</p> <p>No tree planting is to occur in or within 20 m of GSM habitat or NTG.</p>	<p>ACT Government to co-ordinate with Sport and Recreation Services</p>	Ongoing (undertaken as part of weed control)
<b>Soil Cultivation</b>	<p>Soil cultivation, e.g. ploughing, rotovating, spike and core aeration in exotic pasture areas, as defined on the latest vegetation map, is permitted without consultation.</p> <p>Soil cultivation, e.g. ploughing, rotovating, spike and core aeration in native pasture or NTG areas, as defined on the latest vegetation map, requires consultation with the ACT Government and may require a site inspection by a suitable qualified environmental professional.</p>	<p>ACTEA in consultation with ACT Government</p>	Ongoing

Activity	Description	Responsibility	Timeframe
<b>Management of Stable Waste and Sand</b>	<p>Stable waste may be spread around jumps and along cross-country galloping routes<sup>1</sup> in exotic pasture, mixed pasture and native pasture areas, as defined on the latest vegetation map<sup>2</sup>, without consultation.</p> <p>Stable waste can be spread around jumps and along cross-country galloping routes without consultation.</p> <p>Stable waste is not to be spread in NTG areas except on cross-country galloping routes and only at depths of 1-10 cm with an average depth of 5 cm and a maximum width of 3 m.</p> <p>Sand may be spread on cross-country galloping routes through native pasture and NTG areas at depths of 1-10 cm with an average depth of 5 cm and a maximum width of 3 m.</p> <p>Sand may be spread over areas of now more than 12 m<sup>2</sup> on either side of a horse jump at depths of 1-10 cm with an average depth of 5 cm.</p> <p>Sand may be spread on the two concrete crossings over Yarralumla Creek as required for horse and rider safety.</p> <p>Sand may be spread on 'slippery' areas, as an emergency measure during organised equestrian competitions.</p> <p>Additional spreading of sand and stable waste is not to be undertaken without consultation with the ACT Government.</p>	ACTEA	Ongoing
<b>Grazing</b>	Grazing does not take place in the project area and is not to occur in the future.	ACT Government	Permanent
<b>Burning</b>	Burning is not to be used as a vegetation management tool.	ACT Government	Permanent
<b>Vehicle Movement</b>	Vehicles, including jump judge vehicles are to kept out of NTG areas, as defined on the latest vegetation map, at all times, except:	ACTEA	Ongoing
	<ul style="list-style-type: none"> <li>during jump maintenance / construction, in which event vehicle movement must be minimised to that absolutely necessary; and</li> </ul>		

<sup>1</sup> Cross-country galloping routes are those routes used for organised competitions.

<sup>2</sup> The test vegetation map shall be published on the ACT Government website.

Activity	Description	Responsibility	Timeframe
	<ul style="list-style-type: none"> <li>where it is not possible to avoid crossing NTG areas, in which event vehicles must do so using the shortest route.</li> </ul> <p>Jump maintenance / construction should be undertaken outside of the GSM flying season whenever possible.</p>		
<b>Establishment of new jumps, infrastructure</b>	<p>New jumps and infrastructure in exotic pasture areas, as defined on the latest vegetation map, are permitted without consultation.</p> <p>New jumps and infrastructure in mixed pasture and native pasture areas, as defined on the latest vegetation map, which require minimal soil disturbance of no more than 3 m<sup>2</sup>, i.e. the equivalent of several post-holes, are permitted without consultation. Features with a construction or built disturbance area exceeding 3 m<sup>2</sup>, e.g. platform jumps, require consultation with the ACT Government and may require a site inspection by a suitable qualified environmental professional.</p> <p>All new jumps, infrastructure and disturbance in natural temperate grassland areas, as defined on the latest vegetation map, require consultation with the ACT Government and may require a site inspection by a suitable qualified environmental professional.</p>	ACT Government in consultation with a suitably qualified environmental professional.	As needed
<b>New Track Formation</b>	<p>New formed tracks, e.g. fire trails, access tracks, gravel tracks and footpaths, require consultation with the ACT Government before development and may require a site inspection by a suitable qualified environmental professional.</p> <p>This description does not apply to cross-country horse riding courses that develop during competition or general use.</p>	ACT Government	Ongoing
<b>Interpretive Signage</b>	<p>GSM interpretive signage (e.g. Appendix I) is to be erected in suitable locations around the YEP. Three signs are proposed. These would be located at the YEP entrance off Cotter Road, at the Woolshed carpark and at the YEP entrance opposite the Molonglo River crossing.</p>	ACT Government in association with ACTEA	2014
<b>Document Display</b>	<p>The Offset Management Plan is to be available on the ACT Government website.</p> <p>Monitoring reports and revised vegetation and GSM habitat maps are to be available on the ACT Government website (refer Section 4.6).</p>	ACT Government	Ongoing

## 6 MONITORING SCHEDULE AND DURATION

Table 5 presents an indicative OMP implementation schedule.

Monitoring shall be undertaken for 5 years or until the key thresholds of potential concern (Section 4.6) have not been triggered for three consecutive years, due to:

- GSM numbers increasing;
- GSM habitat areas increasing;
- GSM habitat quality improving;
- NTG areas increasing; and
- NTG quality improving.

With reference to Approval conditions 1(g) and 3, after 5 years of monitoring, the ACT Government shall review the offset management programme performance in consultation with the Commonwealth and the ACTEA to determine whether ongoing monitoring is necessary and, if so, whether changes to the OMP are required.

## 7 ROLES AND RESPONSIBILITIES

### 7.1 Administration

The Land Development Agency, on behalf of the ACT Government shall be responsible for the OMP preparation and approval process.

The ACT Government shall be responsible for administering and implementing the OMP, and managing the YEP offset area.

Sport and Recreation Services, ACT Government shall continue to undertake annual mowing and weed control works in consultation with the ACTEA and in accordance where practical with the OMP.

### 7.2 Funding

The ACT Government shall provide funding for the following tasks:

- OMP administration and implementation;
- YEP offset area management;
- signage; and
- (Annual mowing in parallel with this OMP).

Table 6 provides a schedule of anticipated direct costs associated with management of the YEP offset area.



Table 5. Indicative monitoring schedule.

Year	Monitoring and Reporting*	Task	Date	Responsibility	Analysis	Comment
2013	Initiate monitoring program	<ul style="list-style-type: none"> <li>Undertake baseline vegetation assessment</li> <li>Establish monitoring quadrats and traverse route</li> </ul>	Nov-Dec (approximate)	ACT Government	N/A	The baseline vegetation assessment was undertaken on 14/11/2014 and is summarised in Section 4.3.2. The traverse route and quadrats were established on 10/12/2014 and are shown in Figure 4.
	Year 1 monitoring	<ul style="list-style-type: none"> <li>Flying moth count</li> <li>Vegetation monitoring</li> </ul>	Nov-Dec (approximate)	ACT Government	No analysis	First year monitoring data collected.
	Reporting year 1	<ul style="list-style-type: none"> <li>Monitoring</li> </ul>	February (2014)	ACT Government		Reporting of baseline vegetation assessment and year 1 data collection only.
2014	Year 2 monitoring	<ul style="list-style-type: none"> <li>Flying moth count</li> <li>Vegetation monitoring</li> </ul>	Nov-Dec (approximate)	ACT Government	Compare with Year 1 data, analyse with coefficient of determination and present graphically.	Two years of comparable data collected.
	Reporting year 2	<ul style="list-style-type: none"> <li>Monitoring</li> <li>(Compliance)</li> </ul>	February (2015) March (2015)	ACT Government		Reporting of statistical analysis following two years of comparable data. Compliance report to include OMP performance. Report posted on ACT Government website.
2015 - 2017	Years 3-5 monitoring	<ul style="list-style-type: none"> <li>Flying moth count</li> <li>Vegetation monitoring</li> </ul>	Nov-Dec (approximate)	ACT Government	Compare with previous year's data, analyse with coefficient of determination and present graphically.	Multiple years of comparable data collected.

Year	Monitoring and Reporting*	Task	Date	Responsibility	Analysis	Comment
	Reporting years 3-5	<ul style="list-style-type: none"> <li>Monitoring (Compliance)</li> </ul>	February (201X) March (201X)	ACT Government		Reporting of statistical analysis following multiple years of comparable data. Compliance report to include OMP performance. Report posted on ACT Government website.
2017 – 20++	Monitoring ceases or continues as above.					Monitoring and reporting requirements may cease if the Commonwealth agrees that, after a 5 year period, the offset area has become self-sufficient (refer Conditions 1(g) and 3).

Table 6. Offset area management anticipated cost schedule.

Schedule	Task	Costs
Setup Costs	OMP establishment and implementation <ul style="list-style-type: none"> <li>Prepare OMP</li> <li>Revise baseline conditions</li> <li>Establish monitoring sites</li> <li>Undertake stakeholder consultation</li> </ul>	\$20,000
	Signage	\$10,000
Annual Costs	Annual monitoring and reporting (5 years @ \$10,000 / y)	\$50,000
<b>Total Anticipated YEP Offset Costs</b>		<b>\$80,000</b>

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## **8 RECOMMENDATIONS**

### **8.1 Education and Training**

Education and training for YEP users and managers is recommended through the provision of information as follows:

- The ACTEA to provide a link from the ACTEA / Equestrian Park page of its website to the appropriate ACT Government website.
- The ACT Government to provide the ACTEA with reference GSM and management information, e.g. maps, weed species identification sheets, to be placed on the ACTEA / Equestrian Park website and / or in its document *Guidelines for the Use of Equestrian Park and Cotter Plots, Yarralumla*, available on line at: <http://www.actea.asn.au/equestrianpark.html>.

### **8.2 Weed Control**

Controlling Chilean needle grass and, to a lesser extent, African lovegrass in areas of natural temperate grassland is an essential management action to prevent Chilean needle grass spreading and the further degradation of the natural temperate grassland and GSM habitat.

- The ACT Government, in association with Sport and Recreation, undertake spot spraying of Chilean needle grass and African lovegrass within natural temperate grassland areas.
- The ACT Government, in association with the ACTEA, and Sport and Recreation, prepare a strategy with the objective to minimise the spread and ultimately eradicate Chilean needle grass and African lovegrass from the YEP.
- The ACTEA to consult with the ACT Government and Sport and Recreation as to ongoing weed control needs.

### **8.3 Fire Management**

Bush and grassland fires, especially from the west, pose a potential threat to the YEP cross country area. Almost all of the 150-160 horse jumps are made of timber and could be damaged during a fire event. While the area is subject to bushfire hazard reduction activities (i.e. slashing twice a year), as outlined in the ACT Bushfire Operations Plan (2013b), consideration should be given to the development of a site-specific YEP fire management plan.

- ACT Government to conduct a fire risk assessment including a review of fire management practices employed at YEP to assess the extent that current practices provide suitable fire risk reduction and adequately protect:
  - people using the facility, especially during competitions;
  - YEP infrastructure; and
  - environmental values (e.g. GSM and NTG).

### **8.4 Stockpile and Log Removal**

Mulch, manure and log stockpiles are present along the eastern margin of the woodland on the top of the hill in the western third of the project area. These piles cover or are very close to GSM habitat. Activities in relation to these piles, e.g.

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tractors delivering or removing material, have the potential to further disturb GSM habitat.

- The ACT Government, in consultation with the ACTEA, consider relocating the stockpiles to a less sensitive area and rehabilitating the vegetation with native grasses.

## 9 ACTEA AND EPMG USER CLUBS

- **ACT Equestrian Association**
  - PO Box 4, Curtin ACT 2605
  - [www.actea.asn.au](http://www.actea.asn.au)
  - [info@actea.asn.au](mailto:info@actea.asn.au)
- **ACT Dressage Association**
  - PO Box 989, Dickson, ACT 2602
  - <http://www.actdressage.equestrian.org.au/>
- **ACT Endurance Riders Association**
  - PO Box 3009, Weston Creek, ACT 2611
  - <http://www.actera.org.au/>
- **ACT Showjumping Club**
  - PO Box 388, Curtin, ACT 2605
  - <http://actsjc.snappages.com/>
- **Canberra Lakes Pony Club**
  - PO Box 518, Curtin, ACT 2605
  - <http://www.canberrallakes.pcansw.org.au/>
  - [canberrallakes@gmail.com](mailto:canberrallakes@gmail.com)
- **National Capital Horse Trials Association**
  - Equestrian Park, Cotter Road, Weston Creek, ACT 2600
  - <http://nchta.wordpress.com/>
- **Tuggeranong Adult Riding Club**
  - PO Box 5045, Chisholm, ACT 2905
  - <http://www.tuggeranongarc.equestrian.org.au/>
  - [tarcnews@hotmail.com](mailto:tarcnews@hotmail.com)

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<http://www.environment.gov.au/biodiversity/threatened/communities/natural-temperate-grasslands.html>
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## **APPENDICES**

<b>APPENDIX A:</b>	<b>EPBC 2012 / 2692 APPROVAL CONDITIONS</b>
<b>APPENDIX B:</b>	<b>SURVEY PROCEDURES – NATIVE PASTURE AND NATURAL TEMPERATE GRASSLAND</b>
<b>APPENDIX C:</b>	<b>SURVEY DATA SHEET – NATIVE PASTURE AND NATURAL TEMPERATE GRASSLAND</b>
<b>APPENDIX D:</b>	<b>NATIVE PASTURE AND NATURAL TEMPERATE GRASSLAND SPECIES TYPE CODES</b>
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<b>APPENDIX H:</b>	<b>GOLDEN SUN MOTH HABITAT QUALITY SCORE SCALE</b>
<b>APPENDIX I:</b>	<b>GOLDEN SUN MOTH INDICATIVE INTERPRETIVE SIGN AND TEXT</b>
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**APPENDIX A:      EPBC 2012/2692 APPROVAL CONDITIONS**



Australian Government

Department of Sustainability, Environment, Water, Population and Communities

## Approval

### Mixed use development within Campbell Section 5, ACT (EPBC 2012/6292)

This decision is made under sections 130(1) and 133 of the *Environment Protection and Biodiversity Conservation Act 1999*.

#### Proposed action

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**person to whom the approval is granted** Land Development Agency

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**proponent's ACN (if applicable)** ABN: 20 419 925 679

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**proposed action** The proposed action involves the construction of a mixed-use development comprising commercial, residential and public use areas within Campbell Section 5, Constitution Avenue, ACT [See EPBC Act referral 2012/6292].

## Approval

Controlling Provision	Decision
National Heritage places (sections 15B & 15C)	Approved
Listed threatened species and communities (sections 18 & 18A)	Approved
Commonwealth land (sections 26 & 27A)	Approved

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#### conditions of approval

This approval is subject to the conditions specified below.

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#### expiry date of approval

This approval has effect until May 2043.

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## Decision-maker

**name and position** James Tregurtha  
Assistant Secretary  
South Eastern Australia Environment Assessment Branch

**signature**



**date of decision** 13 May 2013

## Conditions attached to the approval

1. To compensate for residual impacts from the action to the **golden sun moth** and **natural temperate grassland**, the person taking the action must develop an Offset Management Plan (OMP) to conserve, manage and improve habitat within the **Yarralumla Equestrian Park offset area**. The OMP must include:
  - a) map(s) and **shapefiles** that clearly defines the location and boundaries of the **Yarralumla Equestrian Park offset area** including offset attributes;
  - b) details of the quality of habitat on site (supported by maps), including the results of baseline surveys undertaken by a **suitably qualified expert** at an optimal ecological time to demonstrate the extent of **golden sun moth habitat** and **natural temperate grassland** habitat within the **Yarralumla Equestrian Park offset area**;
  - c) measures to manage and improve no less than 4.6 hectares (ha) of habitat within the **Yarralumla Equestrian Park offset area** for the better protection of the **golden sun moth** and **natural temperate grassland** including, details of: the duration, timing, level of effort, methodology, and the person(s) responsible for undertaking the management actions. Management actions must include (but need not be limited to):
    - i. mowing and biomass control;
    - ii. weed management;
    - iii. waste management (including both general rubbish and waste associated with the operation of surrounding areas as an equestrian park, for example horse manure); and
    - iv. measures to avoid or minimise the risk of soil compaction.

For the avoidance of doubt the **Yarralumla Equestrian Park offset area** must include no less than 4.6 ha of habitat suitable for the **golden sun moth** and no less than 0.5 ha of **natural temperate grasslands**.

- d) a commitment that management actions will continue to be implemented until such time that monitoring indicates the **Yarralumla Equestrian Park offset area** has become **self-sufficient** for the **values** which it is intended to protect;
- e) measures that prevent the **Yarralumla Equestrian Park offset area** from being subject to uses that are incompatible with the conservation of the area as habitat for the **golden sun moth** and **natural temperate grassland** (including the provision of signage which provides information on the **Yarralumla Equestrian Park offset area** and why it is being managed);
- f) details of an appropriate monitoring program to be undertaken by a **suitably qualified expert**, including aims, methodology reporting, and benchmarks for success, to determine whether the **golden sun moth** and **natural temperate grassland** values at the **Yarralumla Equestrian Park offset area** are improved. The monitoring must address (but need not be limited to):
  - i. numbers of **golden sun moth**; and
  - ii. extent and quality of habitat for both the **golden sun moth** and **natural temperate grassland**.
- g) a commitment that monitoring will continue to be undertaken until such time as the person taking the action can provide demonstrable evidence that the offset area has become **self-sufficient**;
- h) provisions for making the results of any monitoring programs available on the person taking the action's website, within 12 months of implementation, and then annually until the **Minister** agrees in writing that monitoring can cease;
- i) details of contingency measures should the monitoring required by condition 1) f) determine that the **golden sun moth** and **natural temperate grassland** values have either degraded, or not improved at the **Yarralumla Equestrian offset area**;
- j) details of administration and funding arrangements with the relevant parties who will be responsible for managing the **Yarralumla Equestrian offset area**; and
- k) a schedule of anticipated costs associated with the management of the **Yarralumla Equestrian Park offset area**.

The OMP must be submitted to the **Minister** for approval at least three months prior to the sale of any **individual blocks** or within 12 months of the date of this approval, whichever is sooner. The OMP must be implemented from the date of its approval.

2. Until such time as the OMP is approved, the person taking the action must undertake interim measures for managing the **Yarralumla Equestrian offset area** for the better protection of the **golden sun moth**, including (but not necessarily limited to): mowing and biomass control, weed management, removal of waste and litter, and measures to avoid/minimise the risk of soil compaction. Within 90 days of this notice, an outline of the interim management actions to be undertaken (including timing, duration and level of effort) must be endorsed by a **suitably qualified expert** and submitted to the **Minister**.



3. If, after five years or anytime thereafter, the monitoring required by condition 1) f) identifies that the management actions outlined in the OMP for the better conservation of **golden sun moth habitat** and **natural temperate grassland habitat** within Yarralumla Equestrian Park have been unsuccessful (as determined by the **Minister**), then the person taking the action must develop an Additional Offset Management Plan and/or Strategy (AOS).

The AOS must address how the proposed offset will improve the protection of, and provide long-term conservation benefits for the **golden sun moth** and **natural temperate grassland**, and detail how the proposal meets the requirements of the department's current offset policy and guidance documents.

The AOS must be submitted to the **Minister** for approval within six months of the **Minister** determining that actions were unsuccessful.

The approved AOS must be implemented on the date of its approval.

4. To reduce, manage and mitigate impacts to the heritage values of the **surrounding context**, the person taking the action must
- a) ensure overall **building heights** comply with those shown in Figure 2 (Annexure A);
  - b) ensure no built structure including balconies and other articulated elements which protrude from building facades encroaches into the **verge between the Campbell Section 5 property boundary and Anzac Park East**;
  - c) restrict **development** on Constitution Avenue to a minimum setback of 6.5 metres from the property boundary as shown in Figure 4 (Annexure A);
  - d) ensure that the 8 metre setback zone from the north-western property boundary (as illustrated at Figure 4, Annexure A) comprises a minimum of 1 **established tree** per 20 linear metres along the entire length of the set back zones
  - e) ensure **service entries or waste collection facilities** do not face Anzac Park East;
  - f) ensure all building facades along Anzac Park East have blinds or privacy screens affixed to windows and balconies which may be visible from the **memorials along Anzac Parade** or any vantage point along Anzac Parade;
  - g) ensure all artificial lighting (including streetscape lighting and external building lights) does not illuminate or infringe upon any area within at least a ten metre radius of the **memorials along Anzac Parade** (the use of vegetation buffers and angled lighting fixtures may be used to fulfil this requirement);
  - h) ensure the views of the **memorials along Anzac Parade** from Anzac Parade towards the development site, have a back drop of trees and not buildings, as shown in Figure 5 (Annexure A);
  - i) landscape any **roads** adjoining Anzac Park East in a manner consistent with that illustrated at Figures 6 and 7 (Annexure A);



- j) provide and maintain (in perpetuity) a vegetation buffer within the verge **between the Campbell Section 5 property boundary and Anzac Park East**. The buffer must:

- i. comprise sufficient vegetation in terms of type, number, density, height and longevity to meet its **intended purpose**; including the planting of at least 1 **established tree** per 20 linear metres (interspaced with **shrubs**) along the length of the verge; and
- ii. be implemented prior to the sale of any **individual block**

For the avoidance of doubt, the vegetation buffer need not extend across the **roads** illustrated at Figure 5 (Annexure A).

- k) monitor the success of the vegetation buffer in meeting its **intended purpose**.

The results of the monitoring program must be updated on a yearly basis and made available upon the **Minister's** request. The person taking the action has 30 days in which to comply with such a request.

If, at any time after 5 years following the **commencement of construction**, the **Minister** determines that the vegetation buffer is failing to fulfil its **intended purpose**, the person taking the action must within the timeframe specified, prepare a strategy for the approval of the **Minister**, which outlines the contingency measures to be implemented for mitigating any failings of the vegetation buffer. The strategy must include evidence that consultation has been sought on the adequacy of the contingency measures from both the Australian War Memorial and the National Capital Authority.

5. If the person taking the action proposes to sell any of the land within the **development footprint**, the person taking the action must notify the **Minister** of the sale at least two months before executing a contract for sale.

The person taking the action must include a covenant on each title of the **individual blocks**, that requires the title holder to reduce, manage and mitigate impacts to the heritage values of the **surrounding context** pursuant to condition 4a) to 4g) of this approval.

Any contract for the sale of **individual blocks** must also stipulate that the design and materiality of buildings (to be constructed within **individual block(s)**) be done in a manner that is sympathetic with the heritage values of the **surrounding context**.

To ensure this requirement is met, any contract of sale must prescribe the buyer to engage a **suitably qualified expert** to prepare a **Heritage Impact Statement (HIS)** for the design of all buildings on any **individual blocks**. The contract must stipulate that the final designs for any buildings must be consistent with the recommendations of the HIS. The HIS must be provided to the department and published on the internet for a period of no less than 60 days.

Any contract of sale must be provided to the **Minister** if requested. The person taking the action has 30 days in which to comply with such a request.

6. Within 30 days after the **commencement** of the action, the person taking the action

must advise the **Department** in writing of the actual date of commencement.

7. 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 any management plans, reports, strategies, or agreements 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.

8. Within three months of every 12 month anniversary of the **commencement** of the action, the person taking the action must publish 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.

9. Upon the direction of the **Minister**, the person taking the action must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the **Minister**. The independent auditor must be approved by the **Minister** prior to the commencement of the audit. Audit criteria must be agreed to by the **Minister** and the audit report must address the criteria to the satisfaction of the **Minister**.

10. If the person taking the action wishes to carry out any activity otherwise than in accordance with the management plan, report, strategy, or agreement 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 management plan, report, strategy, or agreement.

The varied activity shall not commence until the **Minister** has approved the varied management plan, report, strategy, or agreement in writing. The **Minister** will not approve a varied management plan, report, strategy, or agreement unless the revised management plan, report, strategy, or agreement result in an equivalent or improved environmental outcome over time.

If the **Minister** approves the revised management plan, report, strategy, or agreement, then that management plan, report, strategy, or agreement must be implemented in place of the management plan, report, strategy, agreement originally approved.

11. If the **Minister** believes that it is necessary or convenient for the better protection of listed threatened species and communities; national heritage places; and Commonwealth land, to do so, the **Minister** may request that the person taking the action make specified revisions to any management plan, report, strategy, or agreement specified in the conditions, and to submit the revised management plan, report, strategy, or agreement for the **Minister's** written approval.

The person taking the action must comply with any such request. The revised approved management plan, report, strategy, or agreement must be implemented. Unless the **Minister** has approved the revised management plan, report, strategy, or agreement, then the person taking the action must continue to implement the management plan, report, strategy, and agreement originally approved, as specified in the conditions.

12. If, at any time after five years from the date of this approval, the person taking the action has not **substantially commenced** the action, then the person taking the action must not substantially commence the action without the written agreement of the **Minister**.

13. Unless otherwise agreed to in writing by the **Minister**, the person taking the action must publish all management plans, reports, strategies, and agreements referred to in these conditions of approval on their website. Each management plan, report, strategy, and agreement must be published on the website within 1 month of being approved.

#### **Definitions:**

**Building height** means the height measured from and between the finish footpath level at each corner of a development block, as illustrated at Figure 8, Annexure A.

**Commencement** (except in the sense of substantial commencement) means the commencement of construction.

**Construction** means any infrastructure, excluding fences and signage, associated with the proposed action and includes any preparatory works required to be undertaken including **clearing vegetation**, the erection of any onsite temporary structures and the use of heavy duty equipment for the purposes of breaking the ground for buildings, infrastructure or landscaping.

**Clearing vegetation** means the cutting down, felling, thinning, logging, removing, killing, destroying, poisoning, ringbarking, uprooting or burning of vegetation.

**Department** means the Australian Government Department administering the *Environment Protection and Biodiversity Conservation Act 1999*.

**Development** means the built area at Campbell Section 5. For condition 4 c), the **development** does not include the use of any outdoor retail or commercial areas such as alfresco dining.

**Development footprint** means the area proposed for development as illustrated at Figure 6, Annexure A.

**EPBC Act** means the *Environment Protection and Biodiversity Conservation Act 1999*.

**Established** means at least 5 metres in height for trees; and at least 1 metre in height for shrubs.

**Evergreen** means vegetation that retains its leaves throughout all four seasons of the year.

**Golden sun moth** means, the invertebrate, *Synemon plana* listed as critically endangered under the **EPBC Act**.



**Heritage Impact Statement** means an assessment of potential impacts upon heritage matters (including but not necessarily limited to those items defined as **surrounding context**) against the official values and attributes for which these heritage items are listed. The assessment must address (but need not be limited to) the following design attributes: building form, size, layout, orientation, materiality and colour.

**Individual block** means any piece of land within the **development footprint** that is proposed to be sold and/or developed for residential/commercial purposes.

**Intended purpose** means to provide an **evergreen** vegetative backdrop which obscures the visibility of the **development** from Anzac Parade and the **memorials along Anzac Parade**.

**Maturity** means the maximum height at which the tree is anticipated or likely to reach within its life span.

**Memorials along Anzac Parade** mean those memorials which contribute to the values of the Anzac War Memorial and Memorial Parade as described on the National Heritage List under Place ID #105889.

**Minister** means the Minister responsible for the administration of the **EPBC Act** and includes a delegate of the Minister.

**Natural temperate grassland** means the natural temperate grassland of the southern tablelands of NSW and the Australian Capital Territory ecological community listed as endangered under the **EPBC Act**.

**Offset attributes** mean an '.xls' file capturing relevant attributes of the Offset Area, including the EPBC reference ID number, the physical address of the offset site, coordinates of the boundary points in decimal degrees, the EPBC protected matters that the offset compensates for, any additional EPBC protected matters that are benefiting from the offset, and the size of the offset in hectares.

**Roads** mean 'Road 1A' and 'Road 2A' as illustrated at Figures 5 and 6 (Annexure A).

**Self-sufficient** means the **values** of the offset area do not require ongoing management in order to reduce their risk of loss, or ensure their long-term protection.

**Service entries or waste collection facilities** means vehicular entrances for deliveries or repair work, truck loading zones, and waste bins.

**Shapefiles** means an ESRI ArcGIS Shapefile, containing '.shp', '.shx.' and '.dbf' files and other files. Shapefiles must include appropriate metadata capturing attributes including but not limited to the EPBC reference number of the approved action and details of the EPBC protected matters present within the offset, covenant or legal protection details, including type and identification. The department prefers shapefiles using the Geocentric Datum of Australia (GDA) 94.

**Shrub** means any evergreen plant that is capable of reaching at least 2 metres in height (but preferably capable of reaching 5 – 8 metres at **maturity**).

**Soft landscaping** means landscaping with vegetation, as opposed to built or man-made structures.

**Substantially commence** means the erection of any permanent infrastructure excluding signage and fences, associated with the action.

**Suitably qualified expert means:**

For conditions 1) and 2):

A suitably qualified botanist, ecologist, or environmental scientist with at least two years of demonstrated expertise in the surveying and management of **golden sun moth and natural temperate grassland**, and who is independent to the person taking the action.

For condition 5)

A suitably qualified heritage consultant with at least two years of demonstrated expertise in the preparation of heritage impact statements, who is a member of the International Council on Monuments and Sites (ICOMOS), and who is independent to the person taking the action.

**Surrounding context** includes the Australian War Memorial and Anzac Parade (as listed on the National Heritage List as Place ID #105889); the Parliament House Vista (as listed on the Commonwealth Heritage List as Place ID #105466); and the Parliament House Vista Extension – Portal Buildings (as listed on the Commonwealth Heritage List as Place ID #105474).

**Tree** means an evergreen plant that is capable of reaching at least 20 metres in height, after ten years of growth.

**Values** refers to the **golden sun moth and natural temperate grassland**

**Yarralumla Equestrian Park offset area** means the area identified as 'Offset Area' in Figure 1 at Annexure A.

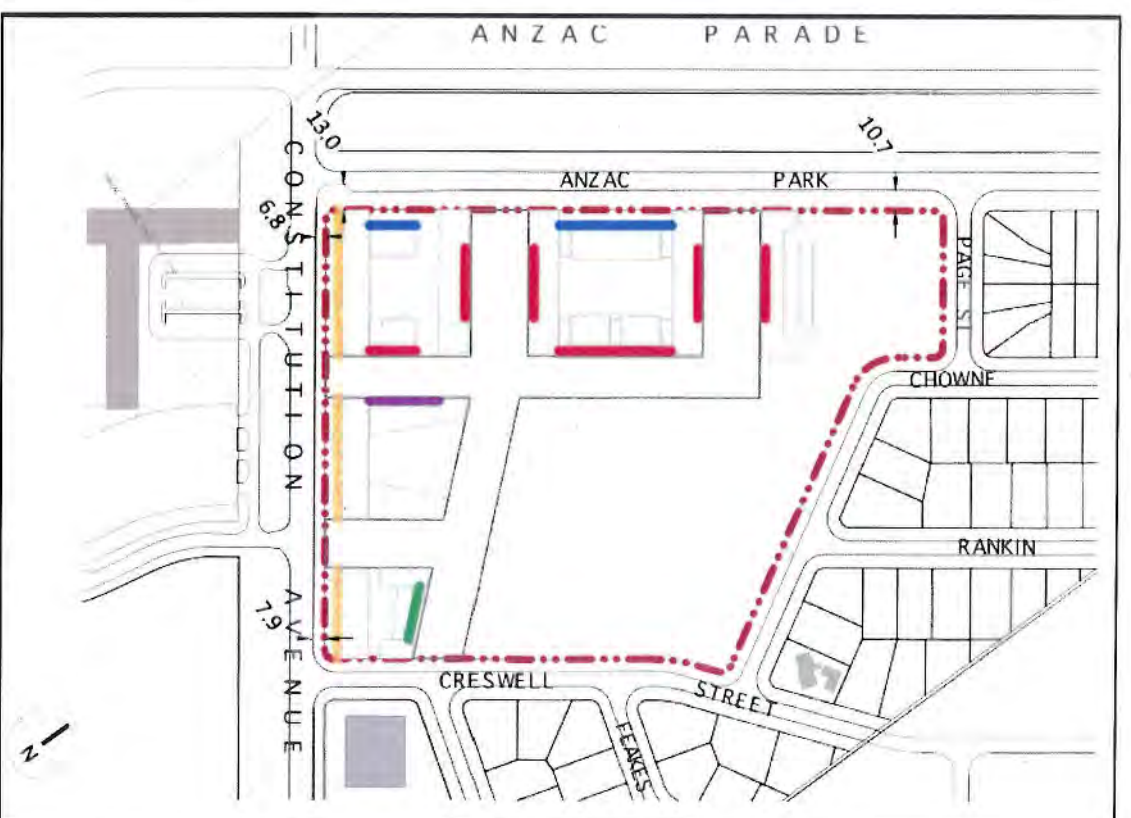
**Verge between the Campbell Section 5 property boundary and Anzac Park East** means the area immediately adjacent to the north-western property boundary illustrated at Figure 3, and ranging from 10.7m to 13 m in width.

**Annexure A**

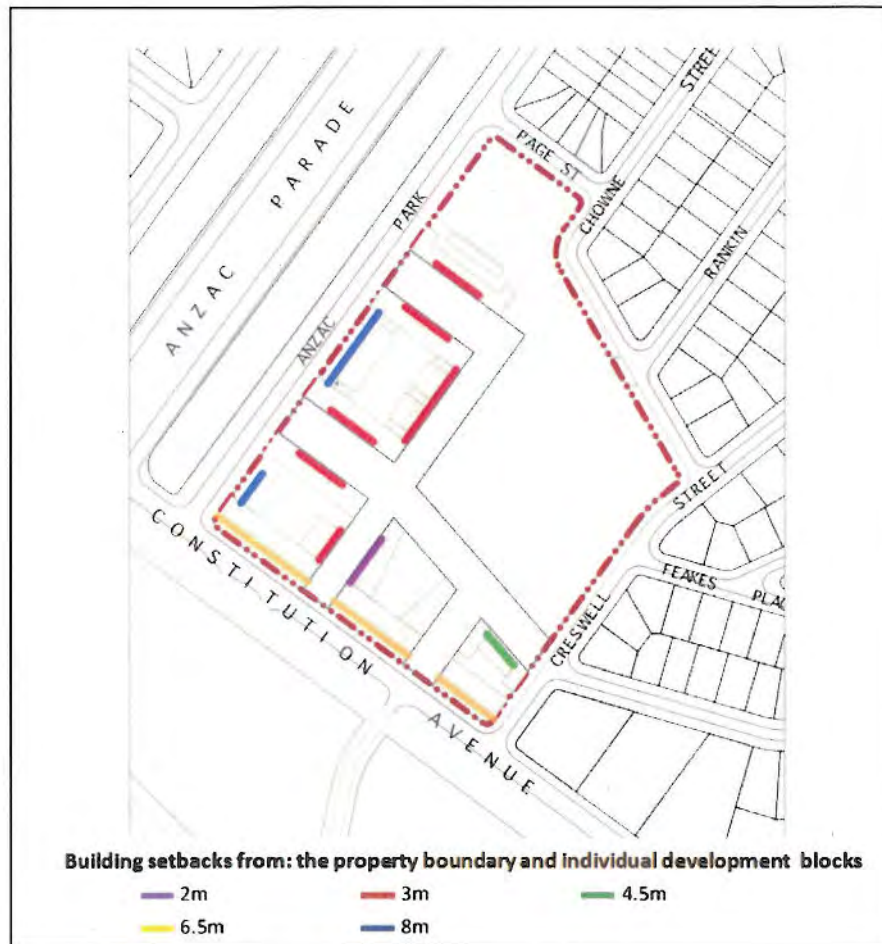


**Figure 1:** Map showing the Yarralumla Equestrian Park Offset Area.









**Figure 4:** Diagram showing the building setbacks from the property boundary (blue and yellow lines), and from the individual development blocks (purple, red and green lines). The dotted red line indicates the Campbell Section 5 property boundary.



**Figure 5:** Diagram showing the location of proposed roads (Road 1 (A) and Road 2 (A)) and landscaping in relation to the memorials along Anzac Parade.

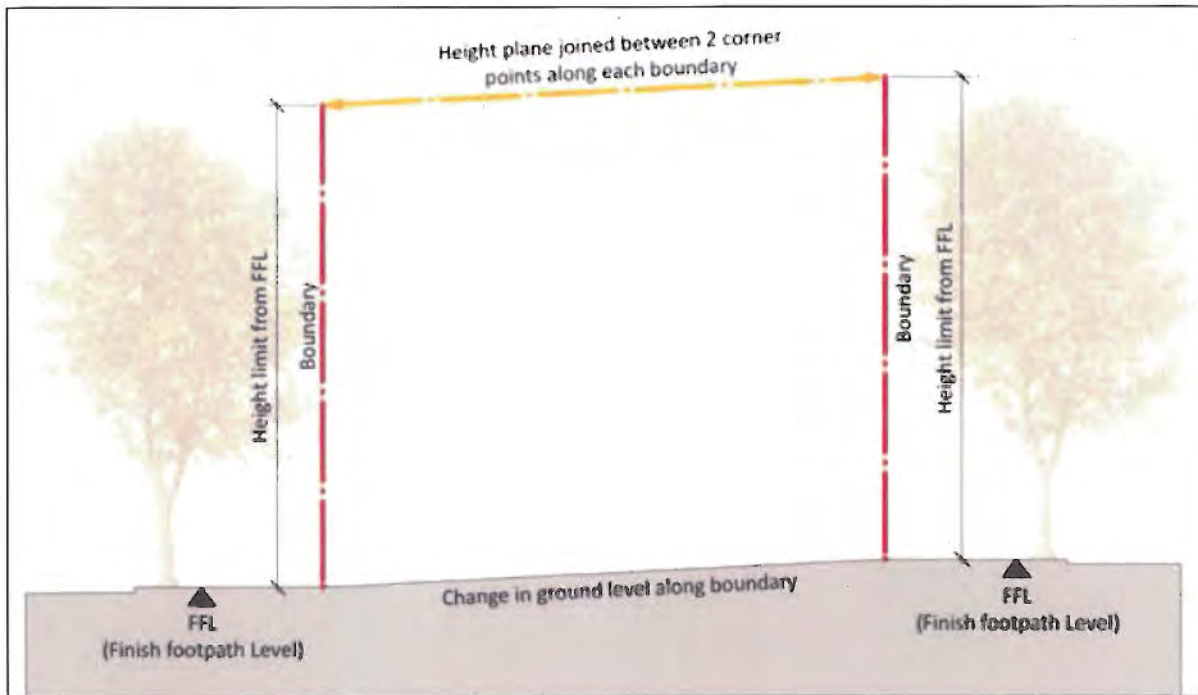


**Figure 6:** Map showing the development footprint for Campbell Section 5. The individual blocks proposed for sale are labelled A to E.



**Figure 7:** Diagram showing proposed landscaping (including indicative tree heights) for roads adjoining Anzac Park East.





**Figure 8:** Diagram showing the reference points from which to measure building heights.

## APPENDIX B: SURVEY PROCEDURES – NATIVE PASTURE AND NATURAL TEMPERATE GRASSLAND

### Year 0: Quadrat Establishment

1. Figure 2 based on the Year 0 vegetation assessment was used to establish 12 vegetation survey quadrats measuring 4 m x 4 m within NTG, native pasture and Chilean needle grass areas.
2. Each site was assigned a number (i.e. 1-12), described, photographed and the centre point identified with GPS. The quadrats are not permanently marked.
3. The data obtained was used to populate Table 6.

**Table 7. Vegetation survey monitoring locations in the Yarralumla Equestrian Park.**

Quadrat	Easting	Northing	Site description
1	688464	6090692	Native pasture
2	688365	6090708	NTG
3	688404	6090815	NTG approximately 4 m from rock
4	688417	6090862	Mixed pasture with <i>Chrysocephalum</i> sp.
5	688433	6091037	Chilean needle grass ( <i>Nasella neesiana</i> ), brome ( <i>Bromus</i> sp.) and wild oats ( <i>Avena</i> sp.).
6	688539	6090745	NTG / native pasture
7	688880	6090613	NTG
8	688756	6090658	NTG
9	688794	6090724	Mixed pasture
10	688676	6090786	NTG
11	688632	6090844	NTG
12	688620	6090955	NTG

### Year 0: Vegetation Assessment – Floristic Value (Rehwinkel 2007)

1. The vegetation assessment is to be conducted in early to mid- November.
2. Data is to be recorded using the vegetation assessment survey data sheet provided (Appendix D). One sheet each for sites 1-12.
3. The site number, date and observer details are to be recorded on each sheet.
4. The 4 m<sup>2</sup> quadrat is to be searched and each native and exotic plant species present recorded on the survey data sheet.
5. Cover abundance is to be calculated for native species recorded based upon the Braun-Blanquet score (refer survey data sheet, Appendix D).
6. Calculations of floristic value for native pasture and NTG are to be conducted in accordance with Rehwinkel (2007).
7. Incidental observations of weed species and other factors (e.g. erosion) that may be affecting vegetation cover should be recorded.

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**Year 0: Vegetation Assessment – NTG quality scale** (Nash and Hogg 2013)

1. The qualitative vegetation quality assessment is to be conducted concurrently with the floristic value assessment for each site.
2. Each 4 m<sup>2</sup> quadrat is to be assessed and a value assigned (i.e. score 1-10) in accordance with (Nash and Hogg 2013, Appendix C).
3. The corresponding quality score is to be recorded in the 'Quality Assessment Score' box on the vegetation assessment survey data sheet (Appendix D).

**Year 1 Onwards: Vegetation Assessment – Floristic Value & NTG quality scale**

The vegetation assessment procedure outlined above is to be repeated annually in early to mid-November for all 12 sites.

**Quadrat Number:**

<b>Species name</b> <small>(Include native and exotic species but only native species are used for the floristic value)</small>	<b>BB*</b> <b>Score</b>	<b>Species type code</b>	<b>Indicator species level 2</b>	<b>Indicator species level 2 with the exception of those with scores of 'r'</b>	<b>Indicator species (level 1 &amp; 2)</b>	<b>Indicator species levels 1 &amp; 2 with the exception of those with scores of 'r'</b>
<b>Total</b>						
<b>SITE'S FLORISTIC VALUE SCORE</b>						
<b>SITE'S NATIVE GRASSLAND SCORE</b>						

**r** - <5% cover and solitary (<4 individuals)  
**+** - <5% cover and few (4-15 individuals)  
**1** - <5% cover and numerous / scattered (>15 individuals)

4 - 51% - 75% cover  
5 - >75% cover

## APPENDIX D: NATIVE PASTURE AND NATURAL TEMPERATE GRASSLAND SPECIES TYPE CODES

Species	Type code	Species	Type code
<i>Acacia acinacea</i>	2	<i>Caladenia</i> spp.	2
<i>Acacia armata</i> (syn. <i>paradoxa</i> )	2	<i>Calandrinia</i> sp.	2
<i>Acacia dawsonii</i>	2	<i>Callistemon sieberi</i>	2
<i>Acacia decora</i>	2	<i>Calocephalus citreus</i>	2
<i>Acacia doratoxylon</i>	2	<i>Calochilus robertsonii</i>	2
<i>Acacia gunnii</i>	2	<i>Calotis anthemoides</i>	2
<i>Acacia pycnantha</i>	2	<i>Calotis lappulacea</i>	2
<i>Acacia siculiformis</i>	2	<i>Calytrix tetragona</i>	2
<i>Acacia ulicifolia</i>	2	<i>Cardamine</i> spp.	2
<i>Acacia verniciflua</i>	2	<i>Carex bichenoviana</i>	2
<i>Acaena</i> spp.	C	<i>Carex</i> spp. (excluding <i>C. bichenoviana</i> )	C
<i>Acrotriche serrulata</i>	2	<i>Cassinia</i> spp.	C
<i>Adiantum aethiopicum</i>	2	<i>Cassytha</i> sp.	C
<i>Agrostis</i> spp.	C	<i>Centella</i> spp.	2
<i>Ajuga australis</i>	2	<i>Centipeda cunninghamiana</i>	C
<i>Allocasuarina luehmannii</i>	2	<i>Chrysocephalum apiculatum</i>	1
<i>Alternanthera</i> sp. A	C	<i>Chrysocephalum semipapposum</i>	2
<i>Amphibromus</i> spp.	C	<i>Clematis microphylla</i>	2
<i>Aphanes australiana</i>	C	<i>Comesperma ericinum</i>	2
<i>Aristida behriana</i>	2	<i>Convolvulus angustissimus</i>	C
<i>Aristida ramosa</i>	C	<i>Cotula australis</i>	C
<i>Arthropodium milleflorum</i>	2	<i>Craspedia</i> spp.	2
<i>Arthropodium minus</i>	2	<i>Crassula</i> spp.	C
<i>Asperula ambleia</i>	2	<i>Cryptandra amara</i>	2
<i>Asperula conferta</i>	2	<i>Cullen microcephalum</i>	2
<i>Asperula scoparia</i>	2	<i>Cullen tenax</i>	2
<i>Asplenium flabellifolium</i>	2	<i>Cymbonotus</i> spp.	C
<i>Astroloma humifusum</i>	2	<i>Cymbopogon refractus</i>	2
<i>Austrodanthonia</i> spp.	C	<i>Cynodon dactylon</i>	C
<i>Austrostipa</i> spp.	C	<i>Cynoglossum australe</i>	2
<i>Billardiera scandens</i>	2	<i>Cynoglossum suaveolens</i>	C
<i>Blechnum</i> sp.	2	<i>Cyperus</i> spp.	C
<i>Boerhavia dominii</i>	2	<i>Daucus glochidiatus</i>	C
<i>Bossiaea buxifolia</i>	2	<i>Daviesia genistifolia</i>	2
<i>Bossiaea prostrata</i>	2	<i>Daviesia latifolia</i>	2
<i>Bossiaea riparia</i>	2	<i>Daviesia leptophylla</i>	2
<i>Bothriochloa macra</i>	C	<i>Daviesia mimosoides</i>	2
<i>Brachycome aculeata</i>	2	<i>Derwentia perfoliata</i>	2
<i>Brachycome diversifolia</i>	2	<i>Desmodium brachypodum</i>	2
<i>Brachycome heterodonta</i>	2	<i>Desmodium varians</i>	2
<i>Brachycome ptychocarpa</i>	2	<i>Deyeuxia quadriseta</i>	2
<i>Brachycome rigidula</i>	2	<i>Dianella longifolia</i>	2
<i>Brachycome</i> sp. aff. <i>formosa</i>	2	<i>Dianella revoluta</i>	2
<i>Brachycome spathulata</i>	2	<i>Dichelachne</i> spp.	C
<i>Brachyloma daphnoides</i>	2	<i>Dichondra repens</i>	C
<i>Brunonia australis</i>	2	<i>Dichondra</i> sp. A	2
<i>Bulbine bulbosa</i>	2	<i>Dichopogon fimbriatus</i>	2
<i>Bulbine glauca</i>	2	<i>Dichopogon strictus</i>	2
<i>Burchardia umbellata</i>	2	<i>Digitaria</i> spp.	C
<i>Caesia calliantha</i>	2	<i>Dillwynia</i> spp.	2
<b>Species</b>	<b>Type code</b>	<b>Species</b>	<b>Type code</b>



<i>Dipodium punctatum</i>	2	<i>Isoetopsis graminifolia</i>	2
<i>Discaria pubescens</i>	2	<i>Isolepis</i> spp.	C
<i>Diuris</i> spp.	2	<i>Isotoma fluviatilis</i>	2
<i>Dodonaea boroniifolia</i>	2	<i>Joycea pallida</i>	C
<i>Dodonaea viscosa</i>	2	<i>Juncus</i> spp.	C
<i>Drosera peltata</i>	C	<i>Kunzea ericoides</i>	C
<i>Echinopogon</i> spp.	C	<i>Kunzea parvifolia</i>	C
<i>Einadia hastata</i>	2	<i>Laxmannia gracilis</i>	2
<i>Einadia nutans</i>	C	<i>Lepidium ginninderrense</i>	2
<i>Elymus scaber</i>	C	<i>Lepidosperma laterale</i>	2
<i>Enneapogon nigricans</i>	C	<i>Leptorhynchos elongatus</i>	2
<i>Epilobium</i> spp.	C	<i>Leptorhynchos squamatus</i>	2
<i>Eragrostis</i> spp.	C	<i>Leptospermum</i> spp.	C
<i>Eriochilus cucullatus</i>	2	<i>Lespedeza juncea</i>	2
<i>Erodium crinitum</i>	C	<i>Leucochrysum albicans</i>	2
<i>Eryngium ovinum</i>	2	<i>Leucopogon fletcheri</i>	2
<i>Eryngium vesiculosum</i>	2	<i>Leucopogon fraseri</i>	2
<i>Euchiton</i> spp.	C	<i>Leucopogon virgatus</i>	2
<i>Eutaxia diffusa</i>	2	<i>Levenhookia dubia</i>	2
<i>Galium gaudichaudii</i>	2	<i>Linum marginale</i>	2
<i>Gastrodia sesamoides</i>	2	<i>Lissanthe strigosa</i>	2
<i>Genoplesium</i> spp.	2	<i>Lobelia gibbosa</i>	2
<i>Geranium antrorsum</i>	2	<i>Lomandra bracteata</i>	I
<i>Geranium</i> spp. (excluding <i>G. antrorsum</i> )	C	<i>Lomandra filiformis</i>	I
<i>Glossodia major</i>	2	<i>Lomandra longifolia</i>	2
<i>Glycine clandestina</i>	2	<i>Lomandra multiflora</i>	2
<i>Glycine tabacina</i>	2	<i>Lomatia myricoides</i>	2
<i>Gompholobium huegelii</i>	2	<i>Lotus australis</i>	2
<i>Gonocarpus tetragynus</i>	I	<i>Luzula</i> spp.	2
<i>Goodenia hederacea</i>	2	<i>Lythrum hyssopifolia</i>	C
<i>Goodenia pinnatifida</i>	2	<i>Melichrus urceolatus</i>	2
<i>Grevillea lanigera</i>	2	<i>Mentha diemenica</i>	2
<i>Grevillea ramosissima</i>	2	<i>Microlaena stipoides</i>	C
<i>Grevillea rosmarinifolia</i>	2	<i>Microseris lanceolata</i>	2
<i>Grevillea</i> sp. aff. <i>alpina</i>	2	<i>Microtis</i> spp.	2
<i>Gynatrix pulchella</i>	2	<i>Mirbelia oxylobioides</i>	2
<i>Gypsophila tubulosa</i>	C	<i>Montia fontana</i>	C
<i>Hakea microcarpa</i>	2	<i>Muehlenbeckia tuggeranong</i>	2
<i>Haloragis heterophylla</i>	I	<i>Neopaxia australasica</i>	2
<i>Hardenbergia violacea</i>	2	<i>Opercularia hispida</i>	2
<i>Helichrysum rutidolepis</i>	2	<i>Ophioglossum lusitanicum</i>	2
<i>Helichrysum scorpioides</i>	2	<i>Oreomyrrhis eriopoda</i>	2
<i>Hemarthria uncinata</i>	2	<i>Oxalis</i> spp.	C
<i>Hibbertia riparia</i>	2	<i>Panicum effusum</i>	C
<i>Hovea linearis</i>	2	<i>Paspalum distichum</i>	C
<i>Hydrocotyle algida</i>	C	<i>Patersonia sericea</i>	2
<i>Hydrocotyle callicarpa</i>	2	<i>Pelargonium</i> spp.	2
<i>Hydrocotyle laxiflora</i>	2	<i>Pellaea falcata</i>	2
<i>Hydrocotyle peduncularis</i>	C	<i>Pennisetum alopecuroides</i>	2
<i>Hypericum gramineum</i>	2	<i>Pentapogon quadrifidus</i>	2
<i>Hypericum japonicum</i>	2	<i>Persicaria prostrata</i>	C
<i>Hypoxis</i> spp.	2	<i>Persoonia linearis</i>	2
<i>Imperata cylindrica</i>	C	<i>Pimelea curviflora</i>	2
<i>Indigofera adesmiifolia</i>	2	<i>Pimelea glauca</i>	2
<i>Indigofera australis</i>	2	<i>Pimelea linifolia</i>	2
<b>Species</b>	<b>Type code</b>	<b>Species</b>	<b>Type code</b>
<i>Plantago gaudichaudii</i>	2	<i>Senecio</i> spp. (excludes <i>S. macrocarpus</i> )	C

<i>Plantago varia</i>	2	<i>Sida corrugata</i>	2
<i>Platylobium formosum</i>	2	<i>Solanum</i> sp. (spiny leaves)	2
<i>Pleurosorus rutifolius</i>	2	<i>Solanum</i> spp.	2
<i>Poa labillardieri</i>	*	<i>Solenogyne dominii</i>	C
<i>Poa meionectes</i>	C	<i>Solenogyne gunnii</i>	C
<i>Poa sieberiana</i>	C	<i>Sorghum leiocladum</i>	2
<i>Podolepis jaceoides</i>	2	<i>Spiranthes sinensis</i>	2
<i>Polygala japonica</i>	2	<i>Sporobolus</i> spp.	C
<i>Pomaderris pallida</i>	2	<i>Stackhousia monogyna</i>	2
<i>Pomax umbellata</i>	2	<i>Stellaria pungens</i>	2
<i>Poranthera microphylla</i>	2	<i>Stuartina</i> spp.	C
<i>Portulaca oleracea</i>	C	<i>Stylidium despectum</i>	2
<i>Prasophyllum petilum</i>	2	<i>Stylidium graminifolium</i>	2
<i>Pratia purpurascens</i>	2	<i>Stypandra glauca</i>	2
<i>Prunella vulgaris</i>	2	<i>Styphelia triflora</i>	2
<i>Pseudognaphalium luteoalbum</i>	C	<i>Swainsona sericea</i>	2
<i>Pteridium esculentum</i>	C	<i>Swainsona recta</i>	2
<i>Pterostylis</i> spp.	2	<i>Tetratheca</i> spp.	2
<i>Ptilotus</i> sp.	2	<i>Thelymitra</i> spp.	2
<i>Pultenaea</i> spp.	2	<i>Themeda australis</i>	*
<i>Ranunculus</i> spp.	2	<i>Thysanotus patersonii</i>	2
<i>Rhodanthe anthemoides</i>	2	<i>Thysanotus tuberosus</i>	2
<i>Rhytidosporum procumbens</i>	2	<i>Tricoryne elatior</i>	2
<i>Rubus parvifolius</i>	2	<i>Triptilodiscus pygmaeus</i>	2
<i>Rumex brownii</i>	C	<i>Utricularia dichotoma</i>	2
<i>Rumex dumosus</i>	C	<i>Velleia paradoxa</i>	2
<i>Rutidosia leptorhynchoides</i>	2	<i>Veronica</i> spp.	2
<i>Rutidosia multiflora</i>	2	<i>Viola betonicifolia</i>	2
<i>Schoenus apogon</i>	C	<i>Vittadinia</i> spp.	C
<i>Scleranthus biflorus</i>	2	<i>Wahlenbergia</i> spp.	C
<i>Scleranthus diander</i>	2	<i>Westringia eremicola</i>	2
<i>Scleranthus fasciculatus</i>	2	<i>Wurmbea dioica</i>	2
<i>Scutellaria humilis</i>	2	<i>Xanthorrhoea australis</i>	2
<i>Sebaea ovata</i>	2	<i>Xerochrysum viscosum</i>	2
<i>Senecio macrocarpus</i>	2	<i>Zornia dyctiocarpa</i>	2

**Note:** C - common or increaser species

I - indicator species level 1

2 - indicator species level 2

\* *Themeda australis* and *Poa labillardieri* need to be treated as indicator species level 2 if they dominate a site.

Not all species found in grassy ecosystems may be on this list. If other species are recorded in the quadrat, treat them as C species.

## APPENDIX E: GRASSLAND QUALITY SCORE SCALE

Score	Grassland Description
<b>10</b>	Predominantly native groundcover with high forb diversity, including many significant species. Minimal component of exotic weeds or grasses (annual, perennial). Has high structural complexity such as rocky outcrops, a dam, a drainage area and a mixture of tussocky and tufted species with inter-tussock spaces. Supports more than one threatened species.
<b>9</b>	Similar to Score 10 but with one or two factors being less than optimal, e.g. only moderate to high native cover (9A), a moderate component of annual exotic grasses (9B).
<b>8A</b>	A high proportion of native species and low abundance of exotic perennial species. Annual exotic species of moderate abundance. High diversity of forb species but a reduced number of significant species (moderate only). A wide range of habitat features and more than one threatened species are present.
<b>8B</b>	A high proportion of native species and low abundance of exotic perennial species. Annual exotic species of moderate abundance. A reduced range of habitat features but a high diversity and significance of native forbs. Threatened species are present.
<b>8C</b>	Similar to Score 10 but with no threatened species known to be present.
<b>7A</b>	Moderate to high proportion of native species with moderate to low abundance of perennial species. Moderate abundance of exotic annual species. Moderate to high forb diversity and significance. A wide range of structural features and more than one threatened species are present.
<b>7B</b>	Predominantly native with few exotic perennial or annuals. Moderate to high forb diversity and significance. Moderate range of habitat features. No threatened species present.
<b>6A</b>	Predominantly native with few exotic perennial but a moderate abundance of annuals. Moderate forb diversity but includes significant species. Has a low range of structural features. Supports one threatened species.
<b>6B</b>	A moderate cover of native species and moderate exotic perennials. A moderate cover of exotic annuals. High forb diversity but moderate significance. A wide range of structural habitat features. At least one threatened species present.
<b>6C</b>	Moderate cover of native species but low incidence of annuals. Moderate forb diversity but includes significant species. Has at least a moderate range of structural features. Does not support threatened species.
<b>5A</b>	Moderate to high native component and moderate to low exotic perennials. Moderate abundance of annual species. Moderate forb diversity and moderate significance. Has a moderate range of structural features. Does not support threatened species.
<b>5B</b>	Moderate native component with moderate exotic perennials, but few exotic annuals. Moderate forb diversity and moderate significance. Has a moderate range of structural features but no threatened species.
<b>5C</b>	Moderate native component with moderate exotic perennials, with moderate exotic annuals. A moderate diversity of forbs with some of moderate significance that are limited in extent. Limited range of habitat features but supports low numbers of one threatened species.
<b>4A</b>	Moderate native component, moderate exotic perennials and annuals. Moderate forb diversity, moderate significance. Limited range of habitat features and no threatened species.
<b>4B</b>	Moderate to high native component and moderate to low exotic perennials but high exotic annual component. Low diversity overall but high significance of forbs within a small patch. A moderate range of habitat features but no threatened species.
<b>4C</b>	Marginal cover of native species with moderate to high component of exotic perennials and high incidence of exotic annuals. A patch with a moderate diversity of forbs that have moderate significance. Limited range of habitat features but is known to support low numbers of one threatened species.

Score	Grassland Description
<b>3A</b>	Moderate native component with moderate exotic perennials. High abundance of exotic annuals. Low diversity of native forbs but moderate significance. Limited habitat features and no threatened species.
<b>3B</b>	Marginally native with moderate to high exotic perennials. High abundance of exotic annuals. Low diversity of native forbs but a patch with high significance. Few habitat features and no threatened species.
<b>2</b>	Similar to Score 1 (below) but with one or two factors being more optimal, e.g. moderate native cover (2A), moderate exotic annual component (2B).
<b>1</b>	Only marginally native with high exotic perennial component (but still more than 50% native excluding annuals). A high proportion of exotic annual species. Relatively few forbs and those present are common species tolerant of disturbance. Limited habitat features. No threatened species.

Source: Nash, K and Hogg, D. 2013. *Application of EPBC Act offset assessment guide to natural temperate grassland of the Southern Tablelands of NSW and the Australian Capital Territory*. David Hogg Pty Ltd, Canberra, ACT. 8 p.

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**APPENDIX F: SURVEY PROCEDURES – FLYING GSM NUMBERS****Year 0 onwards: Rotational Point Count**

1. Locate each of the 12 quadrats used for the vegetation and habitat assessments.
2. While standing in the middle of each quadrat, count all GSM observed in and beyond the quadrat to approximately 20 m while rotating through 360°.
3. Record GSM numbers on the Flying GSM survey data sheet (Appendix G).
4. Wait 30 seconds.
5. Repeat Steps 2-4, nine more times.
6. Average the GSM count at each site and enter result on the Flying GSM survey data sheet (Appendix G).

**Year 0: Traverse Count**

1. Identify an approximate traverse through grassland adjacent to the rotational point count sites.
2. Plot the traverse on a map.
3. Note the time when starting to walk the traverse.
4. Count all GSM observed while walking slowly and steadily along the traverse.
5. Note the time once the traverse is completed.
6. Record GSM numbers and times on the Flying GSM survey data sheet (Appendix G).
7. Calculate the number of GSM observed per minute.

**Year 1 Onwards: Traverse Count**

1. Follow the mapped traverse from Year 0 as close as practicable.
2. Note the time when starting to walk the traverse.
3. Count all GSM observed while walking slowly and steadily along the traverse.
4. Note the time once the traverse is completed.
5. Record GSM numbers and times on the Flying GSM survey data sheet (Appendix G).
6. Calculate the number of GSM observed per minute.

**Notes:**

- Marker posts or similar cannot be used to mark sites as they may threaten horse and rider safety.
- Turning full circle for a rotational point count should take approximately one minute.

- 
- Should a quadrat be unusable, repeat Year 0: Quadrat Establishment steps 1-2 for the vegetation assessment (Appendix B) preferably as close as possible to the unusable quadrat, before continuing with Step 3.
  - Record female GSM separately at the bottom of the Flying GSM survey data sheet (Appendix G).



[illegible]

**FLYING GOLDEN SUN MOTH ROTATIONAL POINT COUNT**

<b>Survey #:</b>		<b>Start</b>	<b>Finish</b>	<b>Observer(s):</b>
	<b>Time (24 h):</b>			
	<b>Temperature (°C):</b>			
	<b>Wind (km/h):</b>			

Site	1	2	3	4	5	6	7	8	9	10	Average*
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

\* GSM / minute

**OPPORTUNISTIC RECORDS**

Easting	Northing	Number	Dominant Vegetation

## APPENDIX H: GOLDEN SUN MOTH HABITAT QUALITY SCORE SCALE

Natural temperate grassland containing GSM (maximum 10)	Natural temperate grassland lacking GSM (maximum 5)	Secondary native grassland (maximum 5)	Chilean needle grass dominated grassland (maximum 3)
10. High quality NTG habitat High numbers of GSM	Not applicable	Not applicable	Not applicable
9. High quality NTG habitat Moderate numbers of GSM			
8. High quality NTG habitat Low numbers of GSM			
7. High quality NTG habitat Very low numbers of GSM or Moderate quality NTG habitat High numbers of GSM			
6. Moderate quality NTG habitat Moderate numbers of GSM or High quality native pasture High numbers of GSM			
5. Moderate quality NTG habitat Low numbers of GSM or High quality native pasture Moderate numbers of GSM	5. High quality NTG habitat No GSM	5. High quality secondary grassland Moderate (to high?) numbers of GSM	Not applicable
4. Moderate quality NTG habitat Very low numbers of GSM or High quality native pasture habitat Low numbers of GSM or Moderate quality native pasture habitat Moderate numbers of GSM	4. High quality native pasture habitat No GSM	4. High quality secondary grassland Low numbers of GSM or Moderate quality secondary grassland Moderate numbers of GSM	
3. High quality native pasture habitat Very low numbers of GSM or Moderate quality native pasture habitat Low numbers of GSM	3. Moderate quality NTG habitat No GSM	3. High quality secondary grassland Very low numbers of GSM or Moderate quality secondary grassland Low numbers of GSM or Low quality secondary grassland Moderate numbers of GSM	
2. Moderate quality native pasture habitat Very low numbers of GSM or Low quality native pasture habitat Moderate numbers of GSM	2. Moderate quality native pasture habitat No GSM	2. Moderate quality secondary grassland Very low numbers of GSM or Low quality secondary grassland Low numbers of GSM	
		3. CNG dominated but significant native content High numbers of GSM	
		2. CNG dominated but significant native content Low to very low numbers of GSM or CNG dominated, low native content Moderate to low numbers of CNG	

Natural temperate grassland containing GSM (maximum 10)	Natural temperate grassland lacking GSM (maximum 5)	Secondary native grassland (maximum 5)	Chilean needle grass dominated grassland (maximum 3)
1. Low quality native pasture habitat Low to very low numbers of GSM	1. Low quality NTG habitat No GSM	1. Low quality secondary grassland Very low numbers of GSM	1. CNG dominated but significant native content Low to very low numbers of GSM or CNG dominated, low native content Moderate to low numbers of CNG

**Note:** NTG – Natural Temperate Grassland

GSM – Golden Sun Moth

CNG – Chilean Needle Grass

Source - Hogg, D. 2012. *Application of EPBC Act offsets assessment guide to the golden sun moth*. David Hogg Pty Ltd, Canberra, ACT. 5 p.

## APPENDIX I: INDICATIVE GOLDEN SUN MOTH INTERPRETIVE SIGN AND TEXT



**Golden sun moth interpretive sign, York Park Conservation Site, Barton, ACT.**

### INTERPRETIVE SIGN TEXT

The following text is based closely on the text in the above sign and is indicative of the text (along with the moth and grass figures) suggested for the three proposed signs at the YEP.

### YARRALUMLA EQUESTRIAN PARK CONSERVATION AREA

#### The Golden Sun Moth

The Golden Sun Moth (*Synemon plana*) belongs to an ancient moth family (Castniidae) and is believed to have its origins in the supercontinent of Gondwana dating back 10 million years. It is now an endangered species, existing in low numbers in western Victoria and on small sites in the ACT.

The Golden Sun Moth has a curious life cycle. Most of its life is spent below ground in the egg, larval and pupal stages. Adult moths have a very short life – usually less than two days – and are unable to feed as they have no mouthparts. The moths inhabit native grassland dominated by Wallaby Grass; in the ACT this is Short



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wallaby Grass (*Rytidosperma carphoides*). Unlike most moths, the Golden Sun Moth flies during the day.

Surveys have shown that the Golden Sun Moth is being successfully maintained on this site.

Females emerge from the pupae with all their eggs fully developed. Their task is to mate and lay their eggs. The female moth has more vivid colouring than the male. As she moves along the ground she exposes yellow-orange hindwings which attract patrolling males.

### **Natural Temperate Grassland**

Natural temperate grassland originally covered a vast area of south-eastern Australia. Today, only isolated remnant patches, such as the areas at the Yarralumla Equestrian Park, remain. Found on this site are grass species such as Kangaroo Grass (*Themeda* spp.), Wallaby Grass (*Rytidosperma* spp.) and Spear Grass (*Stipa* spp.), and also colourful herbs (wildflowers) such as Yellow Buttons (*Chrysocephalum apiculatum*). Natural temperate grassland once supported a rich vertebrate and invertebrate fauna, but it is now known that some animals have declined dramatically in numbers or disappeared altogether.

Urban development, agricultural use and pasture improvement are major threats to these grasslands. They may also be degraded by grazing, weed invasion, changed fire regimes and changing soil moisture characteristics.

Natural temperate grassland conservation is an urgent national task. These grasslands are also of cultural significance representing vestiges of the Australian landscape prior to European settlement. They also have aesthetic value. The striking russet-brown seed heads of Kangaroo Grass and the mass of fluffy white flowers of the Wallaby Grass tussocks impart distinctive colours and textures to the landscape during summer.

### **Biological Diversity**

Biological diversity refers to the variety of all life forms, i.e. the different plants, animals and micro-organisms, the genes they contain and the ecosystems of which they form a part. The protection and maintenance of genetic diversity, species diversity and ecosystem diversity are all part of biodiversity conservation.

Biological diversity conservation is a core objective of the Commonwealth's National Strategy for Ecological Sustainable Development.

### **Biodiversity Conservation**

At Yarralumla Equestrian Park, biological diversity conservation means protecting the Golden Sun Moth and the small patches of remnant native grassland which provides its habitat.

Management activities have included:

- 
- managing equestrian activities so they complement biodiversity conservation
  - annual monitoring of the grassland plant communities and the moth populations
  - ongoing maintenance of grassland such as weed control and periodic mowing; and
  - preparing and revising management guidelines.

In addition, special site use conditions have been prepared to ensure that ongoing use of Yarralumla Equestrian Park does not compromise grassland habitat values.

All these activities recognise the Commonwealth and ACT Government's obligations and responsibilities for the maintenance of biological diversity. The project demonstrates that biodiversity conservation is possible in the midst of urban development.

**[central black box area]**

The grassland areas beyond this sign used for cross country riding comprise remnants of natural temperate grassland, which would have been typical of the 'Limestone Plains' at the time of the first European settlement in the early 1800s. The grassland is the habitat for the endangered Golden Sun Moth, which is a species of scientific interest.

The Commonwealth and ACT Government have taken specific action to protect and manage the Yarralumla Equestrian Park's natural values in association with ongoing equestrian activities.

## APPENDIX J: WEED CONTROL CALENDAR

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

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

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