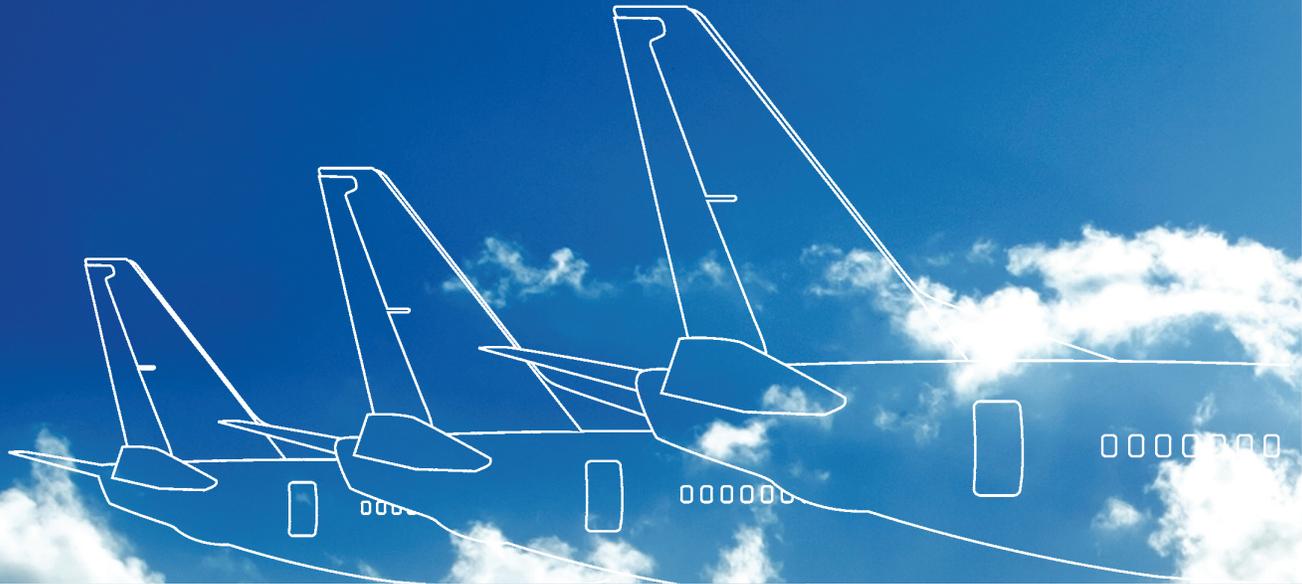


CANBERRA
AIRPORT



Canberra Airport 2009 Master Plan Offset Strategy

Infrastructure Upgrade and Construction
(EPBC 2009/4748)

9 February 2010



Canberra Airport takes its environmental responsibilities seriously. Given this it will do all that it is reasonable and practicable in the circumstances to ensure it and its employees, officers, agents, and contractors comply with this strategy.

Canberra Airport has taken expert advice from Peter Robertson, Wildlife Profiles Pty Ltd and co-author of the Grassland Earless Dragon Recovery Plan, Alison Rowell, Qualified Ecologist and University of Canberra, Institute of Applied Ecology.

Canberra Airport has also consulted with the Department of Defence, ACT Commissioner for Sustainability and the Environment, Friends of Grasslands, Conservation Council - ACT Region, ACT Department of Environment, Climate Change, Energy & Water, Limestone Plains Group and peak community groups (ACT and NSW) regarding the EPBC Act referrals and listed threatened species on Airport.

This Canberra Airport Offsets Strategy (EPBC 2009/4748) was approved by the Minister for the Environment, Water, Heritage and the Arts on 9 February 2010, as a condition to EPBC Act Referral 2009/4748 prior to commencing the *Infrastructure upgrade and Construction at Canberra Airport*.

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Attachment A – *Infrastructure upgrade and Construction at Canberra Airport (EPBC 2009/4748)* notice of approval

Attachment B – Plan of Management for “The Parlour Grasslands” Conservation Area

1.0 Introduction

Canberra Airport has a responsibility to the Airlines, aviation businesses including freight companies and the community to ensure that infrastructure including the construction and widening of runways, taxiways and aprons is in place to meet aviation demand and ensure the safe, regular and efficient management of aviation and other traffic on and around the Airport.

The necessary upgrades to aviation infrastructure and development are outlined in the Airport's approved 2009 Master Plan. These include upgrades to taxiway, aprons and navigation aids and the construction of the northern road.

In February 2009, a referral (EPBC 2009/4748) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was submitted to the Department of Environment, Water, Heritage and the Arts (DEWHA) for the *Infrastructure upgrade and construction at Canberra Airport* during the 20 year forecast of Canberra Airport's 2009 Master Plan.

The *Infrastructure upgrade and construction at Canberra Airport EPBC 2009/4748* referral underwent extensive public consultation not only through the EPBC Act process but also through the 60 business day public consultation process for the 2009 Master Plan.

The referral was approved with conditions on 11 November 2009 by the Department of the Environment, Water, Heritage and the Arts (refer to Attachment A). Approval condition 3 requires the approval of this Offset Strategy with details of offsets for the removal of natural temperate grassland and Grassland Earless Dragon and Golden Sun Moth habitat.

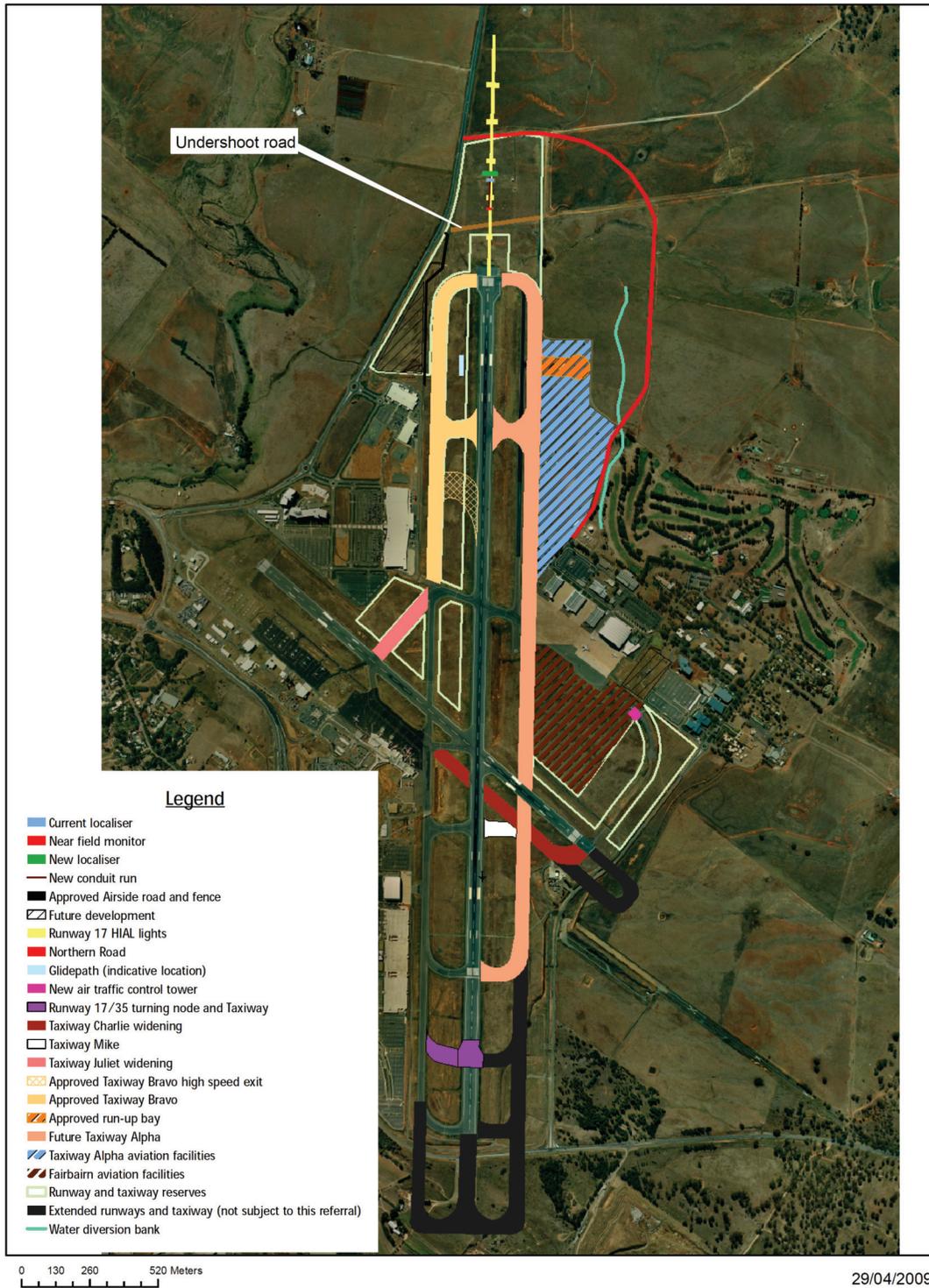
2.0 Development

The 2009 Master Plan identified a wide range of new developments, upgrades and improvements to aeronautical infrastructure to ensure that Canberra Airport is ready to cater for the future requirements of civil aviation and other users of the Airport. The proposed developments will also allow for the safe, regular and efficient management of aviation and other traffic around the Airport as shown in Figure 1 and include:

- Extension of the Fairbairn apron;
- Construction of Taxiway Alpha aviation facilities;
- Construction of Taxiway Mike;
- Realignment and widening of Taxiway Alpha to meet relevant standards;
- Widening and strengthening of Taxiways Charlie and Juliet;
- Construction of a new Air Traffic Control Tower;
- Upgrades to tarmacs in all precincts;
- Relocation of Runway 35 threshold;
- Turning node on Runway 17/35;
- New link taxiways to Runway 17/35;
- Relocation of General Aviation area;
- Expansion of freight facilities;
- Improving drainage north of Majura;
- Upgrading of lighting, including new High Intensity Approach Lighting (HIAL) to Runway 17;
- GPS Ground Station;
- Provision for Runway Visual Range (RVR) instruments and other infrastructure required for improved precision navigation;
- Upgrading of the aerodrome to Category II and III ILS/GPS on Runways 17/35;
- Upgraded Airfield lighting;
- Relocation of Instrument Landing System (ILS);
- Construction of a northern access road (currently Defence land);
- Upgrading of the airside roads; and
- Provision of buffers to ensure ongoing maintenance of airfield and aviation:
 - 10m road corridor
 - 4m from the building
 - 60m taxiway corridor
 - 90m cross Runway 12/30 corridor
 - 150m main runway 17/35 corridor

These developments will be undertaken on an as need basis and the total amount of natural temperate grassland likely to be removed during the implementation of the 2009 Master Plan is 23ha on Airport and 0.84ha on Defence land for the HIAL (calculated using Canberra Airport 2004 grassland monitoring data).

Figure 1: Proposed developments approved with conditions under the EPBC Act



3.0 Approval conditions

The developments listed in Section 2 have been approved with conditions in the *Infrastructure upgrade and construction at Canberra Airport EPBC 2009/4748* referral on 11 November 2009 (Attachment A).

The approved referral (EPBC 2009/4748) Condition 3 states:

- 3** *The person taking the action must develop and submit a Canberra Airport Offsets Plan which must include but not be limited to:*
- a) The acquisition and protection in perpetuity of land containing natural temperate grassland at a ratio of 3 hectares for every one hectare removed while the total area of natural temperate grassland removed remains under 15 hectares;*
 - b) The acquisition and protection in perpetuity of land containing natural temperate grassland at a ratio of 5 hectares for every one hectare removed once the total area of natural temperate grassland removed equals or exceeds 15 hectares; and*
 - c) Provide details of the future ownership and management of the land to be used as the offset.*
- The Canberra Airport Offsets Plan must be submitted to and approved by the Minister prior to removal of any natural temperate grassland or habitat for listed threatened species. The approved Canberra Airport Offsets Plan must be implemented.*

4.0 Offset Actions

In response to the referral approval conditions Canberra Airport has prepared this Offset Strategy for referral *Infrastructure upgrade and construction at Canberra Airport EPBC 2009/4748*.

The Offset Actions are tabularised below in Table 1 and discussed in further detail in subsequent sections.

Table 1: Summarised Offset Actions

Response to condition:	Offset Action	Refer to Section	Refer to Pages
3(a) & 3(b)	Acquisition of offset land	4.1	8
3 (c)	Providing details of future ownership and management of offset land	4.2	9
	Designation of a Conservation Area	5.0	9
	Investigation of Malcomvale Property	6.0	10-11
	Promotion of a Consultative Panel	7.0	12
	Timeframe for completion of offset actions	8.0	13-14

4.1. Acquisition of Land

Canberra Airport investigated the acquisition of the Parlour Grasslands, in response to condition 3(a), and received in principle support from the Department of Environment, Water, Heritage and the Arts. Contracts for the Parlour Grassland were subsequently exchanged.

The offset property “Parlour Grasslands” contains a Conservation Area of approximately 47ha and is subject to a conservation management agreement with the Nature Conservation Trust of New South Wales, in a form acceptable to the Department of Environment, Water, Heritage and the Arts.

The offset will be at a ratio of 3 hectares for every one hectare removed from the Airport while the total area of natural temperate grassland removed remains under 15 hectares and at a ratio of 5 hectares for every one hectare removed once the total area of natural temperate grassland removed equals or exceeds more than 15 hectares.

The “Parlour Grasslands” is being purchased as the offset for this Master Plan Offset Strategy EPBC 2009/4748 and Canberra Airport will sign a Trust Agreement with the Nature Conservation Trust of NSW as outlined in the Plan of Management.

The maximum area of NTG cleared on Canberra Airport at any given time will be limited to the area that is offset for under approval conditions 3 a) and b) at that time. Consequently the purchase of the Parlour Grasslands property will provide an offset for the first stage of development at Canberra Airport.

Additional offset land will be acquired on a pro-rata basis as required. The area of NTG on offset properties will be accurately mapped by a suitable qualified expert, and the total amount of NTG determined before any further development at Canberra Airport.

4.2. Details of future ownership and management of offset land

Canberra Airport Pty Ltd (or its nominee) will manage the offset land in perpetuity as required. Details of any transactions will be supplied to the Department of Environment, Water, Heritage and the Arts prior to completion.

The Plan of Management for “The Parlour Grasslands” Conservation Area is provided in Attachment B and has been agreed upon between Canberra Airport, the Department of Environment, Water, Heritage and the Arts and other relevant authorities, including the Nature Conservation Trust of NSW.

The Plan of Management is consistent with the ACT Lowland Native Grassland Conservation Strategy, Action Plan 28 and National Recovery Plan for Natural Temperate Grassland of the Southern Tablelands (NSW and ACT): An Endangered Ecological Community.

The Parlour Grasslands includes a 1.5ha development area that is located close to the entry point into the property and existing road so as to minimise disturbance to the grasslands.

No final decisions have been made concerning development on the development area, however all development is subject to the terms of the Trust Agreement and the Plan of Management.

Conservation groups, such as the Friends of Grasslands, may also be invited to inspect the Parlour Grasslands as a field trip site. This will be

undertaken in accordance with the Plan of Management.

The removal of seed from the Parlour Grasslands, for use outside of the property, will be undertaken in accordance with the Plan of Management to ensure that an adequate natural seed bank is retained in the Conservation Area to allow for natural regeneration processes.

5.0 Conservation Area

A Conservation Agreement between the Department of Environment, Water, Heritage and the Arts and Canberra Airport is to be formally submitted and finalised, in the event that the land is incorporated into the Canberra Airport lease for the purpose of constructing the northern road, in response to the referral approval conditions for the *Transfer of Defence Land at Majura, ACT EPBC 2007/3756*.

In addition, the natural temperate grassland and listed threatened species to the north of the Airport’s undershoot road is to be placed in the Conservation Agreement as part of the offset for this *Infrastructure upgrade and construction at Canberra Airport EPBC 2009/4748* referral. Refer to Figure 2 below.

This Conservation Area was identified by Canberra Airport in the referral and Preliminary Documentation for EPBC 2009/4748 as being beneficial for the long term viability of natural temperate grassland and listed threatened species on Airport.

6.0 Investigation of West Malcolmvale

The southern section of the northern road reserve, otherwise known as the former West Malcolmvale property, will require further assessment, in the event the land is incorporated into the Airport lease for the purpose of constructing the northern road, as to whether the site supports listed threatened species and if rehabilitation of the site is viable.

The west Malcolmvale property was leased by Defence as a rural lease until July 2007 and was not part of the Majura Military Training Area.

At present the site is assessed as native pasture with high weed infestation. No recent fauna surveys have been conducted.

The investigations proposed for the Malcolmvale property include:

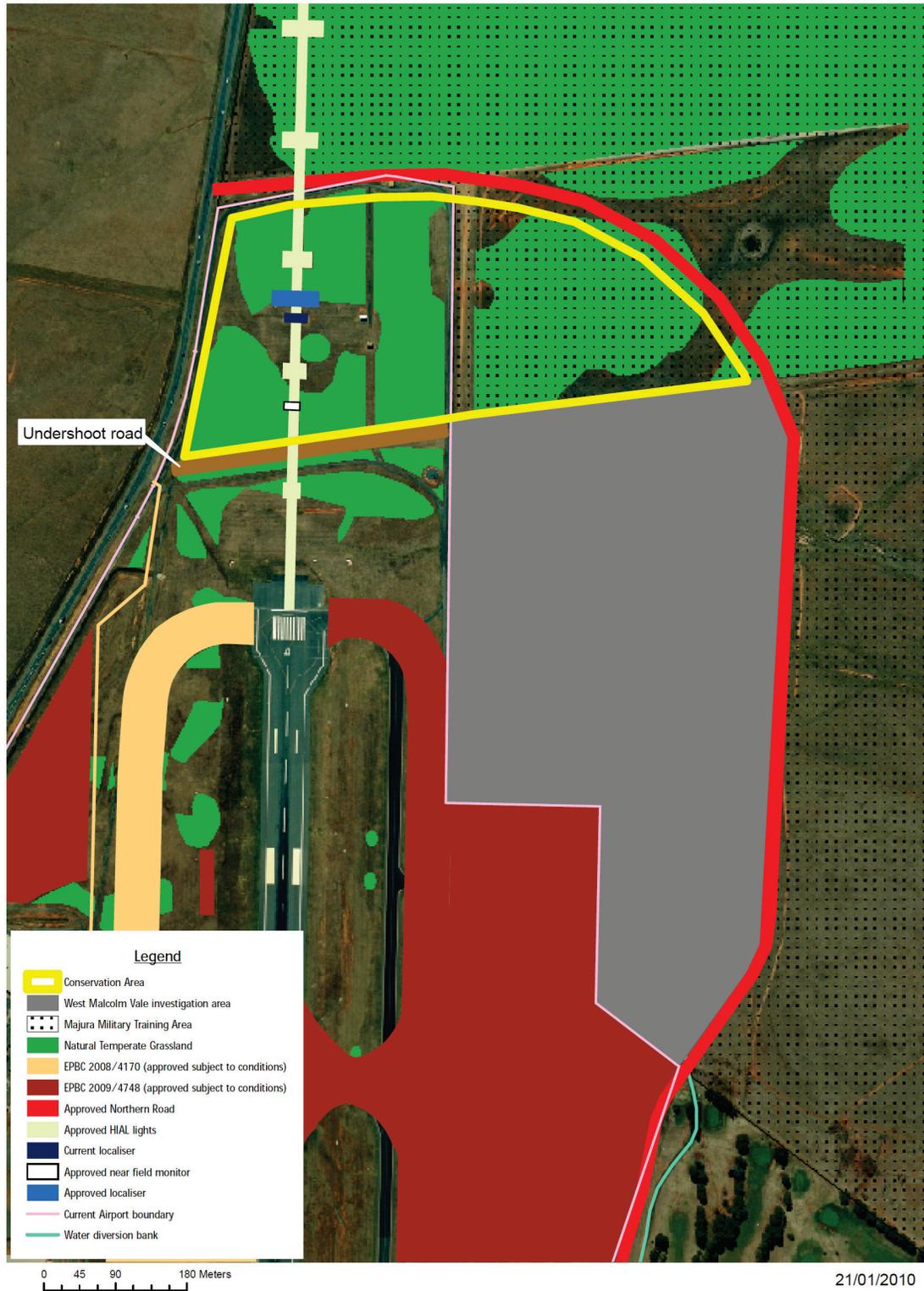
- Surveying the area for weeds, grassland diversity and grass structure;
- Surveying for Grassland Earless Dragon; and
- Extensive weed control.

If viable, the following rehabilitation methods will be considered:

- Installing artificial burrows to encourage repopulation of Grassland Earless Dragons in the area;
- Varying mowing heights in west Malcolmvale to improve grassland quality and Grassland Earless Dragon habitat (in response to University of Canberra Grassland Earless Dragon Post Doctorate Research outcomes); and
- Translocation and/or seeding of forbs to increase grassland diversity.

The opportunity to rehabilitate this degraded native grass will improve grassland quality and increase the area of Golden Sun Moth and Grassland Earless Dragon habitat.

Figure 2: Conservation Area



7.0 Consultative Panel

Canberra Airport will promote the formation of a consultative panel, in partnership with the University of Canberra, for a regional approach to planning and management of natural temperate grasslands and listed threatened species.

The objective of the Consultative Panel is to improve communication between planners, developers, ecologists and members of recovery teams including the implementation of a Regional Framework.

8.0 Delivery of Offset Actions

The timeframes for the completion of the actions outlined in this strategy are listed in Table 2.

Table 2: Timeframes for the completion of offset actions

Conservation Offset	Timeframe
Acquisition of offset land	<ul style="list-style-type: none"> The “Parlour Grasslands” has been acquired as an offset property. Additional offset land will be acquired, as required, prior to further development
The mapping and area of NTG on the "Parlour Grasslands" property to be confirmed by a suitable qualified expert.	<ul style="list-style-type: none"> Before any initial clearing goes ahead on Canberra Airport relating to the Master Plan
Additional offset land will be acquired on a pro-rata basis as required, as per approval conditions 3 a) and b)	<ul style="list-style-type: none"> Prior to further development
The area of NTG on any additional offset properties needs to be accurately mapped and confirmed by a suitable qualified expert	<ul style="list-style-type: none"> Prior to further development
Management of offset land	<ul style="list-style-type: none"> A Plan of Management (developed in consultation with the Department of Environment, Water, Heritage and the Arts and other relevant authorities) is attached to this Offset Strategy. The Plan of Management will be reviewed in consultation with the Department of Environment, Water, Heritage and the Arts and other relevant authorities, no later than five years from the commencement of the Plan.
Conservation Agreement	<ul style="list-style-type: none"> Conservation Agreement for the Conservation Area in Figure 2 is to be formally submitted and finalised in the event the land is incorporated in the Airport lease.
Investigation of Malcolmvale	<ul style="list-style-type: none"> Investigation to be undertaken, in the event that the land is incorporated in the Airport lease.
Consultative Panel	<ul style="list-style-type: none"> Collaboration on the consultative panel to commence March-2010.

Reporting	<ul style="list-style-type: none">• Annual Summary Reports to Department of Environment, Water, Heritage and the Arts and Department of Infrastructure, Transport, Regional Development and Local Government for a period of five years.• Provide updates during ongoing consultation meetings
-----------	---

9.0 References

- ACT Government, 2005 *A Vision of Splendid of the Grassy Plains Extended: ACT Lowland Native Grassland Conservation Strategy*. Action Plan No. 28 (Arts, Heritage and Environment, Canberra).
- ACT Government, 1999. Perunga Grasshopper (*Perunga ochracea*): A vulnerable species. Action Plan 21. Environment ACT, Canberra.
- Canberra Airport 2009 Master Plan, <http://www.canberraairport.com.au>.
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- Canberra Airport Threatened Species Management Plan, 2010.
- Environment ACT 2005 *National Recovery Plan for Natural Temperate Grassland of the Southern Tablelands (NSW and ACT): and endangered ecological community* (Environment ACT, Canberra).
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- Northern Access Road Referral under the *Environment Protection and Biodiversity Conservation Act 1999*, Transfer of Defence Land at Majura, EPBC 2007/3756. 15 April 2008. <http://www.environment.gov.au>.
- Report on ACT Lowland Native Grassland Investigation, Commissioner for Sustainability and the Environment, 19 March 2009 <http://www.environmentcommissioner.act.gov.au/>
- Robertson, P. & Cooper, P. (2000). *Recovery Plan for the Grassland Earless Dragon (Tympanocryptis pinguicolla)*. Unpublished report to Environment Australia, Canberra).
- Robertson, P & Evans M. (2006). Draft National Action Plan for the Grassland Earless Dragon (*Tympanocryptis pinguicolla*). Unpublished report to the Department of Environment, Water, Heritage and the Arts, Canberra).
- Sharp S, Dorrough J, Rehwinkel R and Eddy D. 2002 *The Grassy ecosystem management kit: a guide to developing conservation management plans*. Environment ACT, Canberra.
- Smith W.J.S & Robertson P. National Recovery Plan for the Striped Legless Lizard (*Delma impar*) 1999-2003. Unpublished report to Environment Australia, Canberra.



Mr Stephen Byron
Managing Director
Canberra Airport Pty Ltd
1/2 Brindabella Circuit
CANBERRA CITY ACT 2609

Date 7/ November 2009
EPBC Ref (EPBC 2008/4748)
EPBC contact Chris Murphy
6274 1821
Chris.Murphy@environment.gov.au

Dear Mr Byron

**Decision on approval
Infrastructure Upgrade and Construction at Canberra Airport, ACT
(EPBC 2008/4748)**

I have considered the proposal to upgrade and construct infrastructure at Canberra Airport (EPBC 2008/4748), in accordance with Part 9 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and have decided to grant an approval to Canberra Airport Pty Ltd. The proposal must be undertaken in accordance with the specified conditions. A copy of the approval and conditions is attached for your information.

The Department notes that works undertaken on Canberra Airport to rehabilitate Natural Temperate Grassland will be taken into consideration in finalising the offset requirements. It should be noted however that the reinstatement of an ecological community is a difficult process.

In relation to the Northern Road I note that this conditional approval in no way provides access to or pre-empts any decision regarding the transfer of the land in question to Canberra Airport. I therefore strongly recommend that you seek to confirm with the Minister of Defence whether the land required for the Northern Road will be transferred before incurring any costs in the development of the Northern Road Strategy required under condition 5.

I would appreciate it if you could inform me who will be the contact person responsible for complying with the conditions. Implementation of the approval conditions may be audited by my Department at a future date. Please note any plans required as conditions of approval will be regarded as public documents unless you provide sufficient justification to warrant commercial-in-confidence status.

It should be noted that, although an approval has been granted under Part 9 of the EPBC Act, this approval does not relieve the person to whom it has been granted from an obligation to comply with any other law of the Commonwealth, State or Territory that is applicable to the action, and to have any right, title or interest that is required to access land or waters and to do the action.

If you require any further information please contact Chris Murphy on (02) 6274 1821 or Chris.Murphy@environment.gov.au.

Yours sincerely

Ms Vicki Middleton
Assistant Secretary
Environment Assessment Branch

Enc



Australian Government

Department of the Environment, Water, Heritage and the Arts

Approval

Infrastructure Upgrade and Construction at Canberra Airport ACT (EPBC 2009/4748)

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

Proposed action

person to whom the approval is granted Managing Director
Canberra Airport Pty Ltd

proponent's ACN and ABN (if applicable) ACN: 080 361 548
ABN 14 050 361 548

proposed action To upgrade and construct aviation and airfield based development and supporting airport infrastructure during the life of Canberra Airport's 2009 Master Plan and as outlined in the referral received 19 February 2009 and the preliminary documentation received 26 June 2009 (EPBC 2008/4748).

Approval

Controlling Provision	Decision
Listed threatened species and communities (sections 18 & 18A)	Approve
Commonwealth land (sections 26 & 27A)	Approve

conditions of approval This approval is subject to the conditions specified below.

expiry date of approval This approval has effect until 15 November 2109

Decision-maker

name and position Vicki Middleton
Assistant Secretary
Environment Assessment Branch

signature

date of decision 11 November 2009

Conditions of approval

1. The person taking the action is only permitted to clear Natural Temperate Grassland in Area A at Annexure 1. The area identified as the Northern Road at Annexure 1, may only be cleared in accordance with condition 5. All other sites in Annexure 1 containing Natural Temperate Grassland must be protected.
2. The person taking the action must develop and submit a Threatened Species Management Plan to the Minister. The plan must include measures to manage Natural Temperate Grassland and Threatened Species on the Canberra Airport lease, including:
 - a) Monitoring and mapping;
 - b) Weed control;
 - c) Mowing heights and regimes;
 - d) Rehabilitation and revegetation;
 - e) Drainage;
 - f) Monitoring regimes and survey methods;
 - g) Thresholds for triggering further management intervention;
 - h) Environmentally significant areas and their protection; and
 - i) Results of research and details of any current and future research proposals.

The Threatened Species Management Plan must be submitted and approved by the Minister before construction commences. The approved Threatened Species Management Plan must be implemented.

3. The person taking the action must develop and submit a Canberra Airport Offsets Plan which must include but not be limited to:
 - a) The acquisition and protection in perpetuity of land containing Natural Temperate Grassland at a ratio of 3 hectares for every one hectare removed while the total area of Natural Temperate Grassland removed remains under 15 hectares;
 - b) The acquisition and protection in perpetuity of land containing Natural Temperate Grassland at a ratio of 5 hectares for every one hectare removed once the total area of Natural Temperate Grassland removed equals or exceeds 15 hectares; and
 - c) Provide details of the future ownership and management of the land to be used as the offset.

The Canberra Airport Offsets Plan must be submitted to and approved by the Minister prior to removal of any Natural Temperate Grassland or habitat for listed threatened species. The approved Canberra Airport Offsets Plan must be implemented.

4. The person taking the action must develop and submit a Construction Environment Management Plan (CEMP) to the Minister. The plan must include but not be limited to:
 - a) Establishment and maintenance of fences and signage of "no go areas" in areas of Natural Temperate Grassland and threatened species habitat;
 - b) Identification and implementation of erosion and sedimentation control measures during and following construction;
 - c) Identification and implementation of appropriate weed hygiene measures;
 - d) Induct construction workers and contractors about requirements to protect threatened species and Natural Temperate Grassland in accordance with relevant legislation;
 - e) Measures to reduce impacts on listed threatened species;
 - f) Indicative environmental management checklists to assist with monitoring the implementation of environmental management obligations during construction works; and
 - g) Unless otherwise specified, the person taking the action must submit a report of performance against the requirements of the CEMP by 30 June in each year for a period of 5 years.

The CEMP must be approved by the Minister before construction commences. The approved CEMP must be implemented.

5. The person taking the action must develop and submit a Northern Road Strategy to the Minister following written agreement from the Minister for Defence to transfer the land conditioned under the approval EPBC 2007/3756. The Northern Road Strategy must demonstrate that the Northern Road at Annexure 1 will achieve:
 - a) No net loss of habitat for the Grassland Earless Dragon as identified on the map at Annexure 2;
 - b) No fragmentation of Grassland Earless Dragon habitat as identified on the map at Annexure 2;
 - c) No net impacts on the Grassland Earless Dragon from construction activities; and
 - d) No increase the risk of extinction for the east Majura Valley Grassland Earless Dragon population.

The Northern Road Strategy must include a population viability analysis that has been peer reviewed by a suitably qualified expert, familiar with the Grassland Earless Dragon, and agreed to by the Minister. The Northern Road Strategy must be approved by the Minister before construction of the Northern Road commences. The approved Strategy must be implemented.

6. If the Minister believes that it is necessary or desirable for the better protection of the environment, the Minister may request that the person taking the action make specified revisions to a plan or strategy approved pursuant to conditions 2, 3, 4 and 5, and submit the revised plan or measure for the Minister's approval. The person taking the action must comply with any such request. If the Minister approves a revised plan or measure pursuant to this condition, the person taking the action must implement that plan or measure instead of the plan or measure as originally approved.
7. If the person taking the action wishes to carry out any activity other than in accordance with a plan or strategy approved pursuant to conditions 2, 3, 4 and 5 the person taking the action must submit for the Minister's approval a request for revision of the plan. If the Minister approves the revised plan or measure so submitted, the person taking the action must implement that plan or measure instead of the plan or measure as originally approved.

8. If, at any time after 5 years from the date of this approval, the Minister notifies the person taking the action in writing that the Minister is not satisfied that there has been substantial commencement of the development, the development must not thereafter be commenced.

Definitions:

Construction – all work but does not include survey, acquisitions, fencing, test drilling/test excavations, building/road dilapidation surveys, or other activities that will have a minimal environmental impact.

Fragmentation - The breaking up of a large intact area of a single vegetation or habitat type into smaller intact units.

Minister - The Minister responsible for the administration of the *Environment Protection and Biodiversity Conservation Act 1999*.

No Go Areas – Areas identified within the Canberra Airport Lease which requires protection from construction and temporary impacts including: the movement of construction vehicles and machinery, stockpiling and any actions that will degrade or damage grassland species.

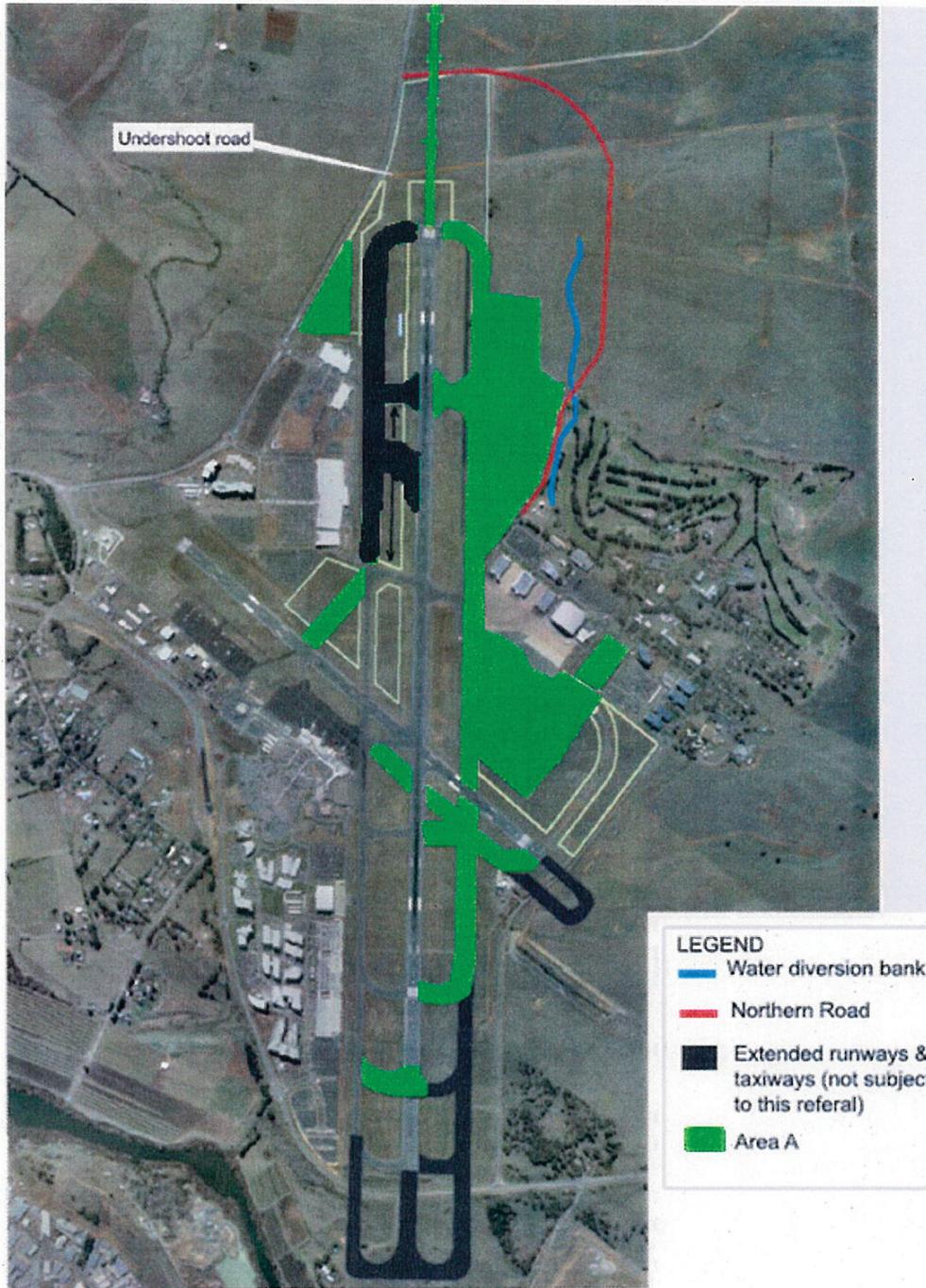
Natural Temperate Grassland - The ecological community referred to as: Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory and described in the document titled '*Advice to the Minister for the Environment and Heritage from the Endangered Species Scientific Subcommittee (ESSS) on a proposal to add an ecological community to Schedule 2 of the Endangered Species Protection Act 1992 (ESP Act)*'.

Substantial commencement - The construction of any infrastructure, excluding fences and signage, associated with the proposed action.

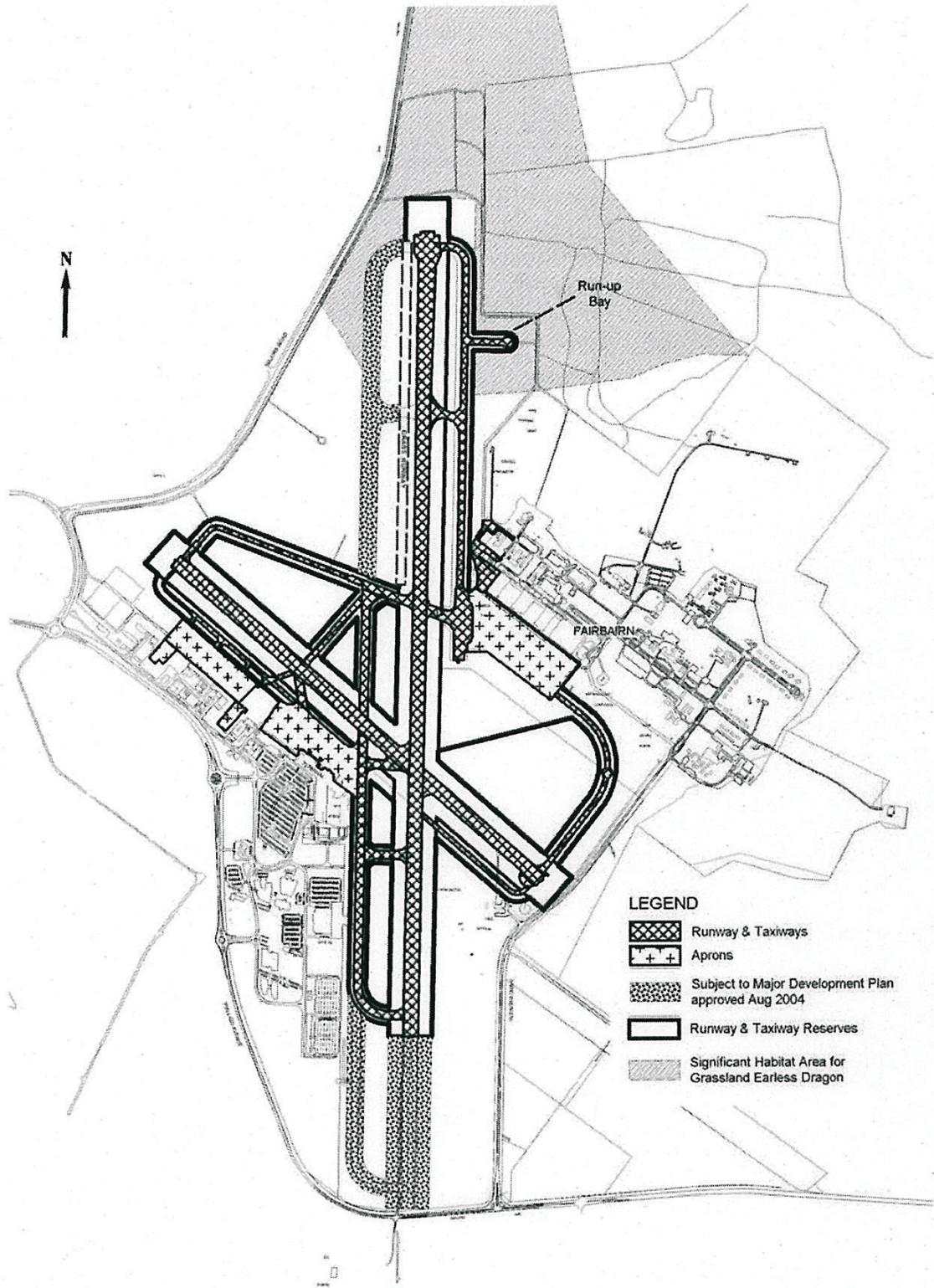
Threatened Species

Golden Sun Moth	(<i>Synemon plana</i>)
Perunga Grasshopper	(<i>Perunga orchracea</i>)
Striped Legless Lizard	(<i>Delma impar</i>)
Grassland Earless Dragon	(<i>Tympanocryptis pinguicolla</i>)

Annexure A



Annexure B





Plan of Management
for

“The Parlour Grasslands”
Conservation Area

Lots 86, 95 and 166 DP 754890,
Jerrabatgulla Road, Jerrabatgulla



*Protection of endangered Natural Temperate
Grasslands of the Southern Tablelands*

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1 INTRODUCTION

1.1 Overview of Natural Heritage Values

"The Parlour Grasslands" Conservation Area at Lots 86, 95 and 166 DP 754890 provides protection for many important natural heritage values. The most significant values include:

- a lack of modification (in a landscape dominated by land that is managed for agricultural purposes and modified with introduced pastures);
- the presence of threatened species including the Mauve Burr Daisy and the Diamond Firetail Finch;
- potential habitat for grassland dependant threatened and declining animals;
- the presence of a Nationally Endangered Ecological Community – ' Natural Temperate Grassland of the Southern Tablelands';
- having patches of Snow Gum Woodland (nominated for listing as an EEC); and
- the location of the Conservation Area within a central sector of the landscape scale "Kosciusko to Coast" project which aims to help landholders reconnect isolated woodlands and grasslands between Kosciuszko National Park and the forests of the Far South Coast.

1.2 Legal Framework

A Trust Agreement shall be made between the Landholder of Lots 86, 95 and 166 DP 754890, Parish of Krawarree, County of Murray, known as The Parlour Grasslands Jerrabatgulla Rd, Jerrabatgulla New South Wales (the Land) and the Nature Conservation Trust of NSW (the Trust) pursuant to Part 3, section 30 of the Nature Conservation Trust Act 2001(NSW) (the Act).

The Trust Agreement (the Agreement) covers a conservation area (the Conservation Area) of approximately 47 ha as defined in Map 1 of this Plan.

This Plan of Management (the Plan) is prepared pursuant to section 33 (1) of the Act.

The purpose of the Plan is to outline the management practices agreed to by the Landholder and the Nature Conservation Trust of NSW and to provide for the periodic review of these practices.

The Plan operates in conjunction with the Agreement and provides the framework for the management of the Conservation Area.

The words and phrases used in this Plan have the same meaning as defined in the Agreement.

1.3 Commencement and Review

Operation of this Plan commences on the day of execution of the Agreement. This Plan will be reviewed jointly by the Landholder and the Nature Conservation Trust of NSW no later than five years from the commencement of the Plan, or sooner if circumstances dictate a need for a review. This Plan shall remain in force until any new Plan is adopted.

1.4 Relevant Legislation

The Trust Agreement and this Plan of Management do not release the Landholder from their obligations to comply with the requirements of all legislation applicable to the Land. The management of the Land is subject to other relevant legislation, including but not limited to the legislation listed in Appendix B.

The list in Appendix B is not intended to be a complete statement of all of the legislation which the Landholder is required to comply with in relation to the Conservation Area. The Trust has provided the list in good faith and has not investigated the particular circumstances which may apply to the Conservation Area. The Landholder should satisfy itself as to legislation which may apply with respect to the Conservation Area, and be aware that new legislation may be created, and that legislative requirements may change over time.

1.5 Location and Regional Context

The Parlour Grasslands is a 48.5ha property located approximately 40kms south of Braidwood in the Upper Shoalhaven river catchment (Map 1). The property is situated on foothill slopes in the sub-catchment of Jerrabatgulla Creek which lies approximately 900 m to the west.

The property is within the NSW South Eastern Highlands bioregion which covers the dissected ranges and plateau of the Great Dividing Range, the Great Escarpment to the east, down to the western slopes of the inland drainage basin and continues into Victoria. The South Eastern Highlands bioregion contains a diverse range of ecosystems ranging from wet and dry sclerophyll forest, woodlands, grasslands and wetlands. These vegetation ecosystems vary across the bioregion in relation to altitude, temperature and rainfall (DEC 2004).

The property is one part of a much larger remnant of the nationally Endangered Ecological Community (EEC) – 'Natural Temperate Grassland of the Southern Tablelands' and the rare lowland Snow Gum Woodland vegetation community, which remains along the north eastern edge of the Jerrabatgulla Valley. With only 739 hectares of Natural Temperate Grassland conserved within 32 reserves across the NSW and Australian Capital Territory, The Parlour Grasslands represent an increase of approximately 6% in the area conserved of this EEC state-wide. The majority of the Conservation Area is identified as Natural Temperate Grassland.

With much of the landscape in the area altered through clearing and pasture improvement the property forms a vital link at both the local scale through providing continuity between the grassland, Snow Gum Woodlands mosaic and the Wet Sclerophyll forests upslope. While at a larger scale the property acts as a stepping stone between larger forested reserves in the region such as Tallaganda State Forest 4km to the west and Deua National Park 2km to the East.

The Braidwood area was first explored between 1817-20 by Hamilton Hume, Charles Throsby, James Meehan and John Oxley looking for a passage to the coast. Settlement followed in the area during the 1830's with settlers bringing sheep and cattle to graze on the fertile native pastures (HO & DUAP 1996). The gold rush of the 1850's saw a boom in the area with many shops, banks and hotels being built in Braidwood and agricultural industries increasing across the region with the influx of thousands of fossickers. It was estimated that the population of the Braidwood region in 1871 was well over 10,000 composed of convicts, Chinese settlers, graziers and bushrangers. This progressive period however came to an end by the early 1900's with diminishing gold being found in the region.

Beef and sheep grazing and other agricultural activities such as stone fruit orchards are the current primary industries in the area. Due to the areas rich cultural heritage and its proximity to the coast and many national parks the area has seen tourism become one of its key industries since the 1970's. Braidwood is listed by the National Trust as an historic town.

The impact of the areas mining and agricultural history has resulted in much of the lower undulating landscape and riparian areas being cleared of vegetation. The main environmental issues in the area are the loss of native vegetation cover, loss of riparian vegetation, erosion, sedimentation of creeks and rivers, weed invasion and feral animals (<http://www.southern.cma.nsw.gov.au/> Feb 2008).

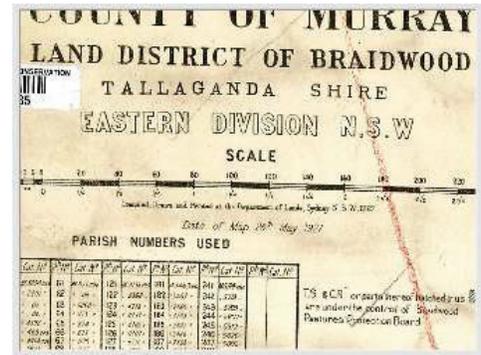
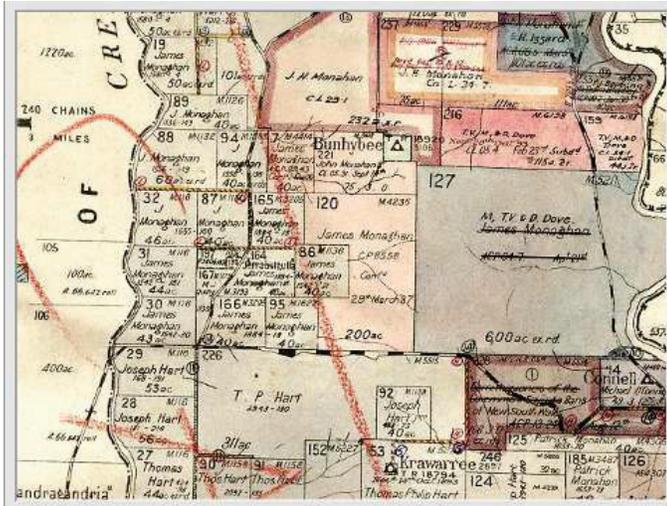
1.6 Site Description

The Conservation Area has an area of approximately 47 ha. It covers the majority of the property, excluding a 1.5 ha domestic area (Map 2). The property is gently undulating and occurs on the mid slopes of the Jerrabatgulla Valley. Elevation across the property ranges from 710 to 760 m above sea level. It is zoned Rural (1a) in the current Local Environment Plan (old Tallaganda Shire).

1.7 Property History

The Parlour Grasslands was formally part of a larger 424 ha property which was subdivided into smaller allotments within the last decade. The larger property, known locally as "The Parlour Paddock", was managed as two large grazing paddocks, 161 ha and 242 ha in size, extending from east of Jerrabatgulla Road across to the Upper Shoalhaven valley (Pers. Comm. David O'Connell Dec 2007). Much of the "The Parlour Paddock" was originally owned by James Monaghan from 1887 until the 1920's (see figure below).

The only buildings ever to be constructed on "The Parlour Paddock" were a shearing shed and yards which have been used up until recently (Pers. Comm. David O'Connell Dec 2007). "The Parlour Paddock" has a long history of grazing by sheep and more recently cattle. The two large paddocks were historically set stocked at low rates, predominately due to the paucity of water in the paddocks. There is no history of cultivation and fertilizer was only applied once to the Jerrabatgulla valley paddock (Pers. Comm. David O'Connell Dec 2007). There is evidence of clearing across "The Parlour Paddock" particularly of the Snow Gum Woodland community occurring on the lower slopes of the Jerrabatgulla valley. The area has been burnt at some time, with fire scars present on trees in the forested slopes of Bunhybee Hill.



Extracts from the 1927 County of Murray Parish map showing the original subdivisions and title-holders of the Jerrabatgulla Valley area. Source: Department of Lands – Parish Map Preservation Project – <http://parishmaps.lands.gov.au>



Fungi and Common Everlasting (*Chrysocephalum apiculatum*)

1.8 Natural Heritage Values

The property contains a mosaic of grasslands and woodlands and patches that are in a state of transition. The north eastern half of the property is dominated by the nationally endangered 'Natural Temperate Grassland of the Southern Tablelands (NSW and ACT)' community (*Environmental Protection and Biodiversity Conservation Act 1999* (Cth)). While the south western half of the property contains areas of a Snow Gum Woodland community (see Map 3).

Natural Temperate Grassland of the Southern Tablelands

This community is naturally treeless or very sparsely treed and dominated by tussocky native grass species. Gaps between the tussocks are filled with herb species such as daisies, lilies, orchids and any bare ground is generally covered with mosses and lichens. The dominant grasses found in the Conservation Area include Kangaroo Grass (*Themeda australis*), Purple Wire Grass (*Aristida ramosa*), Wallaby Grasses (*Austrodanthonia* spp.), Weeping Grass (*Microlaena stipoides*), Spear Grasses (*Austrostipa* spp.), Red Anthered Wallaby Grass and Tussock Grasses (*Poa* spp.).

Poa Tussock (*Poa sieberiana*) and Kangaroo Grass are the most dominant grasses across the Conservation Area occurring in both dry and wet habitats. On the drier upper slopes, a more open grassland community occurs dominated by Purple Wire Grass and sub-dominated by Spear and Wallaby grass species. In the dampest habitats, such as along drainage lines, swards of River Tussock (*Poa labillardieri*) occur (Keith 2004). There is a very high diversity of herb species scattered between the grass tussocks within the Conservation Area, such as Billy Buttons (*Craspedia variabilis*), Clustered Everlasting (*Chrysocephalum semopapposum*), Common Fringe Lily (*Thysanotus tuberosus*), Dwarf Wedge Pea (*Gompholobium minus*), Sickle Greenhood Orchid (*Pterostylis falcata*), Austral Ladies Tresses (*Spiranthes australis*) and the endangered Mauve Burr Daisy (*Calotis glandulosa*).



A selection of the herb species diversity which occurs within the Natural Temperate Grassland Community at The Parlour Grasslands: (from left) Sickle Greenhood Orchid (Pterostylis falcata) (Roger Farrow), Austral Ladies Tresses (Spiranthes australis), Dwarf Wedge Pea (Gompholobium minus) and Common Fringe Lily (Thysanotus tuberosus) (Roger Farrow).

The high diversity of native grasses and herbaceous species found within the Conservation Area indicates that the grassland community is of a very high conservation value. With such little of this grassland remaining in the region, the Conservation Area may provide vital habitat for grassland specific species such as the threatened Striped Legless Lizard (*Delma impar*) and Southern Bell Frog (*Litoria reniformis*).

Snow Gum Woodland Community

Patches of Snow Gum Woodland are interspersed with the grassland community, with the largest remnants occurring in the south western part of the Conservation Area (See Map 3). The Snow Gum Woodland is dominated by Snow Gum (*Eucalyptus pauciflora*) with some Candlebark (*E. rubida*), Ribbon Gum (*E. viminalis*) and Black Gum (*E. aggregatta*) as sub-dominates. The shrub layer consists of Wattle species (*Acacia* spp.), Grey Guinea Flower (*Hibbertia obtusifolia*), Tea-tree species (*Leptospermum* spp.) and Rice-flower species (*Pimelea* spp.). The understorey is dominated by

native grass and herbaceous species with a similar suite of species such as found within the NTG community.

Woodland communities across the region have suffered extensive clearing and alteration through grazing activities, with only a few remnants retaining their broad complement of flora species (Keith 2004). Within the Conservation Area, the Snow Gum Woodland Community varies from relatively intact patches along the western boundary fence through to areas with only one or two Eucalypt trees or only a cover of shrub and ground cover species remaining along the southern boundary fence. This variation in cover of the woodland community is presumably a consequence of past management activities such as clearing. These remnant areas, whilst small, provide a very important link between the lower slopes of the Jerrabatgulla valley, the NTG community and the forested slopes of Bunhybee Hill. Woodland specific species such as the threatened Diamond Firetail finch (*Stagonopleura guttata*) may use these areas for nesting and roosting while accessing food resources from the grassy understorey and neighbouring grassland community. See Section 2.1 for more information about threatened species.



A Snow Gum Woodland patch along the western boundary fence

1.9 Aboriginal Cultural Heritage Values

The Conservation Area lies within the traditional lands of the Ngarigo and Yuin people. Ngarigo Country extends south of Canberra across the Southern Tablelands and the Australian Alps with Yuin Country bordering to the south east. Yuin Country extends from the coastal area between Eden and Jervis Bay up into source of the Shoalhaven River (Howitt 1996; HO & DUAP 1996).

At the time of writing, there is no knowledge of any archaeological or cultural heritage survey ever being conducted on "The Parlour Grasslands". There are no recorded cultural heritage sites on the

Australian Heritage Database occurring on or near the Conservation Area, however cultural and heritage sites have been recorded from Parks and Reserves throughout the region.

Given its proximity to the fertile valleys of the Upper Shoalhaven catchment, it is highly likely that sites of cultural significance for the Ngarigo and Yuin people are present on the land. It is recommended that the landowner should engage with the Aboriginal Land Council, relevant local elders, the Department of Climate Change and the Trust in relation to the potential for future survey or on any other cultural heritage issues.

Aboriginal objects and Aboriginal places are protected under the *National Parks and Wildlife Act 1974*. Aboriginal objects include any deposit, object or material evidence relating to Aboriginal habitation of an area, such as campsites, shell middens, scarred trees, stone arrangements and stone artefacts. This Plan will be amended if necessary, in conjunction with the Landholder, in order to protect any sites discovered within the Conservation Area.

2 Management Schedule

The management of the Conservation Area at Lots 86, 95 and 166 DP 754890 will be guided by the following overarching aim:

- **Protect and manage natural and cultural heritage values for conservation in perpetuity.**

Under this overarching aim are specific broad goals for the Conservation Area for which each management action should work towards:

- Protection and enhancement of existing native habitat;
- Protection of threatened species and their habitats;
- Regeneration of native flora species;
- Control of weeds and feral animals; and
- Maintenance and enhancement of water quality
- Maintenance of a diversity of ground flora



Looking north across The Parlour Grasslands and the Jerrabatgulla valley

The following pages provide the information on relevant management issues to help guide the landholder/s of Lots 86, 95 and 166 DP 754890 and the Trust as the property is managed for conservation into the future.

After a brief description of each management issue, management *Goals*, *Conditions* and *Recommendations* are listed in the following format:

Relevant management Goals developed by the Trust and the Landholder/s are specified in the green text box.

Sub-clauses of Section 5.3 of the accompanying **Trust Agreement** specify activities which are not permitted within the Conservation Area and then list any relevant exceptions. If the conditions under which an activity may occur are not clearly defined within the Agreement, then additional detail will be inserted as *Conditions* within this Plan of Management (includes relevant landholder obligations/actions).

For ease of cross-referencing to the Agreement, any relevant Sub-Clauses are listed at the beginning of each *Condition* box e.g. [5.3 (e)]

The specific *Conditions* under which an activity must be conducted are detailed in bold in the red bordered text box.

Recommendations, which should be followed to the best of the landholders' ability where practical (as distinct from *Conditions*), are detailed in the blue bordered text box.

The Goals, Conditions and Recommendations will be reviewed and amended where necessary by the Trust in agreement with the Landholder/s as part of the ongoing Stewardship Program. The Landholder/s is/are encouraged to notify the Trust of additional actions not listed in this Plan which may also work towards the conservation goals under each issue.



Field day held on The Parlour Grasslands in conjunction with the Southern Tablelands Grassy Ecosystems Conservation Management Network, December 2007.

2.1 Grazing Management

The condition of the ground cover within the Conservation Area is predominantly native dominant with a diversity of native grass and herb species. Weed cover is low across the Conservation Area with broad leaf weeds and exotic annual and perennial grass species found scattered at extremely low densities. The species composition of the ground cover varies according to soil type and landscape position, therefore some areas may be more prone to degradation than others.

Given that the ultimate aim is conservation management and the small size of the property, The Parlour Grasslands is not capable of supporting an intensive grazing operation. This contrasts with the neighbouring properties in the valley, which are larger and may contain more productive alluvial soils and pasture improved paddocks. The recent spell of dry years has resulted in very little feed being available for domestic stock in the region. In such conditions maintaining a large to medium sized flock, year round, on The Parlour Grasslands will result in significant deterioration of the native ground cover vegetation and soil structure.

The property has had a very long history of light grazing by domestic stock, predominantly sheep (Pers.Comm. David O'Connell Dec 2007). This has resulted in the retention of many grazing sensitive flora species such as lilies, daisies and orchids that have been lost from much of the surrounding landscape due to higher stocking densities and pasture improvement activities. This conservative grazing regime may be partly a consequence of the original property, "The Parlour Paddock", being managed as two large paddocks with limited water sources for domestic stock.

As the property has had a history of grazing by domestic stock, this disturbance management must be continued to retain the high conservation values of The Parlour Grasslands. Without this disturbance there is the potential for the more competitive species, such as Kangaroo Grass, to suppress the smaller herbaceous species, such as the endangered Mauve Burr Daisy. However care must be taken to continue to retain these conservation values by not **over** or **under** grazing the native ground cover. Whilst no formal grazing management records are known to exist for "The Parlour Paddock", the high floral diversity indicates a conservative stocking rate between one and two Dry Sheep Equivalent (DSE)/ ha (with one DSE representing a 55 kg wether). A low stocking rate/ha needs to be kept in place if domestic stock are to be kept for **longer periods** (e.g. a few months per year) on the property. However if stock are to be used only occasionally throughout the year, i.e. as part of a crash grazing regime where higher densities are used over a short time period, then stocking rates will need to be adjusted accordingly. Stocking rates may also need to be adjusted to take into account additional grazing pressure from kangaroos.

Getting the right balance in integrating grazing and conservation management will require experience and **evolve over time** in response to varying factors, and so the best management will need to be dynamic and adaptive. Success in meeting the goals will rely on good on-going monitoring and communication between the landholder and the Trust, and a developed understanding of practical management conditions for grazing of the Conservation Area.

The Conservation Area has been divided up into four Grazing Zones, which are based on the vegetation communities' management needs (see Map 3). Zone 1 and 2 are Snow Gum Woodland areas which vary in tree and shrub cover across the Conservation Area. Zones 3 and 4 are areas of dry and wet Natural Temperate Grassland.



*Looking across the north eastern section of The Parlour Grasslands with a *Poa tussock* species (*Poa spp.*) dominated wet grassland community in the foreground. The forested slopes of Bunhybee Hill are in the back ground.*

Grazing Management Goals

- *Allow native ground cover species to be able to flower, set seed and increase their abundance*
- *Allow for natural regeneration of woody shrubs and trees in woodland areas*
- *Avoid creating areas of bare ground through overgrazing*
- *Avoid creating areas of dense grass swards through a lack of disturbance*
- *Maintain native ground cover in **good** condition*

2.1.1 Performance based measures of grazing impact

Whilst the Trust and local extension staff will be available to offer recommendations on a suitable grazing regime, the restoration and maintenance of The Parlour Grasslands will ultimately **rely on the experience of the Landholder** to judge the timing of moving and excluding stock at the right time to keep the native ground cover in *good* condition.

The following indicators or thresholds (with photo examples of native ground cover in *good* and *deteriorated* condition) **will be used to prevent the native vegetation on The Parlour Grasslands from becoming over or under grazed.** These will be discussed and endorsed by the Landholder/s and the Trust on site.

Factors which indicate native ground cover vegetation in a *good* condition are:

- retained high level of vegetative ground cover (> 80% which includes any mosses and lichens)
- tussocks of grass tall and spreading in shape during spring/summer (may include standing dry matter)
- retained/increased diversity of herbs (especially palatable species such as orchids)
- small open spaces maintained between grass tussocks (which may be covered by mosses and lichens)
- presence of new low/prostrate shrub regeneration and/or actively growing tips in mid-spring
- evidence that native grasses have set and dispersed seed
- retained cover of litter (dry plant matter)

These factors will be measured by the Trust, in conjunction with the Landholder as part of the Monitoring Program (see Appendix A).

Below are photographs of native ground cover vegetation in *good* condition.



Kangaroo Grass (Themeda australis) and Wallaby Grass (Austrodanthonia sp.) grassland community in good condition with a diversity of herb species and mosses and lichens in inter-tussock spaces. Plant cover is >80% and grass height ranges from 5 to 15cm

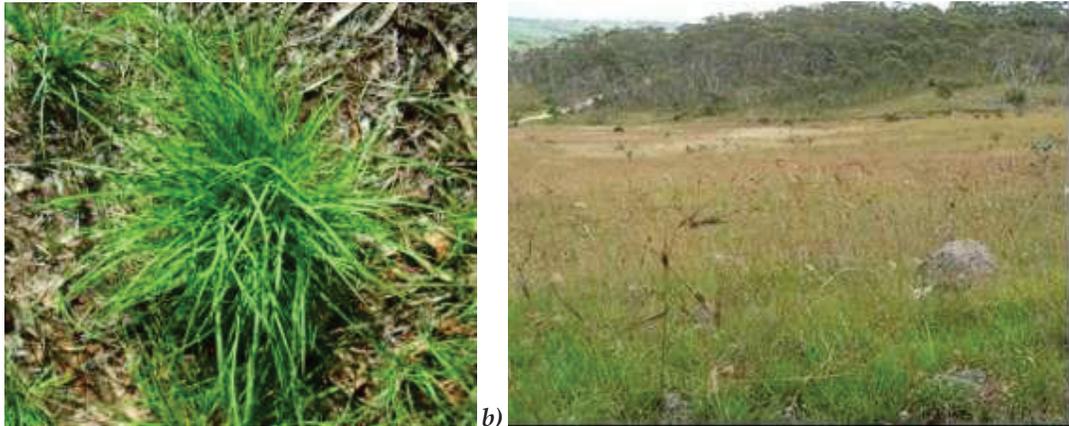


Wet Natural Temperate Grassland community in good condition co-dominated by Kangaroo Grass (Themeda australis) and Poa Tussock species (Poa spp.) with a diversity of taller herb species such as Grass Trigger Plant (Stylidium graminifolium) and Buttercups (Ranunculus sp.)

Strategic grazing can help maintain floral biodiversity in native grasslands and woodlands. Grazing reduces the grass biomass which in turn helps small herbs (such as daisies and orchids) to flourish. Without grazing or fire, the native ground cover at 'Bunhybee' Grasslands may become less diverse.

Whilst grazing can positively influence biodiversity values, it should not be seen as playing exactly the same role as fire, because certain native species are grazed preferentially by stock, and fire may help stimulate the germination of a number of species with dormant seeds that are stored in the soil.

*Native pastures are susceptible to damage from **drought** but they are regarded as more resilient than improved pastures. Grazing in droughts will usually reduce ground cover significantly and increase the amount of bare ground. Under these conditions the ground will be more susceptible to erosion and weed invasion when the rain finally falls. **Overgrazing** of native pastures should be avoided particularly during drought as it can i) expose the growing points of the plant to extreme temperatures, which may kill the plants, and ii) grasses may take several years to regain stature and vigour.*



a) Kangaroo Grass tussocks in good condition a) without seed heads and b) with seed heads. Note the spreading structure and the height (>15 cm) of the tussocks

Stocking rates should match the carrying capacity of, or the feed availability within, the native pasture. This rate should also take into account any grazing by feral and native herbivores.

A rest (spell) over spring and/or summer allows many/most native species to produce seeds and favours seedling recruitment. Grazing during spring/summer may also favour weed species, especially annual grasses (eg. Fescue species (Vulpia spp.) and rosette-forming plants (e.g. Patterson's curse (Echium plantagineum) and Nodding Thistle (Carduus nutans)). These species quickly colonise bare ground and suppress/displace some native species, particularly the small herbs. Exotic annual grasses can be controlled in native pastures by timing grazing to correspond with the flowering time of the exotic grasses, thereby reducing its seed production.

"Crash grazing" of large mobs over very short periods (eg. a few days to up to a fortnight confined to small paddocks) is one strategy that can be used in order to reduce the selectivity of stock in order to reduce cover of less desirable species and protect rarer and more palatable native plants such as herbs, lilies and orchids.



The presence of regenerating and new regrowth of Eucalypt and shrub species plus an intact ground cover composed of native grass and herb species indicates "good" condition within the Snow Gum woodland community



*From left to right: new shrub regrowth on Silver Banksia (*Banksia marginata*), Eucalypt seedling and a regenerating drainage line with Eucalypt saplings and Tea tree species (*Leptospermum* spp.)*

Native ground cover is generally regarded as *deteriorated* due to **over grazing** if any of the following factors are observed across the majority of the Conservation Area:

- significant increase in cover of bare ground,
- the **average** grass height is below 2cm high,
- tussocks of taller species such as kangaroo grass (*Themeda australis*) are narrowed (not spreading) and less than 15cm high,
- woody shrub/tree regeneration present has a majority of growing stems chewed off
- stock are markedly browsing less palatable plants such as Purple wiregrass (*Aristida ramosa*) and Poa Tussock (*Poa labillardieri*)

Stock then should be removed as soon as it is practical and the area should then be rested to allow the ground-cover vegetation to recover. It is acknowledged that deterioration may be due to feral/native herbivore browsing (and if necessary); refer to Section 2.8 of the Plan of Management to consider control options.

Below are photographs of native ground cover in a **deteriorated** condition due to over grazing.



Kangaroo grass dominated grassland in poor condition from overgrazing. Note the lack of inter-tussock species such as daisies and lilies and the large areas of bare ground with no cover of lichen or mosses. Grass cover is < 50% and height is < 2 cm.

If a paddock shows signs of significant deterioration during the year then stock should not be returned to that paddock until grass heights are well above the thresholds for **good** condition (see above). Resting the paddock for a longer period than normal is strongly recommended in these circumstances.

Conversely, **too much** grass biomass can effectively “choke” out the diversity of forbs, herbs, lichens, mosses, orchids, etc. that rely on the inter-tussock spaces as habitat to grow and germinate from. Stock grazing has performed the service of grass biomass removal for the last few decades and if used under a strategic regime is the most practical method of maintaining diversity at The Parlour Grasslands.

Native ground cover is generally regarded as **deteriorated** due to **under grazing** if monitoring by the Landholder and/or the Trust indicates a marked **decrease in the area of inter-tussock spaces** combined with a significant **increase in cover of tussock grasses (including standing dry matter)** across the majority of the paddock.

Stock should be reintroduced to the area or stocking levels increased as soon as it is practical to bring the native grass cover back to a **good** condition. It is acknowledged that this deterioration may be due to factors such as high rainfall during the growing season resulting in current stocking levels being unable to manage the increased grassland cover. In these circumstances stocking levels may need to be adjusted or other management actions such as burning may need to be implemented.

Below are photographs of native ground cover in a **deteriorated** condition due to under grazing.



*Deteriorated grassland community dominated by Kangaroo Grass (*Themeda australis*) with a much reduced inter-tussock diversity. Cover of grass is 100% and there are no spaces for herbs/forbs to germinate from.*

Grazing Management Conditions [5.3 (e), 5.3(o) iii]

Conditions are listed below which aim towards meeting the above goals and protecting the natural values on The Parlour Grasslands. Grazing outside of these conditions may be considered provided that the conservation goals are still being met. Any changes will require the consent of the Trust prior to commencement, and the Plan of Management will be varied accordingly (if required).

- Native ground cover will be maintained in “good” condition, as defined in this plan.
- Areas within the Conservation Area must be rested from grazing on a rotational basis from the start of September to the end of January to allow plants to flower and set seed (this period will be dependent on monitoring and may be subject to change).
- If the condition of the native ground cover has deteriorated due to over grazing, then the Landholder will decrease/remove stock immediately or when practical in the short term, until the paddock has been restored to at least good condition.
- If the condition of the native ground cover has deteriorated due to under grazing, then the Landholder will reintroduce/increase stock immediately or when practical in the short term, until the paddock has been restored to at least good condition.
- To reduce the risk of introducing weed species, supplementary feeding of fodder or grain is to occur outside of the Conservation Area (or within a designated feed-out area).
- Following a fire, stock must be excluded (where practicable) from the burnt area until the regeneration is sufficient to sustain the pressure of stock grazing.

Grazing Management Recommendations

- Due to the grazing history of the Land, sheep are preferred over cattle as they will have a lighter impact on fragile plants and ground cover, particularly in the wet grassland communities.
- If stock are to be brought in from outside the local Braidwood region – they should be quarantined for a period of 6 days in a holding paddock, preferably located outside of the Conservation Area, or in a temporarily fenced area (of lower plant diversity) close to the road to reduce the potential of new weed species introductions.
- Consider new internal or temporary fencing if required to suit grazing regime – consult the Trust or the Southern Rivers CMA as incentives may be available.
- Monitoring of condition will need to be more regular if using rotational grazing with large stocking rates (crash grazing). Crash grazing can be a useful management tool to minimize selectivity of stock and maximize their ability to control weeds and/or manipulate the diversity of the grass sward.
- Avoid using vehicles to muster stock due to risk of soil compaction damage – mustering by foot or on horseback is preferable.
- The Landholder/s should keep a record of the stock numbers and grazing duration so that grazing intensity (DSE/ha/time) can be calculated and used to guide future management decisions.

2.2 Threatened and Priority Species

Limited formal flora and fauna surveys have been conducted on The Parlour Grasslands. The following Threatened species recordings are the results of incidental sights by the Trust staff and Rainer Rehwinkel from the Department of Environment, Climate Change & Water.

Endangered Ecological Communities: Large areas of the vegetation in the Conservation Area are representative of Natural Temperate Grassland of the Southern Tablelands of New South Wales and the Australian Capital Territory. This is listed as an Endangered Ecological Community (EEC) under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC). A detailed profile of this community is provided in Appendix E.

Threatened flora species which have been recorded to date on the property include:

- Mauve Burr Daisy (*Calotis glandulosa*) (Vv)

The Mauve Burr Daisy has been observed at a number of locations across the Conservation Area. These locations are yet to be formally recorded. A detailed profile of this threatened species is provided in Appendix E.

Threatened flora species that may occur but have not been identified include:

- Araluen Gum (*Eucalyptus kartzoffiana*) (Vv)
- Tarengo Leek Orchid (*Prasophyllum petilum*) (Ee)
- Austral Toad Flax (*Thesium australe*) (Vv)

Threatened fauna species which have been recorded to date on the property include:

- Diamond Fire Tail (*Stagonopleura guttata*) (v)

The Diamond Firetail finch has been noted once in the Conservation Area. A detailed profile of this threatened species is provided in Appendix E.

Threatened fauna species that may occur in the Conservation Area but have not been recorded include:

- Eastern Pygmy-possum (*Cercartetus nanus*) (Vv)
- Brown Tree Creeper (eastern subspecies) (*Climacteris picumnus victoriae*) (Vv)
- Spotted-tailed Quoll (*Dasyurus maculatus*) (Vv)
- Striped Legless Lizard (*Delmar impar*) (Vv)
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) (Vv)
- Southern Bell Frog (*Litoria reniformis*) (Ee)
- Square-tailed Kite (*Lophoictinia isura*) (Vv)
- Hooded Robin (south-eastern form) (*Melanodryas cucullata cucullata*) (Vv)
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*) (Vv)
- Barking Owl (*Ninox connivens*) (Vv)
- Yellow-bellied Glider (*Petaurus australis*) (Vv)
- Squirrel Glider (*Petaurus norfolcensis*) (Vv)
- Brush-tailed Phascogale (*Phascogale tapoatafa*) (Vv)
- Koala (*Phascolarctos cinereus*) (Vv)
- Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*) (Vv)

Note: (v) = listed as Vulnerable or (e) = Endangered under the *Threatened Species Conservation Act* 1995 NSW. (V) = listed as Vulnerable or (E) = Endangered under the *Environmental Protection and Biodiversity Conservation Act* 1999 (Cth) (EPBC).



Mauve Burr Daisy (Calotis glandulosa) is a sprawling, multi-branched herb which occurs in the Natural Temperate Grassland and Snow Gum Woodland (Photo - Roger Farrow)

Threatened species, endangered populations and endangered ecological communities are protected in NSW under the *Threatened Species Conservation Act* 1995 (TSC Act).

It is an offence to "harm" or "pick" threatened species, populations or ecological communities, or cause "damage" to critical habitat or the habitat of threatened species, populations or ecological communities.

The Trust, in conjunction with the landholder, will develop specific management conditions if required for threatened and/or priority species that are identified on the Conservation Area.

Threatened Species Management Goals

- *Maintain or improve the viability of threatened species populations and their habitats; including species that are known or likely to utilise the Conservation Area.*
- *Maintain the diversity and structural complexity of native habitats*

Threatened Species Conditions [5.3 (a), 5.3 (n)]

- **Works must not cause harm to threatened species populations or ecological communities. It is important to be conscious of this whilst conducting activities such as:**
- **Feral animal control works**
- **Infrastructure, track and fencing maintenance**
- **Firewood wood collection (in accordance with 2.5 of this plan)**
- **Seed collection (in accordance with 2.6 of this plan)**

Threatened Species Recommendations

- Monitor threatened species populations in conjunction with the Trust
- Encourage targeted surveys for populations of the threatened Mauve Burr Daisy by appropriately experienced persons with locations recorded
- Identify and report any additional threatened species to the Trust



Diamond Firetail (Stagonopleura guttata) (Photo – Julian Robertson - Canberra Ornithologists Group)

2.3 Tracks, Water and Infrastructure

The main tracks, water and infrastructure that currently exist on the property are summarised below and illustrated on Map 4. It is important that all people undertaking works within the Conservation Area (or adjacent to where relevant) are informed about the existence, location and purpose of the Conservation Area and relevant management conditions.

Access tracks

Currently there is one 4wd track from the property entrance gate which extends for approximately 1.2 kilometres across the property. A 2wd accessible track will need to be constructed to the 1.5 ha domestic area.

Fences

There are fences along the entire property boundary (see Map 4). The west and southern boundary fencing is older style netting fencing with two plain top wires and is currently being renovated by the Trust to make it stock proof. The remainder of the boundary fence along the eastern and northern boundary is in good condition and has been constructed within the last couple of years.

Services

Mains electricity and telephone access are not connected. Electricity lines run through the property. Connection of services to the domestic area must be within the confines of existing tracks on the Land.

Residence, sheds and stock yards

No structures exist on the property at present. Proposed structures will be built outside the Conservation Area in the 1.5 ha domestic area. This plan will be amended where necessary to ensure that any proposed developments associated with the domestic area occur with minimal impacts to natural heritage values within the Conservation Area.

Water Storage and Reticulation

There are no permanent or significant water courses on The Parlour Grasslands. A number of small intermittent creeks and drainage areas exist within the Conservation area which supports diverse Wet Natural Temperate Grassland communities. There are two dams on the property which are shown on Map 4. No water reticulation systems currently exist on the property.

The natural water flow through the property can be affected by activities such as dam maintenance, earthworks, diversion channels, and road maintenance. Any development of water storage and reticulation on the property requires the consent of the Trust to ensure minimal impacts to the natural heritage values.

Tracks, Water and Infrastructure Management Goals

- *Construct and maintain existing tracks and infrastructure within Conservation Area without compromising natural heritage values.*
- *Maintain the quality of intermittent stream beds and banks and drainage lines within the Conservation Area.*

Tracks, Water and Infrastructure Conditions [5.3(a) i, 5.3(d), 5.3(f), 5.3(h), 5.3(j) & 5.4(a)]

- Any infrastructure or track maintenance activities that may disturb earth and/or native vegetation must be compliant with any relevant legislative restrictions that apply to the Land, including those specified under the *Native Vegetation Act 2003*.
- Vegetation may be slashed to a total of 3 m width only from the edge of boundary fence lines and dams designated on Map 4 Tracks, Water and Infrastructure.
- Earthworks (involving soil disturbance and vegetation clearance) may be used to maintain existing tracks and the dams designated on Map 4 Tracks, Water and Infrastructure within the existing track and associated edges or drains to a total width of 6m, and to the outer edge of the dam bank.
- Proposed activities beyond distances specified in this Plan must have the consent of the Trust prior to commencing.
- In order to protect/enhance conservation values, new fencing may be erected using minimal impact methods of construction.
- Earthworks may be used for the establishment of an alternative access track and services (e.g. electricity, telecommunications) to the dwelling on the Land. Services may be either above ground using poles across the Conservation Area or underground but within the confines of the track edges on the Land. The endorsement of the Trust is required in writing before any earthworks associated with track and service establishment are undertaken to ensure minimal impact on conservation values.
- Earthworks may be used for the establishment of a new dam and associated water reticulation system on the Land. The endorsement of the Trust is required in writing before any earthworks associated with dam and water reticulation system establishment are undertaken to ensure minimal impact on conservation values.

Tracks Water and Infrastructure Recommendations

- Minimise and manage soil disturbance during maintenance to reduce potential for weed infestation
- Minimise erosion and runoff from unsealed roads and track surfaces entering waterways by using retention and diversion banks where appropriate.
- Keep vehicle use for management purposes to defined tracks to avoid erosion.
- Extend fencing where appropriate to protect Natural Heritage Values e.g. exclude stock access to eroded gullies and from watercourses that flow through the property and also from any dams where practical. The Trust can assist by seeking potential funding sources for fencing works.
- Inform the Trust of any development that may impact on water quality within or adjacent to the Conservation Area.
- Inform the Trust of any development that may impact on water quality within or adjacent to the Conservation Area.

2.4 Fire management

In the drier times of the year the grassland vegetation of The Parlour Grasslands has the potential to be a fire hazard if the ground cover vegetation was left to accumulate from season to season. However maintaining a conservative grazing regime (this includes native herbivores) will keep grasses biomass levels down and hence assist in reducing the fuel load across the property.

Whilst fire may be beneficial to specific native flora and fauna and their restoration within the Conservation Area, the integrity and complexity of native fire-adapted ecosystems can be threatened by an overly high fire frequency and/or intensity. Fire may also cause the loss of valuable old hollow bearing trees and stags.

Planning for the protection of life and property (persons, dwellings, buildings, infrastructure) is beyond the scope of this Plan of Management

- *Maintain the ecological integrity and complexity of native ecosystems in the Conservation Area.*
- *Assets and persons are protected from bushfire.*

Planned fire may be a beneficial tool for management on The Parlour Grasslands, especially for areas not subject to grazing or if grazing pressure is insufficient to maintain areas of the Conservation Area in good condition, however this should only occur under the conditions below.

Fire Management Conditions [7(a) & (b)]

- **The NSW Rural Fire Service (RFS) and the Trust must be consulted if planned fire is to be used for ecological purposes**
- **Planned fire for fuel reduction purposes will only be used under RFS recommendations given specifically for the Conservation Area, aligned with any relevant Threatened Species requirements (refer Section 2.2), and in consultation with the Trust.**
- **Firebreaks involving clearing of vegetation may be constructed to minimum standards as recommended by the RFS around the boundary of the Conservation Area only (except in emergency situations under RFS authorisation).**

Planning for the protection of life and property (persons, dwellings, buildings, infrastructure) is beyond the scope of this Plan of Management.

Fire Management Recommendations

- Fire may be beneficial in reducing biomass of the grasslands in small trial areas – however any trials will need to ideally be conducted at cooler times of the year and involve the RFS to avoid risks of fire spread beyond containment lines.
- Liaise with relevant fire/government authorities and consultants to prepare and implement a **separate** fire management plan for the protection of life and property.
- Inform the RFS immediately if wildfire is observed within the Conservation Area. Lake George Fire Control Centre (02) 6297 1840

- Inform the RFS and those fighting the fire of any ecologically sensitive areas to be avoided where possible.
- In conjunction with the Trust, monitor impacts on native flora and fauna, invasion of weed species and soil erosion to waterways.
- Any damage to fencing should be rectified as soon as possible to prevent stock access to site.
- Avoid grazing areas affected by fire for at least 12 months
- Take advantage of any opportunity post fire to control weed regrowth and weed seedling germination.

2.5 Firewood Collection

The retention of fallen timber is extremely important habitat for many fauna species including birds, reptiles and small mammals. Much of the Snow Gum woodland community within the Conservation Area is in a state of regeneration, therefore only small areas of fallen branches and trees with hollows exist. The collection of firewood is therefore limited to non-hollow branches and trees removed for infrastructure maintenance.

Firewood Collection Goals

- *Firewood is collected in a sensitive manner in recognition of habitat requirements of local fauna*

Firewood Collection Conditions [5.3 (n)]

- **Collection of timber is restricted to non-hollow logs/branches removed during fence and track maintenance activities only within an area of 3m either side of the fence/track.**
- **Removed timber will only be used for heating of the Landholders dwelling on the Land.**
- **Standing dead trees provide den, nesting and/or roosting sites for arboreal animals, owls and other birds and will be left in situ**
- **Any fallen timber with large hollows provides valuable habitat and will be left *in situ***

Firewood Collection Recommendations

- During fence and track maintenance any hollow branches or logs should be retained in the Conservation Area after moving it away from the fence line or track.
- Avoid collecting damp or decaying timber
- Only use firewood as necessary for heating – consider alternative heating sources or more efficient wood heaters

2.6 Revegetation works and seed collection

Some planting of shrubs and trees along the stream course on The Parlour Grasslands may be necessary to stabilise the banks from erosion. Ideally, any revegetation works will only use plants that have germinated from seed sourced from the property. Seed may also be collected from the property for use in regional revegetation projects and to donate or sell to regional seed banks.

It must be remembered however that the production of seed by native flora species is an essential component of an ecosystems restoration capacity, and as such native seed should be conserved on site as much as possible. The maintenance of foliage cover on native plants is essential for maintaining plant health and animal habitat.

Revegetation and Seed Collection Management Goals

- *Control erosion along water courses and gullies*
- *Buffer threatened species habitat*
- *Conduct revegetation, restoration and seed collection using best practice principles that minimises disturbance to flora and fauna and their habitats*

Revegetation and Seed Collection Conditions [5.3(a) ii, 5.3(b), 5.3(f) iii]

- **Any seed collection must be conducted on a rotational basis on the Land to fulfil plant species recruitment requirements.**
- **Where possible use only local provenance indigenous seed or plants for any revegetation and restoration works.**
- **Any revegetation and restoration works must follow protocol as agreed between the Trust and the Landholder**
- **Licenses are required for collection of material of protected plants listed under Schedule 13 of the National Parks and Wildlife Act 1979 (NSW) and threatened species listed on the TSC Act 1995 (refer to Section 2.2).**

Revegetation and seed collection Recommendations

- Identify sites for future revegetation works
- Use seed collected from Conservation Area for any revegetation and restoration works
- As the Land is dominated by native grasses, avoid deep ripping as this can create excessive ground disturbance and create areas for weed colonisation.
- Contact the Southern Rivers CMA, Braidwood office for potential incentives
- Ensure best practice regeneration/revegetation/seed collection is undertaken. Contact the Trust, Greening Australia or the CMA for information regarding regeneration incentives and advice
- Ensure that an adequate natural seedbank is retained in the Conservation Area to allow for natural regeneration processes and to provide a food source for animals.
- During seed collection, ensure that plant health is maintained and not compromised by over cutting/wounding.

2.7 Control of Noxious and Environmental Weeds

Environmental weeds are flora species which are not indigenous to the habitats in the local area. These species have the capacity to significantly modify native vegetation composition and structural complexity throughout competing native species for limited resources such as water, nutrients and light. Environmental weeds are listed as **noxious** under the *Noxious Weed Act 1993*, if they have significant negative impacts on the environment, human health, livestock or the agriculture industry.

Overall, there is a very sparse cover of weeds occurring across the Conservation Area. A number of scattered patches of locally declared noxious weeds, Blackberry (*Rubus fruticosus* spp. agg.) Serrated Tussock (*Nassella trichotoma*), Sweet Briar (*Rosa rubiginosa*), Paterson's curse (*Echium plantagineum*) and Nodding Thistle (*Carduus nutans*) have been identified within the Conservation Area. These noxious weeds are currently being controlled by the Trust. As with all weed control works, follow up control is essential. Information regarding control of these noxious weeds is provided in Appendix G and H.

These noxious weeds are all classified as class 4 weeds (A locally controlled weed) in the Palerang Council area. Class 4 weeds are plants that pose a threat to primary production, the environment or human health, are widely distributed in an area to which the order applies and are likely to spread in the area or to another area. The control objective for this class of weed is to minimise the negative impact of those plants on the economy, community and environment of New South Wales. An owner/occupier (other than a public authority) of land in Palerang Council area must control class 4 noxious weeds according to the control measure. A noxious weeds information pamphlet for Palerang Council is provided in Appendix H.

Other weed species occur as isolated individuals distributed across the Conservation Area such as Fleabane (*Conyza vulgare*), European Sorrel (*Acetosella vulgaris*), Dandelion (*Taraxacum officinale*) and Paspalum (*Paspalum dilatatum*). At present these species are of less concern, however they should be monitored to ensure they do not begin to compete against the native plant communities within the Conservation Area.

Weed Control Management Goals

- *Native vegetation cover is maintained and enhanced.*
- *Blackberry, Serrated Tussock, Paterson's Curse, Nodding Thistle and Sweet Briar infestations are controlled.*
- *Weed control is undertaken in a manner that does not degrade the values of the Conservation Area and promotes native vegetation recovery.*

Weed Control Conditions [5.3(f) iv, 5.3(j) ii, 8 (a), recital E]

- **Control noxious weeds as required under the Noxious Weeds Act 1993.**
- **Only herbicides that are registered in NSW for the control of the target species are to be applied (see product label &/or contact the Trust for advice).**

Weed Control Recommendations

- Monitor and maintain areas previously cleared of weeds
- Refer to the attached weed control guidelines (Appendix G & H) or contact the Trust for further information
- Use only broad-leaf specific herbicides for control of Paterson's Curse, Nodding Thistle and Blackberry, to avoid killing grass beneath and in the vicinity of plants.
- If serrated tussock plants have developed seed, remove seed heads and leave in a sealed plastic bag for a few months or dispose by incineration. Ideally seeds will be disposed of on site to avoid potential spread.
- Do not use boom sprays – use only spot spray specific equipment.
- Monitor for infestations of new weed species. If required seek identification advice from the Trust, Southern Rivers CMA or local Landcare group.
- If required, seek funding to assist with weed management works. Contact the Trust for assistance with identifying funding opportunities.



*An infestation of Serrated Tussock (Nassella trichotoma) occurring on the wall of the southern dam.
Note long drooping flowering seed heads.*

2.8 Feral/native animal control

Feral animal species present on The Parlour Grasslands include feral pigs (*Sus scrofa*), brown hares (*Lepus capensis*), European rabbits (*Oryctolagus cuniculus*) and the red fox (*Vulpes vulpes*). These pest animals present a threat to the integrity and long term viability of the flora and fauna communities. There are also kangaroos resident in the surrounding landscape, however at present they are not causing any significant deterioration to the native ground cover.

The presence of feral pigs in the Conservation Area is a major management concern. Feral pigs may cause considerable damage to vegetation and are recognised as a Key Threatening Process in the *Threatened Species Conservation Act* (1995). Control of feral pigs should be undertaken in consultation with the Rural Lands Protection Board. A fact sheet on feral pigs and their control is provided in Appendix F.



An example of a feral pig rooting with the soil disturbed from the pigs using their snout and teeth to dig for underground food

Feral/native Animal Control Management Goals

- *Minimise the impact of pest animals on native plants and animals.*
- *Pest animals are controlled*
- *Conduct control in a manner that is sympathetic to the conservation of Natural Heritage Values.*

Feral/native Animal Control Conditions [5.3(c), 5.3(f) iv & 5.3(k)]

- **Landholders must comply with obligations under the Rural Lands Protection Act 1998 (RLP Act) to eradicate pest animals on land they own, occupy or manage.**
- **Landholders must comply with obligations to prevent cruelty to animals**
- **Fumigate and collapse rabbit warrens by non-mechanical methods only. Mechanical ripping will only be permitted with the Trust's consent and survey prior to implementation.**

- **Kangaroo control will be only permitted with the Trust's consent and survey prior to implementation (subject to any additional relevant conditions), and under authorisation and license issued by the appropriate Government authority.**
- **Landholders must comply with legislative requirements regarding the use, transportation and storage of firearms**

Feral/native Animal Control Recommendations

- Seek assistance from the Rural Lands Protection Board on control methods.
- Investigate opportunities to link with neighbour pest animal control programs.
- Develop a pig control program for the Conservation Area in consultation with adjoining landholders, the Rural Lands Protection Board and the Trust (refer to Appendix F for notes on pig control).
- Shooting of pest animals should only be performed by skilled operators who have the necessary experience with firearms and who hold the appropriate licences and accreditation.

2.9 Recreational Opportunities

The Parlour Grasslands provides excellent opportunities for passive recreation such as walking and bird watching. Other recreational activities may be compatible with the conservation of the natural heritage values of the Conservation Area, if undertaken in a sensitive manner.

- *Undertake recreational activities in a manner sensitive to the Natural Heritage Values.*

Recreation Conditions [5.3(e), 5.3(i), 5.3(o)]

- **Dogs may be walked in the Conservation Area off leash but under the effective control of the owner at all times.**
- **The Trust may give consent to other activities provided that Natural Heritage Values are not going to be adversely affected.**
- **A tent may be erected at a location where the impact to native ground cover is minimal.**
- **A campfire may be used at a location where the impact to native ground cover is minimal (and in accordance with RFS advice).**

2.10 Neighbour Information, Education, and Co-Operation

It is important that all people undertaking works or agisting stock within the Conservation Area (or adjacent to where relevant) are informed about the existence, location and purpose of the Conservation Area and relevant management conditions [see Clause 8 of Agreement]. The Parlour Grasslands may be a catalyst for broad scale co-operative conservation projects with neighbouring properties. The Conservation Area is located within a landscape where overall conservation efforts will be enhanced through integrated land management.

Neighbour Education Goals

- Provide adequate and accessible information on the boundaries of the Conservation Area (and Grazing Zones) and management goals in order to protect the integrity of Natural Values.

The Conservation Area is located within a landscape where overall conservation efforts will be enhanced through integrated land management.

Neighbour Education Management Recommendations

- Signs supplied by the Trust may be erected in appropriate locations to indicate the location of the Conservation Area and to recognise the efforts of the Landholder.
- Meet with adjacent landholders and inform them of the intent of the Conservation Area and develop strategies for maximizing joint control of pests species such as pigs, rabbits and weeds.
- As opportunities arise, inform nearby landholders of the conservation value of the property
- Where practical establish contact with the local Landcare Group and the Southern Rivers CMA.
- Where appropriate open the property and Conservation Area for field day sites (eg. as an example of land managed for conservation in conjunction with strategic grazing).



*Friends of Grasslands members finding new plants on the neighbouring "Bunhybee Grasslands"
(photo- Rainer Rehwinkel)*

3 MONITORING

3.1 Regular Contact

The Trust will endeavour to maintain regular and helpful contact with the Landholder as part of its Stewardship Program. The Landholder will be contacted at least once per year by phone or via a visit to the property to discuss issues related to the Agreement. This will ensure that the Landholder receives advice and assistance in maintaining the value of the site. The Landholder is also encouraged to contact the Trust at any time in relation to any management problems that may arise.

3.2 Vegetation Monitoring

The Trust will monitor Natural Heritage Values of the Conservation Area utilising photo points and vegetation plot data, see Appendix A.

3.3 Disturbance Monitoring

In the event of acute disturbance to the site it is important that the Landholder report this to the Trust so that any necessary remedial action is not neglected or unduly delayed.

4 REFERENCES

Environment ACT (2005) *National Recovery Plan for Natural Temperate Grassland of the Southern Tablelands (NSW and ACT): an endangered ecological community*. Environment ACT, Canberra.

Keith, D. A. (2004) *Ocean Shores to Desert Dunes: the native vegetation of New South Wales and the ACT*. NSW Department of Environment and Conservation, Hurstville.

Benson, J.S. (1994) The native grasslands of the Monaro region: Southern Tablelands. *Cunninghamia* 3, 609-50.

Howitt, A.W. (1996) *The Native Tribes of South-Eastern Australia*. Aboriginal Studies Press, Canberra.

Heritage Office (HO) & Department of Urban Affairs and Planning (DUAP) (1996) *Regional Histories: Regional Histories of New South Wales*. Sydney.

NSW Department of Primary Industries (2007) *Vertebrate Pest Control Manual – Legislative & Policy Requirements for Pest Animal Management*.

Websites

<http://www.argylecounty.com.au/towns/braidwood.html>

<http://www.aiatsis.gov.au/>

<http://www.environment.nsw.gov.au/bioregions/SouthEasternHighlandsBioregion.htm>

<http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/noxweed>

<http://www.threatenedspecies.environment.nsw.gov.au>

<http://www.southern.cma.nsw.gov.au/>

<http://parishmaps.lands.gov.au>

APPENDIX A – MONITORING AND ASSESSMENT TECHNIQUES

The Landholder and the Trust recognise that the condition of the native ground cover will vary over time as a result (in part) of natural variation in the climate as well as grazing pressures (i.e. domestic stock, native herbivores, feral herbivores). The effectiveness of rainfall (i.e. amount, intensity and seasonality), for example, can have a significant effect on the condition of the native ground cover. Such factors will be taken into account when the Trust and the Landholder monitor the paddocks and evaluate the impact of the current grazing regime.

Reference sites will be used by both the Landholder and the Trust to help monitor the condition of the native vegetation. These were established during September 2008 at four locations across the property (see Map 5).

Location of the reference sites (& fixed-point photograph points)

(Map datum GDA '94 MGA):

- Photo point 1: Northing 6048291, Easting 735524, Elevation 734m
- Photo point 2: Northing 6048400, Easting 735974, Elevation 787m
- Photo point 3: Northing 6048789, Easting 736333, Elevation 754m
- Photo point 4: Northing 6048553, Easting 735564, Elevation 728m

These sites will provide a way of comparing the condition of the native ground cover/vegetation.

The Trust in conjunction with the Landholder will establish photopoints at the reference sites to enable monitoring over time. The Trust and/or the Landholder will, from time to time, rephotograph these photopoints in the future. Ideally these points should be re-photographed every two years and at the same time of year for consistency.

By comparing the photographs at each site over time, the Landholder and the Trust should be able to detect significant changes in vegetation cover and structure. For example, a significant increase or decrease in the extent or size of kangaroo grass *Themeda* and wallaby grass *Austrodanthonia* tussocks, or shrub growth may be evident.

In addition to taking the photographs, the Trust and/or Landholder will periodically record the grass heights and vegetation cover at each of the reference sites. This will be conducted via a 50m line transect method where the cover and height of vegetation will be recorded over a metre length every 5m along a 50m measuring tape. The transects will align with the direction of the photopoints where possible, with a standard orientation recorded. The Trust may also periodically assess the condition of the vegetation using the BioMetric method at each reference site. Refer to http://www.nationalparks.nsw.gov.au/npws.nsf/content/biometric_tool for more information on the BioMetric method.

Photopoints

One of the simplest methods of monitoring the pasture in a paddock is to take photographs from a fixed-point over a period of time. Taking the photos at the same time of year each time (preferably spring) will allow for more objective comparisons. The types of changes that are picked up using this technique are changes in ground cover, bare ground as well as some changes in vegetation structure.

At The Parlour Grasslands these fixed points are not marked on the ground using steel posts or other objects that stick out of the ground. To help identify the reference sites, the point at which the photograph is taken by the following:

- a GPS reading is taken at the spot and the grid reference is recorded below so that any other GPS will be able to relocate the spot (+/- 5 metres); and
- a large rock (or another large heavy object) is also used to mark the spot and a photograph is also taken of the rock to help relocate it.

The direction (bearing) that the photographs are taken with respect to the reference site is always South-South-West (~200°). A southerly bearing means that the camera never faces into the sun which can obscure the photograph. A tape measure should be wound out along that bearing from the reference site. The 2-metre mark, 5-metre mark and 15-metre mark should be clearly tagged (with coloured tape for example) so that it is clearly visible to the photographer through the viewfinder / camera screen.

A **photograph of the reference site** (the 'starting point') only needs to be done once, which is at the establishment of the reference point **OR** if there is some significant change to the marker (eg. the rock is replaced by some other marker).

The **close-up photograph** is taken of the first metres of the transect so that the 2-metre mark is at the top of the photograph. This photograph provides information on the ground cover vegetation and the amount of bare ground.

The **middle-ground photograph** is positioned so that the 5-metre mark is in the middle of the photograph. This photograph provides detail over a wider area and helps indicate the general state of the grasses in this vicinity.

The **landscape photograph** is positioned so that the 15-metre mark is in the middle of the photograph. This photograph provides a view of the landscape/ paddock as a whole, and should help detect changes in structure (such as tree or shrub regeneration, or invading woody weeds).

For further information on the grazing of native pastures, please refer to the following publications:
Eddy, D. (2002). *Managing Native Grassland: a guide to management for conservation, production and landscape protection*. World Wide Fund for Nature Australia. Sydney, NSW.

Eddy, D., Mallinson, D., Rehwinkel, R & Sharp, S. (1998). *Grassland Flora: a field guide for the Southern Tablelands (NSW & ACT)*. Environment ACT, NSW National Parks and Wildlife Service, World Wide Fund for Nature Australia, Australian National Botanic Gardens, Natural Heritage Trust. Canberra, ACT.

Barlow, T. (1998) '*Grassy Guidelines*' How to manage native grasslands and grassy woodlands on your property. Available on website:
<http://www.ea.gov.au/land/publications/grassguide/index.html>

McIntyre, S., McIvor, J. G., Heard, K. M. (2002) *Managing & conserving grassy woodlands*

Mokany, Friend, Kirkpatrick, and Gilfedder. (2006) '*Managing Tasmanian Native Pastures: a technical guide for graziers*'

McIntyre, S., McIvor, J. G. & MacLeod, N. D. (2000) Principles for sustainable grazing in eucalypt woodlands: landscape-scale indicators and the search for thresholds. In: *Management for Sustainable Ecosystems* (eds P. Hale, A. Petrie, D. Moloney & P. Sattler) pp. 92– 100. Centre for Conservation Biology, University of Queensland, *Brisbane*

Website for the Stipa Native Grasses Association Inc. <http://www.stipa.com.au>

Photopoints in September 2008

Photo Point 1: Snow Gum Woodland <50% cover

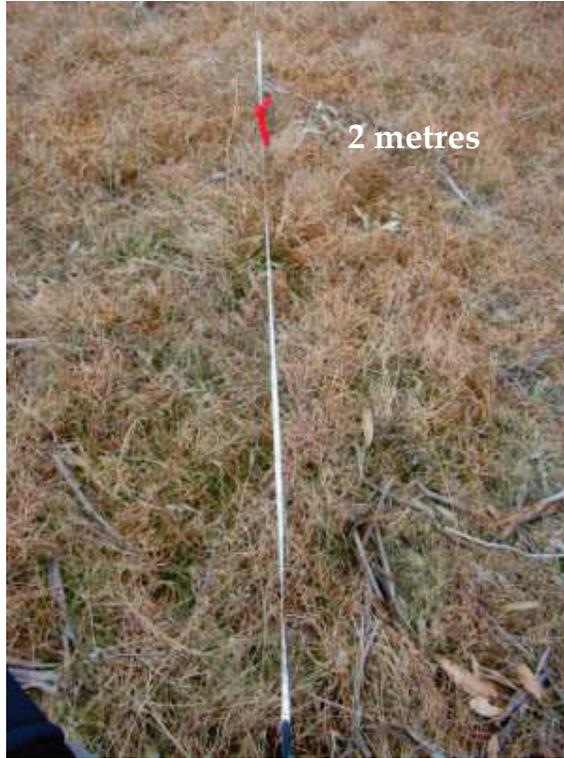
Date: 03/09/08

Transect direction: 220° SSW

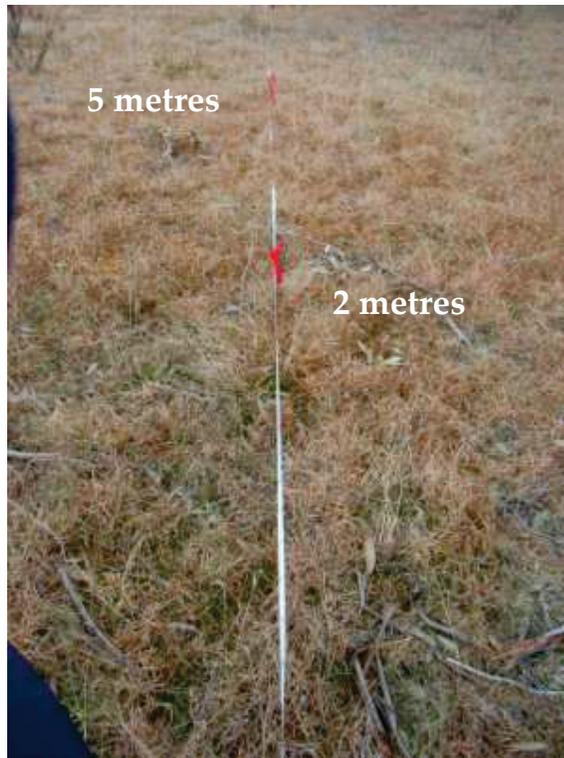
Location notes: Approximately 50m south of the track in the south western section of the property (see Map 5). Reference point marked by a multi-stemmed Snow Gum (see Reference Point photo below).



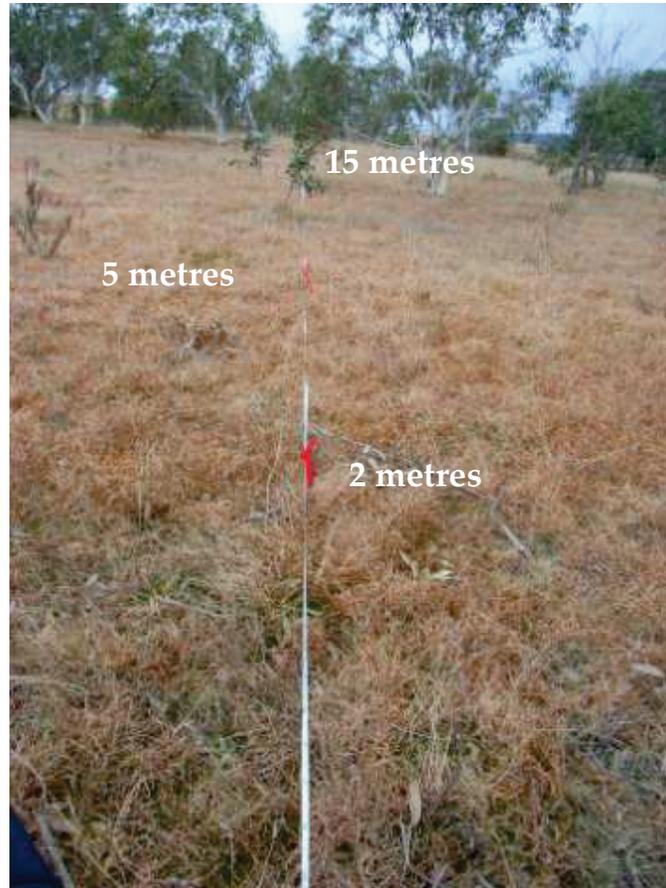
Reference point photo



Close up photo with the 2 metre mark located at the top of the photo



Middle ground photo with the 5 metre marker located in the centre of the photo



Landscape photo with the 15 metre marker in the centre of the photo

Photo Point 2: Wet Natural Temperate Grassland of the Southern Tablelands Community

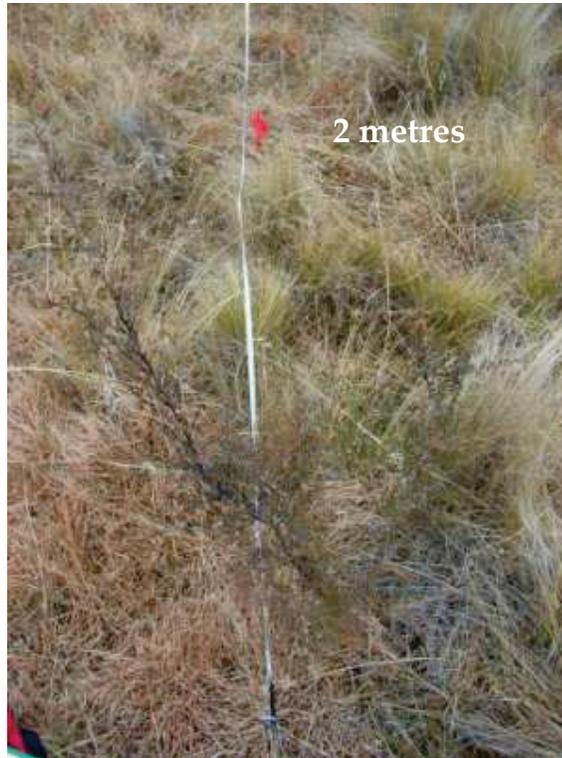
Date: 03/09/08

Transect direction: 220° SSW

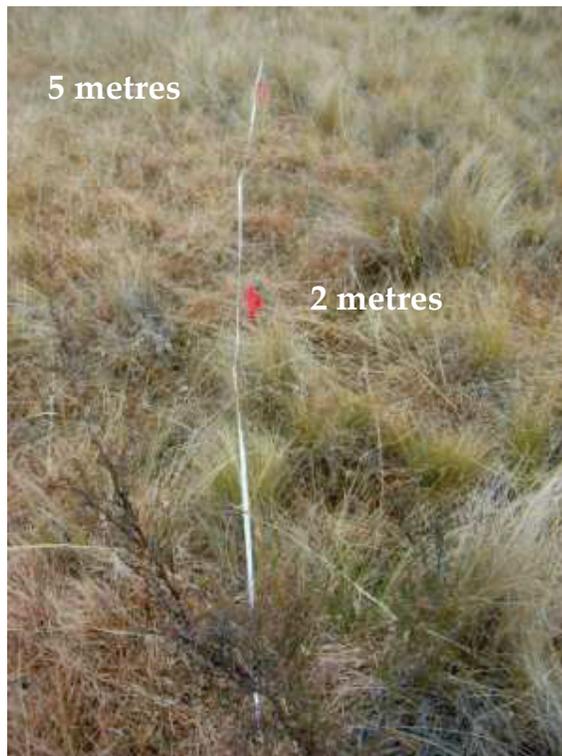
Location notes: Located in the centre of the property adjacent to the track (see Map 5). Reference point located within a small stand of *Kunzea* sp. (see Reference Point photos below).



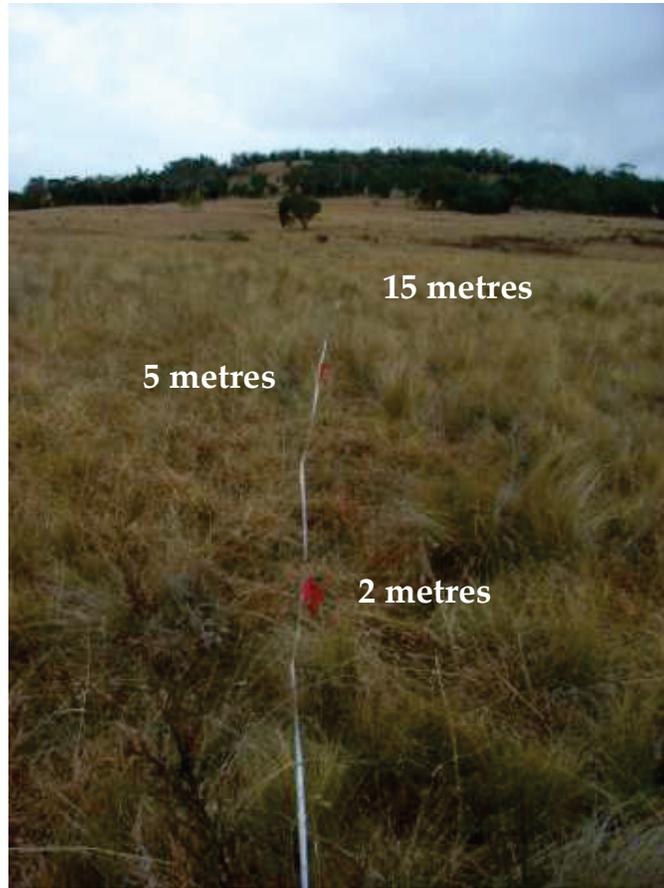
Reference point photos



Close up photo with the 2 metre mark located at the top of the photo



Middle ground photo with the 5 metre marker located in the centre of the photo



Landscape photo with the 15 metre marker in the centre of the photo

Photo Point 3: Dry Natural Temperate Grassland of the Southern Tablelands Community

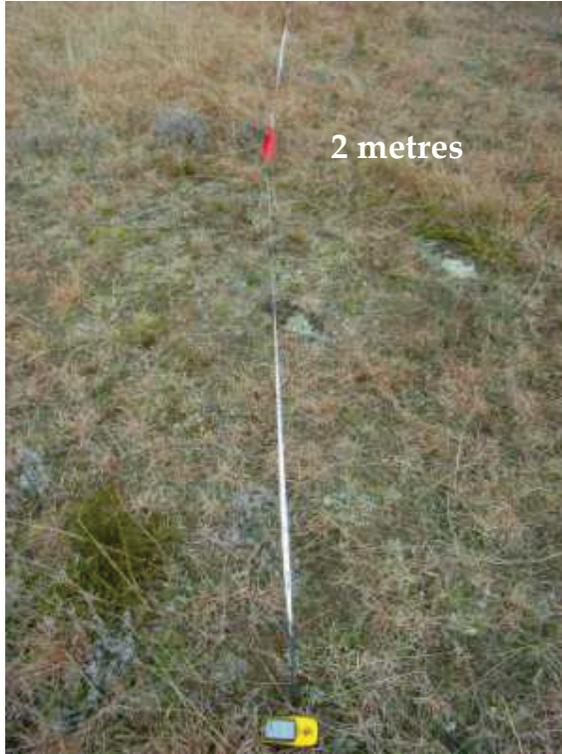
Date: 03/09/08

Transect direction: 220° SSW

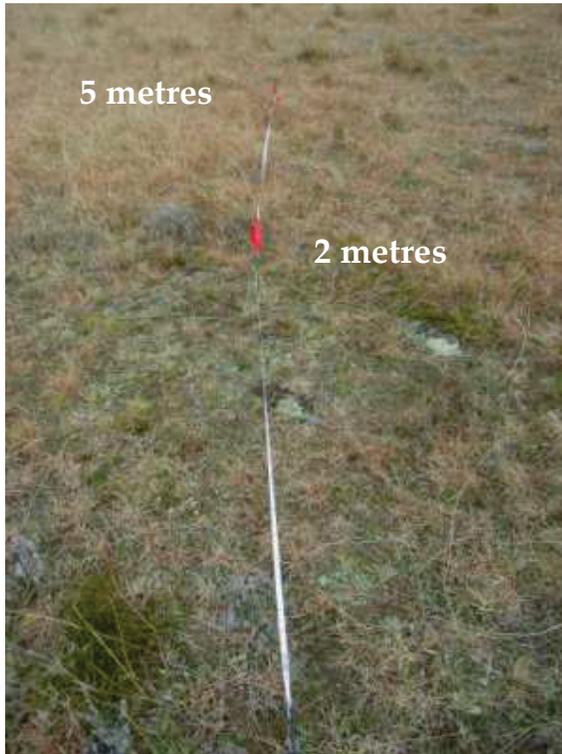
Location notes: Located in the north eastern section of the property (see Map 5). Reference point approximately 100m south of the boundary fence & an Acacia tree (see Reference Point photo below).



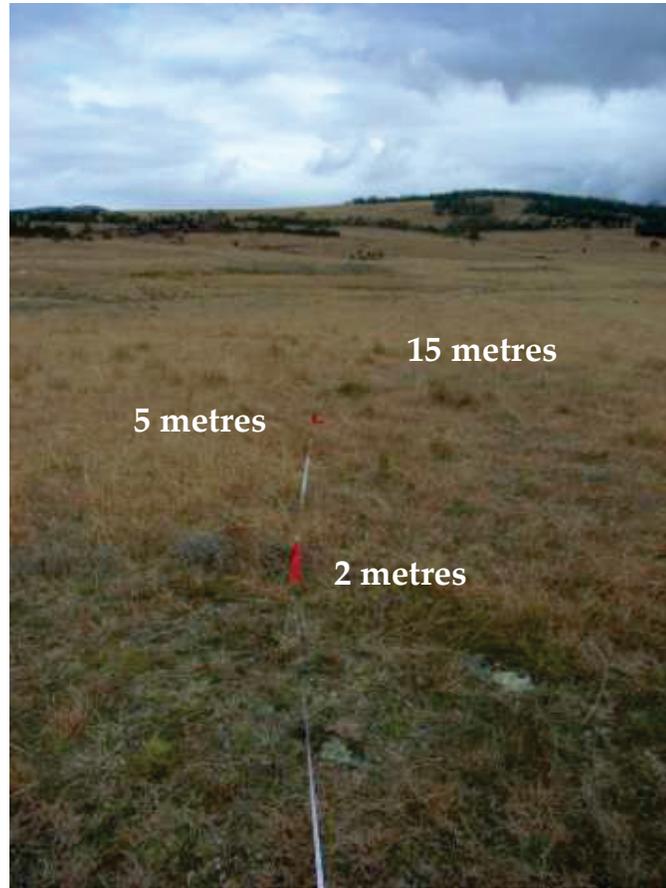
Reference point photo



Close up photo with the 2 metre mark located at the top of the photo



Middle ground photo with the 5 metre marker located in the centre of the photo



Landscape photo with the 15 metre marker in the centre of the photo

Photo Point 4: Snow Gum Woodland

Date: 03/09/08

Transect direction: 220° SSW

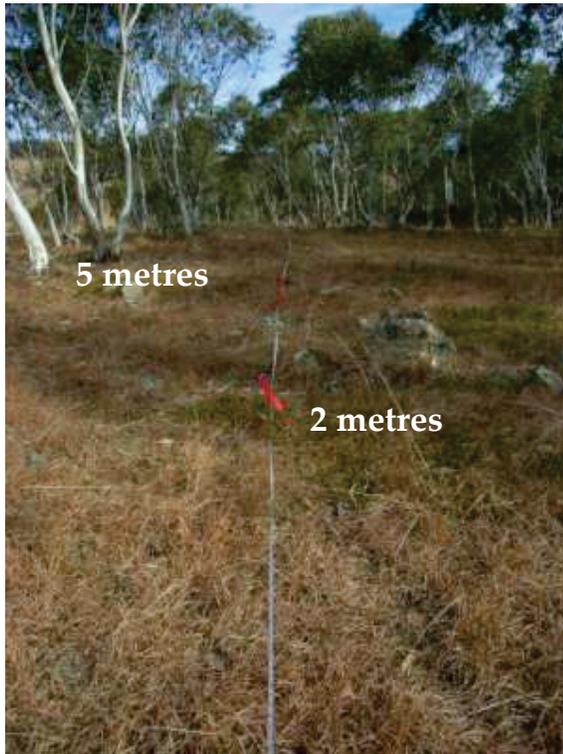
Location notes: Located in the north western section of the property (see Map 5). Reference point marked by a *Eucalyptus* sp. sapling (see Reference Point photo below).



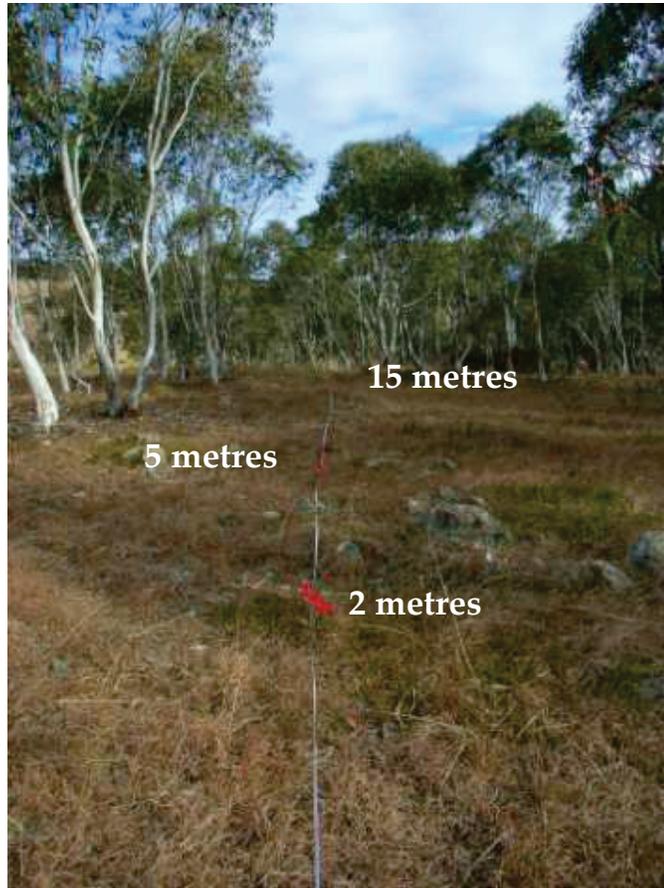
Reference point photo



Close up photo with the 2 metre mark located at the top of the photo



Middle ground photo with the 5 metre marker located in the centre of the photo



Landscape photo with the 15 metre marker in the centre of the photo

APPENDIX B – RELEVANT LEGISLATION

- *Nature Conservation Trust Act 2001* (NSW), which includes provisions about the objects, powers and functions of the Trust and the contents of trust agreements;
- *National Parks and Wildlife Act 1974* (NSW), which includes provisions relating to the conservation of nature, and the conservation of objects, places or features (including biological diversity) of cultural value within the landscape;
- *Threatened Species Conservation Act 1995* (NSW), which includes provisions for the nomination and protection of threatened species, populations and endangered ecological communities;
- *Rural Lands Protection Act 1998* (NSW), which includes provisions about the responsibility of Landholder to control specified exotic animals;
- *Noxious Weeds Act 1993* (NSW), which includes provisions about the responsibility of Landholder to control specified and declared noxious weeds;
- *Rural Fires Act 1997* (NSW), which includes provisions about circumstances under which the Landholder must undertake a hazard reduction burn;
- *Native Vegetation Act 2003* (NSW), which includes provisions that relate to the sustainable management and conservation of native vegetation;
- *Environment Planning and Assessment Act 1979* (NSW), which includes provisions relating to ecologically sustainable development;
- *Water Management Act 2000* (NSW), which includes provisions for the sustainable and integrated management of the water sources of the State;
- *Native Title Act 1993* (Cth), which contains provisions relating to native title rights and interests;
- *Environmental Protection and Biodiversity Conservation Act 1999* (Cth), which includes provisions for the protection of the environment, particularly those matters of national environmental significance.

See www.austlii.edu.au for detail on these Acts and other legislation.

APPENDIX C – FLORA SPECIES OCCURRING IN THE CONSERVATION AREA.

The following Table 1 shows flora species that were recorded during informal surveys of the Conservation Area from September 2007 through to January 2008 by Trust staff (Nicky Bruce and Nigel Jones) and Rainer Rehwinkel from the Department of Environment, Climate Change and Water.

The Conservation Area supports a high diversity of plants with a total of 192 species recorded during a number of informal ground surveys including 31 introduced and 161 native plants. Additional species are likely to be identified with further survey effort. In particular, cryptic plants such as orchids, which are only visible above ground for short periods, may be located during targeted seasonal surveys.

One threatened plant, the Mauve Burr Daisy (*Calotis glandulosa*), was recorded on the property currently listed under the *Threatened Species Conservation Act 1995* and *Environmental Protection and Biodiversity Conservation Act 1999*.

Table 1. Flora species known to occur in the Conservation Area.

Abundance: **Rp/c** = rare patches or clumps < 3 patches with < 10 plants per patch, **R** = Rare at site (< 3 plants), **O** = Occasional (<5% cover), **Ip/c** = intermittent patches or clumps, **I** = intermittent/subdominant, **F** = frequent/dominant. Species that are threatened (Vulnerable or Endangered under the *Threatened Species Conservation Act 1995* or *Environmental Protection and Biodiversity Conservation Act 1999*) are marked in **bold** font. Species marked with an Asterix * are noxious or environmental weeds.

Scientific Name	Common Name	Frequency Code
<i>Acacia brownii</i>		R/p
<i>Acacia dealbata</i>	Silver Wattle	R/p
<i>Acacia gunnii</i>	Ploughshare Wattle	R/p
<i>Acacia mearnsii</i>	Late Black Wattle	R
<i>Acacia melanoxylon</i>	Blackwood Wattle	R
<i>Acaena x anserovina</i>		R/p
<i>Acaena novae-zelandiae</i>	Bidgee Widgee	R
<i>Acaena ovina</i>	Sheep's Burr	R
<i>Acrotriche serrulata</i>	Honeypots	O
<i>Adiantum aethiopicum</i>	Maidenhair Fern	R/p
<i>Agrostis meulleriana</i>		
<i>Ajuga australis</i>	Austral Bugle	R
<i>Allocasuarina distyla</i>	A she-oak	O
<i>Alternanthera sp.</i>	Lesser Joy-weed	
<i>Amyema pendulum</i>	A mistletoe	O
<i>Aristida ramosa</i>	Purple Wire-grass	O/p
<i>Asperula conferta</i>	Common Woodruff	O
<i>Asplenium flabellifolium</i>	Necklace Fern	R
<i>Astroloma humifusum</i>	Cranberry Heath	R
<i>Austrodanthonia carphoides</i>	Short Wallaby Grass	R/p
<i>Austrodanthonia laevis</i>		

<i>Austrodanthonia spp</i>	Wallaby Grasses	O
<i>Austrostipa densiflora</i>	Brushtail Speargrass	R
<i>Austrostipa falcata</i>	Cork-screw grass	I
<i>Banksia marginata</i>	Silver Banksia	R
<i>Bossiaea buxifolia</i>	Box-leaved Bossiaea	O
<i>Bossiaea prostrata</i>	Creeping Bossiaea	O
<i>Bothriochloa macra</i>	Red-grass	O
<i>Brachyscome heterodonta</i>	Lobe-seeded Daisy	R
<i>Brachyscome rigidula</i>	Leafy Daisy	R
<i>Brachyscome scapigera</i>		
<i>Brachyloma daphnoides</i>	Daphne Heath	O/p
<i>Bulbine bulbosa</i>		
<i>Bursaria spinosa</i>		
<i>Caesia calliantha</i>		
<i>Callistemon sieberi</i>	River Bottlebrush	R/p
<i>Calotis glandulosa</i>	Mauve Burr-daisy	R
<i>Carex breviculmis</i>	Short-stemmed sedge	O
<i>Carex tereticaulis</i>		
<i>Carex sp.</i>	A sedge	O
<i>Cassinia longifolia</i>	Dolly Bush	R
<i>Cassinia sp.</i>	A cassinia	R
<i>Centipeda minima</i>	Spreading Sneezeweed	R/p
<i>Chamaecyce drummondii</i>	Caustic Weed	R
<i>Cheilanthes sp.</i>	A rock-fern	R
<i>Chenopodium pumilo</i>	Small Crumbweed	O
<i>Chloris truncata</i>	Windmill Grass	
<i>Chrysocephalum apiculatum</i>	Common Everlasting	O/p
<i>Chrysocephalum semipapposum</i>	Clustered Everlasting	R
<i>Convolvulus angustissimus</i>	Blushing Bindweed	R
<i>Cotula australis</i>	Water Buttons	R
<i>Craspedia variabilis</i>	Billy Buttons	O
<i>Crassula sieberiana</i>	Australian Stonecrop	O
<i>Cymbonotus lawsonianus</i>	Austral Bear's ear	O
<i>Daviesia mimosoides</i>	Leafy Bitter-pea	R
<i>Desmodium varians</i>	Slender Trick-trefoil	R
<i>Dianella longifolia</i>	Smooth Flax-lily	R
<i>Dichelachne crinita</i>	A plume-grass	O
<i>Dichelachne rara</i>	A plume grass	R
<i>Dichondra repens</i>		
<i>Diuris chryseopsis</i>	Golden Moths Orchid	O
<i>Diuris sulphurea</i>	Tiger Orchid	R/p
<i>Eleocharis ?gracilis</i>		
<i>Elymus scaber</i>	Common Wheat-grass	O
<i>Enneapogon nigricans</i>	Nineawn Grass	R
<i>Epacris microphylla.</i>	A heath	R/p
<i>Epilobium billardierianum</i>	La Billardiere's Willowherb	R
<i>Eragrostis parvifolia</i>	Weeping Lovegrass	R
<i>Eragrostis trachycarpa</i>		

<i>Eucalyptus aggregata</i>	Black Gum	R
<i>Eucalyptus dives</i>	Broad-leaved Peppermint	O/p
<i>Eucalyptus pauciflora</i>	Snow Gum	O
<i>Eucalyptus rubida</i>	Candlebark	O/p
<i>Eucalyptus viminalis</i>	Manna Gum or Ribbon Gum	R
<i>Euchiton involucreatum</i>	A cudweed	R
<i>Euchiton sphaericum</i>	A cudweed	O
<i>Exocarpus cupressiformis</i>	Cherry Ballart	OS
<i>Fimbristylis dichotoma</i>		
<i>Galium gaudichaudii</i>	Rough Bedstraw	R
<i>Geranium antrorsum</i>	Antrorse Geranium	R
<i>Geranium solanderi</i>	Native Geranium	R
<i>Glycine clandestina</i>	Twining Glycine	R
<i>Gompholobium minus</i>	Dwarf Wedge-pea	O
<i>Gonocarpus tetragynus</i>	Common Raspwort	O
<i>Goodenia hederacea</i>	Ivy-leaf Goodenia	O
<i>Goodenia hederacea</i> ssp. <i>alpestris</i>		
<i>Hakea microphylla</i>	Small-fruited Hakea	R/p
<i>Haloragis heterophylla</i>	Swamp Raspwort	O
<i>Hardenbergia violacea</i>	Native Sarsparilla	R
<i>Helichrysum rutidolepis</i>		
<i>Hemarthria uncinata</i>	Mat-grass	O/p
<i>Hibbertia obtusifolia</i>	Grey Guinea-flower	O
<i>Hovea linearis</i>	Creeping Hovea	O
<i>Hydrocotyle algida</i>	Swamp Pennywort	R
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	
<i>Hypericum gramineum</i>	Small St John's Wort	R/p/c
<i>Hypericum japonicum</i>	A St John's Wort	R
<i>Hypoxis hygrometrica</i>		
<i>Isoetopsis graminifolia</i>	Grass Cushion	O
<i>Isotoma fluviatilis</i>	Swamp Isotome	R
<i>Joycea pallida</i>	Red-anthered Wallaby Grass	R/p
<i>Juncus filicaulis</i>	Pinrush	R
<i>Juncus fockei</i>		
<i>Juncus planifolius</i>		
<i>Juncus</i> sp.	A rush	R
<i>Kunzea parvifolia</i>	Violet Kunzea	O/p
<i>Lachnagrostis filiformis</i>		
<i>Laxmannia gracilis</i>	Wire Lily	R/p
<i>Leptorhynchos squamatus</i>	Scaly Buttons	O
<i>Leptospermum lanigerum</i>	Woolly Teatree	
<i>Leptospermum myrtifolium</i>	A teatree	O/p
<i>Leptospermum obovatum</i>	A teatree	O/p
<i>Leptospermum polygalifolium</i>	A teatree	O
<i>Leucopogon fraseri</i>	A beard-heath	O
<i>Leucopogon virgatus</i>	Slender Beard-heath	O/p
<i>Linum marginale</i>		

<i>Lomandra filiformis</i>	Wattle Mat-rush	O
<i>Lomandra longifolia</i>	Spiny Mat-rush	R
<i>Lomandra multiflora</i>	Many-flowered Mat-rush	R
<i>Lomatia ilicifolia</i>	Holly-leaf Lomatia	R
<i>Luzula</i> sp.	A woodrush	O
<i>Lythrum hyssopifolium</i>	Purple Loosestrife	R/p
<i>Melichrus urceolatus</i>	Urn Heath	R/p
<i>Mentha diemenica</i>		
<i>Microlaena stipoides</i>	Weeping-grass	O
<i>Microstis</i> sp.	An onion orchid	R
<i>Myriophyllum</i> sp.	Milfoil	R
<i>Opercularia hispida</i>	Hairy Stinkweed	O
<i>Ophioglossum lusitanicum</i>	Adder's Tongue	O
<i>Oreomyrrhis eriopoda</i>	Native Carraway	R
<i>Oxalis perennans</i>	Grassland Wood-sorrel	R
<i>Panicum effusum</i>	Hairy Panic	O
<i>Persicaria prostrata</i>		
<i>Pimelea curviflora</i>	Curved Rice-flower	R
<i>Pimelea glauca</i>	Shrubby Rice-flower	R/p
<i>Plantago gaudichaudii</i>	Narrow Plantain	O
<i>Plantago varia</i>	Variable Plantain	O
<i>Poa labillardieri</i>	River Tussock	O
<i>Poa meionectes</i>		O
<i>Poa sieberiana</i>	Poa Tussock	R
<i>Poa</i> sp.	A tussock grass	R
<i>Poranthera microphylla</i>	Small Poranthera	R/p
<i>Pterostylis falcata</i>	A greenhood orchid	O
<i>Pultenaea subspicata</i>	Low Bush-pea	R
<i>Ranunculus lappaceus</i>	Common Buttercup	O
<i>Ranunculus</i> sp.	A buttercup	R/p
<i>Rumex brownii</i>	Swamp Dock	R
<i>Rumex dumosus</i>	Wiry Dock	R
<i>Sarga leiocladum</i>		
<i>Schoenus apogon</i>	Common Bog-sedge	O
<i>Scleranthus biflorus</i>	Mossy Knawel	O
<i>Senecio quadridentatus</i>	Hoary Ragwort, Fireweed	R
<i>Solenogyne dominii</i>	Smooth Solenogyne	O
<i>Solenogyne gunnii</i>	Hairy Solenogyne	O
<i>Spiranthes sinesis</i>		
<i>Stackhousia monogyne</i>	Creamy Candles	O
<i>Stylidium graminifolium</i>	Grass Trigger-plant	O
<i>Themeda australis</i>	Kangaroo-grass	O
<i>Thelymitra</i> sp.	A sun orchid	O
<i>Thysanotus tuberosus</i>	Common Fringe-lily	R/p
<i>Tricoryne elatior</i>	Yellow Rush-lily	O
<i>Triptilodiscus pygmaeus</i>	Austral Sunray	O/p
<i>Utricularia dichotoma</i>	Fairy Aprons	R
<i>Velleia montana</i>	Montane Velleia	R/p
<i>Veronica calycina</i>		

<i>Veronica gracilis</i>	Graceful Speedwell	O
<i>Viola betonicifolia</i>	Native violet	R
<i>Vittadinia cuneata</i>	Fuzzy New Holland Daisy	O
<i>Vittadinia muelleri</i>	Narrow-leafed New Holland Daisy	R/p/c
<i>Wahlenbergia</i> spp.	Native bluebells	O
<i>Wurmbea dioica</i>	Early Nancy	R
Exotic Species		
<i>Acetosella vulgaris</i>	European Sorrel	O
<i>Aira</i> sp.	Hair Grass	O
<i>Anagallis arvensis</i>	Scarlet Pimpernel	R
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	R/p
<i>Briza minor</i>	Shivery-grass	R
<i>Bromus hordaceus</i>	Soft Brome-grass	R
* <i>Carduus nutans</i>	Nodding thistle	R
<i>Centaurium erythraea</i>	Pink Stars or Common Centaury	R
<i>Cerastium glomeratum</i>	Mouse-ear Chickweed	R
<i>Cirsium vulgare</i>	Black Thistle	R
<i>Conyza bonariensis</i>	Fleabane	R
<i>Echium plantagineum</i>	*Paterson's Curse	R
<i>Gnaphalium americanum</i>	A cudweed	R
<i>Holcus lanatus</i>	Yorkshire Fog	R
<i>Hypochaeris glabra</i>	Smooth Cat's-ear	R
<i>Hypochaeris radicata</i>	Cat's-ear	O
<i>Lepidium africanum</i>	A peppercress	R/p
<i>Nassella trichotoma</i>	*Serrated Tussock	O/p
<i>Paronchia brasiliana</i>	Chilean Whitlow-wort	O
<i>Paspalum dilatatum</i>	Paspalum	R
<i>Petrorrhagia nanteuilii</i>	Proliferous Pink	O
<i>Plantago coronopus</i>	Buck's-horn Plantain	O
<i>Plantago lanceolata</i>	Ribwort Plantain	O
<i>Rosa rubiginosa</i>	*Sweet Briar	R
<i>Rubus fruticosus</i> spp.agg.	*Blackberry	R
<i>Salix</i> sp.	*A willow	R
<i>Sisyrinchium</i> sp. A	A scourweed	R
<i>Sonchus oleraceus</i>	Common Sow-thistle	R
<i>Taraxacum officinale</i>	Dandelion	R
<i>Trifolium</i> spp.	Clovers and trefoils	R
<i>Vulpia</i> sp.	A rat's-tail fescue	O

APPENDIX D – FAUNA SPECIES OCCURRING IN THE CONSERVATION AREA

No formal fauna surveys have been conducted to date within the Conservation Area. On a visit to the property, a threatened woodland bird was recorded, the Diamond Firetail (*Stagonopleura guttata*).

APPENDIX E – THREATENED COMMUNITIES AND SPECIES PROFILES

The following profiles have been sourced from the Department of Environment and Conservation -<http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/index.aspx>

Natural Temperate Grassland of the Southern Tablelands (NSW and ACT)

Conservation status in NSW: Not listed
National conservation status: Endangered

Description

Natural Temperate Grassland is a naturally treeless or sparsely-treed community, in which the most obvious components are various species of native grasses.

Many sites contain wet areas that are habitat for wetland flora species. The community also includes a range of mammal, bird, reptile, frog and invertebrate fauna species. Intact remnants that contain a high diversity of flora species are now rare.

Location and habitat

Distribution

Occurs in the Southern Tablelands of NSW (an area bounded by the Snowy Mountains and Brindabella Range in the south-west, coastal ranges and escarpments to the east, extending north to the Abercrombie River, with a north-western boundary extending from Burrinjuck Dam to Boorowa, then east to the Lachlan River and north to Wyangala Dam). Contained within the South Eastern Highlands bioregion and within an altitude range of between 560 and 1200 metres.

Habitat and ecology

- Characterised by the dominance of native grasses, including Kangaroo Grass *Themeda australis*, Poa Tussock *Poa sieberiana*, River Tussock *P. labillardieri*, Red Grass *Bothriochloa macra*, speargrasses *Austrostipa* spp. and wallaby grasses *Austrodanthonia* spp..
- Intact sites contain a diversity of plant species, including one or more of the main grasses, additional grass species, and a diversity of forbs, including plants in the daisy, lily, orchid, pea and other plant families.
- The community also includes a range of mammal, bird, reptile, frog and invertebrate fauna species, some of which are threatened species.
- Many sites contain wet areas (drainage lines, soaks, springs, etc) that are habitat for wetland flora species such as rushes *Juncus* spp., sedges, *Carex* spp. and a variety of forbs.
- Occurs in a variety of landforms but generally occur on the fertile lower parts of the landscape (flats, drainage lines, frost hollow valleys, foothills) where resources such as water and nutrients are abundant, but tree growth is restricted by periodic drying or waterlogging,



A Speargrass Grassland, habitat for threatened species of plants, reptiles and invertebrates

Image: © Rainer Rehwinkel



A Kangaroo Grass Grassland (Turallo Nature Reserve)

Image: © Rainer Rehwinkel



A grassland showing a diversity of wildflowers (Top Hut TSR, Monaro)

Image: © Rainer Rehwinkel

frosting, or exposure to westerly winds; remnants also occur on midslopes to hilltops and plateaux, particularly in basalt country, but also where exposure and soil conditions limit tree growth on other substrates.

- Remnants may occur within a mosaic of grassy woodlands, including Box-Gum Woodland and Snow Gum Woodland, or may be bounded by dry or wet sclerophyll forest, wetland or heathland.
- It may be difficult to definitively determine whether a site is natural grassland or secondary grassland (i.e. derived from clearing of woodland); because many woodland types with a similar groundlayer are either EECs or declining communities, the remnant is likely to have conservation significance as a secondary grassland.
- Sites with particular characteristics, including those with dense tussocky structure, cracking clay soils, or loose, embedded or outcropping rocks are very important as wildlife habitat.
- Retention of remnants may be important, as they contribute to productive farming systems (stock shelter, seed sources, sustainable grazing and water-table and salinity control).

Threats

- Invasion of remnants by non-native plant species, including noxious weeds, pasture species and environmental weeds, including garden escapees, olives and pines.
- Deliberate plant introductions, in particular, the addition of legumes, grasses, shrubs and trees (no plantings of native species that are not found in grassland, particularly trees and shrubs but also herbaceous species).
- Clearing, degradation and fragmentation of remnants for agricultural, forestry, infrastructure and residential development.
- Continuous heavy grazing and trampling of remnants by grazing stock, resulting in losses of plant species (simplification of the groundlayer), erosion and other soil changes, including increased nutrient status.
- Application of intense defoliation regimes, in particular, too frequent burning or slashing.
- Invasion of remnants by feral animals resulting in the degradation of the community and loss of fauna species.
- Disturbance and clearance of remnants during road, rail and infrastructure maintenance and upgrades.
- Physical compaction of the soil, by people, stock and vehicles.
- Chemical changes to the soil by the application of fertilisers and lime, or from run-on of nutrients from adjacent sites
- Altered soil moisture conditions, including modified drainage (wetter sites become more prone to weed invasion).
- Salinity and the associated remediation for salinity (i.e. exclusion of stock and tree planting).

What needs to be done to recover this species?

- Undertake control of rabbits, hares, foxes, pigs and goats (using methods that do not disturb the native plants and animals of the remnant).
- If burning a remnant, do not burn entire remnant at one time; practice patch burning to affect no more than 5% of remnant at any one time; allow perpetually unburnt sections to act as refuges.
- Prevent changes to the site's surface and sub-surface soil drainage.
- Do not collect rocks from remnants.
- Do not plant species that are not native to this community into remnants; if planting locally-indigenous tree species, do not plant in densities that exceed 10% crown cover.
- Manage stock to reduce grazing pressure in high quality remnants (i.e. those with high flora diversity or fauna habitat).

- Modified remnants have a capacity for natural or assisted rehabilitation; an essential for rehabilitation is to reduce grazing pressure; native plant diversity can then be enhanced by one or more of the following methods: allowing natural dispersal of seeds from outside the site; activation of the site's soil seed bank (particular disturbance regimes may be applied); or the deliberate introduction of locally-indigenous species.
- Do not apply fertilisers or lime to natural grasslands.
- Erect on-site markers to alert maintenance staff to the presence of a high quality remnant or population of a threatened species.
- Prevent physical compaction of the soil by people, stock and vehicles.
- Undertake weed control (taking care to spray or dig out only target species).
- Protect all sites of conservation significance from further clearing and adverse disturbance.
- Ensure remnants remain connected or linked to each other; in cases where remnants have lost connective links, re-establish them by rehabilitation of sites to act as stepping stones for fauna, and flora (pollen and seed dispersal).
- Mark remnants onto maps (of the farm, shire, region, etc) and use maps to plan activities (e.g. remnant protection, rehabilitation or road, rail and infrastructure maintenance work).

Mauve Burr-daisy

Calotis glandulosa

Conservation status in NSW: Vulnerable
National conservation status: Vulnerable

Description

The Mauve Burr-daisy is a sprawling, branched herb that grows to 20 cm tall and up to 1 m wide. The soft, bright green, hairy leaves have indented edges. They are up to 3 cm long and 9 mm wide. The 2 cm wide flower-heads are solitary, mauve, and with a yellow centre. Flowers may also be white, blue or pink. They appear in spring and summer. Flowers are followed by a head of brown burrs that may stick to clothing and animals' coats.

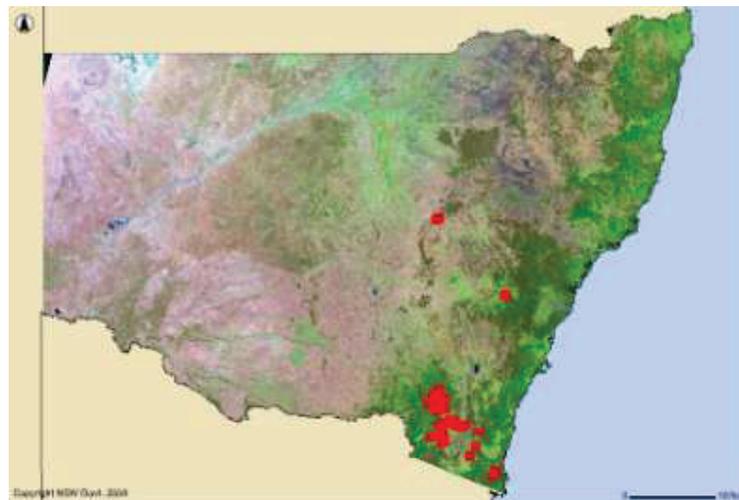


Image: © John Briggs

Location and habitat

Distribution

Mauve Burr-daisy's main distribution is in the Monaro and Kosciuszko regions. There is a known site in the upper Shoalhaven catchment and record from near Oberon. There are old, highly dubious records from the Dubbo area and Mt Imlay.



Distribution in NSW

Habitat and ecology

- Found in montane grasslands in the Australian Alps.
- Found in subalpine grassland (dominated by *Poa* spp.), Natural Temperate Grassland (dominated by *Themeda australis*) and Snow Gum (*Eucalyptus pauciflora*) Woodlands on the Monaro and Shoalhaven area.
- Appears to be a coloniser of bare patches, which explains why it is often seen on roadsides.
- Apparently common on roadsides in parts of the Monaro.
- Does not persist in heavily-grazed pastures of the Monaro.
- Dispersed by the sticky burrs.

Threats

- Loss and degradation of habitat and/or populations on the Monaro from road works (particularly widening or re-routing).
- Loss and degradation of habitat and/or populations on the Monaro by clearing of habitat for residential and agricultural developments.
- Loss and degradation of habitat and/or populations on the Monaro by intensification of grazing regimes.
- Loss and degradation of habitat and/or populations on the Monaro by invasion of weeds.
- Loss and degradation of local habitat and/or populations in Kosciuszko National Park by pigs and roadworks.

What needs to be done to recover this species?

- Undertake pig control in areas that surround populations.
- Protect known populations from changes to land use.
- Do not undertake road works, pasture modification or other changes in land use that may affect populations.
- Do not increase grazing pressures on sites where populations persist - reduce grazing pressures where possible.
- Undertake weed control in and adjacent to populations, taking care to spray or dig out only target weeds.
- Mark sites and potential habitat onto maps (of the farm, shire, region, etc) used for planning (e.g. road works, residential and infrastructure developments, remnant protection, rehabilitation).
- Search for new populations in potential habitat.

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Diamond Firetail

Stagonopleura guttata

Conservation status in NSW: Vulnerable



Juvenile Diamond Finch
Image: © Helen Fallow

Description

The Diamond Firetail is a most striking finch with a bright red bill, and red eyes and rump. The white throat and lower breast are separated by a broad black breast-band that extends into the strongly white-spotted, black flanks. It has a grey back and head, and ashy-brown wings. The call is a plaintive, drawn-out, nasal 'twoo-wheee'. Flight is low and direct, with slight undulations.



Location and habitat

Distribution

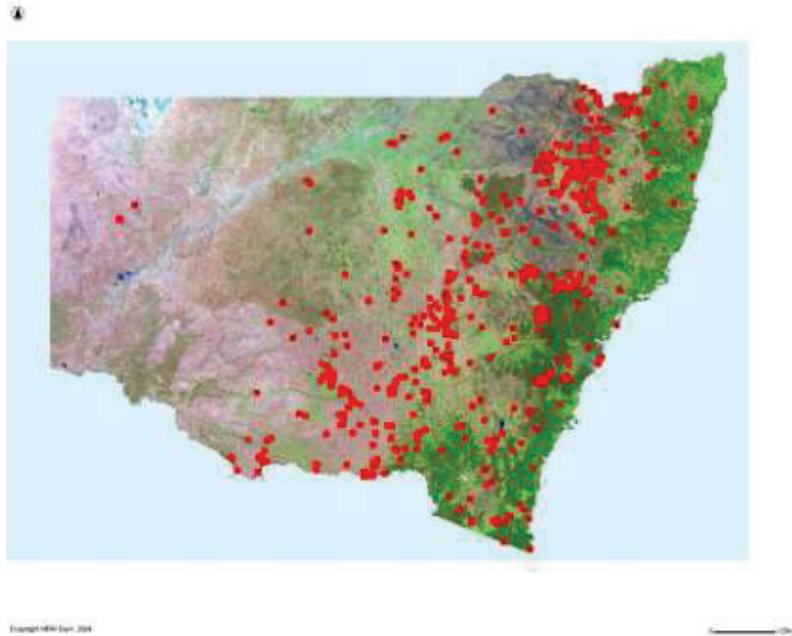
The Diamond Firetail is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over the rest of NSW. Also found in the Australian Capital Territory, Queensland, Victoria and South Australia.



Diamond Firetails
Image: © Helen Fallow

Habitat and ecology

- Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum *Eucalyptus pauciflora* Woodlands.
- Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities.
- Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland.
- Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season).
- Usually encountered in flocks of between five to 40 birds, occasionally more.
- Groups separate into small colonies to breed, between August and January.
- Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests.
- Birds roost in dense shrubs or in smaller nests built especially for roosting.
- Appears to be sedentary, though some populations move locally, especially those in the south.
- Has been recorded in some towns and near farm houses.



Distribution in NSW

Threats

- Clearing and fragmentation of woodland, open forest, grassland and mallee habitat for agriculture and residential development, and firewood collection.
- Poor regeneration of open forest and woodland habitats.
- Invasion of weeds, resulting in the loss of important food plants.
- Modification and destruction of ground- and shrub layers within habitat through: removal of native plants, litter and fallen timber; introduction of exotic pasture grasses; heavy grazing and compaction by stock; and frequent fire.
- Predation of eggs and nestlings by increased populations of native predators such as the Pied Currawong *Strepera graculina*.
- Risk of local extinction due to small, isolated populations.

What needs to be done to recover this species?

- Search for the species in suitable habitat in areas that are proposed for development or management actions.
- Retain dead timber on the ground in open woodland areas.
- Reduce heavy grazing by domestic stock in areas of known or potential habitat, to enable flowering and subsequent seeding of grasses and forbs that this species requires.
- Control weeds in areas of known habitat, especially the exotic, winter-fruited shrubs such as cotoneasters, hawthorns, firethorns and privets that support Pied Currawongs.
- Retain and protect woodland, open forest, grassland and mallee habitat from clearing, fragmentation and disturbance; areas of 200 hectares or greater within woody vegetation are particularly significant, though this species also uses treeless grasslands in the Southern Tablelands.
- Expand and reconnect smaller fragments of habitat, by fencing and encouraging natural regeneration or applying revegetation techniques where regeneration fails.
- Ensure remnant populations remain connected or linked to each other; in cases where remnants have lost connective links, re-establish links by revegetating sites to act as stepping stones for dispersal.
- Mark sites onto maps or plans.

References

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APPENDIX F – FERAL PIG FACT SHEET

The following fact sheet is sourced from the Department of Primary Industries - <http://www.dpi.nsw.gov.au/> as the Standard Operating Procedure for feral pig control.

CODE OF PRACTICE

model code of practice for the humane control of feral pigs

Prepared by Trudy Sharp & Glen Saunders, NSW Department of Primary Industries

Introduction

This aim of this code of practice is to provide information and guidance to vertebrate pest managers responsible for the control of feral pigs. It includes advice on how to choose the most humane, target specific, cost effective and efficacious technique for reducing the negative impact of feral pigs.

This code of practice (COP) is a guide only; it does not replace or override the legislation that applies in the relevant State or Territory jurisdiction. The COP should only be used subject to the applicable legal requirements (including OH&S) operating in the relevant jurisdiction.

Background

There is a growing expectation that animal suffering associated with pest management be minimised. This should occur regardless of the status given to a particular pest species or the extent of damage or impact created by that pest. While the ecological and economic rationales for the control of pests such as the feral pig are frequently documented, little attention has been paid to the development of an ethical framework in which these pests are controlled. An ethical approach to pest control includes the recognition of and attention to the welfare of all animals affected directly or indirectly by control programs. Ensuring such approaches are uniformly applied as management practices requires the development of agreed Standard Operating Procedures (SOPs) for pest animal control. These SOPs are written in a way that describes the procedures involved for each control technique as applied to each of the major pest animal species. While SOPs address animal welfare issues applicable to each technique, a Code of Practice (COP) is also required that bring together these procedures into a document which also specifies humane control strategies and their implementation. COPs encompass all aspects of controlling a pest animal species. This includes aspects of best practice principles, relevant biological information, guidance on choosing the most humane and appropriate control technique and how to most effectively implement management programs.

This code is based on current knowledge and experience in the area of feral pig control and will be revised as required to take into account advances in knowledge and development of new control techniques and strategies.

PIGCOP1 - humane pest animal control - model code of practice for the humane control of feral pigs

Definitions and Terms

Pest animal – any native or introduced, wild or feral, non-human species of animal that is currently troublesome locally, or over a wide area, to one or more persons, either by being a health hazard, a general nuisance, or by destroying food, fibre, or natural resources (Koehler, 1964).

Welfare – an animals' state as regards its attempts to cope with its environment (Broom, 1999). Welfare includes the extent of any difficulty in coping or any failure to cope; it is a characteristic of an individual at a particular time and can range from very good to very poor. Pain and suffering are important aspects of poor welfare, whereas good welfare is present when the nutritional, environmental, health, behavioural and mental needs of animals are met. When welfare is good suffering is absent (Littin et al., 2004).

Humane – causing the minimum pain, suffering and distress possible. To be humane is to show consideration, empathy and sympathy for an animal, an avoidance of (unnecessary) stress, and the demonstration of compassion and tenderness towards our fellow creatures (Australian Veterinary Association, 1997).

Humane Vertebrate Pest Animal Control – the development and selection of feasible control programs and techniques that avoid or minimise pain, suffering and distress to target and non-target animals (RSPCA, 2004).

Best Practice Management – a structured and consistent approach to the management of vertebrate pests in an attempt to achieve enduring and cost-effective outcomes. 'Best practice' is defined as the best practice agreed at a particular time following consideration of scientific information and accumulated experience (Braysher, 1993).

Best Practice Pest Management

From an animal welfare perspective, it is highly desirable that pest control programs affect a minimum number of individuals and that effort is sustained so that pest densities always remain at a low level. Over the last decade, the approach to managing pest animals has changed. Rather than focussing on killing as many pests as possible, it is now realised that like most other aspects of agriculture or nature conservation, pest management needs to be carefully planned and coordinated. Pest animal control is just one aspect of an integrated approach to the management of production and natural resource systems. Most pests are highly mobile and can readily replace those that are killed in control programs. Unless actions are well planned and coordinated across an area, individual control programs are unlikely to have a lasting effect. When planning pest management, there are some important steps that should be considered (after Braysher & Saunders, 2002).

1. What is the trigger to undertake pest animal management? Is there a community or political pressure for action on pests and an expectation that pest animals should be controlled? Pest control is unlikely to be effective unless there is strong local or political will to take action and commit the necessary resources.
2. Who is the key group to take responsibility for bringing together those individuals and groups that have a key interest in dealing with the pest issue?

3. What is the problem? In the past the pest was usually seen as the problem. Hence the solution was to kill as many pests as possible. We now know that the situation is more complex. First, determine what is the problem. It may be reduced lambing percentage, fence damage, reduced crop yields, complaints from neighbours or emotional stress from worrying about the next attack. Several factors impact on each of these problems and control of pests are often only part of the solution. The following questions then help define the problem:
 - Who has the problem?
 - Where is the problem?
 - How severe is the problem?
 - Will the problem change with time?
4. Identify and describe the area of concern. Sometimes it helps to remove agency and property boundaries so that the problem can be viewed without the tendency to point blame at individuals; groups or agencies. Property and agency boundaries can be added later once agreement is reached on the best approach.
5. Trying to deal with the complexity of a very large area can be daunting so it often helps to break the area into smaller management units for planning. These smaller units may be determined by water bodies, mountain ranges, fences, vegetation that is unsuitable for a particular pest or other suitable boundaries that managers can work to. While it is best to work to boundaries that restrict the movement of pests, this may not be practicable and jurisdictional boundaries, for example, the border of a Landcare group, may have to be used in combination with physical boundaries. Once the management units are identified:
 - Identify as best you can, the pest animal distribution and abundance in each management unit.
 - Estimate as far as is practicable, the damage caused by the pest or pests to production and to conservation.
6. Gather and assess other relevant planning documents such as Catchment Management Plans, Recovery Plans for threatened species and Property Management Plans. Identify any key constraints that may prevent the plan being put into operation and identify all the key stakeholders.
7. Develop the most appropriate pest management plans for each of the management units.

Implementing effective and humane pest control programs requires a basic understanding of the ecology and biology of the targeted pest species and in some cases those species affected directly (non-targets) or indirectly (prey species) by a control program. It is also essential to understand the impact created by the pest i.e. what is the problem? Managers should take the time to make themselves aware of such information by reading the recommended texts at the end of this code of practice. A brief summary follows. This information is extracted from the publication *Managing Vertebrate Pests: Feral Pigs* by Choquenot et al. (1996).

Feral Pig Facts

Most feral pigs in Australia are descendants of various breeds of the Eurasian wild boar or the domestic pig, which for various reasons, particularly lack of restraint and deliberate releases, reverted to living in the wild. Initially, the distribution of pigs was close to major settlements throughout Australia, but as changes occurred in the management of rural properties, many pigs were left unattended, wandered away and established truly feral colonies.

Once established, colonies of feral pigs rapidly built up in many areas. Estimates of population size vary between 3.5 million and 23.5 million, inhabiting 38% of Australia, but their distribution and abundance can vary markedly from year to year according to environmental conditions.

The biology and ecology of feral pigs are two of the major reasons why they are such an important and successful vertebrate pest in Australia. Their large robust bodies, snouts specially developed for rooting up the ground, omnivorous diet and adaptive activity patterns allow them to live in a wide range of habitats. Feral pigs are habitat generalists and have colonised subalpine grasslands and forests, dry woodlands, tropical rainforests, semi-arid and monsoonal floodplains, swamps and other wetlands in many parts of the Northern Territory, Queensland, New South Wales, and other states and territories. Their prime requirements are a reliable and adequate supply of water, food and cover. Temporal changes can occur in their use of habitats to satisfy these requirements, particularly to obtain shade and water and exploit seasonally abundant food sources.

The reproductive potential of feral pigs is more similar to that of rabbits than to that of other large mammals in Australia. Fecundity increases with age and body weight but can be strongly affected by seasonal conditions. Under favourable conditions, breeding can occur throughout the year and sows can produce two weaned litters every twelve to fifteen months, with an average of six piglets per litter. This gives feral pigs the capacity to recover quickly from the effects of management programs or other setbacks such as droughts.

Feral Pig Impact

Feral pigs are responsible for several types of agricultural damage. They prey on newborn lambs, eat and destroy grain crops, damage fences and water sources, reduce yields of sugarcane and some tropical fruit crops, and compete with stock for feed by eating or damaging pasture. There are no reliable estimates of the cost of feral pig damage to agricultural production, although it is likely that the damage is at least of the order of \$100 million annually, and it may be much more.

Although feral pigs are often regarded as having deleterious effects on the environment, there is little objective information available on their impact. The most important environmental impacts are likely to be habitat modification through selective feeding, trampling damage and rooting for underground parts of plants and invertebrates; as well as predation on, competition with, or disturbance of, a range of native animals. Most perceptions of environmental damage by pigs focus on their rooting up of soils, grasslands or forest litter, particularly along drainage lines, moist gullies and around swamps and lagoons, or after rain, when the ground is softer. Their impact on different plants is largely unknown, as is the extent of their role as seed eaters or dispersers, and in spreading rootrot fungus (*Phytophthora cinnamomi*), responsible for dieback disease in native vegetation. Feral pigs readily eat

animal material, but are probably not significant predators of most fauna except local populations of earthworms.

Feral pigs are the main wild animal of concern in Australia in relation to the potential spread of exotic diseases, particularly foot-and-mouth disease (FMD), the main exotic disease of concern in Australia. Feral pigs can act as hosts or vectors of several endemic and exotic diseases and parasites that can affect other animals, including domestic livestock and humans. The major endemic diseases and parasites of concern are leptospirosis, brucellosis, melioidosis, tuberculosis and sparganosis. The involvement of feral pigs in an exotic disease outbreak could delay disease detection; increase the rate and extent of disease spread; make disease eradication measures expensive, time-consuming or impossible; and have severe repercussions for Australia's livestock industries.

Feral Pig Control Strategies

Integrated management using a range of control techniques produces the best results, but a lack of reliable information on 'on-farm' control costs is seen as a barrier to adoption of some techniques. In the case of feral pig there is also the complication that it can be viewed by some as a major pest of the environment and agriculture, and by others as a valued resource and source of income. Control strategies need to address both these viewpoints. By necessity, any control effort must be sustained. There are three essential requirements for a pest control technique – necessity, effectiveness and humaneness. The best strategy is to develop a plan which maximizes the effect of control operations and reduces the need to cull large numbers of animals on a regular basis.

Developing a feral pig management plan

This involves:

- *Defining management objectives.* Objectives are a statement of what is to be achieved, defined in terms of desired outcomes, usually conservation or economic benefits. Objectives should state what will be achieved (reduced impact) where, by when and by whom.
- *Selecting management options.* The management option is selected that will most effectively and efficiently meet the management objectives. The options include: eradication, containment, sustained management, targeted management, one-off action and taking no action.
- *Set the management strategy.* This defines the actions that will be undertaken: who will do what, when, how and where. It describes how the selected pest management options and techniques will be integrated and implemented to achieve the management objectives.
- *Monitoring the success of the program against the stated objectives.* Monitoring has two components, *operational monitoring* – what was done when and at what cost- this determines the efficiency of the program, and *performance monitoring*- were the objectives of the plan achieved and if not why not, that is the effectiveness of the program.

Choosing control techniques

Feral pig control techniques have the potential to cause animals to suffer. To minimise this suffering the most humane technique useable in any given situation must be employed. This will be the technique that causes the least amount of pain and suffering

to the target animal with the least harm or risk to non-target animals, people and the environment. The technique must also be effective in the situation where it will be used (e.g. aerial shooting will have little effect in forested areas). It is also important to remember that the humaneness of a technique is highly dependant on whether or not it is correctly employed. In selecting techniques it is therefore important to consider whether sufficient resources are available to fully implement that technique.

Cooperative control

It may not be economic for a property to be independent in equipment and labour for feral pig management. Group schemes and cooperative effort provide economies of scale and social benefits that encourage sustained effort. Cooperative control effort can also encourage financial support from governments.

Feral Pig Control Techniques

The most commonly used feral pig control techniques are lethal baiting, shooting, trapping and exclusion fencing. There are currently no biological or fertility control agents suitable for use against feral pigs. Cost-effectiveness, humaneness and efficacy for each control technique are useful in deciding the most appropriate strategy. A brief evaluation of the humaneness of control techniques follows:

Humaneness of control techniques

Lethal baiting

Lethal baiting is considered to be the most viable and cost-effective method of feral pig control in extensive rangeland areas; however poisons do not usually cause a humane death. Depending on the poison used, target animals can experience pain and suffering, sometimes for an extended period, before death. Non-target animals including native species, cats, dogs and livestock can also be exposed to poisons either directly by eating baits intended for pest animals (primary poisoning) or through the scavenging of tissues from a poisoned animal (secondary poisoning). Two poisons are currently registered for feral pig control in Australia: sodium monofluoroacetate (1080) and yellow phosphorus (CSSP). Warfarin is also being trialled for use with feral pigs under an experimental permit. Phosphorus and warfarin cause longer periods of pain and sickness than 1080, therefore 1080 is more acceptable as a lethal control method.

1080

In feral pigs, poisoning from 1080 is typified by salivation, jaw chomping, vomiting, increased lethargy, and laboured respiration. Some pigs exhibit signs of central nervous system disturbance including hyperexcitability, squealing, manic running, paralysis or convulsions, followed by coma and then death. Other animals may lie quietly, breathing slowly and laboriously until death. Time to death is variable depending upon the amount of 1080 absorbed but is usually around 4 hours.

Relatively large amounts of 1080 must be distributed in baits to kill feral pigs, creating a serious risk of primary poisoning in non-target species. Meat baits are of considerable concern as they contain a high concentration of 1080 (72 mg per bait), which is more than 10 times the concentration used for wild dog baits.

Yellow phosphorus (CSSP)

In pigs, ingestion of yellow phosphorus produces lethargy, depression and signs of gastrointestinal irritation such as reluctance to move or eat, vomiting and diarrhoea.

With very large doses, pigs can die from shock within 6-12 hours of ingestion. If the dose is lower, animals may survive for a several days before dying from liver necrosis and heart failure. Most pigs die 2-4 days after ingestion. However, in some cases there may be a delay of up to 3 weeks before death occurs.

Warfarin

With warfarin poisoning, the onset of symptoms and time to death can be highly variable and are usually dependent on the amount of warfarin ingested. Signs of warfarin poisoning are not usually apparent until 1-3 days after ingestion. Large doses of warfarin may cause massive haemorrhage into body cavities or the brain resulting in sudden death before or soon after the appearance of initial signs. Animals that receive smaller doses may take around 10 to 14 days to die after the initial dose. These animals may show signs of depression/lethargy and anorexia followed by manifestations of haemorrhage including anaemia, laboured breathing, pale mucous membranes and weakness. Bleeding may be visible around the nose, mouth, eyes and anus and animals may pass bloody faeces and urine. In pigs, bleeding into weight-bearing joints is common. The resulting swollen, tender joints cause lameness, recumbency and reluctance to move, which prevents the animal from accessing its normal feeding grounds. The discomfort and pain from haemorrhages in internal organs, muscles and joints can typically last for several days before death.

Shooting

Ground shooting

Shooting can be a humane method of destroying feral pigs when it is carried out by experienced, skilled and responsible shooters; the animal can be clearly seen and is within range; and the correct firearm, ammunition and shot placement is used.

Wounded animals must be located and killed as quickly and humanely as possible. If lactating sows are shot, efforts should be made to find dependent piglets and kill them quickly and humanely.

Aerial shooting

Aerial shooting of feral pigs from a helicopter can be a humane control method when it is carried out by highly skilled and experienced shooters and pilots; the correct firearm, ammunition and shot placement is used; and wounded animals are promptly located and killed. Shooting from a moving platform can significantly detract from the shooter's accuracy therefore helicopter shooting operations do not always result in a clean kill for all animals. Follow-up procedures are essential to ensure that all wounded animals are killed.

With aerial shooting, chest shots are preferred as the heart and lungs are the largest vital area and an accurate shot is more achievable particularly within the range of unusual angles encountered when shooting from above. Although death from a chest shot may be more certain, compared to an accurate head shot, a shot to the chest does not render the animal instantaneously insensible and time to death is slower.

Trapping

Trapping of pigs can be a humane method of control when traps are inspected at least once daily and they are set up to provide shade and shelter. Pigs have poor thermoregulation and can suffer greatly when exposed to extremes of heat and cold.

The trap should be constructed in a way so as not to cause injury from loose wire, sharp edges or malfunctioning gates. Also, a smaller mesh size should be used to prevent injuries to the pigs' snouts if they charge at the trap when attempting to escape.

Trapped pigs must be destroyed by shooting as quickly and humanely as possible. If lactating sows are caught in a trap without their young, efforts should be made to find dependent piglets and kill them quickly and humanely.

Although pig traps are designed for the capture of feral pigs, there is still a risk of capturing other species. Use of a pig-specific gate trip mechanism minimises the risk of catching some species e.g. cassowaries and wallabies, whilst the placement of a steel post across a funnel trap entrance at a height of 1 metre above the ground will prevent cattle from entering. Non-target animals that are caught but not injured should be released at the trap site. If they are injured, but may respond to veterinary treatment, such treatment should be sought. Severely injured non-target animals should be destroyed quickly and humanely.

Table 1: Humaneness, Efficacy, Cost-effectiveness and Target Specificity of Feral Pig Control Methods

Control Technique	Acceptability of technique with regard to humaneness*	Efficacy	Cost-effectiveness	Target Specificity	Comments
Exclusion fencing	Acceptable	Limited	Expensive	Can be in certain situations	Fencing can be effective for small, critical (economically or environmentally) areas, though the maintenance cost are high.
Ground baiting with 1080	Conditionally acceptable	Effective	Cost-effective	Relatively large amounts of 1080 are required to kill pigs; therefore there is a significant potential risk of poisoning non-target animals. Strategic ground baiting uses fewer baits than aerial baiting programs. Uneaten baits can be collected and destroyed.	Currently the most cost-effective technique available. 1080 ingestion can also kill non-target animals including native species, cats, dogs and livestock. 1080 is toxic to humans; operators need to take precautions to safeguard against exposure.
Aerial baiting with 1080	Conditionally acceptable	Effective	Cost-effective	Relatively large amounts of 1080 are required to kill pigs; therefore there is a significant potential risk of poisoning non-target animals. Uneaten baits cannot be collected. Dried meat baits remain toxic for longer periods than fresh meat.	Effective for broad scale control in remote areas. 1080 ingestion can also kill non-target animals including native species, cats, dogs and livestock. 1080 is toxic to humans; operators need to take precautions to safeguard against exposure.
Yellow phosphorus (CSSP) baiting	Not acceptable			Potential risk of poisoning non-target animals	Inhumane and should not be used. Alternatives are available in all situations where yellow phosphorus could potentially be used. Yellow phosphorus usually takes several days to kill, during which time the animal experiences distress, disability and/or pain. It is therefore considered inhumane.

FIG CP-9 - humane control of feral pigs

FIG CP-10 - humane control of feral pigs

Table 1: Humaneness, Efficacy, Cost-effectiveness and Target Specificity of Feral Pig Control Methods

Control Technique	Acceptability of technique with regard to humaneness*	Efficacy	Cost-effectiveness	Target Specificity	Comments
Warfarin baiting	Not acceptable			Potential risk of primary poisoning in non-target animals, although secondary poisoning is relatively uncommon (compared to 1080)	Inhumane and should not be used. Alternatives are available in all situations where warfarin could potentially be used. Anticoagulant poisons usually take several days to kill, during which time the animal experiences distress, disability and/or pain. Warfarin is therefore considered inhumane.
Ground shooting	Conditionally acceptable	Not effective	Not cost-effective	Target specific	Labour intensive, only suitable for smaller scale operations.
Aerial Shooting	Conditionally acceptable	Effective	Relatively expensive. Can be cost-effective when pig density is high	Target specific	Provides high level medium- to long-term control of feral pig populations
Trapping	Acceptable	Can be in certain situations	Can be in certain situations	May catch non-target animals	Important control technique in areas where baiting or aerial shooting is not possible. Not practical for large scale control.

* Acceptable methods are those that are humane when used correctly.

* Conditionally acceptable methods are those that, by the nature of the technique, may not be consistently humane. There may be a period of poor welfare before death.

* Methods that are not acceptable are considered to be inhumane. The welfare of the animal is very poor before death, often for a prolonged period.

Standard Operating Procedures

Standard operating procedures are currently available for the following feral pig control methods:

- Trapping of feral pigs (PIG001)
- Aerial shooting of feral pigs (PIG002)
- Ground shooting of feral pigs (PIG003)
- Use of Judas pigs (PIG004)
- Poisoning of feral pigs using 1080 (PIG005)

Legislation

All those involved in pest animal control should familiarise themselves with relevant aspects of the appropriate Commonwealth and State or Territory legislation. The table below gives examples of some of the relevant legislation. This list is by no means exhaustive and is current at January, 2004.

Commonwealth	<i>Agricultural and Veterinary Chemicals Code Act 1994</i> <i>Environment Protection and Biodiversity Conservation Act 1999</i>
ACT	<i>Animal Welfare Act 1992</i> <i>Nature Conservation Act 1980</i> <i>Poisons Act 1933</i> <i>Pesticides Act 1989</i> <i>Animal Diseases Act 1993</i> <i>Prohibited Weapons Act 1996</i> <i>Firearms Act 1996</i> <i>Environment Protection Act 1997</i> <i>Rabbit Destruction Act 1919</i>
New South Wales	<i>Prevention of Cruelty to Animals Act 1979</i> <i>Pesticides Act 1999</i> <i>Rural Lands Protection Act 1998</i> <i>National Parks and Wildlife Act 1974</i> <i>Game and Feral Animal Control Bill 2002</i> <i>Threatened Species Conservation Act 1995</i> <i>Wild Dog Destruction Act 1923</i>
Northern Territory	<i>Animal Welfare Act</i> <i>Territory Parks and Wildlife Conservation Act</i> <i>Poisons and Dangerous Drugs Act</i>
Queensland	<i>Animal Care and Protection Act 2001</i> <i>Health (Drugs and Poisons) Regulation 1996</i> <i>Land Protection (Pest and Stock Route Management) Act 2002</i> <i>Nature Conservation Act 1992</i>
South Australia	<i>Prevention of Cruelty to Animals Act 1985</i> <i>Animal and Plant Control (Agricultural Protection and Other Purposes) Act 1986</i> <i>Controlled Substances Act 1984</i> <i>National Parks and Wildlife Act 1972</i> <i>Dog Fence Act 1946</i>
Tasmania	<i>Animal Welfare Act 1993</i> <i>Vermin Control Act 2000</i> <i>Poisons Act 1971</i> <i>Agricultural And Veterinary Chemical (Control of Use) Act 1995</i> <i>National Parks and Wildlife Act 1970</i> <i>Police Offences Act 1935</i>
Victoria	<i>Prevention of Cruelty to Animals Act 1986</i> <i>Catchment and Land Protection Act 1994</i> <i>Agriculture and Veterinary Chemicals (Control of Use) Act 1992</i> <i>Catchment and Land Protection Act 1994</i> <i>Drugs, Poisons and Controlled Substances Act 1981</i> <i>Wildlife Act 1975</i> <i>Flora and Fauna Guarantee Act 1988</i> <i>National Parks Act 1975</i>
Western Australia	<i>Animal Welfare Act 2002</i> <i>Agriculture Protection Board Act 1950</i> <i>Agriculture and Related Resources Protection Act 1976</i> <i>Poisons Act 1964</i> <i>Wildlife Conservation Act 1950</i> <i>Biological Control Act 1986</i>
Other relevant legislation	<i>Firearms Acts</i> <i>Occupational Health and Safety Acts</i> <i>Dangerous Goods or Substances Acts</i> <i>Dog Acts</i>

Note: copies of the above legislation and relevant regulations may be obtained from Federal, State and Territory publishing services.

Further Information

Contact the relevant Commonwealth, State or Territory government agency from the following list of websites:

Commonwealth	Department of Environment and Heritage http://www.deh.gov.au/
ACT	Environment ACT http://www.environment.act.gov.au/
NSW	NSW Department of Primary Industries www.dpi.nsw.gov.au
NT	Parks & Wildlife Commission www.nt.gov.au/ipe/pwcnt/
QLD	Department of Natural Resources and Mines www.nrm.qld.gov.au
SA	Animal & Plant Control Commission http://sustainableresources.pir.sa.gov.au
TAS	Department of Primary Industries, Water & Environment www.dpiwe.tas.gov.au
VIC	Department of Primary Industries, Agriculture & Food www.dpi.vic.gov.au
WA	Agriculture WA www.agric.wa.gov.au

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PI50014 - humane pest animal control - model code of practice for the humane control of feral pigs



Disclaimer

The views and opinions expressed in this publication are those of the authors and do not necessarily reflect those of the Commonwealth and New South Wales Governments or the Commonwealth Minister for the Environment and Heritage and the New South Wales Minister for Primary Industries respectively. While reasonable efforts have been made to ensure that the contents of this publication are factually correct, the Commonwealth and New South Wales do not accept responsibility for the accuracy or completeness of the contents, and shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of this publication.

APPENDIX G – NOXIOUS WEED SPECIES INFORMATION

NSW DPI

CALENDAR OF GROWTH CYCLE & CONTROL TIMES FOR WEEDS OF THE SOUTHERN TABLELANDS

Note: this indicates *general* growth cycle and control time patterns for the specified weeds. These times may vary with weather conditions and with the specifications of chemical labels and permits.

SEASON	SUMMER			AUTUMN			WINTER			SPRING			
	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	
SERRATED TUSsock <i>Nassella trichotoma</i> NOXIOUS (4)													
	GERMINATION												
	FLOWERING												
	SEED FORMATION												
	SEED DROP												
	HERBICIDE	FLUPROMPHATE: SPOT/BROADCAST											
	OTHER CONTROL	CRIP; COMPETITIVE VEGETATION COVER; SPOT SPRAY GLYPHOSATE WHEN ACTIVELY GROWING											
CHILEAN NEEDLE GRASS <i>Nassella neesiana</i> NOXIOUS (4)													
	GERMINATION												
	FLOWERING												
	SEED FORMATION												
	SEED DROP												
	HERBICIDE	SPOT SPRAY/BROADCAST											
	OTHER CONTROL	STRONG COMPETITIVE PASTURE; SHORT DURATION ROTATIONAL GRAZING											
AFRICAN LOVEGRASS <i>Eragrostis curvula</i> NOXIOUS (4)													
	GERMINATION												
	FLOWERING												
	SEED DROP												
	HERBICIDE	SPOT SPRAY/BROADCAST						SPOT SPRAY/BROADCAST					
	OTHER CONTROL	STRONG COMPETITIVE PASTURE; CRIP											
WINTER GRASSES <i>Vulpia</i> spp., barley grass NOT DECLARED													
	GERMINATION												
	PLANTS GROWING												
	SEED DROP												
	HERBICIDE	BROADCAST											
	OTHER CONTROL	STRONG COMPETITIVE PASTURES; GRAZE											
BLACKBERRY <i>Rubus fruticosus</i> NOXIOUS (4)													
	GERMINATION												
	NEW CANES												
	FLOWERING												
	FRUITING												
	HERBICIDE	SPOT SPRAY/BROADCAST						SPOT SPRAY/BROADCAST					
	OTHER CONTROL	MECHANICAL; HAND WEEDING; SLASHING; GRAZE GOATS; BIOLOGICAL CONTROL											
GORSE <i>Ulex europaeus</i> NOXIOUS (3)													
	GERMINATION												
	FLOWERING												
	SEED DROP												
	HERBICIDE	SPOT SPRAY						SPOT SPRAY					
	OTHER CONTROL	GRAZE SHEEP/GOATS; BURMING; SLASHING; CUT AND PAINT; MECHANICAL; STRONG COMPETITIVE PASTURE											

CALENDAR OF GROWTH CYCLE & CONTROL TIMES FOR WEEDS OF THE SOUTHERN TABLELANDS

SEASON	SUMMER			AUTUMN			WINTER			SPRING		
MONTH	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
PATERSON'S CURSE <i>Echium plantagineum</i> NOXIOUS (4)												
	GERMINATION											
	ROSETTE FORMATION											
	FLOWERING											
	SEED DROP											
	HERBICIDE				SPOT SPRAY ACTIVELY GROWING ROSETTES							
	OTHER CONTROL	STRONG COMPETITIVE PASTURE; GRAZE; BIOLOGICAL CONTROL; CHP										
ST JOHN'S WORT <i>Hypericum perforatum</i> NOXIOUS (3/4)												
	GERMINATION											
	FLOWERING											
	SEED DROP											
	HERBICIDE	SPOT SPRAY/BROADCAST									SPOT SPRAY/BROADCAST	
	OTHER CONTROL	STRONG COMPETITIVE PASTURE; GRAZE SHEEP/GOATS; HAND REMOVAL; BIOLOGICAL CONTROL										
SCOTCH THISTLE <i>Onopordum acanthium</i> NOXIOUS (4)												
	GERMINATION											
	FLOWERING/SEEDING											
	HERBICIDE				SPOT SPRAY ROSETTES ACTIVELY GROWING*							
	OTHER CONTROL	STRONG COMPETITIVE PASTURE; DIG OR PLOUGH ROSETTES; GRAZE; BIOLOGICAL CONTROL; SLASH										
NODDING THISTLE <i>Carduus nutans</i> NOXIOUS (4)												
	GERMINATION											
	FLOWERING/SEEDING											
	HERBICIDE				SPOT SPRAY ROSETTES ACTIVELY GROWING*							
	OTHER CONTROL	STRONG COMPETITIVE PASTURE; DIG OR PLOUGH ROSETTES; GRAZE; BIOLOGICAL CONTROL; SLASH										

Note: At the time of publication, only some of these weeds are declared noxious, as indicated.

For more information contact your local council or NSW DPI Goulburn on (02) 4828 6600.

NOXIOUS WEEDS ACT 1993 – CLASSES

CLASS 1, STATE PROHIBITED WEEDS

Class characteristics – Class 1 noxious weeds are plants that pose a potentially serious threat to primary production or the environment and are not present in the State or are present only to a limited extent.
Control objective – to prevent the introduction and establishment of those plants in NSW.
Control measures – The plant must be eradicated from the land and the land must be kept free of the plant.

Examples:
a) absent Statewide: locust, bromeliads, karoos thorn, slum weed
b) present in NSW: parthenium weed, horse tail

CLASS 2, REGIONALLY PROHIBITED WEEDS

Class characteristics – Class 2 noxious weeds are plants that pose a potentially serious threat to primary production or the environment of a region to which the order applies and are not present in the region or are present only to a limited extent.
Control objective – to prevent the introduction and establishment of those plants in parts of NSW.
Control measures – The plant must be eradicated from the land and the land must be kept free of the plant.

Examples:

a) alligator weed, b) salvinia

CLASS 3, REGIONALLY CONTROLLED WEEDS

Class characteristics – Class 3 noxious weeds are plants that pose a serious threat to primary production or the environment of an area to which the order applies, are not widely distributed in the area and are likely to spread in the area or to another area.
Control objective – to reduce the area and the impact of those plants in parts of NSW.
Control measures – The plant must be fully and continuously suppressed and destroyed, or

The plant must be fully and continuously suppressed and destroyed and the plant must not be sold, propagated or knowingly distributed.
Examples:
a) giant Parramatta grass, b) gorse, St John's wort in some areas

CLASS 4, LOCALLY CONTROLLED WEEDS

Class characteristics – Class 4 noxious weeds are plants that pose a threat to primary production, the environment or human health, are widely distributed in an area to which the order applies and are likely to spread in the area or to another area.
Control objective – to minimise the negative impact of those plants on the economy, community or environment of NSW.
Control measures – a) The growth and spread of the plant must be

controlled according to the measures specified in a management plan published by the local control authority.

Examples:
African lovegrass, fireweed, St John's wort, Paterson's curse, scotch and nodding thistle in some areas, or
b) The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority. The plant must not be sold or deliberately distributed.
Examples:
Blackberry, Chilean needle grass, serrated tussock

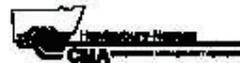
CLASS 5, RESTRICTED PLANTS

Class characteristics – Class 5 noxious weeds are plants that are likely, by their sale or the sale of their seeds or movement within the State or an area of the State, to spread in the State or outside the State.
Control objective – to prevent the introduction of those plants into NSW, the spread of those plants within NSW or from NSW to another jurisdiction.
Control measures – The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with.

Examples:
a) wild artichoke, bridal creeper, willows, thistle and esparrillo

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing August 2006. However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate offices of New South Wales Department of Primary Industries or the user's independent advisor.

Prepared by Cathy Crawford
All photos by Loni Mc Winter except serrated tussock by Michael Michelmore



APPENDIX H – PALERANG COUNCIL NOXIOUS WEEDS INFORMATION PAMPHLET



**NOXIOUS WEEDS
INFORMATION
PAMPHLET**

This pamphlet outlines the responsibilities of landowners or occupiers for the control of declared noxious weeds.

**Council Offices: 4 Majara Street Bungendore
144 Wallace Street Braidwood**

**Telephone: 1300 735 025
Facsimile: 6238 1290
E-mail: records@palerang.nsw.gov.au**

WHAT IS A NOXIOUS WEED?

Although there are many plants which could be classed as noxious weeds, only those plants which have a detrimental effect or cause serious economic loss to agriculture or the environment (providing there is a reasonable and enforceable means of control) are considered as candidates for declaration as noxious weeds.

There are two categories of noxious weeds: Statewide and local Council declarations.

Statewide declared noxious weeds are the most important and pose an ongoing serious threat to agriculture or the environment throughout the State.

Locally declared noxious weeds are those which cause problems within a local council area, catchment or region.

NOXIOUS WEEDS AND YOU!

Weeds have the capacity to substantially reduce agricultural production and they represent a major form of environmental degradation. For these reasons, the control of noxious weeds assumes a very high priority for Palerang Council. All owners/occupiers of land within Palerang Council area have a physical, moral and legal obligation to control noxious weeds on their land.

Physical Requirement:

Weeds compete for light, nutrients and moisture and therefore they contribute to reductions in plant and animal performance. Heavy infestations of noxious weeds can lead to a dramatic decline in levels of agricultural productivity. Noxious weeds also have the propensity to invade native grasslands and, as such, pose a major threat to the environment of this district.

Moral Requirement: All owners/occupiers of land have a moral obligation as owners and caretakers of land to not only prevent the establishment of noxious weeds, but to stop the spread of weeds from their land on to adjoining lands. This responsibility is an obligation of land ownership.

Legal Requirement: Under the Noxious Weeds Act 1993, owners/occupiers have a legal requirement to control noxious weeds as per the specified control measure.

Noxious Weeds Categorisation

The Act specifies five control classes. Every declared noxious weed is placed within a class. Below are the five different classes:

Class 1 noxious weeds are plants that pose a potentially serious threat to primary production or the environment and are not present in the State or are present only to a limited extent.

Control measure: The plant must be eradicated from the land and the land must be kept free of the plant.

Class 2 noxious weeds are plants that pose a potentially serious threat to primary production or the environment of a region to which the order applies and are not present in the region or are present only to a limited extent.

Control measure: The plant must be eradicated from the land and the land must be kept free of the plant.

Class 3 noxious weeds are plants that pose a serious threat to primary production or the environment of an area to which the order applies, are not widely distributed in the area and are likely to spread in the area or to another area.

Control measure: The plant must be fully and continuously suppressed and destroyed.

Class 4 noxious weeds are plants that pose a threat to primary production, the environment or human health, are widely distributed in an area to which the order applies and are likely to spread in the area or to another area.

Control measure: Refer to Palerang Council's local weed management plan for class four noxious weeds on page 20.

Class 5 noxious weeds are plants that are likely, by their sale or the sale of their seeds or movement within the State or an area of the State, to spread in the State or outside the State.

The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with.

Noxious weeds that are classified as Class 1, 2 or 5 noxious weeds are *notifiable weeds*. An occupier of land on which there is a notifiable weed must notify Council of that fact within 3 days after becoming aware that the notifiable weed is on the land.

WHO IS RESPONSIBLE FOR CONTROL OF NOXIOUS WEEDS?

Private Owners and Occupiers of Land - Responsibilities

Every home owner, landowner, occupier or person(s) leasing or renting properties must be aware of their obligations to control noxious weeds. The person(s) who has the care, control and use of the land is the occupier. He/she is responsible for the control of noxious weeds. There are many other areas such as watercourses, unfenced roads, laneways etc., and adjoining owners should enquire at the Council to determine their responsibilities.

An occupier who fails to control noxious weeds as per the specified category, shall be liable to heavy penalties.

Council's Responsibilities

- To inspect all lands for noxious weeds and advise owners of the presence of noxious weeds and provide advice on the best methods of control .
- To control noxious weeds on Council-owned land and Council maintained roadsides as required under the control categories.
- To control noxious weeds on vacant Crown land through grants from the Department of Lands.
- To enforce control of noxious weeds on private land, using the provisions of the Act.

Public Authorities - Responsibilities

To control noxious weeds as required under the control categories to the extent necessary to prevent the weeds from spreading to adjoining land.

INSPECTIONS AND NOTICES

Council has authorised its noxious weeds officers to enter land for the purpose of locating and identifying infestations of noxious weeds on the land. It is desirable that the owner/occupier is present during an inspection, however it is not necessary. Council staff are available to assist in weed identification and to advise on weed control methods.

Following a property inspection, an Inspection Report is forwarded to the owner/occupier.

If, on subsequent inspection, control as per control categories has not been carried out, a weed control notice will be issued, requiring control by a specified time. Failure to comply with this Notice will result in Council instituting legal procedures and/or the issue of a further notice, whereby Council enters the land and carries out the required control at the owner/occupier's expense.

NOXIOUS WEED CONTROL

The aim of weed control is to deplete weed seed reserves and prevent further replenishment of the seed store by preventing growth of the weeds and to remove vegetative plant parts including roots, stems, branches, stolons, tubers or other plant parts which may allow the plant to vegetatively propagate.

Integrated weed management

Integrated weed control is the coordinated use of a range suitable chemical and non-chemical control methods. The aim is to incorporate a variety of control methods that are cost-effective and practical and that reduce the reliance on herbicides. Successful implementation of integrated weed management programs requires long-term planning; knowledge of the weed's biology and life cycle, and the appropriate weed control methods.

In many situations, weed control becomes more cost-effective and practical when methods are integrated by combining chemical and non-chemical controls. However, knowledge of the weed, the appropriate control methods and timing of each control, as well as planning, are essential for success.

Biological control

Biological control involves the use of the plant's natural enemies such as insects, mites and diseases to control weed populations. It is an economical, effective and environmentally sound method of weed control.

However, biocontrol is a long term technique with extensive development and establishment phases. Furthermore, biocontrol will not eradicate a weed but, if successful, reduces it to an acceptable level where it can be controlled by other means. Successful biocontrol may take more than ten years to be effective, and results may vary from area to area.

Herbicide control

Herbicides are widely used for the control of weeds in agricultural and non-agricultural situations. Herbicides kill weeds by interfering with the growth process of the plant, by replacing hormones in the plant, or blocking chemical reactions in other ways. Some herbicides do this where they make contact with the plant, others need to be translocated in the plants system to the site of action. Herbicides are therefore grouped as either translocated or contact.

There are numerous forms of application techniques that can be used. Some of these are listed below.

- Spot spraying.
- Boom spraying
- Cut stump
- Stem injection

Cultivation

Cultivation is a proven way of controlling weeds. Implements range from large tractors and ploughs through to hand tools like a chipping hoe. This method results in the direct control of weeds. The treatment of some large infestations of weeds with herbicides is not economically feasible. Cultivation is therefore an option, but one that must be used wisely. Smaller weeds are destroyed more rapidly, efficiently and cheaply destroyed by cultivation. Shoots can also be buried deep to prevent regrowth, the roots exposed to dry out, shoots separated from the roots, or a combination of all three.

Cultivation has two main objectives: to prevent seeding and destroy the existing plants. Cultivation can be used to cut off weed problems before they get out of control. However, eradication of perennial plants by cultivation can be difficult and depends on the root system or rhizomes present. You can control these types of weeds by repeated passes, whereby the roots and rhizomes are dragged to the surface to dry out and die. This is however seldom entirely effective.

Control by cultivation should therefore aim at exhausting the food reserves through repeated disturbance and removal of the shoots every seven to ten days.

For effective control by cultivation, weeds should be attacked before flowering and under reasonably dry conditions.

Manual cultivation using chipping hoes, mattocks and other suitable hand tools is another viable means of control in small scale situations, although this method is time consuming and labour intensive.

Reafforestation

Reafforestation is a long-term method of weed control. The aim is to form a dense tree canopy that restricts sunlight penetration to weeds on the forest floor.

Mature trees compete for moisture, nutrients and sunlight, therefore restricting potential weed establishment and growth. It can take five to ten years before trees form a dense canopy and during this establishment phase, weed control can be critical to the success of the plantation. It may therefore be necessary to use other forms of weed control such as herbicides and mechanical means to assist in this establishment phase. The effectiveness of reafforestation for weed control depends on the tolerance of various weeds to shading, the added competition and forest management.

Land Management.

Sound farm management strategies are also effective means of reducing the impact of weeds. Management strategies such as pasture maintenance, good crop vigour, crop rotation, reduced tillage, grazing management, early weed identification and farm hygiene can all reduce weed problems.

COMMON NOXIOUS WEEDS WITHIN SHIRE



SERRATED TUSSOCK (*Nassella trichotoma*)

A dense, tussocky perennial grass. Leaves are 0.5mm in diameter and are no more “serrated” (downwardly rough) than other tussock grasses. Tussocks have a typical bleached golden colour in winter. Seed head has two or three branches at each junction and one seed at the end of each branch. A native of South America.



African Lovegrass (*Eragrostis curvula*)

A tussocky perennial grass up to 1 metre high, with erect stems which may bud at the lower nodes. Leaf colour varies from bright green/blue, leaves vary in width and, in some form, curl at tip. Flower head at panicle up to 30 cm long, sometimes with a weeping habit. A native of South Africa.



GORSE (*Ulex europaeus*)

A densely, spiny perennial shrub grows up to 3m. Mature branches, leaves with rough brown covering but more recent growth is green. Branches produce numerous spines 2-3cm long. Leaves are narrow, spine-like in clusters. Flowers are fragrant, bright yellow and produce a pea-like seed pod. A native of Europe introduced as a hedge plant.



Scotch/English Broom (*Cytisus scoparius*)

A much branched shrub. Stems green, leaves small bright yellow pea flowers but may vary in colour, fruit pod flat, brown or black with brown hairs along margins. The plant contains cystine, a toxic alkaloid, particularly in the flowers and seed. Can cause death through asphyxia. A native from Europe.



Blackberry (*Rubus fruticosus aggregate species*)

Erect woody shrub up to 5m high, with scrambling prickly stems up to 6m long, stems may take root at tip. Compound leaves of 3-5 evenly or irregularly toothed leaflets with prickly petioles. Flowers white to pink. The berries are globular aggregates of seeded fruits which ripen from green to red to black in late summer. A native of Europe.



Sweet Briar (*Rosa rubiginosa*)

Erect, perennial shrub which can reproduce from roots as well as seed. Thorny stems up to 3 metres high. Flowers pale pink and white, five petalled in loose clusters at ends of brambles. A native of Europe and Eastern Asia.



Paterson's Curse in Flower

Paterson's Curse at rosette stage

Paterson's Curse (*Echium plantagineum*)

An erect, coarsely hairy annual herb, sometimes living into second year. Paterson's Curse leaves oval, apex rounded, short hairs, four stamens protruding from corolla. A native of Europe.



Scotch Thistle in Flower

Scotch thistle at rosette stage

Scotch Thistle (*Onopordum acanthium*)

An annual or biannual herb woolly-white in appearance and grows up to 2 metres high. Stems erect with spiny wings which extend from the leaves. Flower heads purple. A very invasive weed of pastures. A native of Europe.



Nodding Thistle (*Carduus nutans*)

Erect annual or biannual thistle which can reach 2 metres in height. Profusely branched thick stems, leaves light green, extending along stems as wings. Flower heads purplish/mauve, 5-6.5 cm in diameter and droop or "nod" at right angles to stem when mature. A native of Europe and Asia.



Bathurst Burr (*Xanthium spinosum*)

A compact annual herb which may become woody with bushy stems with groups of 3 pronged, stiff, yellow spines at base of each leaf or branch. Leaves dark green with distinct white veins. Leaves irregularly hooked. Female flowers develop into brownish egg-shaped burrs 10-12mm long, covered with hooked spines. Plant grows up to 1m high. Generally germinating after summer storms. A native of South America.



St. John's Wort In Flower

St. John's Wort at rosette stage

St. John's Wort (*Hypericum perforatum*)

A rhizomatous, perennial herb which can grow up to a one metre high. Stemless small leaves with hypericin containing oil glands which appear as perforations when held up against light. Stems reddish in colour. Flowers have five yellow petals, three bunches of many stamens. Plant can cause photosensitisation in stock. A native of Europe and Western Asia.



Fireweed (*Senecio madagascariensis*)

Although not common within the area, small infestations have been found. Leaf shape and structure can vary, leaves are generally bright green, alternate, narrow with serrated edges. The leaves are usually 2-6cm long, occasionally reaching 8-10cm on older plants. Flowers are small, yellow and daisy-like, from 1-2cm in diameter and can number from 2-200 per plant in a loose cluster at the end of branches. Petal numbers are usually a constant 13 but can be less.

**DECLARED NOXIOUS WEEDS WITHIN
PALERANG COUNCIL**

Common name	Scientific name	Class
Anchored water hyacinth	<i>Eichhornia azurea</i>	1
Black knapweed	<i>Centaurea nigra</i>	1
Broomrapes	<i>Orobanche species except the native O. cernua variety australiana and O. minor</i>	1
Chinese violet	<i>Asystasia gangetica subspecies micrantha</i>	1
East Indian hygrophila	<i>Hygrophila polysperma</i>	1
Eurasian water milfoil	<i>Myriophyllum spicatum</i>	1
Hawkweed	<i>Hieracium species</i>	1
Horsetail	<i>Equisetum species</i>	1
Hymenachne	<i>Hymenachne amplexicaulis</i>	1
Karoo thorn	<i>Acacia karroo</i>	1
Kochia	<i>Bassia scoparia</i>	1
Lagarosiphon	<i>Lagarosiphon major</i>	1
Mexican feather grass	<i>Nasseella tenuissima</i>	1
Miconia	<i>Miconia species</i>	1
Mimosa	<i>Mimosa pigra</i>	1
Parthenium weed	<i>Parthenium hysterophorus</i>	1
Pond apple	<i>Annona glabra</i>	1
Prickly acacia	<i>Acacia nilotica</i>	1
Rubbervine	<i>Cryptostegia grandiflora</i>	1
Senegal tea plant	<i>Gymnocoronis spilanthoides</i>	1
Siam weed	<i>Chromolaena odorata</i>	1
Spotted knapweed	<i>Centaurea maculosa</i>	1
Water caltrop	<i>Trapa species</i>	1
Water lettuce	<i>Pistia stratiotes</i>	1
Water soldier	<i>Stratiotes aloides</i>	1

USEFUL WEB SITES

Weeds Australia	www.weeds.org.au/
CRC Weed Management	www.weeds.crc.org.au/
NSW Department of Primary Industries	www.dpi.nsw.gov.au/agriculture
CSIRO	www.csiro.au
Palerang Council	www.palerang.nsw.gov.au/
Southern Tableland and South Coast Noxious Plants Committee	www.southeastweeds.org.au
Landcare Australia	www.landcareonline.com/
Sydney Catchment Authority	www.sca.nsw.gov.au/
Department of Natural Resources	www.dlwc.nsw.gov.au/
Catchment Management Authorities	www.cma.nsw.gov.au/
Greening Australia	www.greeningaustralia.org.au

APPENDIX I- VEGETATION MONITORING DATA

Photo Point 1: Snow Gum Woodland

Date: 03/09/08

Transect direction: 220° SSW

Location notes: Approximately 50m south of the track in the south western section of the property (see Map 5). Reference point marked by a multi-stemmed Snow Gum (see Appendix A).

Vegetation cover and height data: recorded every 5 metres along a 50m transect line

Transect point	Vegetation Cover (%) & Native Grass Height (cm)										
	1m	5m	10m	15m	20m	25m	30m	35m	40m	45m	Average
Native Grass	40	90	90	90	90	80	60	65	90	55	75%
Height (cm)	15	10	10	10	10	10	10	10	20	50	15cm
Native Forbs	25	0	5	10	0	5	0	5	10	0	6%
Native Shrubs	5	0	0	5	5	0	25	0	0	0	4%
Native Sedges	0	0	0	0	0	0	0	0	0	0	0
Exotic Grass	0	0	0	0	0	0	0	0	0	10	1%
Exotic Forbs	0	0	0	0	0	0	0	0	0	0	0
Litter	10	0	5	5	5	20	5	10	5	35	10%
Bare ground	0	0	0	0	0	0	10	5	0	0	1.5%
Cryptogamic crust	5	10	0	5	0	5	0	5	0	0	3%
Overstorey											
Native Trees	0	0	0	0	0	40	0	0	0	0	4%
Native Tree regeneration	0	0	30	0	0	0	0	0	0	0	3%

Photo Point 2: Wet Natural Temperate Grassland of the Southern Tablelands Community

Date: 03/09/08

Transect direction: 220° SSW

Location notes: Located in the centre of the property adjacent to the track (see Map 5). Reference point located within a small stand of *Kunzea* sp. (see Appendix A).

Vegetation cover & height data: recorded every 5 metres along a 50m transect line

Transect point	Vegetation Cover (%) & Native Grass Height (cm)										
	1m	5m	10m	15m	20m	25m	30m	35m	40m	45m	Average
Native Grass	90	90	75	90	25	90	60	85	75	90	77%
Height (cm)	30	50	50	20	40	60	50	50	50	30	43cm
Native Forbs	5	5	5	5	5	5	5	5	5	0	4.5%
Native Shrubs	40	0	0	0	0	0	0	0	0	0	4%
Native Sedges	0	0	0	0	0	5	0	0	0	0	0.5%
Exotic Grass	0	0	15	5	25	5	0	0	0	0	5%
Exotic Forbs	0	<5	0	0	0	0	0	0	0	0	0
Litter	5	5	10	0	40	0	20	10	20	10	12%
Bare ground	0	0	0	0	0	0	20	0	0	0	2%
Cryptogamic crust	0	0	0	0	0	0	0	0	0	0	0

Photo Point 3: Dry Natural Temperate Grassland of the Southern Tablelands Community

Date: 03/09/08

Transect direction: 220° SSW

Location notes: Located in the north eastern section of the property (see Map 5). Reference point approximately 100m south of the boundary fence and an Acacia tree (see Appendix A).

Vegetation cover & height data: recorded every 5 metres along a 50m transect line

Transect point	Vegetation Cover (%) & Native Grass Height (cm)										
	1m	5m	10m	15m	20m	25m	30m	35m	40m	45m	Average
Native Grass	50	70	60	95	50	60	55	60	80	55	63.5%
Height (cm)	5	10	10	15	10	20	10	10	15	15	12cm
Native Forbs	10	30	25	5	20	30	40	30	10	<5	22%
Native Shrubs	0	0	0	0	0	0	0	0	0	0	0
Native Sedges	0	<5	0	0	0	0	0	0	0	0	0
Exotic Grass	0	0	0	0	0	0	0	0	0	0	0
Exotic Forbs	0	0	0	0	0	0	0	0	0	0	0
Litter	5	<5	5	5	5	10	<5	0	<5	<5	5%
Bare ground	25	<5	0	0	25	0	<5	10	10	20	11%
Cryptogamic crust	5	<5	5	0	10	0	0	<5	<5	0	3%

Photo Point 4: Snow Gum Woodland

Date: 03/09/08

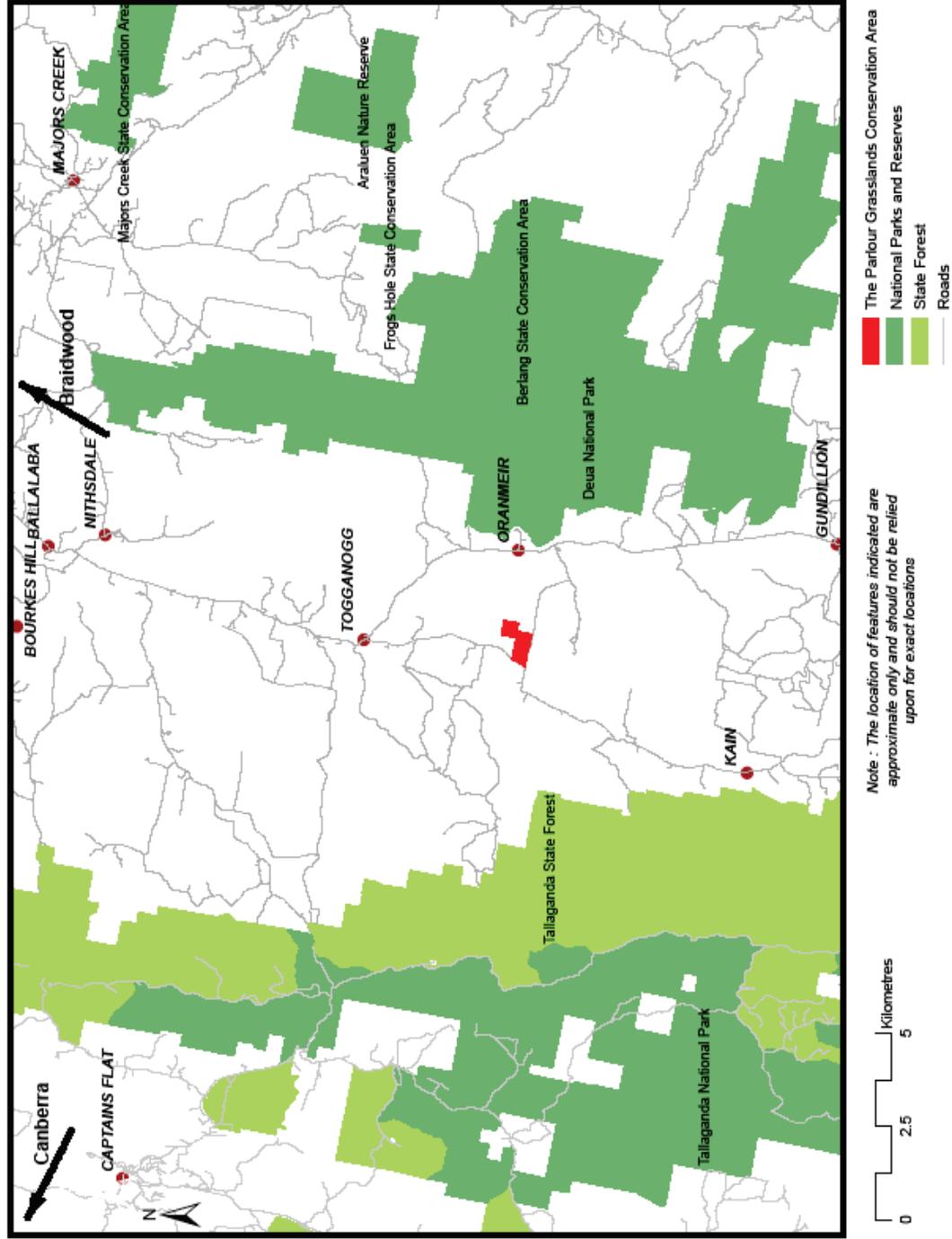
Transect direction: 220° SSW

Location notes: Located in the north western section of the property (see Map 5). Reference point marked by a *Eucalyptus* sp. sapling (see Appendix A).

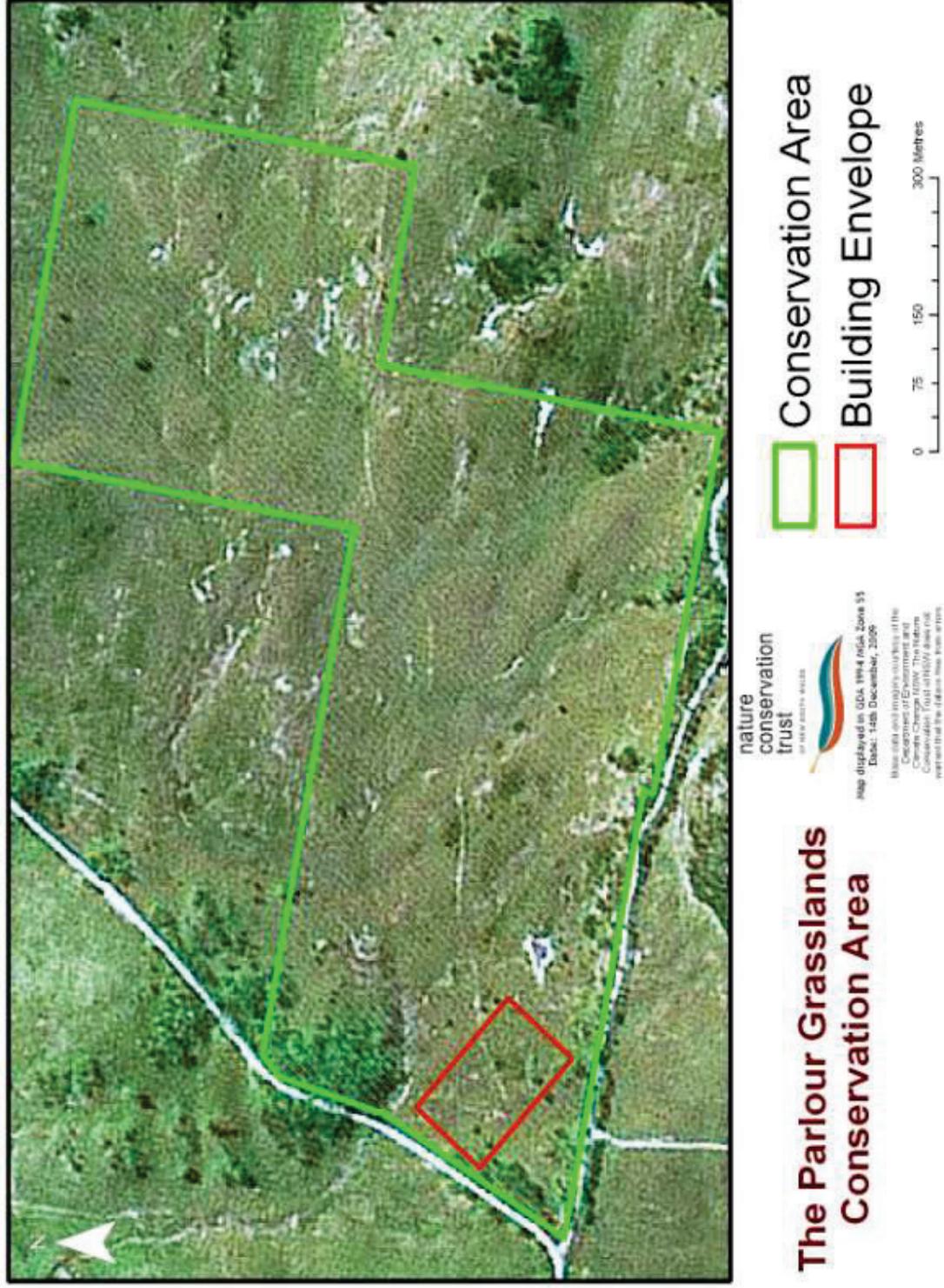
Vegetation cover & height data: recorded every 5 metres along a 50m transect line

Transect point	Vegetation Cover (%) & Native Grass Height (cm)										
	1m	5m	10m	15m	20m	25m	30m	35m	40m	45m	Average
Native Grass	50	45	10	50	25	50	45	0	20	15	31%
Height (cm)	10	10	5	15	10	10	10	0	10	10	9cm
Native Forbs	20	10	15	0	<5	10	0	0	0	0	6%
Native Shrubs	0	0	0	0	20	0	5	0	60	25	11%
Native Sedges	0	0	0	0	<5	0	0	0	0	0	0
Exotic Grass	0	0	0	0	0	0	0	0	0	0	0
Exotic Forbs	0	0	0	0	0	0	0	0	0	0	0
Litter	20	40	45	30	30	35	50	90	20	60	42%
Bare ground	10	5	5	10	25	0	0	10	0	0	6.5%
Cryptogamic crust	0	0	0	0	0	0	0	0	0	0	0
Overstorey											
Native Trees	0	0	0	0	40	0	0	100	20	50	21%
Native Tree regeneration	0	0	0	0	0	0	0	0	0	0	0

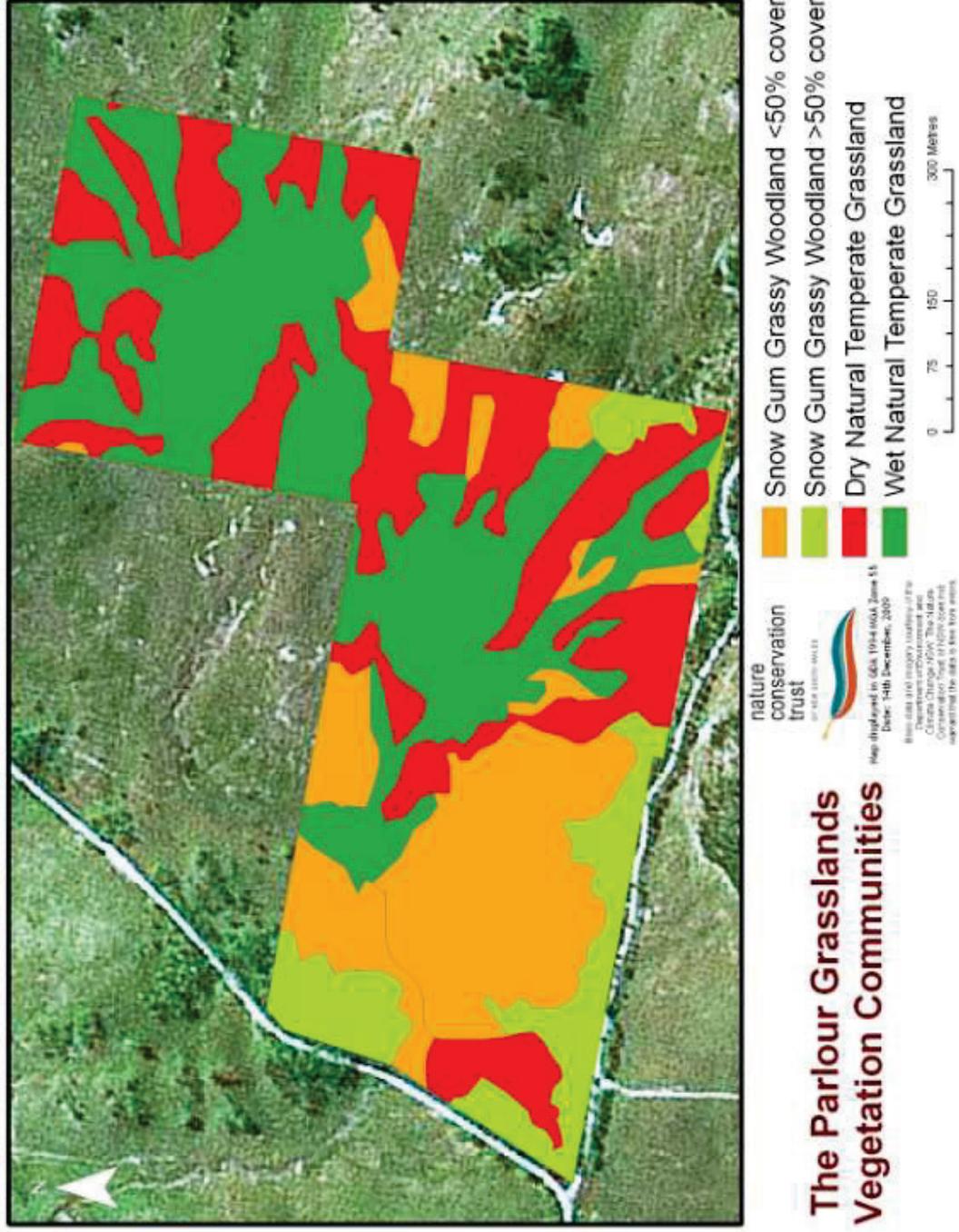
MAP 1. REGIONAL LOCATION OF THE CONSERVATION AREA



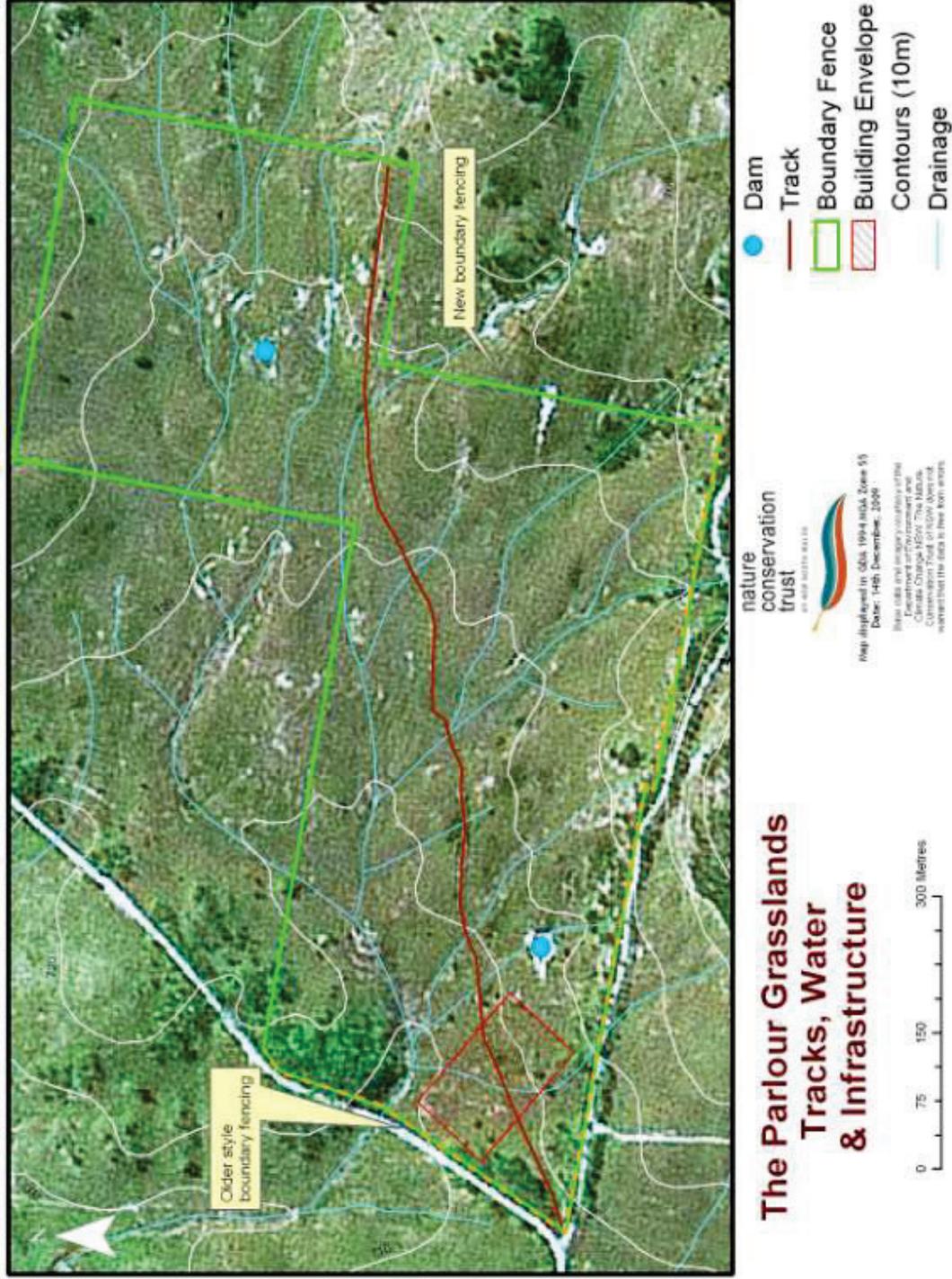
MAP 2. THE CONSERVATION AREA



MAP 3. VEGETATION COMMUNITIES



MAP 4. TRACKS, FENCES AND INFRASTRUCTURE



MAP 5. PHOTO MONITORING POINT LOCATIONS

