

Appendix 6: Ecological Report



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13 October 2010

Ref: 1015

**Re: Golden Sun Moth – Proposed Development of Section 42 (Block 15) Griffith
ACT**

Dear David,

The following provides advice in regard to the critically endangered Golden Sun Moth (*Synemon plana*) and the revised re-development proposal for the Brumbies Rugby Club house at 18 Austin Street (Section 42, Block 15) - Griffith ACT.

Preliminary ecological field assessments were undertaken on 12 and 28 November 2009 for the proposed re-development of the Brumbies Rugby Facility (club house and Griffith Oval) - Section 42, Block 15 and Block 17 (see *Preliminary Ecological Assessment of Section 42, Griffith ACT, Biosis Research, December 2009*). During that assessment low densities of Golden Sun Moth were observed at the south-eastern corner of Block 17 (intersection of Captain Cook Crescent and Austin Street) and at various locations within the medium strip along Captain Cook Crescent.

The Golden Sun Moth was not observed elsewhere on Section 42, including Block 15, during the November 2009 field assessments. Furthermore, Block 15 has been extensively developed (club-house facilities, car parks, pathways and bowling greens) and modified (dense tree canopies and non-native groundcover vegetation), and was considered unsuitable for the Golden Sun Moth.

The re-development of Block 15 is unlikely to incur a direct or significant impact on Golden Sun Moth habitat or the nearby extant population in Block 17 and along Captain Cook Crescent.



Should you have any further questions, please do not hesitate to contact me on 02 6140 2570 or 0488 227 287.

Yours sincerely,



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Preliminary Ecological Assessment of Section 42, Griffith ACT

December 2009

Biosis Research Pty. Ltd.

Report prepared for Redbox Design Group

Preliminary Ecological Assessment of Section 42, Griffith ACT

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December 2009

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Project no. 5701

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ABBREVIATIONS

Box/Gum Grassy Woodland	Name generally given to Yellow Box/White Box/Blakely's Red Gum Woodland (NSW) and Yellow Box/Red Gum Grassy Woodland (ACT) EECs.
CEEC	Critically Endangered Ecological Community
DEWHA	Commonwealth Department of the Environment, Water, Heritage and the Arts
EEC	Endangered Ecological Community
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
NC Act	<i>Nature Conservation Act 1980</i> (ACT)
Region	CMA Catchment or IBRA Bioregion (in this case South Eastern Highlands Bioregion)
spp.	species (plural)
sp.	species (singular)
subsp.	subspecies
Subject site	The area that is the subject of the study

1.0 SUMMARY

Biosis Research Pty. Ltd. was commissioned by Redbox Design Group to undertake an ecological habitat assessment of Section 42 Griffith, ACT (subject site).

The assessment is required as part of a proposed redevelopment of the subject site, which would include the construction of medium-density housing, upgrade of the ACT Brumbies Rugby Club headquarters and reconfiguration of Griffith Ovals No. 1 and No. 2. The proposed development would require a variation of the ACT Territory Plan to proceed.

The subject site is currently used as an administrative and training facility for the ACT Brumbies and as public open space. The surrounding area contains low density residential housing, urban transport links and various recreational facilities, which include, football fields, tennis courts and parkland. The Manuka commercial district is situated less than 500m to the north.

Vegetation within and immediately surrounding the subject site is highly modified and has virtually no floristic resemblance to the original form – native grassland or grassy woodland. Groundcover vegetation is for the most part dominated by non-native herbaceous species and, depending on the area in question, is either densely covered by exotic grasses and/or weeds (i.e. along drainage channels), or maintained playing fields (i.e. former bowling greens and Griffith Oval). Trees and shrubs comprise a variable mix of mostly planted exotic or non-local eucalypt and acacia varieties. The vegetation could be suitably defined as a non-native ‘urban forest’.

There is virtually no opportunity for any Commonwealth or ACT listed threatened plant species within the subject site.

Main fauna habitats include the upper tree canopy, particularly around the perimeter of the site and Griffith Oval, and various understorey shrub components. There are few obvious hollows within the larger trees and therefore limited opportunities for hollow-dependant fauna. Trees and shrubs would provide refuge and some food resources for arboreal and flying animals, such as common brush-tail possums, microbats and birds.

While the occasional occurrence of uncommon or even threatened woodland bird species’ is possible the site does not have any special or intrinsic habitat value necessary for their survival.

The Critically Endangered Golden Sun Moth (GSM) *Synemon plana* was observed in low numbers at the south-east corner of the subject site (intersection of Captain Cook Crescent and Austin Street) and within the road reserve

along Captain Cook Crescent. The remainder of the subject site was unlikely to provide habitat for this species although it could occur on other nearby road reserves and grassy areas.

Targeted surveys for GSM are recommended to determine the extent of distribution, density and if breeding occurs on south-eastern corner of the subject site. Though initial observations suggest that the species does not occur in high numbers consideration should be given to the possible constraints this may pose and the possible use of road reserves (for parking) along Captain Cook Crescent during construction.

Other than meeting tree protection requirements (i.e. regulated or registered trees under the *Tree Preservation Act* 2005) there are no other apparent significant ecological constraints relating to the removal of vegetation from the site.

2.0 INTRODUCTION

Biosis Research Pty. Ltd. (Biosis Research) was engaged by Redbox Design Group to undertake a preliminary ecological assessment for the proposed redevelopment of the Brumbies Rugby Facility at 18 Austin Street, Griffith ACT (subject site).

This report provides a description of the sites' ecological condition and conservation value. The assessment also considers the potential impact of the proposed development on relevant threatened species and ecological communities (or their potential habitats within or adjacent to the subject site) that are listed under the ACT's *Nature Conservation Act 1980* (NC Act) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This report fulfils the initial assessment requirements under the ACT's *Planning and Development Act 2007*.

A concept plan for the proposed development was provided to Biosis Research by Redbox Design Group prior to the site investigation.

2.1 Proposal

The proposed development includes: the construction of an undetermined number of residential dwellings in the south-western corner; the reconfiguration of Griffith Oval and Oval No.2; a new club house and training facility for the ACT Brumbies Rugby Club; Child Care facility and parking for 120 cars. Additional works include walkways and landscaping.

While the full extent of vegetation clearing is unclear it is assumed that all, excluding perimeter trees and shrubs, would be removed.

2.2 Aims of the Assessment

The primary aims of this assessment were to:

- undertake a background literature and database review for threatened species, populations and endangered ecological communities (and their habitats) listed under the NC Act 1980 and EPBC Act 1999 relevant to the subject site and surrounds;
- determine the vegetation type and condition within the subject site;
- identify any ecological constraints and make interim recommendations to avoid or minimise impact of the proposed development; and,
- identify need for future targeted species surveys and/or Referral to the Federal

Environment Minister in accordance with the provision of the EPBC Act.

2.3 Location and Description

2.3.1 Subject site

The subject site is located within Griffith, ACT (Figure 1) and is bounded by Austin Street to the south, Flinders Way and La Perouse Street to the west and Captain Cook Crescent to the east (Figure 2), and is identified as Section 42, Blocks 13, 15, 16 and 17 (see, <http://www.actmap.act.gov.au/framesetup.asp>) and occupies about 7 ha.

Land within the subject site is zoned C26 'Leisure and Accommodation' and PR21 'Urban Open Space'. Current uses include an administrative and training facility for the ACT Brumbies, sporting fields and open space. The surrounding land contains low density residential housing (established during the 1940-50s), primary and secondary roadways, car parks, pathways and recreational facilities such as tennis courts and parkland. Manuka commercial district is situated less than 500m to the north.

2.3.2 Regional Definition

The subject site falls within the Canberra-Queanbeyan Landscape Unit (Fallding 2002) and more broadly the IBRA South Eastern Highlands Bioregion (Thackway and Cresswell 1995).

2.3.3 Local Land Use

Local land uses include: urban residential, commercial, recreational and transport links.

2.3.4 Landform and Drainage

The subject site is flat, low lying and situated between the rise of Red Hill to the south-west and Lake Burley Griffin to the north.

Local stormwater runoff is directed into a small open channel that runs along the western boundary of the site, parallel with Flinders Way. Water discharges from the channel into Lake Burley Griffin.

2.4 Relevant Legislation and Planning Policies

Commonwealth and Territory legislation (and local policies and strategies) relevant to environmental protection and conservation in the ACT are listed below.

2.4.1 Commonwealth Legislation

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

2.4.2 ACT Legislation

- *Environment Protection Act 1997* (EP Act);
- *ACT Environment Protection Policy*;
- *Planning and Development Act 2007* (PD Act);
- *Planning and Development Regulation 2008*;
- *Tree Protection Act 2005* (TP Act);
- *Nature Conservation Act 1980* (NC Act);
- *Pest Plants and Animals Act 2005* (PPA Act);
- *ACT Weeds Strategy 2009-2019*.

2.4.3 ACT and NSW Regional Planning Framework

The *Planning Framework for Natural Ecosystems of the ACT and NSW Southern Tablelands* (Fallding 2002) was developed to provide a strategic framework that addresses the uncertainties of the planning process and to provide a tool for habitat conservation in the region. Part 5 of *Planning Framework for Natural Ecosystems of the ACT and NSW Southern Tablelands* presents a ‘modelled’ strategic approach for prioritising land use and management according to four planning settings:

- Planning setting A – Areas of known conservation importance;
- Planning setting B - Areas of predicted conservation importance;
- Planning setting C - Areas of uncertain importance for biodiversity conservation –more investigation required; and,
- Planning setting D - Areas likely to have limited conservation values.

Habitats within and surrounding the subject site fall within planning settings C and D.

3.0 METHODS

3.1 Literature and Database Sources

Local records of threatened species, populations and endangered ecological communities were obtained from two web based database sources:

- <http://www.gim.act.gov.au/website/incp/viewer.htm> ACT Government Integrated Nature Conservation Plan (INCP) online database; and,
- <http://www.environment.gov.au/erin/ert/epbc/index.html> DEWHA EPBC online database.

Background documents and maps considered in the preparation of this report were:

- *A Planning Framework for Natural Ecosystems of the ACT and NSW Southern Tablelands* (Falling 2002);
- *A Vision Splendid of the Grassy Plains Extended: ACT Lowland Native Grassland Conservation Strategy. Action Plan No. 28.* (ACT Government 2005); and,
- *Woodland for Wildlife: ACT Lowland Woodland Conservation Strategy Action Plan No. 27* (ACT Government 2004).

3.2 Habitat Assessment

The subject site was inspected on 12 and 28 November 2009 to assess the broad vegetation features, dominant plants species and general habitat attributes of the site.

Targeted searches for animals or quantitative sampling for plants were not undertaken. The assessment was conducted ‘on-foot’ randomly throughout the subject site and the immediate surrounds.

3.3 Conservation Significance Assessment

The following factors were considered in assessing the conservation significance of vegetation and habitats on the subject site.

- size;
- connectivity of habitats;
- significant flora and fauna species;
- significant vegetation communities and/or habitats;
- conservation status;

- condition;
- ecological integrity; and,
- Species richness and diversity.

3.4 Taxonomy

Taxonomy is the term that applies to the classification and naming of living things and is usually based on physical and/or genetic similarities.

Plant taxonomy used in this report follows

<<http://www.environment.gov.au/biodiversity/abrs/online-resources/flora/index.html>>.

Animal taxonomy used in this report follows the Australian Faunal Directory (AFD) located at <<http://www.environment.gov.au/biodiversity/abrs/online-resources/index.html>>.

4.0 RESULTS

4.1 Database and Literature Searches

Threatened Plants

Five threatened plant species and/or their habitats have either been recorded or have potential habitat within 5 km of the subject site (ACT INCP map search and EPBC online protected matters search tool, see Section 3.1, above). Of these species, three are listed under the NC Act and five under the EPBC Act:

- Ginninderra Peppercress *Lepidium ginninderrense* (EPBC Act & NC Act);
- Small Purple Pea *Swainsona recta* (EPBC Act & NC Act);
- Hoary Sunray *Leucochrysum albicans* var. *tricolor* (EPBC Act);
- Button Wrinklewort *Rutidosia leptorrhynchoidea* (EPBC & NC Act); and,
- Austral Toadflax *Thesium australe* (EPBC Act).

The extent of habitat modification and the long history of urban development make the subject site and much of the surrounds unsuitable for any of these species.

Ginninderra Peppercress is only known from one location within the Belconnen Naval Transmission Station at Lawson ACT. It was previously recorded in the suburb of Reid, on the northern side of Lake Burley Griffin, but recent searches have failed to relocate the species (ACT Government 2005).

The nearest recorded populations of the Button Wrinklewort occur to the west at Red Hill Nature Reserve; the north-west at Capital Hill and north-west at Stirling Park, Yarralumla (ACT Government 2005).

The Small Purple Pea was recorded to the north-west, near the Glenloch Interchange (ACT Government 2004), although it is unknown if this population now persists. Other populations can be found at Mt Talyor, Kambah and along the Cooma-Goulburn Railway corridor near 'Tralee Station'.

Threatened Animals

Fourteen threatened terrestrial animal species and/or their habitats have been identified within 5 km of the subject site (ACT INCP map search and EPBC online protected matters search tool, see Section 3.1, above). Of these species thirteen are listed under the NC Act and seven under the EPBC Act.

- Golden Sun Moth *Synemon plana* (EPBC Act & NC Act);
- Perunga Grasshopper *Perunga ochracea* (NC Act);

- Striped Legless-lizard *Delma impar* (EPBC Act & NC Act);
- Pink-tailed Worm-lizard *Apraisa parapulchella* (EPBC Act & NC Act);
- Little Eagle *Hieraaetus morphnoides* (NC Act);
- Australian Painted Snipe *Rostratula australis* (EPBC Act);
- Hooded Robin *Melanodryas cucullata* (NC Act);
- Brown Treecreeper *Climacteris picumnus* (NC Act);
- Varied Sittella *Daphoenositta chrysoptera* (NC Act);
- White-winged Triller *Large sueurii* (NC Act);
- Superb Parrot *Polytelis swainsonii* (EPBC Act & NC Act);
- Swift Parrot *Lathamus discolor* (EPBC Act & NC Act);
- Regent Honeyeater *Xanthomyza phrygia* (EPBC Act & NC Act); and,
- Painted Honeyeater *Grantiella picta* (NC Act).

The Golden Sun Moth has been recorded within grassland habitats within central Canberra district, including York Park and St Marks Church in Barton, St John's Church in Reid and at the corner of Stuart Street and McIntyre Street Griffith. *The species was recorded during the current assessment, see discussion in Section 4.3, below.*

The nearest record of the Perunga Grasshopper and Striped Legless Lizard is from a small patch of natural temperate grassland at Yarramundi Reach, to the north-west. Other known populations of the Striped Legless Lizard occur within the Jerrabomberra and Majura Valleys. *There are no habitat opportunities for either species on the subject site.*

The nearest record of the Pink-tailed Worm Lizard is from Red Hill to the west. The species also occurs within other rocky knolls within the Canberra Nature Park, lower Molonglo and Murrumbidgee River corridors and the Jerrabomberra Valley. *There are no habitat opportunities for this species on the subject site.*

There are no known records of the Australian Painted Snipe, Hooded Robin, Varied Sittella, White-winged Triller, Brown Treecreeper, Superb Parrot, Swift Parrot, Regent Honeyeater and Painted Honeyeater within the or adjacent to the subject site. The habitat type within the subject site (urban forest/parkland) would suggest that any occurrence, while not impossible, is probably very rare.

The Varied Sittella and Little Eagle although not common have been recorded at Red Hill Nature Reserve to the west. Surprisingly, there are no records of White-winged Triller, Hooded Robin or Brown Treecreeper within Red Hill Nature Reserve (COG Fact Sheets 2). *The subject site would have no special importance for these species.*

Endangered Ecological Communities

Two endangered ecological communities (EECs) occur within the ACT, they are:

- *Natural Temperate Grassland of the ACT and Southern Tablelands* (NTG), which occurs at Yarralumla, York Park, St Marks Church and Jerrabomberra Valley; and,
- *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*¹, referred to as 'Yellow Box/Red Gum Grassy Woodland' in the ACT.

4.2 Site Assessment - Vegetation

Vegetation on the subject site was separated into three broad types:

- urban forest comprising exotic and non-local native trees and shrubs;
- grassy areas, including bowling greens and Griffith Oval and roadsides; and,
- overgrown riparian vegetation along unnamed drainage channels.

Urban Forest

In excess of 200 planted trees and shrubs occur within the subject site, none of which are considered endemic to the Canberra region. Trees include Elm *Ulmus* sp. Cedar *Cedrus ?atlantica*, Cork Oak *Quercus suber*, Southern Blue Gum *Eucalyptus bicostata* and White Poplar *Poplar alba*. Some trees are of substantial size, i.e. Southern Blue Gum and White Poplar and exceed 20 m in height, or have large spreading canopies, such as Elms that ring Griffith Oval.

Shrubs comprised a mix of native and non-native varieties and were scattered throughout the area, included exotic Chinese Hawthorn *Photinia serratifolia* and Wedge-leaved Wattle *Acacia pravissima*.

Grassy Groundcovers

Except for a small patch of severely modified grassland at the south-eastern corner (which contained a low diversity of native groundcover species including Speargrass *Austrostipa scabra* and Wallaby Grass *Austrodanthonia* sp.) there are no other vestiges of the native or secondary grassland on the subject site.

¹ listed as a 'Critically Endangered Ecological Community' under the EPBC Act

Groundcover vegetation beneath trees and shrubs is dominated by non-native herbaceous species, such as Phalaris *Phalaris aquatica*, Oats *Avena* sp., Barley Grass *Hordeum* sp..

Understories within wetter and shaded areas were dominated by exotic grasses and forbs, including Prairie Grasses *Bromus* spp., Phalaris *Phalaris aquatica* and Lesser Canary Grass *Phalaris minor*.

Drainage channels

The riparian vegetation comprised mostly exotic tree and shrub cover and was dominated by Black Poplar *Poplar nigra*, White Poplar, Willow *Salix* sp. and Southern Blue Gum.

Groundcovers contained a range of non-native grasses and forbs, including Prairie Grass, Phalaris, Sun Spurge *Euphorbia helioscopia*, Great Mullein *Verbascum thapsis* and a range of other non-native herbaceous species.

4.2.1 Endangered Ecological Communities

There was no evidence that either NTG or Box/Gum Grassy Woodland occurred within the subject site.

4.2.2 Recorded Plants

A total of 75 vascular plant species were recorded, which included 60 introduced species and 5 planted non-local eucalypt species (Appendix 1).

No threatened species of plant were recorded.

4.2.3 Noxious Weeds

Noxious weeds included: African Lovegrass *Eragrostis curvula* and Chilean Needle Grass *Nassella nessiana* (Appendix 1).

4.3 Site Assessment: Animals

Few animal species were observed during the field investigation those noted are provided in Table 1, below.

The Common Eastern Froglet *Crinia signifera* was heard calling from an unnamed drainage channel along the western boundary. No other frog species was identified.

Fourteen species of bird were recorded during the short site visit (Table 1). These included Galah *Cacatua roseicapilla*, Sulphur-crested Cockatoo *Cacatua galerita*, Crimson Rosella *Platycercus elegans*, Yellow-tailed Black Cockatoo *Calyptorhynchus funereus*, Australian Raven *Corvus coronoides* and Striated Pardalote *Pardalotus striatus*.

The Critically Endangered Golden Sun Moth (GSM) *Synemon plana* was observed in low numbers (4 males) at the south-east corner (cnr of Captain Cook Crescent and Austin Street) and within the road reserve along Captain Cook Crescent (2 males), directly opposite Griffith Oval (Figure 3). The remainder of the subject site was considered unsuitable for this species.

Table 1: Incidental observations of animal species.

Common Name	Scientific Name	Location	Status
Invertebrate			
Golden Sun Moth	<i>Synemon plana</i>	South-eastern corner within modified grassland	CE/E
Frog			
Common Eastern Froglet	<i>Crinia signifera</i>	Drainage channel	c
Reptile			
Grass Skink	<i>Lampropholis delicata</i>	West side of site	c
Bird			
Australian Magpie	<i>Gymnorhina tibicen</i>	On and off site	c
Australian Raven	<i>Corvus coronoides</i>	On and off site	cb
Common Mynah	<i>Sturnus tristis</i>	On and off site	i
Crimson Rosella	<i>Platycercus elegans</i>	On and off site	cb
Galah	<i>Cacatua roseicapilla</i>	On and off site	cb
Noisy Miner	<i>Manorina melanocephala</i>	Tree canopy on and off site	cb
Pied Currawong	<i>Strepera graculina</i>	On and off site	cb
Red Wattlebird	<i>Anthochaera chrysoptera</i>	On and off site	cb
Striated Pardalote	<i>Pardalotus striatus</i>	Tree canopy	cm
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	On and off site	cb
Superb Fairy-wren	<i>Malurus cyaneus</i>	low shrubs along drainage channel	cb
Yellow-tailed Black Cockatoo	<i>Calyptorhynchus funereus</i>	Call overhead	cb
Weebill	<i>Smicrornis brevirostris</i>	Tree canopy	cb
White-throated Gerygone	<i>Gerygone albogularis</i>	Tree canopy	cm

Key: CE = Critically Endangered EPBC Act; E = Endangered NC Act; c = common species; cb = common breeding resident; cm = common migrant to the ACT; i = introduced.

4.4 Habitat Assessment

4.4.1 Habitats

Fauna habitats of the subject site and surrounding areas correlate broadly to the

structure and composition of the vegetation and landscape features discussed above.

While the subject site provided some food and nesting resources for commonly occurring native and introduced birds. Because of the limited structural complexity, small size and lack of habitat connectivity the opportunities for rare or threatened species were limited and it was of little surprise that a few animal species were observed.

Habitat for the GSM occurred within modified grassland areas at the south-eastern corner of the subject site and the road reserves along Captain Cook Crescent (Figure 3).

5.0 CONSERVATION SIGNIFICANCE

The majority of the subject site has low conservation value at the Territory and Commonwealth levels and would require no further assessment.

The modified grassland at the south-eastern corner and within the road reserves along Captain Cook Crescent contained habitat for the GSM, although observations suggest that the moth occurs in low densities in these areas. Nevertheless additional surveys should be conducted for the species to more accurately determine their density and distribution.

6.0 RECOMMENDATIONS

The following recommendations are provided to assist in the project planning and to reduce the potential impacts on modified grassland along road reserves and at the south-eastern corner of the subject site. These recommendations are made without a full knowledge of the development scope and detail, and are therefore subject to revision.

Further assessment should be undertaken for the GSM along the eastern boundary of the subject site to determine the distribution and density of the species, and to determine if referral to the Commonwealth is required (in accordance with the provision of the EPBC Act) for the proposed development.

Landscaping plans should endeavour to retain the grassy area at the south-eastern corner and as many established trees as is possible, particularly eucalypt species that occur along the margins of the property.

7.0 CONCLUSION

The subject site has been an established residential area for at least 60 years and there is almost complete absence of any native vegetation, consequently the conservation value of the site, relative to local natural vegetation, is considered low. The site does provide some habitat opportunities (shelter/food) for native species of animal although these are not diverse. Species that expected to occur are for the most part common urban dwelling or disturbance tolerant species.

The presence of Golden Sun Moth *Synemon plana* at the south-eastern corner of the site (and within the road reserve along Captain Cook Crescent) presents a seemingly contradictory view, however, it is not uncommon to find this species in the Canberra urban area, particularly where groundcover vegetation is not greatly modified and soil displacement is minimal. The density and distribution of the species on the subject site appears to be low and restricted, respectively, and provided this is true the proposed redevelopment is unlikely to incur a significant impact on this species.

Further surveys are recommended for the Golden Sun Moth to more accurately determine the density and distribution of the species both at the south-eastern corner of the subject site and the adjacent road reserves, particularly along Captain Cook Crescent.

APPENDICES

Appendix 1: Flora List

1:1 Vascular plants recorded during this study.

Introduced taxa are marked with an asterisk. Families are arranged alphabetically.

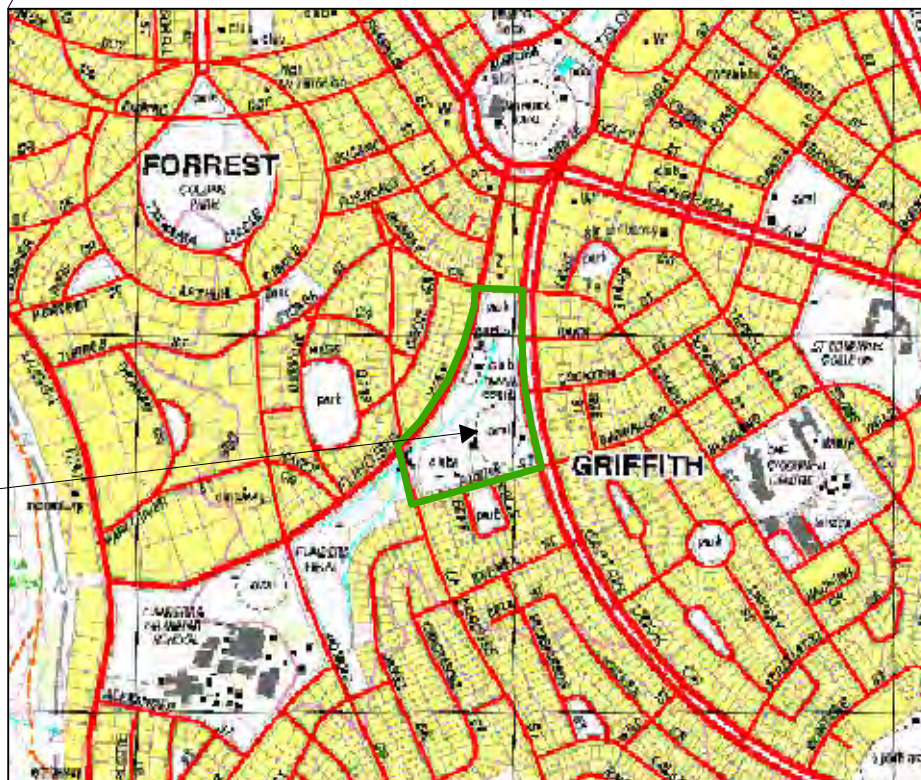
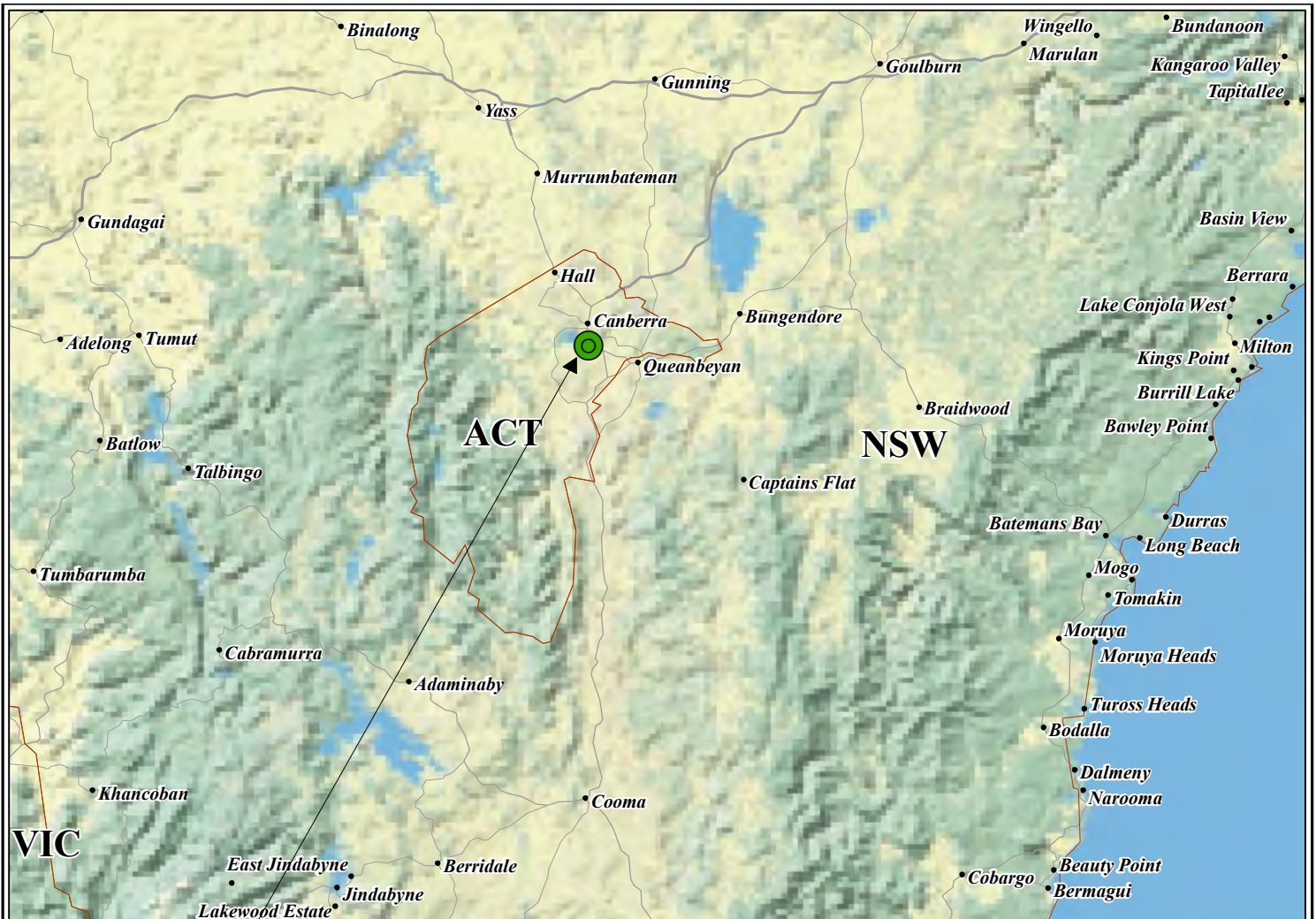
Family	Scientific Name	Common Name	Comment
Trees			
Cupressaceae	* <i>Chamaecyparis ?lawsoniana</i>	False Cypress	
	* <i>Cupressus ?glabra</i>	Cypress	
Fagaceae	* <i>Quercus suber</i>	Cork Oak	S. of oval
Myrtaceae	<i>Eucalyptus ?aggregata</i>	Black Gum	E. of oval
	<i>Eucalyptus bicostata</i>	Southern Blue Gum	Not native to ACT. E. and S-W. of oval
	<i>Eucalyptus sideroxylon</i>	Red Ironbark	Not native to ACT
	<i>Eucalyptus cinerea</i>	Argyle Apple	Not native to ACT
	<i>Eucalyptus</i> sp.		
Pinaceae	* <i>Cedrus ?atlantica</i>	Cedar	E. side of oval
Salicaceae	* <i>Poplar alba</i>	White Poplar	W. of oval
	* <i>Poplar nigra</i>	Lombardy Poplar	W. of oval
	* <i>Salix</i> sp.	Willow	W. of oval
Ulmaceae	* <i>Celtis</i> sp.	European Nettle Tree	S. of oval
	* <i>Ulmus</i> sp.	Elm	Surrounding oval
Srubs			
Mimosaceae	<i>Acacia pravissima</i>	Wedge-leaf Wattle	
Rosaceae	* <i>Photinia serratifolia</i>	Chinese Hawthorn	Around margins of former bowling greens
Solanaceae	* <i>Lycium ferocissimum</i>	African Boxthorn	
Vines			
Araliaceae	* <i>Hedera helix</i>	English Ivy	
Caprifoliaceae	* <i>Lonicera japonica</i>	Japanese Honeysuckle	
Groundcovers			
Asteraceae	* <i>Arctotheca calendula</i>	Capeweed	
	* <i>Cirsium vulgare</i>	Spear Thistle	
	* <i>Conyza</i> sp.	a Fleabane	
	* <i>Hypochaeris radicata</i>	Catsear, Flatweed	
	* <i>Lactuca serriola</i>	Prickly Lettuce	
	* <i>Sonchus oleraceus</i>	Common Sowthistle	
	* <i>Taraxacum officinale</i>	Dandelion	

Family	Scientific Name	Common Name	Comment
	<i>*Tolpis umbellata</i>	Yellow Hawkweed	
	<i>*Tragopogon ?porrifolius</i>		
	<i>Senecio quadridentatus</i>	a Fireweed	
Brassicaceae	<i>*Capsella bursa-pastoris</i>	Shepherd's Purse	
Campanulaceae	<i>Wahlenbergia</i> sp.	bluebell	
Caryophyllaceae	<i>*Cerastium ?glomeratum.</i>	chickweed	
	<i>*Spergularia rubra</i>	Red Sand Spurrey	
	<i>*Viburnum tinus</i>	Laurustinus	Hedge around bowling greens
Euphorbiaceae	<i>*Euphorbia helioscopia</i>	Sun Spurge	
	<i>*Euphorbia peplus</i>	Petty Spurge	
Fabaceae	<i>*Trifolium arvense</i>	Hare's Foot Clover	
	<i>*Trifolium repens</i>	White Clover	
	<i>*Medicago arabica</i>	Spotted Medic	
	<i>*Medicago</i> sp.		
Geraniaceae	<i>*Erodium cicutarium</i>	Common Storks-bill	
	<i>Erodium crinitum</i>	Blue Storks-bill	
Iridaceae	<i>*Iris germanica</i>	Bearded Iris	
	<i>*Romulea</i> sp.	onion grass	
Malvaceae	<i>*Malva neglecta</i>	Mallow	
Oxalidaceae	<i>*Oxalis</i> sp.		
	<i>Oxalis perennans</i>	Grassland Wood Sorrel	
Papaveraceae	<i>*Papaver somniferum</i>	Opium Poppy	
Pinaceae	<i>*Pinus radiata</i>	Monterey Pine	
Plantaginaceae	<i>*Plantago lanceolata</i>	Lamb's Tongues	
Poaceae	<i>Austrodanthonia</i> sp.	Wallaby Grass	South-eastern corner
	<i>Austrostipa scabra</i>	Slender Speargrass	E. of oval
	<i>*Avena</i> sp.	Oats	
	<i>*Bromus diandrus</i>	Prairie Grass	
	<i>*Bromus catharticus</i>	Prairie Grass	
	<i>*Cynodon dactylon</i>	Couch	
	<i>*Dactylis glomerata</i>	Cocksfoot	
	<i>*Eragrostis curvula</i>	African Lovegrass	S. & E. boundary
	<i>*Hordeum leporinum</i>	Barley Grass	scattered
	<i>*Nassella neesiana</i>	Chilean Needle Grass	E. of oval
	<i>Panicum effusum</i>	Hairy Panic	
	<i>*Phalaris aquatica</i>	Phalaris	Creekline
	<i>*Phalaris minor</i>	Lesser Canary Grass	
	<i>*Poa annua</i>	Winter Grass	W. of oval
	<i>Poa</i> sp.	poa	

Family	Scientific Name	Common Name	Comment
	<i>*Lolium perenne</i>	Perennial Ryegrass	scattered
	<i>*Vulpia sp.</i>	Rats Tail Fescue	scattered
Polygonaceae	<i>Rumex brownii</i>	Slender Dock	
Ranunculaceae	<i>*Ranunculus repens</i>	Creeping Buttercup	
Rosaceae	<i>Acaena ovina</i>	Sheep's Burr	
	<i>*Rubus fruticosus</i>	Blackberry	
Rubiaceae	<i>*Galium aparine</i>	Bedstraw	
Scrophulariaceae	<i>*Verbascum thapsis</i>	Great Mullein	
Solanaceae	<i>*Solanum mauritianum</i>	Tobacco Bush	
Verbenaceae	<i>*Verbena bonariensis</i>	Purpletop	

Key: * introduced species

FIGURES



Study Area

Acknowledgements:
Topographic imagery from Land and Property Authority NSW topographic map series (2006)
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Figure 1: Location of the Study Area in a regional context

Date: 30 November 2009

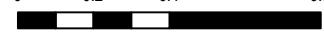
Drawn By: RS

File ID: S5701

Checked By: TO

Location: 5701\Mapping\S5701 F1_region.mxd

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Kilometers



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Acknowledgements: Image from
Redbox Design Group

Figure 2: Site Plan

Date: 3 December 2009

Drawn by: RS

File: S5701

Checked by: TO

Location: 5701\Mapping\S5701 F2_site.mxd





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Acknowledgements: Image from
Lands and Property Authority
NSW SIX Viewer (3/12/2009)

Figure 3: Location of Golden Sun Moth habitat

Date: 3 December 2009

Drawn by: RS

File: S5701

Checked by: TO

Location: 5701\Mapping\5701 F3_habitat.mxd



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