A Planning Framework for Natural Ecosytems of the ACT and NSW Southern Tablelands

Natural Heritage Trust

Helping Communities Helping Australia

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Foreword

The NSW Southern Tablelands and ACT retains important natural areas, including grasslands and grassy woodlands, although some are poorly conserved and are still declining. A total of 156 species have been identified as of conservation importance within the region, including 84 listed threatened species.

The *Planning Framework for Natural Ecosystems of the ACT and NSW Southern Tablelands* has been developed to assist in effective planning for conservation of this biodiversity. By providing comprehensive and consistent information on natural ecosystems, this planning framework will improve certainty for the development industry, and enable effective integration of biodiversity considerations into decision-making processes.

The *Planning Framework for Natural Ecosystems* presents regional-scale information on natural ecosystems and biodiversity. It identifies important species and ecological communities at the regional scale and accesses databases which cross-jurisdictional boundaries. Important regional issues for the conservation of natural ecosystems are also identified. The scientific data supporting the framework will be continuously updated as more information becomes available.

This reference information can be applied within existing agency processes, especially by local government. Importantly the framework also provides principles for strategic planning at the regional and local scales and a context for assessing development proposals.

This report describes the framework and summarises the supporting information. It enables the process of planning for development and conservation to be made more manageable. Applying the framework will not prevent conflict or remove uncertainty in all situations, but it will reduce them considerably.

The planning framework is the result of extensive cooperation between all spheres of government (Commonwealth, NSW, ACT and local) and a range of non-government organisations including the Housing Industry Association, and community resource management and conservation groups. The extensive field surveys and remote sensing mapping which were undertaken to prepare this report as well as the preparation of the framework were supported financially by the Natural Heritage Trust.

The *Planning Framework for Natural Ecosystems* will assist the community in maintaining and enhancing native flora and fauna and habitats while allowing responsible development to proceed.

Tony Carey
Housing Industry Association
Chair of the Joint Regional Biodiversity Working Group

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Acknowledgments

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The early enthusiasm and impetus for this project by David Shorthouse (Environment ACT, and Ian McNamee of the Housing Industry Association (ACT and Southern NSW) is appreciated.

This framework report has been prepared in consultation with, and support from a sub-committee of the JRBWG comprising Michael Saxon and Rainer Rehwinkel (NPWS), David Shorthouse (Environment ACT), Chris Murray (PlanningNSW) and Tony Carey (HIA).

Overall project and contract management was undertaken by Rainer Rehwinkel under the direction of the JRBWG and the sub-committee. Michael Saxon (NPWS), Rainer Rehwinkel (NPWS), and David Shorthouse (Environment ACT) edited this report.

Shawn Capararo (NPWS), Steve Priday (NPWS) and Mark Dunford (Environment ACT) undertook technical analysis, mapping and data compilation.

Charles Walsh Nature Tourism Services designed the cover.

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Abbreviations

ACT	Australian Capital Territory
CMB	Catchment Management Blueprint
CAMBA	China-Australia Migratory Bird Agreement
CRA	Comprehensive Regional Assessment
DA	Development application
DCP	Development control plan
DLWC	NSW Department of Land and Water Conservation
EEC	Endangered ecological community (listed under various acts of legislation)
EIS	Environmental impact statement
EPBC Act	Environment Protection & Biodiversity Conservation Act 1999 (Commonwealth)
EP&A Act	Environmental Planning & Assessment Act 1979 (NSW)
ERIC	Environmental Research and Information Consortium Pty Ltd
FM Act	Fisheries Management Act 1994 (NSW)
ESD	Ecologically sustainable development
HIA	Housing Industry Association (ACT and Southern NSW Region)
IBRA	Interim Biogeographic Regionalisation for Australia
JAMBA	Japan-Australia Migratory Bird Agreement
LEP	Local environmental plan
LGA	Local government area
LG Act	Local Government Act 1993 (NSW)
LPE Act	Land (Planning and Environment) Act 1991 (ACT)
NCA	National Capital Authority
NC Act	Nature Conservation Act 1980 (ACT)
NHT	Natural Heritage Trust
NPWS	NSW National Parks and Wildlife Service
NPW Act	National Parks and Wildlife Act 1974 (NSW)
NSW	New South Wales
NVC Act	Native Vegetation Conservation Act 1997 (NSW)
PoM	Plan of management (for community land)
PlanningNSW	Department of Planning (NSW)
Ramsar	An inter-governmental treaty which provides the framework for national action and international cooperation for the conservation of wetlands and their resources.
REP	Regional environmental plan
RFA	Regional Forest Agreement
RVMP	Regional vegetation management plan
SEE	Statement of environmental effects
SIS	Species impact statement
SoE	State of the Environment (report)
TSC Act	Threatened Species Conservation Act 1995 (NSW)
TSR	Travelling Stock Reserve
WM Act	Water Management Act 2000 (NSW)

Summary

Background

This report outlines a planning framework for natural ecosystems within the NSW Southern Tablelands and ACT region. It outlines regional principles for planning, development and conservation. The report also provides a regional context and structure for integrating scientific data on natural ecosystems into the land use decision-making processes of local, state and Commonwealth government agencies.

The framework is not prescriptive or regulatory, but may be adopted by these agencies to enable natural resource information to be incorporated within existing processes. It can be applied for a wide range of planning purposes. The information within the framework provides a valuable tool to ensure that up-to-date information on natural ecosystems is taken into account at appropriate stages when land use decisions are made.

The framework represents the most recent stage in an ambitious project that commenced in 1995 with the establishment of a working group comprising representatives from ACT Government, NSW Government, Local Government, Commonwealth Government and the Housing Industry Association (ACT and Southern NSW Region). This group was established in response to the need for a more strategic approach to conservation in the ACT region and for greater certainty in planning for future development of Canberra and surrounding communities.

This report was prepared under the direction of a sub-committee of the working group comprising representatives of NSW National Parks and Wildlife Service, Environment ACT, PlanningNSW and the Housing Industry Association. Its preparation included close consultation with government representatives and broad community consultation through a series of workshops.

Recognition of Aboriginal cultural heritage

The framework recognises that Aboriginal people have traditionally had responsibility for custodianship of their country. Traditional custodianship acknowledged the spiritual and physical values of natural ecosystems of the region.

The framework acknowledges the continuation of these responsibilities and supports partnerships in the planning and management of the natural ecosystems of the region.

What does the planning framework do?

The framework does the following:

1 Presents regional-scale information on natural ecosystems and biodiversity to provide a decision-making context. Information mainly relates to those species and ecological communities identified as being of conservation importance at the regional scale. Databases have been developed which cross-jurisdictional boundaries.

2 Identifies important regional issues for the conservation of natural ecosystems.

3 Provides guidance for strategic planning at the regional and local scales, including planning principles.

4 Provides a regional context for assessing development proposals, including a basis for the formulation of site-scale guidelines and standards.

Overview of planning framework

The framework comprises two essential parts that should be referred to concurrently:

1 The elements or steps which provide written guidance for how to consider certain issues, including principles and planning guidelines (ie. what issues are considered at different scales and at different stages in the process of development and land management); and

2 The accompanying maps. There are 4 key planning maps enclosed within an envelope at the back of this report. These supporting maps and the data underpinning them provide access to accurate information on the natural ecosystems of the region.

The framework and its methodology are tools for achieving informed land use decision-making by relevant authorities. The framework enables important information to be integrated within existing planning processes. It can also ensure that consistent information is available throughout the region, since much information on natural ecosystems needs to take into account the regional context and habitat linkages.

Using the framework substantially relies upon on applying two key steps. These are:

1 Identification of regional ecological planning settings shown on Map P3 and generic principles for each individual planning settings. This is indicative of the process and development constraints applying to land.

2 Identification of landscape units, generalised boundaries of which are shown on Map P4. Information on natural ecosystems within landscape unit is presented. This describes important features of the unit to be taken into account in land planning, such as landscape features, vegetation communities and threatened species.

The planning settings should primarily be used for making decisions regarding a specific location, whereas landscape units are used for determining assessment, design and management requirements in a broader sense. The maps for each lead to other information sources and provide guidance for the processes required for implementing the framework. These are planning maps, which summarise scientific data, and make it accessible for planning purposes as required. They provide a way of linking scientific data to planning and decision-making processes.

Although the framework was primarily developed to operate at the regional scale, the mapping is on a computer-based GIS system, allowing it to be used at other scales, including the local government area and site scale.

The framework is not a static document. The framework itself and the data can be updated over time. For example, the remote sensed data collected to develop the vegetation maps for the report, could be updated over time to review trends and environmental change.

The framework will also be enhanced by mid 2003 at which time two further important resources will be available: The first will be a set of landscape unit decision guidelines for decision making authorities and the development industry. These will be tailored to the conservation status of the threatened or rare species or communities within each landscape unit as well as its land management features. It is intended that they will provide explicit guidelines for decision-making authorities with particular emphasis on appropriate courses of action when a threatened species or endangered community is encountered within the landscape unit. The second resource is currently being developed and involves finer scale identification of important habitat and corridors for assemblages of rare or threatened fauna and further identification of regionally rare or poorly reserved vegetation associations.

The planning framework steps and elements are summarised in the table on the following page.

Overview of planning framework elements and steps

Step or element	Applicable scale	Purpose of step
1 Consider **regional principles** (written)	Regional	▪ Identifies regional issues for natural ecosystems. ▪ Outlines planning principles that are applicable throughout the region. Can be incorporated in planning instruments and strategies.
2 Determine **regional ecological planning setting/strategic planning approach** (Map P3, with written criteria)	Regional and LGA	▪ Provides guidance as to whether development is in the appropriate location and a planning framework that each jurisdiction (LGAs and ACT) can develop further. ▪ Identifies priority conservation areas. ▪ Provides standard methods/approach for surveys and assessment in different areas.
3 Refer to **landscape unit descriptions** (written description with Map P4 to define areas)	LGA, site and landscape scale	▪ Differentiates areas within the region where different situations exist, linking regional scale to site scale planning. ▪ Identifies important natural attributes such as endangered ecological communities and threatened species. Used to specify land use options and assessment and management guidelines for specific situations and ecosystems. ▪ Links to management objectives in subsequent plans and policies. Landscape unit guidelines may be adapted for inclusion in these plans.
4 Refer to **key habitats, vegetation and corridors analysis** (NPWS to prepare by mid 2003)	LGA, site and landscape scale	▪ Identifies areas that are important habitat for assemblages of rare or threatened fauna. ▪ Identifies areas that currently are likely to serve as corridors/linkages for rare or threatened fauna. ▪ Identifies regionally rare or poorly reserved vegetation associations. ▪ Identifies areas that are most suitable for revegetation for the purposes of enhancing habitat connectivity.
5 Refer to **land use/activity guidelines** (yet to be prepared)	Site	▪ Identifies generic guidelines for land uses and activities, including how and where they are to be carried out. This may include best practice guidelines for certain development types, or ecosystem specific requirements.
6 Apply **landscape unit decision guidelines** (NPWS to prepare by mid 2003)	Site	▪ Specifies requirements for assessment of impact on individual species or communities (survey and assessment). ▪ Suggests responses to managing landscape/land management issues
7 Establish **site design criteria**	Site	▪ Determines design criteria and field survey requirements for a development proposal. ▪ Used to develop management and development standards, including management plan provisions defining landholder responsibilities and entitlements.

Applying the planning framework

The framework should be used to:

1 Establish common terminology and approach throughout the region (ie. a common level of understanding of the issues and what to do about them).

2 Provide an updated summary of what is important to know about the natural ecosystems of the region.

3 Outline principles and policy for integrating scientific information with development planning approaches.

The framework is primarily aimed at the regional and local government area (LGA) scales, to provide a context for decision-making. When using the planning framework and the accompanying maps and data, the following limitations should be recognised:

- It applies to both ACT and NSW jurisdictions. Legislation and practice requirements differ between these two jurisdictions.
- Information presented is correct as at the date of publication, but may be subject to change over time. The most recent available data should be accessed.
- When interpreting the information presented, data accuracy and mapping scale should be checked. For some applications, additional field survey will be required.

Frequently asked questions

Is the data supporting the framework available?

The data used for preparing the framework will be available to planning agencies within the region. It has been compiled by the NSW National Parks and Wildlife Service (NPWS) Threatened Species Unit, Southern Directorate (Queanbeyan) on Arcview GIS software.

The planning setting maps are available electronically. Alternatively, hard copies are available from the NPWS at any scale required. A charge to cover printing costs will be necessary.

What does the data show?

The data show that important native species and ecological communities remain within the region (primarily grassland and grassy woodland communities) but are being adversely affected by particular land use practices and development pressures.

Important species and communities and their locations have been identified as part of the framework, and are linked to planning and management principles.

It is important to note that although there are limitations in the data supporting the framework, it provides a valuable planning tool for identifying areas important for conservation as well as land suited to further development.

How does the framework relate to regulatory requirements? Is the framework a requirement?

The framework is a reference document. It will provide useful material that can be applied within existing agency processes, including compliance with existing legislative requirements especially by local government. Elements of the framework may be adopted by different agencies and groups where these are appropriate in the circumstances.

Why is it important to have a framework?

Applying the framework will lead to increased certainty for the development industry within the region, and will reduce land use conflict by identifying constraints at the earliest stages of the development process.

If nothing is done to protect and improve management of natural ecosystems there will be continuing degradation of the natural resource base, to the extent that water quality will be reduced, and ecosystems will not be functional and will require increasing management effort and expenditure to maintain. Species will become extinct at the local or regional scales. If the framework is not applied, there will be regional inconsistency, and for example, some species will be protected in some of their range, but not in other parts.

Which scales does the framework operate on?

Although it is a regional approach, it is designed to be used at the local government level, as well as at other scales. The maps can be used and are accurate generally in the range from 1:10,000 upwards. The maps can be adapted for use at the site-specific scale but may require field checking to determine accuracy.

How can local government use the planning framework?

The framework will assist councils in carrying out existing legislative responsibilities. Councils may wish to use the framework by undertaking some or all of the following steps:

1 Adopt the framework in principle.

2 Apply the framework elements/steps.

3 Allocate resources to access the database and supporting information (eg. computer hardware, staff training and database).

4 Make the framework an essential consideration in any new strategic plans (eg. LEPs and DCPs).

5 Utilise data in considering development applications (eg. developing checklists for DAs).

How does the framework apply to your area?

The ecological planning settings map uses scientific data to represent different levels of certainty of information and the estimated ecological importance of land. This provides guidance as to the level of information and also the likely requirements where development proposals exist or where changes to land use and land management may require approval or involve regulatory or other authorities. Ecological planning settings also provide the basis for revegetation opportunities or other land management activities which require an understanding of how land is functioning from an ecological point of view.

The landscape units on the other hand provide a link to on-ground management and decision-making. Each of these units is defined in terms of an identifiable landscape that relates to natural, social, and/or economic characteristics and administrative boundaries. A set of summary information accompanies each landscape unit and includes the important landscape features, land management issues, threatened species and endangered ecological communities that occur within that area. It is possible for each landscape unit to be linked to local government planning controls, development application requirements or financial incentive structures.

What further information is available, and where can it be obtained?

Additional information on the natural ecosystems of the region will become available on an ongoing basis. This will include more detailed data, updated interpretative information, and maps at different scales. This information can be obtained from the agencies outlined in Part 7 of the report.

To support this framework, a set of landscape unit guidelines for decision-making authorities will also be produced by the NPWS over the next six months. These guidelines will be tailored to the conservation status of the threatened fauna or communities within the specific landscape unit as well as its land management features. The NPWS is also preparing a desktop analysis of key habitats for assemblages of rare or threatened fauna, identifying areas that currently are likely to serve as corridors/linkages for rare or threatened fauna vegetation, identifying regionally rare or poorly reserved vegetation associations and identifying areas that are most suitable for revegetation for the purposes of enhancing habitat connectivity.

Part 1
Introduction

1.1 Purpose of the planning framework

Conservation of biodiversity is a fundamental principle of ecologically sustainable development, to which all levels of government in the region are committed by agreements, policy or legislation. Biodiversity and natural ecosystems are therefore essential considerations in land use planning.

This report provides background resource information and a conservation-planning framework for the natural ecosystems of the NSW Southern Tablelands and ACT region. The framework applies to the region shown in Figure 1 and comprises all or part of seven local government areas in NSW and the ACT. It focuses on how to integrate biodiversity issues in land use and development planning processes, and summarises important information on the natural ecosystems of the region.

The region is subject to pressure for urban development in Canberra and surrounding towns and villages, further rural subdivision and continued agricultural, horticultural and forestry activity. The framework can be used to inform decision-making, specifically the formulation, review and assessment of land use plans and development proposals. It presents a regional context and specific guidelines for integrating development and conservation of natural ecosystems and biodiversity. It will assist the region in achieving the goal of ecologically sustainable land use.

An essential role of the report is to make basic scientific information about the natural ecosystems of the region accessible to all relevant agencies and users in a consistent way.

Figure 1: The ACT and NSW Southern Tablelands

1.2 Who can use the planning framework?

The planning framework is written primarily for organisations with land use planning responsibilities and development interests. Other important stakeholders include the community in general, and non-government and government agencies.

Users of the framework and how they may be able to use the report are summarised in Table 1.1. This table also highlights important parts of the report that are likely to be relevant to each user. Decisions by a wide range of different groups affect the natural ecosystems of the region and must be taken into account in planning and management.

The framework provides a resource document to serve statutory and non-statutory planning processes in NSW and the ACT. A key part of this is to integrate information between different jurisdictions within the region to provide a regional context and a common approach recognising that requirements differ between NSW and the ACT. It is also important to take into account limitations on the accuracy of the data.

Table 1.1 Planning framework users

Who can use the report?	What purposes can the report be used for?	Essential parts of the report to read
KEY USERS		
NPWS and Environment ACT	Carrying out legislative responsibilities for biodiversity conservation, threatened species and endangered ecological communities. Review of plans and development proposals. Linking to recovery plans, threat abatement plans (for key threatening processes) Planning for establishment of Conservation Management Networks	Parts 1, 3, 5 and 6
PlanningNSW	Reviewing draft local environmental plans, strategic studies, local and regional policies, and development proposals	Parts 1, 2, 3, 4, 5 and 6
Local Government Councillors	Making planning and development decisions in accordance with legislative responsibilities	Summary
Local government staff	Carrying out legislative responsibilities as planning authorities, and for operational purposes	Summary, and Parts 1, 3.1, 4, 5 and 6
ACT Planning and Land Management	Reviewing draft plans, strategic studies, policies, development proposals and land management operations	Parts 1, 2, 3, 4, 5 and 6
Environment Australia	Reviewing impact of actions on matters of national environmental significance under EPBC Act	Parts 1, 3, 4 and 5
OTHER USERS		
ACT Conservator of Flora and Fauna	Implementing ACT Nature Conservation Strategy, and coordination with other plans	Parts 1, 3, 5 and 6
ACT Commissioner of the Environment	Reference for Australian Capital Region state of environment reporting	Summary and Parts 3, 4 and 5
Development industry	Identifying land having high conservation importance, and in determining the development process and design constraints	Summary Parts 3.1, 4, 5 and 6
Community conservation groups (NGOs such as Conservation Council of the South East Region and Canberra, Landcare, Greening Australia, Friends of Grasslands, and NSW Farmers Association)	Providing information for planning, rehabilitation, restoration and land management purposes	Parts 1, 2, 3 and 5
Natural Resource Management Committees (DLWC catchment management boards, water and vegetation management committees)	Providing information for planning and land management purposes	Whole report

Who can use the report?	What purposes can the report be used for?	Essential parts of the report to read
National Capital Authority	Preparation and implementation of National Capital Plan	Parts 1, 2, 3, 4, 5 and 6
Educational institutions	Informing natural resources research in the region	Parts 1 and 3
Agencies and groups in other regions	Providing an example that may be able to be applied	Whole report
Aboriginal land councils and groups	Providing information and identifying interests	Summary and Parts 1, 3 and 4
Sydney Catchment Authority	Strategic planning and consideration of development proposals	Whole report
Landowners and lessees	Providing information for planning and land management	Summary and Parts 1, 3 and 4
Rural Lands Protection Boards	Management of travelling stock reserves (TSRs)	Summary and Parts 1, 3 and 4

1.3 How to use the planning framework

The planning framework compiles information on natural ecosystems for the region to assist biodiversity conservation and land use planning. The role of the report is to synthesise a wide range of planning and natural resource information for the region in an integrated manner. The framework:

1 Presents regional scale information on natural ecosystems and biodiversity to provide a decision-making context. Information mainly relates to those species and ecological communities identified as being of conservation importance at the regional scale. Databases have been developed which cross-jurisdictional boundaries.

2 Identifies important regional issues for the conservation of natural ecosystems.

3 Provides guidance for strategic planning at the regional and local scales, including planning principles.

4 Provides a context for assessing development proposals, including a basis for the formulation of site-scale guidelines and standards.

The framework may facilitate the adoption of regionally consistent planning approaches if the proposals are adopted and applied by government agencies and local government authorities. It is recognised that the proposals in the report must be closely integrated with other plans, policies, and programs undertaken by a range of agencies. It may be used by local government authorities for the purpose of preparing local environmental studies or assessing development applications.

The proposed framework is not prescriptive, but may be adopted for reference or as a policy document where appropriate. It will provide useful information and guidance to minimise conflict between development and conservation and natural ecosystems. In those cases where conflict does occur, the framework will provide a basis for effectively integrating the consideration of natural ecosystems in planning, and will highlight the choices that need to be made to achieve workable conservation and development outcomes.

1.4 Method and report structure

The project has involved the following steps:

1 Compiling base information (regional database for flora and fauna species, modelled distributions for priority species, point locations for some species). The considerable scientific data that exists for the region is summarised in the report, with detailed reference lists and species lists included in separate databases which are being continually updated (by NPWS and Environment ACT) as more information becomes available.

2 Using satellite image mapping (ERIC 2001) relating to vegetation cover and validating this through field checking, and database review.

3 Summarising and integrating information into a manageable and relevant format, including integrating information between ACT and NSW jurisdictions. Data was compiled by NPWS and integrates a large number of existing data sources to compile a small number of planning maps.

4 Development of a planning framework to reflect the available data. This identifies areas of different conservation importance (regional ecological planning settings) and therefore having different planning requirements. This step involved reviewing data and modelling key species, and ecological communities, recognising that it is not realistic for planners to integrate many separate maps of species or vegetation community information for planning purposes.

5 Identifying landscape units for planning, and using GIS-based data to compile natural ecosystem data for each unit

As far as possible, the presentation of data on natural ecosystems and planning maps recognises ecological boundaries based on landscape characteristics and ecological function, rather than administrative boundaries. This provides a consistent information base between jurisdictions that can be used for decision-making purposes and may contribute to a common understanding of the issues across the region and agency boundaries.

The report presents information on natural ecosystems at the regional scale. However, the framework has been structured to enable it to be applied at the following scales:

1 Landscape scale (regional and local government areas - providing the context for planning and land use)

2 Site scale (property level and sub-catchment areas - supporting development decision-making and management activities at the site scale)

The planning framework itself forms Part 5 of the report, and has been prepared as a stand-alone document. A quick guide to the contents of the report and what each Part does is as follows:

Report sections	Key maps and tables
Part 2 Planning Context	
• Identifies regional boundaries • Identifies policy programs and legislation • Reviews key regional planning issues	Figures 1 to 5: Location, administrative and catchment boundaries
Part 3 Information on natural ecosystems	
• Reviews regional natural ecosystem information • Provides an overview of the databases accompanying the framework • Identifies regionally important ecosystems to be considered in planning • Summarises natural ecosystem information for identified landscape units	P1 Pre-1750 vegetation P2 Extant 2000 vegetation Figures 6 to 11: Distribution of listed threatened species and endangered ecological communities, Table 3.3, 3.5 P4 Landscape units, Part 9.2
Part 4 Issues and priorities for natural ecosystems	
• Identifies threats to natural ecosystems • Identifies planning and management issues for natural ecosystems	Table 4.1 Table 4.2
Part 5 Planning framework	
• Identifies elements in a planning framework for natural ecosystems • Proposes regional biodiversity conservation planning principles - to provide general policy directions • Identifies regional ecological planning settings - a conservation planning framework based on landscape ecological functioning • Identifies planning and management guidelines for landscape units • Provides a structure for preparing land use/activity guidelines, guidelines for conserving important species and communities, and site design criteria	Table 5.1, 5.2 P3 Regional ecological planning settings, Table 4.3 P4 Landscape units, Part 9.2
Part 6 Implementation	
• Makes proposals for implementing the framework	

Part 2
Planning context

Part 2 provides a general context for developing the planning framework for the region's natural ecosystems and biodiversity. It outlines the legislative and administrative frameworks that exist, including current planning approaches. This Part also summarises key planning issues that must be addressed, and identifies some of the obstacles that may exist to the implementation of a strategic framework for the region.

2.1 Project background and boundaries

Growing recognition of the conservation importance of natural ecosystems within the ACT and surrounding areas of NSW, and listings of threatened species under relevant legislation have contributed to the need to improve linkages between formal land use and development regulation processes, and conservation planning. Within the NSW Southern Tablelands and ACT region increasing rural and urban development pressure has contributed to the need to establish an appropriate regional context to strategically plan for the conservation of natural ecosystems and for appropriate development.

The project, of which this planning framework is a part, resulted from the impact on the housing and development industry of uncertainty surrounding the status of land containing threatened species and grassy ecosystems. However, broader issues including land clearing and modification of vegetation communities for rural-based activities must also be considered. A key part of the project is to provide the data needed for sensible conservation planning, leading to measures to justify representation of areas within conservation reserves or to take off-reserve conservation measures. This will also facilitate more informed and timely land use decisions, and improve certainty for landowners and development proponents. The project has evolved and progressed in stages including:

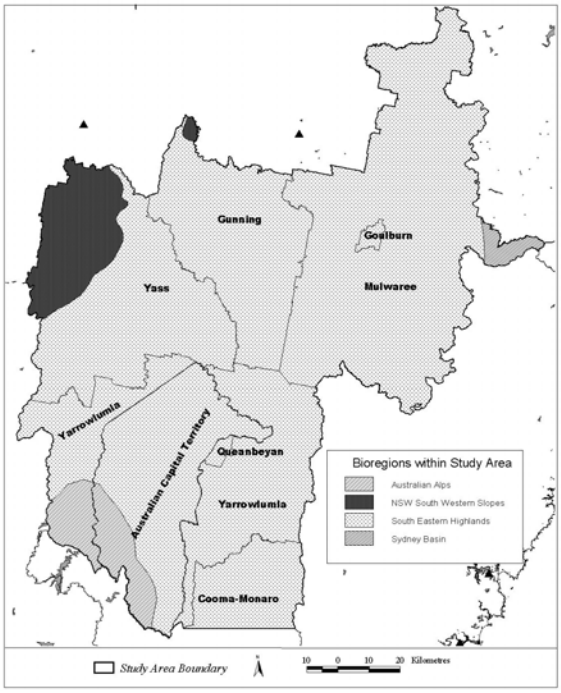

Figure 2: Local Governments, Territories & IBRAs within the study area

1 Assessment of existing information and identification of knowledge gaps (Rehwinkel 1997). This was followed by a broad-scale survey and mapping of grassy ecosystems and their component species, with particular emphasis on threatened species.

2 Ecological surveys to fill identified gaps, resulting in identification of sites and ecological communities of special significance for conservation because of their species composition, and richness of conservation values

3 Reporting of ecosystem information and development of a regional conservation framework for natural ecosystems (this report).

A steering group comprising representatives from Environment ACT, NSW National Parks and Wildlife Service, PlanningNSW and the Housing Industry Association (ACT and Southern NSW Region) managed the preparation of this report. The preparation of the document included close consultation with local government representatives and broad community

consultation, including two workshops. The project history and background is outlined in Part 9.1.

The area to which the report applies follows local government area boundaries, as shown on Figure 2. This includes the following regional boundaries:

- Four bioregions (South Eastern Highlands, NSW South Western Slopes, Australian Alps, and Sydney Basin). The initial project field study area was the IBRA South Eastern Highlands Bioregion but was amended to reflect administrative boundaries for land use planning purposes and to recognise the area of greatest immediate development pressure. Bioregional boundaries are also shown on Figure 2.
- Seven local government areas. The region includes Goulburn, Gunning, Mulwaree, Queanbeyan, Yarrowlumla, and Yass Councils and part of Cooma-Monaro Council. It also includes the Australian Capital Territory for which the ACT Government carries out unified state and local government administrative functions within its boundaries. The relative proportion of each of these administrative areas is shown in Table 2.1.
- Parts of four river catchments (Murrumbidgee, Hawkesbury, Lachlan, and Shoalhaven) and the closed catchment of Lake George as shown on Figure 3.
- Five Rural Lands Protection Board Districts as shown on Figure 4. These are Cooma, Braidwood, Goulburn, Moss Vale and Yass.
- Three regional Aboriginal land councils as shown on Figure 5 and ten local Aboriginal land councils.

Table 2.1 Proportion of region in terms of area, ranked by size

Administrative area	Proportion of area within jurisdiction	Human population 2001
Mulwaree	30.6% (area 521,125 ha)	1.6% (6,438)
Yass	19.4% (area 329,687 ha)	2.4% (9,647)
Yarrowlumla	17.5% (area 297,046 ha)	2.5% (9,972)
ACT	13.9% (area 235,807 ha)	79.5% (310,839)
Gunning	13.0% (area 221,058 ha)	0.5% (2,270)
Cooma-Monaro (northern part of LGA)	5.0% (area 85,854 ha)	<0.1% (<500)
Goulburn	0.3% (area 5,461 ha)	5.2% (20,447)
Queanbeyan	0.3% (area 5,235 ha)	8.0% (31,353)
TOTAL REGION	100% (area 1,701,272 ha)	390,966+

2.2 Legislative and policy framework

Planning for natural ecosystems of the region occurs within a complex legislative and policy framework. This section briefly identifies key elements and summarises some of those that are of most importance. It is important to clearly identify who is responsible for what, and to recognise the distinctions between the administrative jurisdictions, namely Commonwealth, State, Territory and NSW local government. All of the jurisdictions play some role in planning for and managing biodiversity within the region. Important legislation and policies are outlined below. For details, the legislation itself should be referred to, and a summary of provisions applying in NSW is included in the *Biodiversity Planning Guide for NSW Local Government* (Fallding *et al*. 2001).

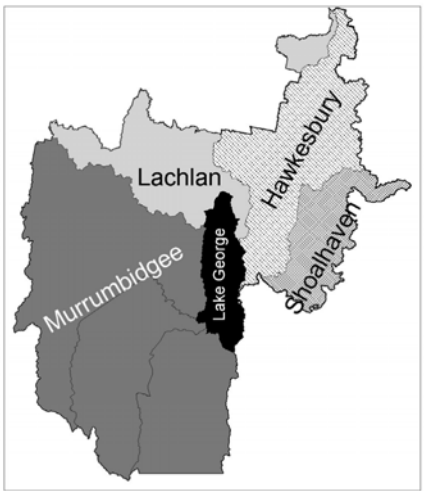

Figure 3: Catchments within the study area

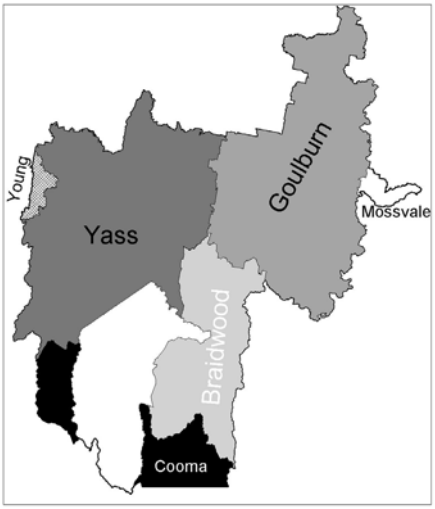

Figure 4: Rural Lands Protection Boards within the study area

Figure 5: Aboriginal Regional Land Council boundaries within the study area

Commonwealth

In general, most practical planning and land management functions relating to biodiversity are carried out under State and Territory legislation. However, the Commonwealth does exercise responsibilities where provided for under the constitution, especially for matters of national importance, international treaty obligations, and Commonwealth land.

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) lists species and ecological communities considered to be threatened with extinction, and provides an environmental assessment and approval process. Where there is a national recovery plan, or likely to be a significant impact on listed species or communities as a result of an action (such as a development proposal) then consent under this Act may be required. Such consent is currently independent from NSW and ACT approvals which may also be required concurrently.

The Commonwealth Government is responsible for international conventions including JAMBA, CAMBA, and Ramsar. As a signatory nation to the *United Nations Convention on Biological Diversity*, Australia is bound to develop and implement strategies that will ensure the conservation and sustainable use of its biological resources. A national policy framework is provided by the *National Strategy for the Conservation of Australia's Biodiversity* (Department of the Environment, Sport and Territories, 1996).

Commonwealth legislation applying to the ACT establishes the National Capital Authority and provides for the preparation of the National Capital Plan. The effect of this is outlined under the ACT legislative framework.

NSW

Most of the region is administered under NSW legislation. The main legislation governing land use is the *Environmental Planning and Assessment Act 1979* (EP&A Act), the *Local Government Act 1993* (LG Act), and a range of natural resource management legislation including the *National Parks and Wildlife Act 1974* (NPW Act), *Threatened Species Conservation Act 1995* (TSC Act), *Fisheries Management Act 1994* (FM Act), *Native Vegetation Conservation Act 1997* (NVC Act) and *Water Management Act 2000* (WM Act). The legislative framework for land use planning integrates natural resource management considerations, even though there is considerable jurisdictional overlap between administrative agencies.

For this project, the two most important pieces of legislation are the EP&A Act which establishes a planning system for land use and regulation of development, and the TSC Act which lists threatened species, endangered ecological communities and threatening processes. Critical habitat can also be listed. It requires recovery plans and threat abatement plans to be prepared for listed species, communities and threatening processes. Although, there is no specific provision for links between these

plans and planning instruments prepared under the EP&A Act (except where critical habitat is listed), the consideration of listed species and communities is required to be considered in applications for development. The listing of threatened species on a NSW basis under the TSC Act provides guidance at a regional level in determining the importance of species and their conservation priority. With the cooperation of PlanningNSW and local government agencies, there is a statutory ability to effectively integrate considerations of threatened species and biodiversity within regional and local planning instruments made under the EP&A Act. Under the LG Act, local governments also have a range of other mechanisms that are available to promote conservation of natural ecosystems, and are well placed to contribute to a regional planning approaches for natural ecosystems.

The strategic framework for the project is the *NSW Biodiversity Strategy* which provides an outline of priorities to be applied to biodiversity in NSW (NPWS 1999).

ACT

The ACT has a different legislative and administrative structure to NSW in relation to land use and land tenure. Two important pieces of legislation applying in the ACT are the *Nature Conservation Act 1990* (NC Act) and the *Land (Planning and Environment) Act 1991* (LPE Act).

The *ACT (Planning and Land Management) Act 1988* (Commonwealth) provides the framework for planning and land management within the ACT. This establishes the National Capital Authority with responsibility to prepare a National Capital Plan, defining planning principles and policies for the National Capital, and applying to certain designated parts of the ACT. This Authority has planning responsibility for designated land comprising the Parliamentary Triangle, Lake Burley Griffin and major hills and ridges in central Canberra. This Act also provides for the making of the Territory Plan by the ACT Government, which must not be inconsistent with the National Capital Plan (ACT Government, undated).

The Territory Plan provides the basic land use planning framework for most development and land use within the ACT and is made under the LPE Act. This Act establishes the ACT Planning Authority and provides for approvals for the carrying out of development. It also provides for the reservation and management of public land for a range of purposes including nature conservation, and deals with pest animals and plants. The Territory Plan outlines the future metropolitan structure, includes water use and catchment policies, and recognises specific policies and land use requirements for river corridors, mountains and bushlands.

The NC Act provides for the protection of native plants and animals (including fish). It provides the framework for declaring species vulnerable or endangered, and communities as endangered, upon the recommendation of a committee established under the Act. Assessment of these species is on a regional basis, thus recognising the relationship of the ACT to surrounding areas in NSW. Action plans (similar to recovery plans in NSW and Commonwealth legislation) are required to be prepared for such declared species or communities. A draft Action Plan in relation to each species, ecological community or process subject of a declaration shall include proposals to ensure, as far as is practicable, the identification, protection and survival of the species, or the ecological community, or proposals to minimise the effect of any process which threatens any species or ecological community. As at June 2002 Action Plans had been completed for all the species and communities declared in the ACT.

The NC Act provides for the regulation of some activities affecting native plants and animals, reservation of areas and for special protection areas. Management agreements may be made with agencies and may deal with matters including the following - access to land; fire management; drainage; management and maintenance of public or private facilities;

rehabilitation of land or public or private facilities; indemnities; emergency procedures; internal stockpiling; fencing; feral animals and weed control. The Act creates a position of Conservator of Flora and Fauna who is responsible for preparing a nature conservation strategy that is to include proposals in relation to the protection, management and conservation of flora and fauna indigenous to the Territory.

A Nature Conservation Strategy has been prepared by the ACT Government (1998) and provides an agreed position on nature conservation priorities for the ACT. One of the objectives of this strategy is to establish and review conservation priorities within a bioregional context and to integrate an ACT nature conservation network within a regional network of linked habitat corridors, native vegetation remnants and reserved areas.

The ACT Commissioner of the Environment undertakes 3 yearly state of the environment reporting for the Australian Capital Region, including the ACT and 18 surrounding local government areas in NSW.

NSW local government

Councils in NSW have specific legislative responsibilities to take steps to conserve biodiversity and are important managers of development and land use management processes. A range of legal and administrative mechanisms provide ways to implement biodiversity conservation outcomes at the local government level. The legislative charter of councils under the LG Act requires implementation of ecologically sustainable development. The Council's role in biodiversity conservation is recognised in the EP&A Act. Specific legislative provisions that apply are outlined in the *Biodiversity Planning Guide for NSW Local Government* (Fallding *et al*. 2001).

The importance of local government is recognised in the *National Local Government Biodiversity Strategy*, a local government initiative adopted unanimously at the National Assembly of Local Government in 1998. Important principles underlying the *National Local Government Biodiversity Strategy* are that:

- biodiversity protection and management is a core function of local government, councils should cooperate to develop biodiversity plans at a regional level;
- biodiversity conservation should be incorporated into local planning instruments;
- regulatory controls should be implemented in conjunction with a program of education and incentives;
- biodiversity conservation should be implemented in a way that maximises community support and efficiently delivers quality outcomes; and
- training, access to information and appropriate professional staffing at the local level should be increased.

Local government can play a key role in biodiversity conservation for a number of reasons:

1 It has responsibility for care, control and management of many areas of land and water and can implement management practices for these areas which support biodiversity.

2 It carries out many activities such as bushfire hazard reduction, and road, stormwater and other construction which may have adverse biodiversity impacts.

3 It is the consent authority for the majority of private development that may directly or indirectly impact on biodiversity

4 It has ability to influence community behaviour through public education and awareness campaigns.

5 It is required to prepare state of the environment reports, and may be able to assess environmental change through monitoring programs.

6 It is a key stakeholder on regional management bodies where biodiversity issues are considered.

2.3 Regional and local policies and programs

There is a range of regional and local policies and programs to which regional planning for natural ecosystems must relate, the most important of which are summarised in Table 2.2.

Recovery and action plans prepared for threatened species and endangered ecological communities under the TSC Act and NC Act are also important to consider. These plans are not directly linked to land use plans, or other regulatory plans but potential exists to closely integrate them so they form an integral part of the assessment of development processes. The recovery plans prepared under the TSC are increasingly providing explicit direction to decision making authorities and it is therefore essential to refer to them as a matter of course.

Table 2.2 Important regional plans, policies and programs

POLICY/STRATEGY	ROLE, LEGAL STATUS AND RELEVANCE
NEW SOUTH WALES	
Environmental planning instruments, including State environmental planning policies and regional environmental plans	Statutory environmental planning instruments prepared under the EP&A Act, including local environmental plans for each local government area within the region.
Catchment management plans (Murrumbidgee Catchment Management Blueprint (CMB), Lachlan CMB, Warragamba CMB, Southern CMB)	Advisory documents relating to coordination functions of catchment management trusts and boards under the *Catchment Management Act 1989* and sub-catchment action plans. Catchment management blueprints identify major natural resource management issues (water quality and flow, salinity, soil health, biodiversity, social/cultural) and include catchment targets and management targets for each issue.
ACT	
Territory Plan	Statutory document. Identifies, and regulates land use and development. Protects open space, conservation of ecological resources and functions
The ACT Nature Conservation Strategy (ACT 1998)	Policy document providing a framework of implementation of goals. Recognises importance of a regional perspective and complementary actions in NSW. Includes a map with a preliminary delineation of a nature conservation network for the ACT and sub-region.
ACT Weeds Strategy (ACT 1996) and Vertebrate Pests Strategy (ACT 2001)	Policy documents which provide a process for enabling effective and efficient control of weeds and feral animals. Recognises that interests extend beyond ACT border and that ACT Government will collaborate with regional stakeholders.
ACT State of the Environment Report	The ACT Commissioner of the Environment undertakes a program of state of the environment reporting.
BOTH NSW AND ACT	
ACT and Sub-region Planning Strategy (1998)	Policy document providing a strategic framework for future growth and development. Proposes a regionally consistent approach for ecological surveys, natural resources management, and identifies indicative wildlife corridors. It includes strategies for rural land uses, and indicative future long-term urban development.
Australian Capital Region State of the Environment Report	A program of state of the environment reporting is undertaken by the ACT Commissioner of the Environment, including a review of all the local government areas subject to the planning framework (amongst others).

2.4 Social, cultural and economic issues

Social, cultural and economic issues play an important role in future planning for natural ecosystems in the region. These issues must be reconciled with the ecological requirements for conservation of species and their habitats.

Within the region, it is important to recognise Aboriginal and native title interests, and other key interests including maintaining viable agricultural industries. Although many of these issues are outside the scope of the current project and strategic planning actions that may arise, they must be acknowledged as playing a role in an integrated long-term land use future for the region.

Natural ecosystems have important aesthetic values, and there is a need to recognise natural and cultural heritage values as well as ecological values (eg. large trees that may have heritage significance, either Aboriginal or European).

2.5 Key planning and management issues

Key regional planning issues are summarised in this section, drawing on issues identified in the *ACT and Sub-region Planning Strategy* and its background reports (ACT and Sub-Region Planning Committee 1998) which provides a policy framework to guide actions for a regional population of up to 500,000 people to 2023:

- **Implementation of strategic principles for natural resources** in the ACT and Sub-region Planning Strategy: Previous strategic planning documents have recognised the importance of ESD and natural ecosystems, but have failed to document how to achieve this, and the data that is necessary to support the implementation of planning approaches.
- **Overlapping responsibilities between agencies and the community:** There is lack of clarity within and between jurisdictions as to who is responsible for what, and what role the community should play.
- **Development pressures arising from economic development and population growth in Canberra:** Major impacts can result from development. Natural ecosystems within about 45 mins - 1 hr drive from Canberra are therefore likely to be vulnerable as a result of development pressures.
- **Issues associated with particular types of land uses**, especially rural residential, urban residential and agriculture.
- **Issues associated with particular types of activities:** These may be indirectly linked to rural land use, including roadside management, tree removal, fire regimes and risks, cultivation and application of fertilisers, firewood and bushrock removal, and small dam construction.
- **Development industry desire for certainty of outcomes:** The industry seeks an identification of areas of ecological sensitivity, and a regionally consistent approach so that a reasonably certain planning process can occur.
- **Management of large parcels of publicly owned land** with biodiversity values.

It is acknowledged that the planning and development issues within the region have led to many initiatives that have been taken to conserve natural ecosystems and biodiversity. This framework builds upon these initiatives.

Part 3

Information on natural ecosystems in the region

This Part provides an overview of data and information that exists about natural ecosystems and native species within the region. It provides important background for decision-makers in applying the planning framework, and explains the scientific basis for the planning maps that accompany the framework.

This Part reviews ecosystems and species of importance within the region and their characteristics (eg. distribution or ecological characteristics). The information is presented in summary form to enable readers to quickly gain an appreciation of the most important issues and to enable important issues to be considered in land use decision-making.

3.1 Overview of natural ecosystems

The NSW Southern Tablelands and ACT region retains important natural ecological and biodiversity assets. The biogeographical context for the region makes it a relatively diverse area and it also represents the limit of distribution for many plant and animal species. For example, the ACT contains many organisms at the fringe of their normal distribution range, which accounts for their locally uncommon status.

The extents of the four bioregions (Thackway and Cresswell, 1995) occurring within the region are shown in Table 3.1.

Table 3.1 IBRA Bioregions within region

Bioregion	Proportion of bioregion within region	Bioregion as % of region
South Eastern Highlands	17.3%	88.9%
NSW South Western Slopes	1.2% (within Yass)	6.1%
Australian Alps	9.0% (within ACT and Yarrowlumla)	4.2%
Sydney Basin	0.4% (within Mulwaree)	0.8%

The broad native vegetation types that remain within the region and their approximate proportions are Native Grassland (1%), Grassland-Woodland Mosaic (3%), Box-Gum Woodland (9%), Dry Forest (21%), Wet Forest (12%), Riparian Forest (0.5%), and Heathland-Shrubland-Herbfield-Rock (1%). These percentage figures refer to remnants in all conditions. Remnants of many vegetation types in good condition (ie. structurally and floristically intact) are relatively rare. Grasslands, Grassland-Woodland Mosaic and Box-Gum Woodlands can be regarded as the most important from a conservation planning point of view because of their extremely restricted extent following development and agricultural land use, and the fact that they are most likely to be impacted upon by development and rural management. In comparison, Wet Forests are relatively well retained, especially in conservation reserves.

Within the region two vegetation communities are listed as endangered ecological communities under various legislation. In addition, a total of 84 species occurring within the region are listed as threatened under NSW, ACT or Commonwealth legislation. Interesting

facts about the current and historic state of biodiversity within the region are presented in Box 1.

Box 1: Regional biodiversity facts

- Two vegetation communities are now listed as endangered ecological communities under State, Territory and Commonwealth Acts. These are Natural Temperate Grasslands and Box-Gum Woodlands, and are defined differently in each jurisdiction.
- A very large proportion of the remaining Native Grasslands and Box-Gum Woodlands in the region is on private land. These communities have declined in distribution and/or are significantly altered, and very little is protected in conservation reserves. In the ACT it is estimated that about 25% of the pre-1750 extent of Yellow Box - Red Gum Grassy Woodland remains in varying condition, while some 90% of the community has been cleared from the region.
- Within the region, a total of 64 flora species and 92 fauna species have been identified as of regional conservation importance. These species are recognised as such because of their rarity, threats, limited distribution, or other ecological characteristics.
- About 47.5% of the region comprises modified ecosystems, including exotic pasture, cultivation, urban areas, pine forest and Secondary Grasslands resulting from clearing of woodland.
- Over 1,200 native plant species occur within the region, including Tuggeranong Lignum and Ginninderra Peppercress, which occur nowhere else. Other species such as Tarengo Leek Orchid have a very limited occurrence elsewhere.
- The bushland surrounding Canberra forms an integral part of the habitat of the urban bird population, and has been suggested as the reason for the relatively high diversity of birdlife in Canberra compared with other cities (David Hogg Pty Ltd 1990).
- A decline in many bird species observed in Canberra gardens has been noted over the last 10 years, and over 40 woodland bird species have been assessed to be in serious decline in the region. Bird decline is a result of modification, loss of habitat and competition.
- It is estimated that 6 out of every 10 new environmental weeds in Australia are escapees from domestic gardens.
- 13 species are believed to have become extinct within the region as a result of land use or habitat changes, including Trout Cod, Southern Swamp Frog, Plains-wanderer, Brolga, Australian Bustard and New Holland Mouse.
- A range of threatened species (including Button Wrinklewort, Small Purple-pea, Striped Legless Lizard, Grassland Earless Dragon, Perunga Grasshopper, Golden Sun Moth) occur within Canberra's urban areas. Protecting grassland and other bushland habitat is essential if they are to survive in the long-term.
- In the Southern Tablelands about 3% of the area estimated to have contained Natural Temperate Grassland prior to 1750 currently exists in moderate to good condition. Those sites that do remain are highly fragmented and moderately to severely reduced in diversity and habitat quality.

3.2 Review of regional data

The maps and the supporting planning framework were prepared using a range of data sources. Records and modelling based on these records are summarised in the planning maps and in other supporting maps. Key data sources used were as follows:

1 Compilation of flora and fauna records from existing databases held by NPWS and Environment ACT, and targeted surveys undertaken for key species (eg. Lawler *et al.*,1999; Clarke, 2001; Rowell, 2001); and

2 Vegetation mapping based on compilation of existing vegetation mapping, including CRA mapping providing floristic information (Thomas, *et al.* 2000), field surveys within Native Grasslands, Box-Gum Woodlands and the Grassland-Woodland Mosaic (eg. Rehwinkel, 1998; Taws and Crawford 1999; Taws and Crawford 2000), and modelling using remote sensing data relating to structural formations of vegetation from Environmental Research and Information Consortium Pty Ltd (ERIC, 2001).

Data sources for maps are listed in Part 9.5, which includes NPWS metadata statements for reference purposes. Maps were compiled from databases of records of species occurrence. Note that in the tables in this report, common names for species are used in preference to scientific names to facilitate understanding for non-scientists.

Maps describing natural ecosystems in the region, what they show, and how they can be used for planning purposes are summarised in Table 3.2.

It is important to recognise the limitations of the data and maps when applying the information accompanying the planning framework in Part 5 of the report. The following matters should be taken into account when using the information:

1 The mapped boundaries of vegetation types are not distinct on the ground, and mapping should be properly interpreted.

2 Modelling is based on a number of field survey and ground-truthing sites and has some degree of inherent error.

3 There is a high degree of variability of field survey within the region, and some areas of the region have greater accuracy of survey than others. Overall, the ACT is the most extensively surveyed.

4 A variety of sources were used to compile composite data for the whole region, thus the accuracy of the data is variable.

5 The information has been compiled primarily for use at the regional and local government area scale. Maps therefore show broad patterns, not fine-grained patterns, and should be used primarily to identify areas and issues for further investigation.

6 More detailed vegetation mapping may exist for particular areas or sites, such as CRA mapping of forest ecosystems.

7 Within the ACT there is a generally higher reliability of information and more areas of conservation importance are identified than in NSW. This is primarily a function of the level of survey, land tenure and history, and past government development and conservation decisions.

Notwithstanding the limitations of the available information, the mapping identifies with reasonable accuracy the occurrence of species, ecological communities and habitat of importance for conservation. For some key species, the accuracy of mapping is extremely accurate.

Table 3.2 Summary of planning framework maps relating to natural ecosystems and biodiversity

Map number and title	What map shows
Map P1 - Predicted native vegetation distribution - pre-1750	This is map of predicted pre-European vegetation types based on floristic plot data and modelling of environmental characteristics. It enables calculation of the proportion of remaining vegetation and an indication of conservation status, and also enables estimation of potential habitat areas.
Map P2 - Predicted extant native vegetation - 2000	Predicted distribution of broad native vegetation types as at 2000, based on field survey, remote sensing and modelling. When compared with the map showing pre-1750 vegetation, this shows a dramatic reduction in area of Native Grassland and Box-Gum Woodland vegetation and an increase of exotic vegetation.
Figure 6 - Records of threatened species of fauna	Recorded locations within the region of threatened fauna species. The map indicates that these species are widespread throughout the region, but it does not provide an accurate representation of actual distribution or conservation status.
Figure 7 - Records of threatened species of flora	Recorded locations within the region of threatened species of flora. The map indicates that these records are widespread throughout the region. Much of the region has been subject to inadequate field survey, and the high proportion of records in the ACT is largely due to the extent of survey effort.
Figure 8 - Records of threatened grassland reptiles	Shows records and modelled distribution of four important grassland reptiles within the region. The map highlights their extremely limited occurrence and where survey effort could be targeted to confirm their presence or absence.
Figure 9 - Records of selected threatened woodland birds	Shows records and modelled distribution of five threatened woodland birds within the region. The map identifies potential habitat for these species.
Figure 10 - Records of Green and Golden Bell Frog, Rosenberg's Monitor, and Golden Sun Moth	Shows records and modelled distribution of four additional threatened fauna species within the region. The map identifies potential habitat for these species.
Figure 11 - Records of threatened flora (selected species)	Shows records and modelled distribution of eight threatened woodland and grassland flora species within the region.

3.3 Description of natural ecosystems and vegetation types

The broad vegetation types in the region are summarised in Table 3.3. This provides an indication of the distribution of these types and should be read in conjunction with Maps P1 and P2 from which it has been derived. It should be noted that these vegetation types broadly indicate the ecosystems that occur and are linked with the distribution of important species within the region.

More detail on the exact scientific descriptions of these broad vegetation types and the vegetation communities that comprise them is included in the databases from which the maps were derived.

It is important to note that the mapped communities in reality rarely form clear boundaries. Broad vegetation types blend with each other at their edges. Also, minor occurrences of particular vegetation types may fall within areas mapped as another vegetation types. For example, small areas of grassland may occur within areas of woodland, or areas of woodland may occur in association with dry forests.

Table 3.3 Broad vegetation types pre-1750 and 2000, and key conservation issues

Native Grassland	
Description	Native grasslands with <10% tree canopy cover. Grassland types vary and may include those dominated by Kangaroo Grass, Poa Tussock, Red Grass, speargrasses and wallaby grasses. Occurs within boundaries of pre-1750 modelled grassland boundaries (mapped at 1:100,000 scale), and elsewhere in valleys subject to poor soil drainage and cold air drainage, on exposed hillsides and in basalt landscapes. Grassland may be fringed by woodland.
Proportion of region	Approx 11% of region at 1750. Approx 1% at 2000 (represents about 9% of pre-1750 area). The 2000 figure includes grasslands in various conditions. For the whole of the Southern Tablelands (ie. including areas that fall outside the region covered by this report), it is estimated that less than 3% of the pre-1750 grassland area remains in good condition. Only a very small proportion of extant grasslands remains in good condition (ie. Floristically and structurally intact and low weed cover).
Key conservation issues	▪ Some of the remaining areas come within the definition of listed endangered ecological communities (Natural Temperate Grasslands of the Southern Tablelands of NSW and ACT, under the EPBC Act, and Natural Temperate Grassland under the NC Act). ▪ Occur largely in low-lying agricultural or grazing lands on freehold tenure and leases. ▪ Poorly represented in the reserve network, with exception of reserves in ACT. ▪ Sites of high biodiversity values are rare, isolated and fragmented. ▪ Some sites contain threatened species (flora, reptiles, and invertebrates). ▪ Threats include inappropriate grazing, clearing for pasture modification or cropping, urban, rural residential and other infrastructure development, weed invasion, bushrock collection.
Main landscape units where vegetation type occurs	Occurs largely in landscape units: 1, 2, 3, 4, 6, 7, 9, 10, 11, 15 and 17. (Landscape units are described in Part 3.6 of report).
Indicative accuracy of mapping	▪ Accuracy of mapping is fair to medium. In some cases this unit may also include areas of exotic grasslands. These are limitations related to modelling error. ▪ Areas of natural grasslands may also occur in areas mapped as Grassland-Woodland Mosaic, Box-Gum Woodland, Dry Forest and Wet Forest, especially in valleys subject to poor soil drainage and cold air drainage. ▪ In some cases, Native Grassland is indistinguishable from Secondary Grassland (see below). ▪ The mapping techniques have not allowed for discrimination between high and low quality remnants.

Table 3.3 Broad vegetation types - continued

Grassland-Woodland Mosaic	
Description	A mosaic of native grasslands and woodlands that are dominated by Snow Gum, Manna Gum, Apple Box, Black Gum, Candlebark and Swamp Gum (cold climate woodland communities), and also areas of Yellow Box and Blakely's Red Gum (Box-Gum) woodlands. Generally occurs on flats, valleys and undulating landscapes.
Proportion of region	Approx 11% of region at 1750. Approx 3% at 2000 (represents about 27% of pre-1750 area). The 2000 figure includes remnant woodland, and natural and Secondary Grassland in various conditions.
Key conservation issues	▪ Some of the remaining areas come within the definition of listed endangered ecological communities (Natural Temperate Grasslands of the Southern Tablelands of NSW and ACT under the EPBC Act, and White Box - Yellow Box - Blakely's Red Gum Woodland, under the TSC Act). ▪ Areas that retain a native grassy groundlayer but have had the tree cover removed are known as Secondary Grasslands. Such areas derived from clearing of Box-Gum Woodland may be regarded as belonging to the listed endangered ecological communities. ▪ Occur largely in low-lying grazing lands on freehold tenure and leases. ▪ Poorly represented in conservation reserves. ▪ Sites of high biodiversity values are rare, isolated and fragmented. ▪ Some sites contain threatened species (flora, reptiles, birds) ▪ Threats include inappropriate grazing, clearing for pasture modification or cropping, urban, rural residential and other infrastructure development, weed invasion, isolated paddock tree removal, firewood collection, bushrock collection.
Main landscape units where vegetation type occurs	Occurs largely in landscape units: 1, 2, 3, 4, 6, 7, 9, 10, 11, 15 and 17. Landscape units are described in Part 3.6 of report.
Indicative accuracy of mapping	▪ Accuracy of mapping is fair to medium. In some cases this unit may also include areas that are exotic grasslands. These are limitations related to modelling error. ▪ In the 2000 map (P2), this unit includes areas that are now Secondary Grasslands (ie. derived from clearing of woodland). These remnant woodlands and grasslands exist in various conditions. Only a very small proportion of extant grasslands remains in good condition (ie. floristically and structurally intact and low weed cover). The mapping techniques have not allowed for discrimination between high and low quality remnants.

Table 3.3 Broad vegetation types - continued

Box-Gum Woodland	
Description	Grassy communities with a tree cover of between 10 - 30%. Dominant tree species include White Box, Yellow Box and Blakely's Red Gum, and some other species. Occur on the deeper soils of the footslopes and midslopes, and occasionally on upper slopes.
Proportion of region	Approx 23% of region at 1750. Approx 9% at 2000 (represents about 39% of pre-1750 area).
Key conservation issues	▪ Some of the remaining areas come within the definition of listed endangered ecological communities (Grassy White Box Woodland under EPBC Act, White Box - Yellow Box - Blakely's Red Gum Woodland, under the TSC Act, and Yellow Box/ Red Gum Grassy Woodland under the NC Act). ▪ Occur largely in low lying agricultural or grazing lands on freehold tenure and leases. ▪ Poorly represented in reserve network, with the exception of reserves in ACT. ▪ Sites of high biodiversity values are rare, isolated and fragmented. ▪ Areas that retain a native grassy groundlayer but have had the tree cover removed are known as Secondary Grasslands. In some cases, these fall under the definition of the listed endangered ecological communities. In NSW Secondary Grasslands derived from White Box - Yellow Box - Blakely's Red Gum Woodland are regarded to be part of this community. ▪ Some sites contain threatened species (flora, reptiles, invertebrates, woodland birds, and bats). ▪ Threats include inappropriate grazing, clearing for pasture modification, cropping, olive groves or vineyards, peri-urban, rural residential and other infrastructure development, weed invasion, firewood collection, isolated paddock tree removal, bushrock collection.
Main landscape units where vegetation type occurs	Widespread throughout region, but formerly dominant over landscape units: 2, 8, 10, 11, 12, 13, 14, 15 and 17. Landscape units are described in Part 3.6 of report.
Indicative accuracy of mapping	▪ Accuracy of mapping is fair to medium. In some cases this unit may also include areas that are exotic grasslands. These are limitations related to modelling error. ▪ In the 2000 map (P2), this unit includes areas that are now Secondary Grasslands (ie. derived from clearing of woodland). These remnant woodlands and grasslands exist in various conditions. Only a very small proportion of Box-Gum Woodland remnants remains in good condition (ie. floristically and structurally intact and low weed cover). The mapping techniques have not allowed for discrimination between high and low quality remnants. ▪ The mapping techniques did not pick up isolated trees or small clumps of trees with an exotic grass ground-layer. These may, in some cases be ecologically important.

Table 3.3 Broad vegetation types - continued

Dry Forest	
Description	Various forest ecosystems with trees occurring in a density of >30% canopy cover. Dominated by one or more of the following tree species: Red Stringybark, Red Box, Scribbly Gum, Brittle Gum, Broad-leafed Peppermint, Red Box, Bundy and Mealy Bundy. Understorey vegetation is often sparse and dominated by shrubs or tussock grass species such as Red-anthered Wallaby Grass. Occur on shallower soils and steeper slopes than those do that support grassy woodlands.
Proportion of region	Approx 38% of region at 1750. Approx 21% at 2000 (represents about 55% of pre-1750 area).
Key conservation issues	▪ Occur largely on low hills adjacent to agricultural or grazing lands on freehold tenure and leases. ▪ Several areas occur within the reserve network, though some communities are inadequately represented in conservation reserves. ▪ Many sites are isolated and fragmented, with grazing occurring on cleared areas (known as Secondary Grasslands – see notes in "Secondary Grasslands derived from clearing of Wet and Dry Forest", below). ▪ Some sites contain threatened species (flora, reptiles, bats, arboreal mammals, and woodland and forest birds). ▪ Threats include clearing for olive groves or vineyards or establishment of pine plantations, peri-urban, rural residential and infrastructure development, weed invasion (including pine wildings), isolated paddock tree removal, firewood collection, bushrock collection.
Main landscape units where vegetation type occurs	Widespread, occurs in all landscape units.
Indicative accuracy of mapping	Good.

Wet Forest	
Description	Various forest ecosystems with trees occurring in a density of >30% canopy cover. Tall forest structure, generally in high elevations and sheltered valleys in moister habitats. Dominated by tree species such as Mountain Gum, Manna Gum, Silvertop Ash, Narrow-leafed Peppermint and Brown Barrel, generally with a ground layer of herbaceous or shrub species.
Proportion of region	Approx 14% of region at 1750. Approx 12% at 2000 (represents about 86% of pre-1750 area).
Key conservation issues	▪ Occur largely on higher hills and mountain ranges. ▪ Significant areas occur within the reserve network. ▪ Some sites contain threatened species (bats, arboreal mammals, forest birds). ▪ Grazing occurs on cleared areas (known as Secondary Grasslands – see notes in "Secondary Grasslands derived from clearing of Wet and Dry Forest", below). ▪ Threats include weed invasion (including pine wildings), firewood collection, inappropriate forestry regimes.
Main landscape units where vegetation type occurs	Mostly confined to landscape units: 3, 5, 8, 10 and 16
Indicative accuracy of mapping	Good.

Table 3.3 Broad vegetation types - continued

Riparian Forest	
Description	Two communities dominated by River Oak and River Red Gum.
Proportion of region	Approx 1% of region at 1750. Approx 0.5% at 2000.
Key conservation issues	▪ Largely confined to valley bottoms with larger rivers. ▪ River Red Gum forests occur largely in the north-west of the region. ▪ Some sites contain threatened species (bats, woodland birds). ▪ Threats include weed invasion (including willows).
Main landscape units where vegetation type occurs	Occurs in landscape units: 11, 12, 14, 15, 16 and 17
Indicative accuracy of mapping	Poor (extant mapping may include areas of willows).

Heathland-Shrubland-Herbfield-Rock	
Description	Includes a range of montane ecosystems.
Proportion of region	Approx 1% of region at 1750. Approx 1% at 2000.
Key conservation issues	▪ Primarily reserved in national parks.
Main landscape units where vegetation type occurs	Occurs in landscape units: 5, 8 and 16
Indicative accuracy of mapping	Fair.

Waterbodies-Wetlands	
Description	Some waterbodies (eg. Lake George and Lake Bathurst) are ephemeral and occupied by grassland or herbfield communities when dry.
Proportion of region	Approx 1% of region at 1750. Approx 1% at 2000.
Key conservation issues	▪ Grazing occurs on large ephemeral lakes. ▪ Some sites contain threatened species (flora, amphibians, and wetland birds).
Main landscape units where vegetation type occurs	
Indicative accuracy of mapping	Poor (small wetlands are not mapped).

Table 3.3 Broad vegetation types - continued

Secondary Grasslands	
Description	Secondary Grasslands are derived from clearing of Wet and Dry Forests, Grassland-Woodland Mosaic and Box-Gum Woodland. Mapping defines different classes of Secondary Grasslands including probability of occurrence.
Proportion of region	Not applicable, since this is not a natural community.
Key conservation issues	▪ In some cases, this unit may include areas derived from clearing of some grassy woodland communities that may come within the definition of the listed endangered ecological community (White Box - Yellow Box - Blakely's Red Gum Woodland, under the TSC Act). ▪ Sites may have high conservation value, and are important for linking or buffering other sites with higher integrity, and of value for rehabilitation. Some areas may have high biodiversity values, depending on the flora and structure present but such sites are rare, isolated and fragmented. ▪ Some sites contain threatened species (flora, reptiles, woodland birds, and bats). ▪ Threats include inappropriate grazing, clearing for pasture modification, cropping, olive groves or vineyards, peri-urban, rural residential and other infrastructure development, isolated paddock tree removal, weed invasion, bushrock collection. ▪ See also notes under "Grassland-Woodland Mosaic" and "Box-Gum Woodland".
Main landscape units where vegetation type occurs	Occurs in all landscape units.
Indicative accuracy of mapping	▪ Fair. In some cases, this unit may include areas that are only partly cleared and an open structured community dominated by the dry or wet forest tree and shrub species remains. ▪ Some remnants exist in good condition. The mapping techniques do not allow for discrimination between high and low quality remnants. ▪ The mapping techniques did not pick up isolated trees or small clumps of trees within the Secondary Grasslands. ▪ In some cases this unit may also include areas of exotic grasslands.

Other	
Description	Exotic pasture, cultivation, urban areas, pine forest.
Proportion of region	0% of region at 1750. Approx 40% at 2000.
Key conservation issues	▪ Exotic pasture may contain isolated paddock trees (eg. Yellow Box or Blakely's Red Gum. ▪ Some trees are important habitat for threatened species (bats, woodland birds) ▪ In NSW, isolated paddock trees, either Yellow Box or Blakely's Red Gum may be part of the listed endangered ecological community (White Box - Yellow Box - Blakely's Red Gum Woodland, under the TSC Act).
Main landscape units where vegetation type occurs	Occurs in landscape units: 2, 8, 10, 11, 12, 13, 14, 15 and 17
Indicative accuracy of mapping	▪ Fair. It is important to note that isolated or clumps of native woodland trees may remain in some areas. These have not been detected using available techniques. Remnants of Native Grassland may also remain within exotic pastures.

3.4 Species information

The databases and supporting maps provide considerable information about individual native species occurring within the region. A summary of the species records included within the databases is shown in Table 3.4. This demonstrates the large number of native species known to occur within the region and the relatively high proportion of these that are listed as threatened. Critical habitat has not been declared in the region to date for any species. The table also demonstrates that for a number of groups of species, the total representation is not known as a result of lack of data.

Table 3.4 Summary of species recorded in region (preliminary)

Group	Native species recorded in region	Listed threatened species	Number of listed threatened species for which recovery or action plans have been completed)		
			EPBC Act	TSC Act	NC Act
Plants	>1200	30	1	3	5
Invertebrates	?	2	-	-	2
Amphibians	25	6	1	2	1
Reptiles	58	5	2	1	2
Birds	279	24	2	1	6
Mammals	54	17	-	-	2
Fish	?	5	1	-	4
TOTAL	Unavailable	84	3	7	22

For the purposes of the planning framework, information on broad vegetation types and important ecosystems and species has been compiled into planning maps. Figures 8-11 show distributions of some key threatened species within the region. Species lists are included within the databases accompanying the framework and are available for analysis for particular planning purposes or scientific needs. Species lists and records should be considered in conjunction with important information for each species, including its status, habitat characteristics, and specific regional threats.

Species information that is not included within the databases or maps relates to aquatic species, invertebrates (other than listed threatened species), and exotic species such as noxious weeds. The lack of records for these species across the region limits the comprehensiveness of the data accompanying the framework, but can be added in future.

3.5 Identifying important ecosystems and species

A total of 64 flora species and 92 fauna species have been identified as of conservation importance within the region and should be taken into account in planning. Many of these are listed as threatened species and therefore have legislative status, and require certain decision-making processes. In addition several species and communities have been earmarked for future nomination for listing. Other species are recognised as being of importance because of their rarity, limited distribution, or other ecological characteristics. Some species occur within the region at the limit of their known geographic range. Many species have been assessed to be in serious decline. Several species are covered by international agreements (eg. JAMBA, CAMBA). Some of the species are poorly

understood. All these issues should be recognised in making judgements for planning and management purposes.

In addition, a number of ecosystems have been identified as important for conservation purposes and are listed as endangered ecological communities. These are summarised in Table 3.5. It should be noted that although these communities have been given different names under different legislative frameworks, from an ecological point of view there is overlap in terms of the actual ecosystems that are included.

Table 3.5 Listed endangered ecological communities occurring within region

Name	Listing	General location and distribution
Grassy White Box Woodland	EPBC Act	Limited to the north-western portion of the region
White Box-Yellow Box-Blakely's Red Gum Woodland	TSC Act	Throughout the region (with the exception of ACT)
Yellow Box / Red Gum Grassy Woodland	NC Act	Lower hillslopes across ACT
Natural Temperate Grassland	NC Act	Valleys of the northern ACT
Natural Temperate Grasslands of the Southern Tablelands of NSW and ACT	EPBC Act	Throughout the region

Note: Some listings of endangered ecological communities under different legislation overlap or are differently defined.

The EPBC Act and NSW legislation allows for listing of areas of critical habitat for threatened species. To date, there have been no areas of critical habitat listed within the region. Criteria, which could be used to determine whether critical habitat may be listed, include presence of a population of a threatened species, botanical significance, potential for enhancement of habitat, size and shape of the area, connectivity with other sites, regional representation and condition of habitat.

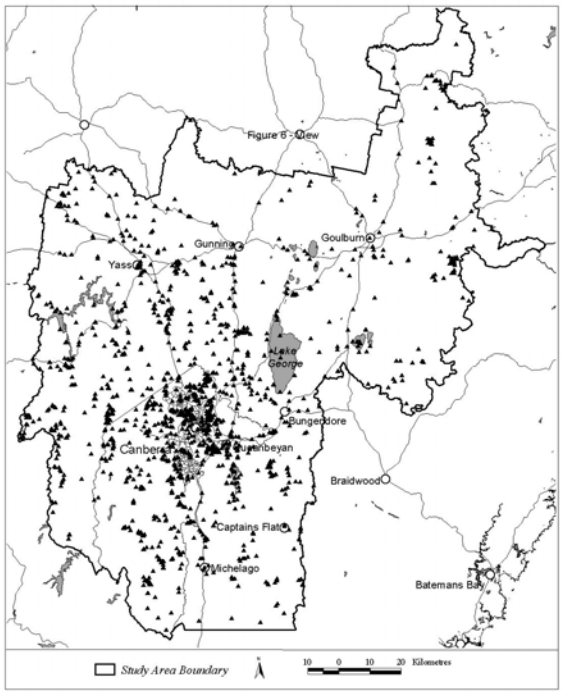

Figure 6: Locations where threatened fauna have been recorded in the study area.

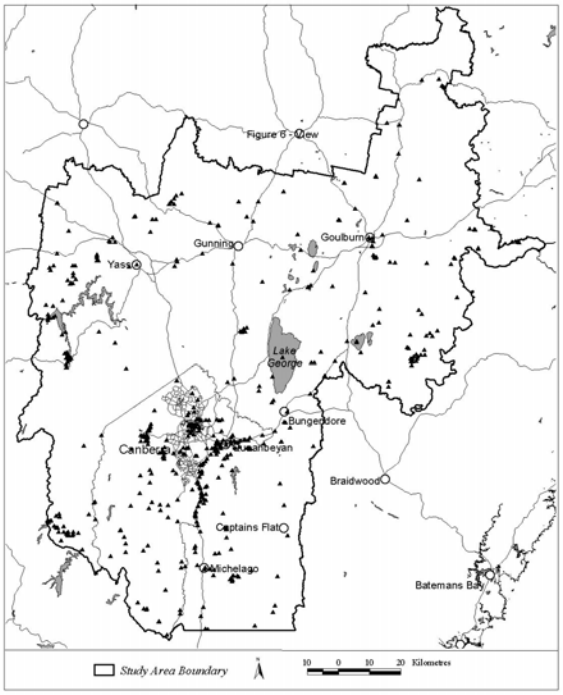

Figure 7: Locations where threatened flora have been recorded in the study area.

Figure 8a: Known locations of threatened grassland reptiles - Little Whip Snake

Figure 8b: Known locations of threatened grassland reptiles – Pink-tailed Worm Lizard (dark shading indicates the modelled distribution of the species)

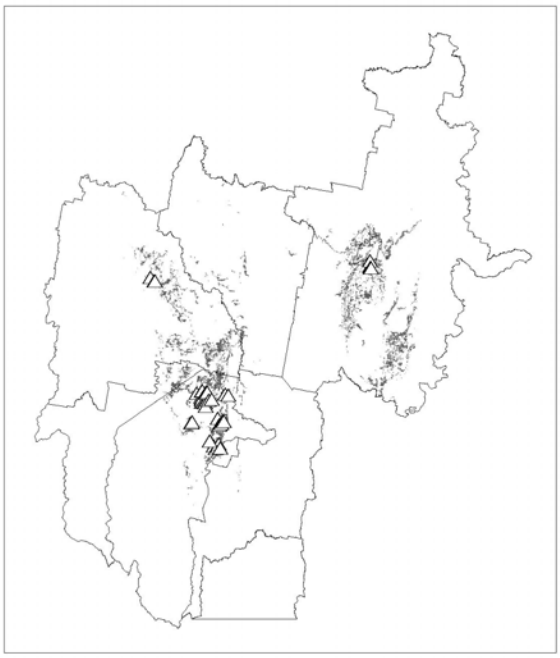

Figure 8c: Known locations of threatened grassland reptiles – Striped Legless Lizard (dark shading indicates the modelled distribution of the species)

Figure 8d: Known locations of threatened grassland reptiles – Grassland Earless Dragon (dark shading indicates the modelled distribution of the species)

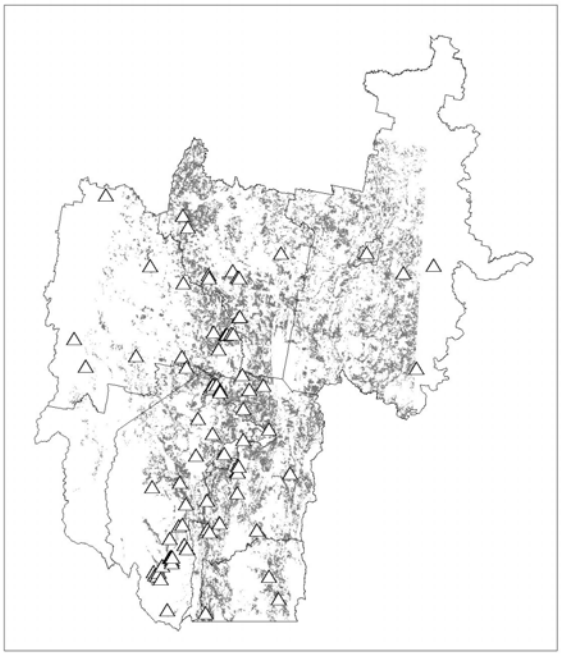

Figure 9a: Known locations of threatened woodland birds – Hooded Robin (dark shading indicates the modelled distribution of the species)

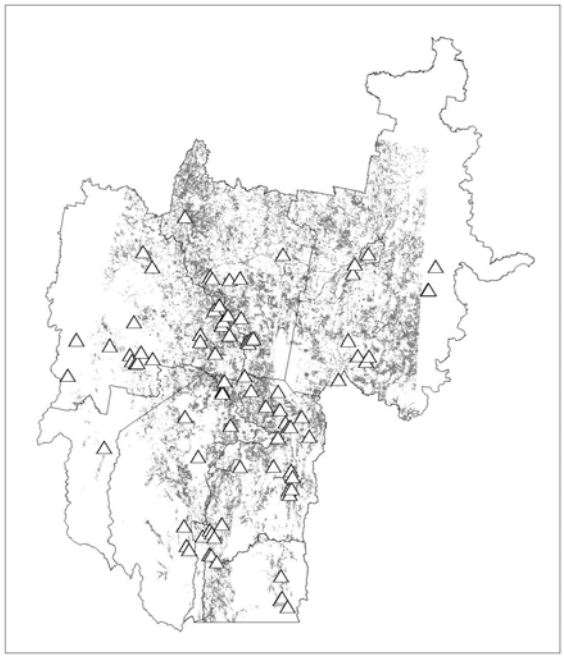

Figure 9b: Known locations of threatened woodland birds – Diamond Firetail (dark shading indicates the modelled distribution of the species)

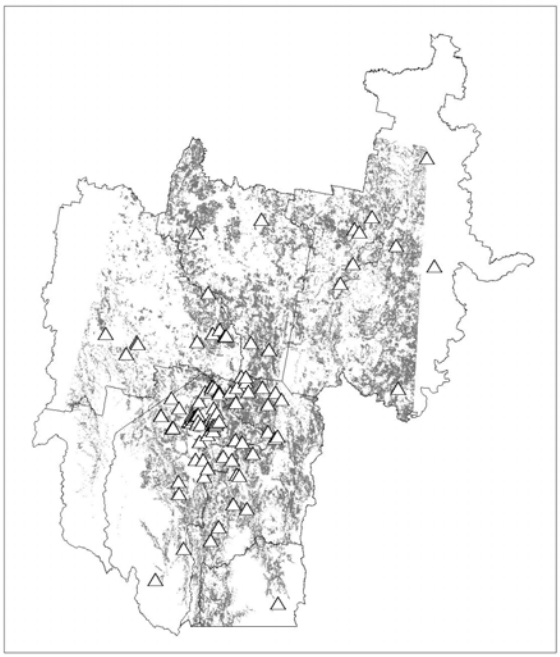

Figure 9c: Known locations of threatened woodland birds – Speckled Warbler (dark shading indicates the modelled distribution of the species)

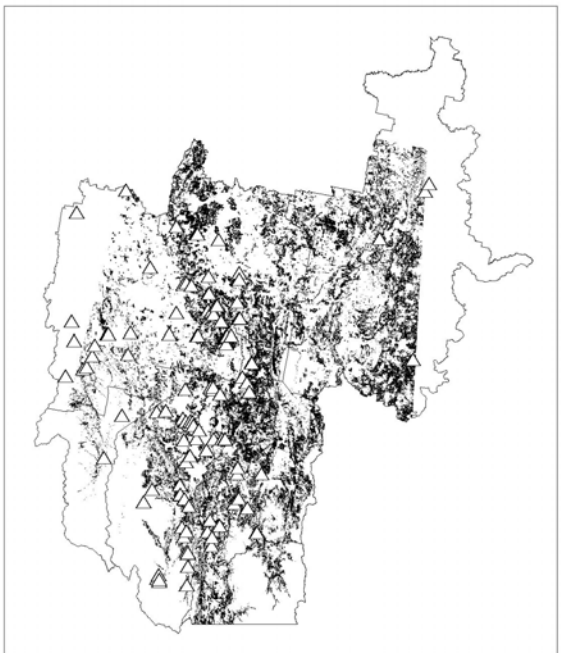

Figure 9d: Known locations of threatened woodland birds – Brown Treecreeper (dark shading indicates the modelled distribution of the species)

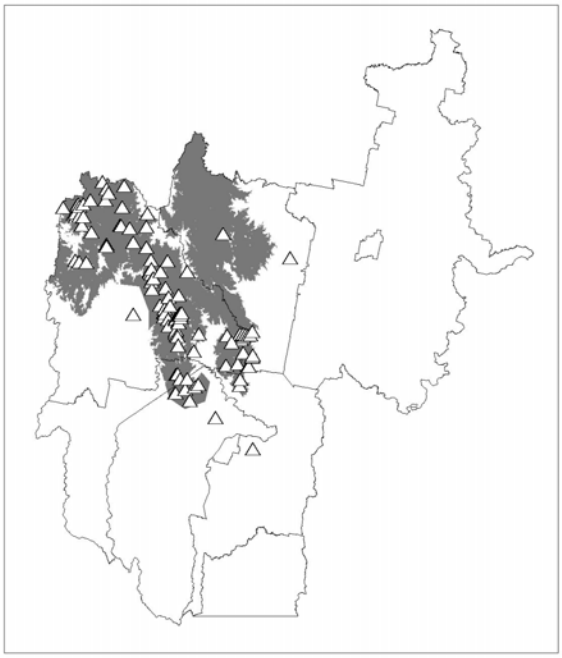

Figure 9e: Known locations of threatened woodland birds – Superb Parrot (dark shading indicates the modelled distribution of the species)

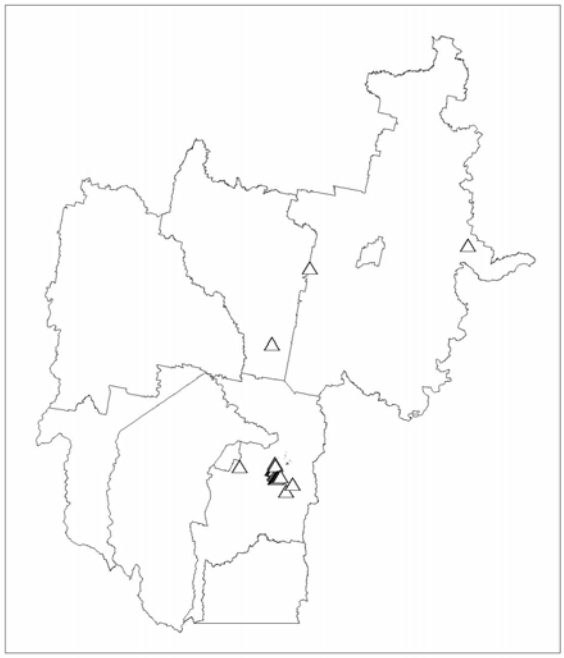

Figure 10a: Known locations of the Green and Golden Bell Frog (dark shading indicates the modelled distribution of the species)

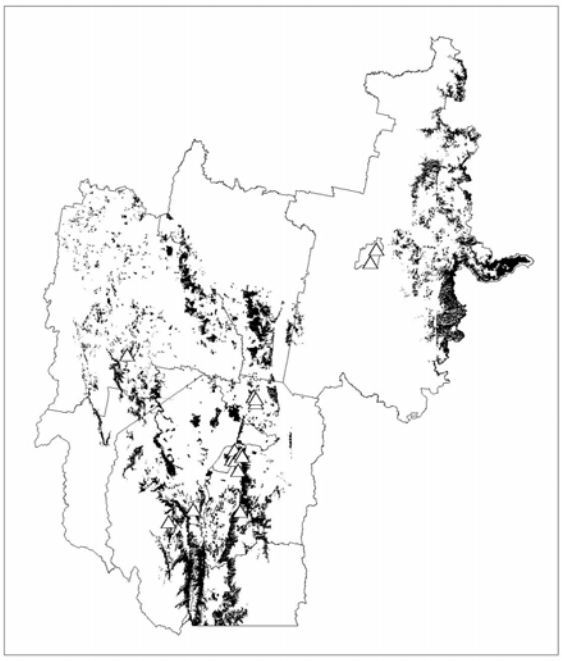

Figure 10b: Known locations of Rosenbergs Monitor (dark shading indicates the modelled distribution of the species)

Figure 10c: Known locations of the endangered Golden Sun Moth (dark shading indicates the modelled distribution of the species)

Figure 11a: Known locations of selected threatened flora within the study area – *Swainsona recta* and *Swainsona sericea*

Figure 11b: Known locations of selected threatened flora within the study area – *Dillwynia glaucula* and *Dodonaea procumbens*

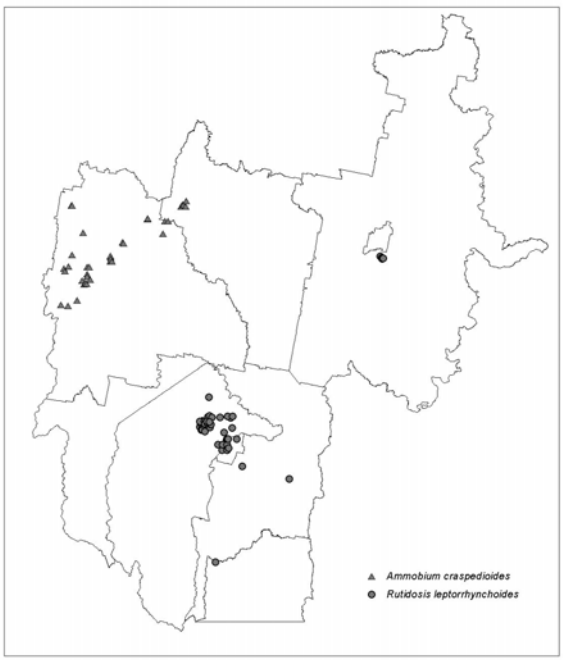

Figure 11c: Known locations of selected threatened flora within the study area – *Ammobium craspedioides* and *Rutidosis leptorrhynchoides*

Figure 11d: Known locations of selected threatened flora within the study area – *Bossiaea oligosperma* and *Diuris aequalis*

3.6 Landscape units

Landscape units form an important component of the planning framework, linking regional-scale issues and principle to a site-scale context for planning and management. These units represent areas within the region having similar ecological, social, economic and administrative characteristics. These landscapes are readily identifiable on the ground and reflect social communities of interest, with the name of the unit derived from the names of major settlements or geographic features occurring within them. The boundaries of the units are approximate only and should be regarded as areas of transition between units with overlapping characteristics at their edges.

The landscape units are listed below and shown in Figure 12. A detailed colour map (map P4) has also been provided with this report.

Table 3.6 Identified landscape units within region (See Map P4)

Landscape unit			
1	Yass	10	Tinderry Range
2	Wee Jasper	11	Bungendore
3	Gundaroo	12	Captains Flat
4	Canberra-Queanbeyan	13	Tallaganda
5	Tharwa	14	Gunning
6	High Country	15	Cullerin
7	Royalla	16	Taralga
8	Michelago	17	Marulan
9	Lake George Range	18	Goulburn

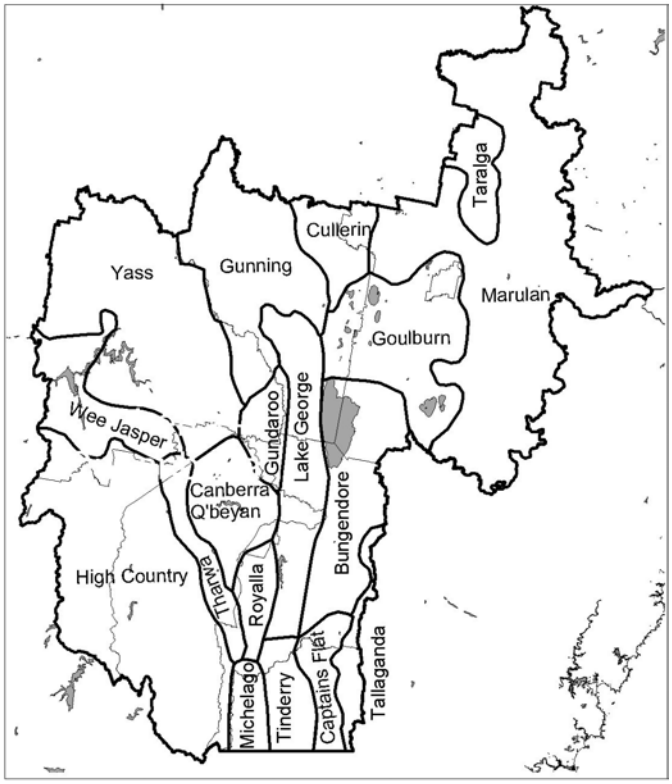

Figure 12: Landscape Units identified within the study area.

The characteristics of each landscape unit and their natural ecosystems and biodiversity are described in Part 9.2. This includes a brief description (location, main land tenures, development pressures), ecosystem types and vegetation communities, important environmental features, important plant species, important fauna species, and planning and management issues.

Landscape units can be used in planning, and incorporated into local environmental plan or development control plan provisions, development assessment and consent requirements. They can be used to provide specific guidance for field survey and assessment, land use options, and land management requirements.

Part 4

Planning issues and priorities for natural ecosystems

This Part outlines key land use and management issues the planning framework needs to consider. Planning objectives for natural ecosystems, regional principles and ecological planning settings are identified. Species-specific issues are not identified, but should be considered as part of the future implementation of the framework steps.

The matters identified in this part should be used as a checklist and reference when applying the planning framework process outlined in Part 5.

4.1 Threats to the region's natural ecosystems

General threats to natural ecosystems and examples are identified in the checklist in Table 4.1. This table can be used to quickly review potential biodiversity impacts of development proposals. The table illustrates that many of the threats are interrelated, and the majority relate to the extent of physical site disturbance as a result of development and the impacts of subsequent land management practices. These are grouped generally according to the geographic scale at which they are most evident, but all can be either directly or indirectly linked to site-specific activities.

As well as the generic threats identified in Table 4.1, species-specific threats have also been identified and are included in recovery plans for listed threatened species. The broad threats identified affect most species although often indirectly. In many cases the direct threats to individual species are not clear due to poor understanding of the biology of the species.

4.2 Overview of land use planning and management issues

From the data and mapping in Part 3 it is possible to identify planning and development issues applying within different jurisdictions in the region. These are shown in Table 4.2.

Broad planning issues should be considered in conjunction with issues identified for specific landscape units within the region, as outlined in Part 9.2. Broad issues and threats to natural ecosystems are made locality and species-specific by linking them to the 18 identified landscape units. These units represent an appropriate scale for providing meaningful planning and management guidance that can directly relate to key users such as community groups, local government and individual landowners.

In applying the framework, it is appropriate to consider a range of questions that are important to address in planning (Box 2) and in land management (Box 3). These reflect the types of applications for which the ecological data supporting the framework may be used, and are useful in guiding future collection and presentation of data.

Table 4.1 Checklist of threats to the region's natural ecosystems

Threat	Examples of actions affecting threat
Continental scale	
Climate change and global warming	Energy use in transport, energy efficiency in building design
Regional and **Landscape scale**	
Clearing and fragmentation of native vegetation (L)	Clearing for rural uses, urban development, roads or cultivation
Over-extraction of natural resources, such as water, and removal of bushrock (L) or firewood	Farm dam construction, irrigation, bushrock and firewood removal
Local Scale	
Land subdivision, building construction and design, especially urban development	Design for land characteristics, including slope, erodibility and stability
Land filling, earthworks, soil erosion, sedimentation and compaction	Building construction and earthworks management, design and siting of development
Roads and traffic	Roadside management practices (clearing, slashing), maintenance of habitat and vegetation, design of crossings suitable for wildlife
Waste disposal and rubbish dumping	Education programs, public land management and signage
Site Scale	
Modification of native vegetation and habitat (and loss of connectivity)	Loss of hollow-bearing trees, removal of fallen timber, destruction of isolated paddock trees, simplification of understorey for rural production
Inappropriate mowing or grazing regimes	Continuous heavy grazing, leading to soil compaction and elimination of native species, too infrequent grazing, too low or too frequent slashing
Inappropriate bush fire management regimes (L)	Long periods without fire, or fire at too frequent intervals or at high intensity is detrimental for the survival of many species
Agricultural practices	Cultivation, application of fertiliser, soil acidification, stock management practices
Pollution and land contamination	Use of fertilisers, herbicides and pesticides
Alteration to hydrological systems; increased nutrients; salinity (L)	Construction of farm dams, clearing of aquifer recharge or discharge areas, fertiliser use, design and siting of on-site effluent disposal systems
Introduction and spread of non-native plants or pathogens	Noxious weed listings, weed control practices, roadside vegetation management, use of appropriate species in amenity and garden plantings
Introduction of non-native animals (L)	Feral animal control, domestic animal management

Notes for Table 4.1:

(L) - means the threat is listed or linked to a key threatening process under the TSC Act, FM Act, NC Act or EPBC Act, and therefore must be considered in determining development proposals.

Whilst some of the above threats may be beyond direct control, there is considerable scope to consider and to influence these threats at all stages in the development process.

Table 4.2 Summary of natural ecosystem conservation planning issues for NSW Southern Tablelands and ACT (for each jurisdiction)

Jurisdiction	Estimated number of mapped CRA forest and non-forest ecosystems*	Number of listed endangered ecological communities (EECs)	Approx conservation reserve area and % of area	Key planning and development issues
ACT	38	2	137,294 ha (58.2%)	▪ urban development ▪ rural uses ▪ catchment management
Cooma-Monaro (part of LGA)	24	2	18,055 ha (21%)	▪ rural residential development ▪ rural land use
Goulburn	7	2	0 ha (0%)	▪ urban and rural residential development
Gunning	27	2	216 ha (0.001%)	▪ rural residential development ▪ rural land use
Mulwaree	59	2	44,078 ha (8.5%)	▪ poor data on natural ecosystems ▪ rural residential development ▪ rural land use ▪ catchment management
Queanbeyan	7	2	2 ha (21%)	▪ urban development
Yarrowlumla	57	2	74,073 ha (24.9%)	▪ rural residential development
Yass	34	2	11,878 ha (3.6%)	▪ rural residential development ▪ rural land use ▪ catchment management and salinity

Note for Table 4.2:

* Estimated number of vegetation communities is based on CRA modelling. This provides an indication of the diversity of vegetation, but does not represent a definitive determination. The number of vegetation communities for the ACT is from ACT Commissioner of the Environment (2002).

Box 2: Key planning questions to consider

- Where should new development be located to minimise ecological impacts?
- What should be the structure and form of new rural, urban and residential development?
- What land needs to be rehabilitated to maintain functional natural ecosystems?
- How does land use affect biodiversity conservation?
- How wide or large do habitat corridors need to be if they are to be effective?
- What should happen to patches of habitat that are already within development zones?
- How are recovery plans linked to land use planning and development assessment?
- How should natural ecosystems be considered in rural smallholding/rural residential strategies?
- How does land tenure and the fragmentation of land ownership affect natural ecosystems?
- How can planning processes adequately identify land, which should be under conservation management, where development is likely to have minimal impact, and where further scientific investigation is required?

Box 3: Key management questions to consider

- What should be done with small patches of Native Grassland or Box-Gum Woodland that are in good condition?
- Which activities should (and should not) be carried out on or adjacent to native vegetation?
- What fire regime is necessary to maintain biodiversity in areas of native vegetation?
- How do agricultural practices such as introduction of non-indigenous species, weed management, changes to drainage, and cultivation and fertiliser use affect natural ecosystems and biodiversity?
- How can biodiversity conservation become part of best practice land management?
- What have been the outcomes of current management practices, and what improvements should be made?

4.3 Identifying objectives and priorities

The framework provides a basis for determining planning objectives and priorities within the region. Objectives for plans made using the framework should reflect objects of the legislation under which those plans are made, and there is scope to take into account proposed regional principles identified in Part 5. Objectives provide a basis for prioritising actions and are an important part of the planning process.

Conservation objectives and proposed actions have already been stated in other documents and strategies applying to parts of the region. It may be useful to consider, adopt or modify these when implementing the framework. Examples of these follow.

Murrumbidgee Catchment Management Board

In the *Draft Murrumbidgee Catchment Blueprint* (Murrumbidgee Catchment Management Board, 2001) objectives and catchment targets have been proposed for water quality and flow, salinity, soil health, biodiversity and capacity building. The proposed catchment target for biodiversity is “by 2012, to manage for biodiversity conservation a minimum of 30% of the area of each of the remaining native vegetation communities and related habitats of the Murrumbidgee Catchment”.

ACT and Sub-region Planning Strategy

The *ACT and Sub-region Planning Strategy* (ACT and Sub-Region Planning Committee 1998) proposed a regionally consistent approach for ecological surveys, and the identification of river and wildlife corridors.

This strategy also identified a number of strategic principles that relate to this planning framework, specifically:

- Maintaining a regionally consistent approach to surveying, protection and management of regional natural resources.
- Specifying best management practices for natural ecosystems.
- Establishment of a conservation reserve and off-reserve system complementing existing conservation corridors and significant natural areas in the region.
- Important landscapes and ecosystems should progressively be included in conservation reserves or protected by appropriate planning and conservation principles.
- Flora and fauna and ecological communities that are threatened with extinction should be protected wherever possible.
- Development and activities likely to have an adverse impact on natural and cultural resources should be planned and managed to ensure that they meet ESD principles and protect those resources.

ACT Nature Conservation Strategy

An action proposed by the *ACT Nature Conservation Strategy* (ACT Government 1998) is the preparation of a master reference document as a planning tool and management guide. The performance indicators for this are:

1 Master plan prepared in consultation with regional authorities and endorsed at cross government level

2 Includes identification of network deficiencies and gaps, and special values which need particular planning and management attention

3 Plan routinely used in relevant open space planning and management exercises and incorporated into GIS systems

4 ACT nature conservation network incorporated into regional corridor network at compatible scale.

The Ecological Resources of the ACT - A review of recent information (Hogg 1990)

This report proposed ecological objectives for the ACT as follows:

1 Protection of native plant and animal species - To protect a full range of the naturally occurring plant communities of the ACT in situations which:

   - maintain their natural relationship with other plant communities and the physical environment
   - are of adequate size to maintain viable populations of component plant and animal species
   - are sufficiently numerous or large in size to ensure survival of at least one area in the event of a natural catastrophe

- occur in situations where their long-term survival can be expected
- recognise that the ACT is part of a large region, in the broad context of which many conservation issues need to be addressed.

2 To protect a full range of the naturally occurring plant and animal species of the ACT in situations where their long-term survival can be expected.

3 Maintenance of wildlife movement corridors - To establish and maintain corridors for the movement of native wildlife between areas of natural habitat within and adjoining the ACT, thus assisting in the conservation of such wildlife at the regional scale.

4 Habitat regeneration or creation - To enhance the ecological resources of the ACT through measures which promote natural regeneration or artificially create new habitat in so far as this is consistent with other planning and management objectives.

5 To promote among the general public and the private sector an appreciation of the ecological resources of the ACT and their values to the community.

6 To enhance the environmental quality of Canberra through the integration of the natural values of open spaces with urban development.

4.4 Regional ecological planning settings

To assist planning, ecological planning settings have been identified for the region for areas of different regional-scale conservation importance for natural ecosystems. These reflect different priorities and identify areas where different planning approaches and assessment processes are applicable. These settings are based on scientific data relating to the distribution of important species, ecological communities and habitats, and relate to the certainty of information available and the ecological processes operating.

Table 4.3 summarises the regional ecological planning settings, including defining characteristics and suggested planning and development principles. These planning settings should be read in conjunction with Map P3. Planning settings are identified from A to D according to their conservation importance, development opportunities and ecological issues. Part 9.3 provides a more detailed explanation of these settings, including the characteristics of each setting and map limitations.

In all of the planning settings there are implications for future land use, development and land management. Planning setting D has the least development constraints from an ecological point of view, while rural or urban development may be compatible in settings C and D, subject to an understanding of ecological issues, development limitations and management requirements.

Planning setting A identifies areas of known conservation importance for endangered grassland and woodland communities (ie. sites where conservation values have been clearly identified) and shows point data where threatened species or sites of high conservation value have been identified. Setting B identifies areas that have been modelled as being of importance (ie. likely to contain either NSW, ACT, Commonwealth listed endangered ecological communities and/or threatened species). Planning setting C includes areas with either lack of data or where modelling was not undertaken because of the presence of ecosystems other than grasslands or woodlands. Within this setting further investigation is required, since endangered ecological communities and threatened species may occur in these areas.

Planning setting D identifies areas likely to have limited natural habitat values and thus should be preferentially selected for development. Remnant grassland and woodland

ecosystems may occur within this setting, but have either not been detected from field work or were not able to be detected by modelling. Planning settings B, C and D each have an inherent uncertainty associated with them relating to the modelling.

Table 4.3 Summary of regional ecological planning settings

Setting number	Description	Suggested planning and development principles
Planning setting A	Areas of known conservation importance	Areas important for conservation, which should be appropriately managed in cooperation with landowners/managers (includes some areas within national parks and nature reserves which are currently conserved). There should be minimal development, land use change and site disturbance if any. Further land subdivision or development should proceed with extreme care and requires detailed scientific assessment. Management plans and conservation incentives should be encouraged.
Planning setting B	Areas of predicted conservation importance	Areas important for conservation, which should be appropriately managed in cooperation with landowners/managers (includes some areas within national parks and nature reserves which are currently conserved). There should be minimal development, land use change and site disturbance. Further land subdivision or development should proceed with extreme care and requires detailed planning evaluation and scientific assessment. Management plans and conservation incentives should be encouraged. May be important for rehabilitation. Field checking is required to determine 1 whether site contains an endangered or regionally rare ecological community 2 if so, what state or condition this is in, and/or 3 presence of habitat for threatened or regionally rare species.
Planning setting C	Areas of uncertain importance for biodiversity conservation - more investigation required	Requires more adequate field survey prior to making development decisions. May have threatened species and contain important areas for rehabilitation to maintain connectivity of natural ecosystems. Development may be appropriate, subject to criteria outlined for landscape units. Limit further fragmentation of natural ecosystems, minimise impacts on adjacent areas of conservation importance, design development to maintain and enhance biodiversity values.
Planning setting D	Areas likely to have limited conservation values	Consideration of natural ecosystems will be a secondary consideration in decision-making. Development should take into account important threatened species habitat elements where applicable (as provided in landscape unit guidelines). Further investigations of natural habitat values will normally be required prior to land use decisions being made as some remnants may remain undetected.

Part 5
Planning framework

This Part outlines a planning framework for natural ecosystems within the region. It outlines regional principles for planning, development and conservation, and provides a structure for integrating scientific data on natural ecosystems in land use decision-making processes. There are 7 steps or elements that form the framework, which should be applied at appropriate scales and stages in the planning process.

5.1 Overview of planning framework

The framework comprises two essential parts that should be referred to concurrently:

1 The elements or steps which provide written guidance for how to consider certain issues, including principles and planning guidelines (ie. what issues are considered at different scales and at different stages in the process of development and land management).

2 The accompanying maps. There are 4 planning maps, plus supporting background maps. These other supporting maps and the data underpinning them provide access to accurate information where necessary.

The framework and its methodology are tools for achieving informed land use decision-making by relevant authorities. The framework enables important information to be integrated within existing planning processes. It can also ensure that consistent information is available throughout the region, since much information on natural ecosystems needs to take into account the regional context and habitat linkages.

Using the framework substantially relies upon on applying two key steps. These are:

1 Identification of regional ecological planning settings, for which there is a map (P3) and generic principles (Table 4.3) for each individual planning settings. This is indicative of the process and development constraints applying to land.

2 Identification of landscape units, generalised boundaries of which are shown on a map (P4). For each landscape unit summary information on natural ecosystems has been prepared (Part 9.2), which outlines the important landscape features, land management issues, threatened species and endangered ecological communities that occur within that area.

The planning settings should primarily be used for making decisions regarding a specific location, whereas landscape units are used for determining assessment, design and management requirements in a broader sense. The maps for each lead to other information sources and provide guidance for the processes required for implementing the framework. These are planning maps that summarise scientific data and make it accessible for planning purposes as required. They provide a way of linking scientific data to planning and decision-making processes.

Although the framework was primarily developed to operate at the regional scale, the mapping is on a computer-based GIS system, allowing it to be used at other scales, including the local government area and site scale.

The framework is not a static document. The framework itself and the data can be updated over time. For example, the remote sensed data collected to develop the vegetation maps for the report can be updated in the future to review trends and environmental change.

The framework will also be enhanced by mid 2003 at which time two further important resources will be available: The first will be a set of landscape unit decision guidelines for decision making authorities and the development industry. These will be tailored to the conservation status of the threatened or rare species or communities within each unit as well as its land management features. It is intended that they will provide explicit guidelines for decision making authorities with particular emphasis on appropriate courses of action when a threatened species or endangered community is encountered within the landscape unit. The second resource is currently being developed and involves finer scale identification of important habitat and corridors for assemblages of rare or threatened fauna and further identification of regionally rare or poorly reserved vegetation associations.

The planning framework steps and elements are summarised in Table 5.1. These steps reflect the stages of development and are explained in more detail later in this Part.

Table 5.1 Overview of planning framework elements and steps

Step or element	Applicable scale	Purpose of step
1 Consider **regional principles** (written)	Regional	▪ Identifies regional issues for natural ecosystems. ▪ Outlines planning principles that are applicable throughout the region. Can be incorporated in planning instruments and strategies.
2 Determine **regional ecological planning setting/strategic planning approach** (map-based, with written criteria)	Regional and LGA	▪ Provides guidance as to whether development is in the appropriate location and a planning framework that each jurisdiction (LGAs and ACT) can develop further. ▪ Identifies priority conservation areas. ▪ Provides standard methods/approach for surveys and assessment in different areas.
3 Refer to **landscape unit descriptions** (written description with a map to define areas)	LGA, site and landscape scale	▪ Differentiates areas within the region where different situations exist, linking regional scale to site scale planning. ▪ Identifies important natural attributes such as endangered ecological communities and threatened species. Used to specify land use options and assessment and management guidelines for specific situations and ecosystems. ▪ Links to management objectives in subsequent plans and policies. Landscape unit guidelines may be adapted for inclusion in these plans.
4 Refer to **key habitats, vegetation and corridors analysis** (NPWS to prepare by mid 2003)	LGA, site and landscape scale	▪ Identifies areas that are important habitat for assemblages of rare or threatened fauna. ▪ Identifies areas that currently are likely to serve as corridors/linkages for rare or threatened fauna. ▪ Identifies regionally rare or poorly reserved vegetation associations. ▪ Identifies areas that are most suitable for revegetation for the purposes of enhancing habitat connectivity.
5 Refer to **land use/activity guidelines** (yet to be prepared)	Site	▪ Identifies generic guidelines for land uses and activities, including how and where they are to be carried out. This may include best practice guidelines for certain development types, or ecosystem specific requirements.
6 Apply **landscape unit decision guidelines** (NPWS to prepare by mid 2003)	Site	▪ Specifies requirements for assessment of impact on individual species or communities (survey and assessment). ▪ Suggests responses to managing landscape/land management issues
7 Establish **site design criteria**	Site	▪ Determines design criteria and field survey requirements for a development proposal. ▪ Used to develop management and development standards, including management plan provisions defining landholder responsibilities and entitlements.

Table 5.2 identifies the planning maps and how they can be used.

Table 5.2 Overview of planning framework maps

Map number and title	How map can be used
Map P1 - Predicted native vegetation distribution – pre-1750	This is map of predicted pre European vegetation types based on modelling of environmental characteristics. It enables calculation of the proportion of remaining vegetation and an indication of conservation status, and also enables estimation of potential habitat areas.
Map P2 - Predicted extant native vegetation – 2000	Predicted distribution of broad native vegetation types as at 2000, based on field survey, remote sensing and modelling. Provides regional context for planning and management.
Map P3 – Regional ecological planning settings	Map identifies 4 ecological planning settings in the region, showing conservation importance of areas. Settings are based on scientific information, taking into account certainty of information.
Map P4 - Landscape units	Shows 18 area-based units for which natural ecosystem and management information is presented. Enables development of site specific guidelines for planning, assessment and management.

Note: The maps have been prepared at both regional and local government area scales. These maps are reliable at these scales, but may require interpretation and field checking when applied at the site-specific scale.

5.2 Consider regional principles

What are regional principles?

A regional principle is a rule of conduct or action that is applied when implementing an objective or policy. These principles have been developed for the region and are modified from the *Biodiversity Planning Guide for NSW Local Government* (Fallding *et al*. 2001). They are mostly generic principles, and focus on conservation planning. Where appropriate, these principles may be overridden by site or locally specific guidelines for habitat or species.

How should the principles be applied?

The principles may be adopted for a range of planning purposes for development proposals, preparation of strategic land use plans, regulatory plans, master plans, environmental impact assessment or site management plans. They could form part of planning instruments such as The Territory Plan, local environmental plans, or a regional environmental plan or strategy. It is important to recognise that the principles must be supported by substantive provisions in a plan which carry them into effect.

These principles can be used when evaluating new planning proposals, especially strategic planning options. They are also able to be used as a checklist when considering alternative planning options or proposals, or for assessment of development proposals to determine whether or not a proposal is suitable.

Table 5.3 Regional principles

Principle	Application of principle to region
Resolve compatibility of biodiversity objectives with other social, cultural and economic objectives	Use regional ecological planning settings to prioritise land use, and to identify potential development opportunities
Encourage land uses and development types that can retain or support the conservation of biodiversity	Appropriate development and a cooperative planning process can contribute to identifying and enhancing biodiversity
Protect all natural areas, not only those identified of highest value	This principle is recognised in regional ecological planning settings. Individual landscape management units need to define specific natural areas and habitat elements of importance, and link to land use planning controls
Protect whole communities and ecosystems, and the natural processes that support them	Ecosystem/ vegetation community/threatened species mapping and modelling was used to define planning settings.
Maintain and enhance existing biodiversity	Further consideration needs to be given to whether this is appropriate at the regional level, or should be defined for landscape management units, because of the serious state of depletion of endangered ecological communities in the region. For some communities a principle of net gain may be appropriate to apply.
Identify the ecological setting when making site-based decisions	This is a planning approach reflecting an understanding of landscape-scale ecological function. Should be applied in all planning decisions.
Minimise landscape fragmentation	Needs to be reflected in planning guidelines for landscape management units and at the site level.
Recognise the different habitat requirements of individual species	Need to know characteristics and profiles for important species, and eventually for all species that need to be considered in plans. Landscape management units enable important species and their characteristics to be identified.
Conserve biodiversity *in-situ* in its natural environment	Important principle to be applied in decision-making.
Promote planting of locally indigenous native species and avoid introducing non-native species or making areas attractive for non-native species	Activity guidelines should be developed to inform vegetation management and landscaping practice at LGA and site scale.
Protect rare and ecologically important species	Important species are identified in the framework, enabling key habitat requirements to be compiled and made available in future for design and planning controls (eg. what area of habitat is needed to support a breeding pair or a local population, what are barriers to their movement and maximum distances between patches of habitat).
Protect unique or sensitive environments	These have been identified by recognising distribution of endangered ecological communities and threatened species and including them within areas of conservation importance. Distribution of other important species could be included to improve accuracy and scope.
Monitor biodiversity impacts over time	Monitoring is needed to inform ongoing management. The framework provides a basis for adding future information and for reporting it and making it available.
Give clarity and certainty to landowners and developers in plan provisions	Regional ecological planning settings summarise level of certainty of information relating to identified important natural ecosystems. This identifies levels of uncertainty and provides direction.
Link plan provisions to other biodiversity conservation initiatives such as incentives or state of the environment reporting	Information can be provided to link to reporting programs.
Apply a precautionary approach where there is a significant chance that a proposal might lead to irreversible consequences	Mapping recognises uncertainties of data.
Link plan making to ongoing land management	Proposed framework provides a basis for linking planning and ongoing land management activities.

Table 5.3 Regional principles - continued

Principle	Application of principle to region
Secure landscape-scale biodiversity conservation through a comprehensive, adequate and representative reserve system	Data enables an assessment of what proportion of species, and ecosystems are represented in reserves, and adequately reserved or subject to off-reserve conservation measures.
Manage threatening processes by identifying, preventing and mitigating the causes of habitat loss	This needs to be considered in implementing the framework.
Give priority to restoration of important ecosystem types	The planning framework can identify ecosystem types needed to be targeted for revegetation and rehabilitation, and opportunities for spatial location of programs.
Development shall minimise impact	Landscape management unit guidelines (to be developed within 6 months) will identify appropriate steps to avoid significant impact on threatened species or communities.
Small, fragmented areas of revegetation are largely ineffectual from an ecological perspective unless they ensure adequate regional integration	Research needed to support planning criteria for habitat connectivity, using planning framework data and maps as a base.

5.3 Determine regional ecological planning settings

What are regional ecological planning settings?

Regional ecological planning settings are shown on Map P3. Four settings are identified which provide a strategic ecosystem planning approach for prioritising land use and management according to ecological function. The regional ecological planning settings map is not a description of ecosystems that exist but rather a planning judgement about their broad role in the landscape. Nevertheless, the map reflects scientific understanding and data that exists.

Regional ecological planning settings are based on the conservation importance of land for natural ecosystems, and indicate the regional ecological context of the land, an appropriate planning approach, and development constraints applying to land. These settings are intended to inform planning, and to guide land use decision-making. They can form the basis of regional-scale planning responses and provide an important context for planners and decision-makers to be able to formulate strategic plans and assess development proposals.

The four settings that are identified within the region are as follows:

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

A more detailed explanation of regional ecological planning settings is included in Section 4.4 and Part 9.3.

How should regional ecological planning settings be applied?

Planning settings should primarily be used for making locational decisions. They identify the ecological context of a site and indicate conservation values and general development potential. They can be used to determine preferred land uses, or to determine development requirements when considered in conjunction with landscape units.

The settings identified on the map should be regarded as indicative and need to be confirmed on site. In particular, these settings provide an indication of the extent of further field survey that may be required to make land use determinations, to undertake development feasibility studies, or to design proposed developments.

5.4 Refer to landscape unit descriptions

What are landscape units?

Landscape units are primarily used for determining locality specific design and management requirements, and are shown on a Map P4. These units represent different parts of the region where particular situations exist for planning for natural ecosystems. These are intended to link the regional and site specific scales where more specific information exists than regional principles or where broad principles may not be useful. These units represent areas within the region having generally similar ecological, social, economic and administrative characteristics. They are determined by topography, climate, with distinctive vegetation characteristics (broad vegetation types, and extent of cover), land use, land tenure, water catchments, communities of interest, distribution of ecological communities and species of interest, administrative boundaries and biodiversity conservation management issues. The units have overlapping characteristics and their boundaries should be regarded as zones of transition.

For each landscape unit summary information on natural ecosystems has been prepared, which outlines important features to be taken into account in planning. Specific information on natural ecosystems and biodiversity is available for each of the 18 landscape management units within the region (Part 9.2). The summary information for each landscape unit includes a description, land uses, vegetation status, endemic features, threatened species, endangered ecological communities and important species, planning or management issues.

In interpreting the maps it should be recognised that the landscape units have generalised boundaries and that the characteristics of these units grade into one another. Therefore, at the boundaries between units, it is appropriate to refer to the descriptions for each of the units.

How should landscape units be applied?

Planning and management information is available for each landscape unit. This should be considered in conjunction with the regional ecological planning setting map, which identifies the regional context of a site and its conservation importance.

Landscape units provide information at a scale that can be used for detailed site planning purposes such as providing access to data, linking to applicable recovery or action plans, and to determine what are the key environmental features to be protected, and objectives for each. The information prepared for each unit may be added to over time, as more data becomes available, and can be integrated with local plans.

Landscape units are able to be used for a range of planning purposes that could include the following:

- Providing specific guidelines that can be used when determining the significance of effects of a proposal on threatened species (eg. applying the 8 Part test under the EP&A Act in NSW). As previously mentioned the NPWS is currently preparing such guidelines and it is expected that they will be finalised within 6 months.
- Such guidelines could be incorporated into Development consent guidelines by Councils.
- Limiting fragmentation of land within nominated catchments.
- Specifying field survey requirements for regionally important species prior to changes to land use or for development proposals.
- Determination of locality specific planning targets, objectives, guidelines or regulations (eg. minimum percentage retention of habitat, minimum patch size for vegetation types, minimum corridor width for vegetation type to maintain habitat connectivity, minimum subdivision area, development potential linked to land capability).
- Generic provisions for site management plans.
- Incentives or financial support for natural regeneration or conservation management on identified land.
- Identification of areas for potential rehabilitation, and incentive measures to encourage rehabilitation.
- Development standards for rural residential zoned land (proportion to be retained in native vegetation, road lengths, disturbance ratio, etc).
- Development assessment considerations relating to natural ecosystems (eg. minimum ecological survey requirements).
- Identification of provisions suitable for inclusion in catchment management plans or regional vegetation management plans.

5.5 Refer to key habitats, vegetation and corridors analysis

What will the analysis produce?

The outcomes of the analysis will be available in both hardcopy and electronic form. It will include the identification of areas important as habitat for assemblages of rare or threatened fauna, areas that currently are likely to serve as corridors/linkages for rare or threatened fauna, regionally rare or poorly reserved vegetation associations, and areas that are most suitable for revegetation for the purposes of enhancing habitat connectivity.

It needs to be recognised however that this information will be produced from a desktop analysis and therefore will require field checking.

How should this information be used?

The applicability of this information is obvious: It will be invaluable in preparing or reviewing LEPs or REPs and should be referred to as a matter of course in considering any development application or major activity proposal.

Industry should also refer to this information as a matter of course when considering purchase of land for development or changing use of existing land assets. Impacting upon any land confirmed as having these values should be avoided.

The identification of land areas that are most suitable for revegetation for the purposes of enhancing habitat connectivity will also be invaluable for landholders or groups undertaking revegetation programs. It will not only identify the most suitable locations for replanting but also the type of vegetation that should be replanted (in order to mimic the original community).

5.6 Refer to activity guidelines

What are activity guidelines?

Activity guidelines are specific requirements for activities that may or may not require consent under planning controls that apply. They are specifically intended to focus on issues associated with the impact of an activity on natural ecosystems.

Activity guidelines have not been prepared at this stage. However, examples of possible activity guidelines that could form part of, or be linked to the planning framework are for the following activities:

1 Cutting of firewood.

2 Subdivisions and associated engineering works.

3 Land and water management practices (including soil erosion and salinity).

4 Grazing of Native Grassland and Box-Gum Woodland.

5 Landscaping and appropriate choice of native and exotic species (eg. do not plant invasive exotic species adjacent to intact native vegetation remnants, do not plant non-indigenous species in remnants).

6 Specification of a regionally consistent ecological survey approaches.

7 Farm dams in rural residential areas.

8 Management issues specific to certain land tenures (eg. road reserves or railway corridors).

9 Bush fire hazard reduction.

10 Intensive agriculture.

11 Weed and pest species management.

12 Companion animal management (eg. application of covenants for the prevention of keeping cats in areas adjacent to native vegetation remnants. In certain situations such as where the Koala occurs, covenants preventing keeping of dogs may be appropriate).

13 Managing native habitat (eg. habitat trees - dead and alive, ground litter and fallen logs, corridor design, minimum remnant size, wetlands, grassy ecosystems, fragmentation and connectivity, riparian buffers).

14 Landscape rehabilitation and restoration (eg. appropriate recognition of functioning natural grassy ecosystem sites, using locally indigenous plant material for restoration)

These activity guidelines could include specific principles, criteria and/or standards that are to be applied, and should be made specific to particular landscape units where appropriate.

Activity guidelines might be specifically applied for individual landscape units within the region. For example, generic 'best land management practice' guidelines could be specified or used as a checklist, and might include the following as appropriate:

1 Fencing of gullies and river banks to prevent access by stock.

2 Rural properties maintaining over 30% native vegetation cover managed primarily for biodiversity conservation and water quality management purposes.

3 Properties with provision for habitat corridors for biodiversity, with patches having a minimum width of 50 metres, ideally in blocks of 2 ha or greater.

4 Active conservation of all native vegetation types occurring on the landholding, especially vegetation on higher fertility sites such as river flats and terraces and areas that contain endangered communities.

5 Restrictions on clearing of further native vegetation on rural properties.

6 Having in place a property management plan for land, which provides for the implementation of the above guidelines, and ensures implementation of suitable bush fire regimes, biodiversity monitoring and weed control, and periodic review of sustained agricultural productivity, especially in areas that contain endangered communities.

7 Guidelines for revegetation or assisted natural rehabilitation, relating to use of appropriate locally indigenous species, density characteristics, and ideas for greater management to enhance greater structural and floristic diversity.

8 Consider retiring land in regional ecological planning setting B from intensive agriculture.

9 Complying with management criteria for fire or grazing practices.

10 Complying with rehabilitation criteria - species characteristics, preferred location for rehabilitation, preferred methods and land tenure, etc (eg. small patches and narrow strips of a few plant species planted at high densities are not ideal habitat for most woodland birds), retention of grassland, woodland or dry forest vegetation by fencing and appropriate management is preferable (eg. applying occasional grazing to grassland sites to remove excess biomass and promote forb diversity, retaining fallen timber and rocks in woodland sites for habitat complexity, promoting tree recruitment, and then applying judicious thinning as appropriate, planting locally indigenous species).

11 No planting of trees and shrubs in grassland.

12 Exclusion or control of domestic animals from those sites which will benefit from such treatment (eg. riparian areas, floristically rich woodland and grassland sites).

13 Specified requirements for special habitats such as road reserves, railway corridors, small watercourses, scattered trees, dead hollow trees, rocky outcrops, river corridor wetlands and floodplains.

14 Retention of litter and fallen timber on site.

14 Maintaining contiguous parcels of land with a habitat area of 100 ha minimum to provide a useable resource for woodland birds with those parcels in close proximity to other parcels to maintain habitat connectivity.

15 Appropriate management requirements for buffer areas.

16 Application of planning tools for conservation of sites such as establishment of nature reserves (NPWS), council reserves or community title land.

17 Application of instruments for off-reserve conservation (eg. covenants under S88b of the *Conveyancing Act 1919* (NSW), VCAs, stewardship payments, incentive payments, joint management agreements and property plans under TSC Act, property management plans under NVC Act, etc).

18 Application of management tools for conservation of biodiversity - (eg. Southern Tablelands Grassy Ecosystem Conservation Management Network for grassland and grassy woodland sites, grassland management plans, Land for Wildlife and other opportunities).

How should the activity guidelines be applied?

Many planning authorities and councils have development control plans or other guidelines that fit into this category, and regional guidelines could be adapted and used within the planning framework.

5.7 Apply landscape unit decision guidelines

What are landscape unit guidelines?

The guidelines will:

1 Describe the key land management issues in the landscape unit and recommend responses to such issues; and

2 Specify the requirements for assessment of impact on individual species or communities and will be tailored to the status of the species or community within each landscape unit.

At this point in time the guidelines will only be of relevance to the NSW planning process although the ACT Government may choose to produce similar guidelines.

Whilst the outcomes of applications for development cannot be pre-empted purely on the basis of the presence of threatened species or endangered ecological communities, the guidelines will give some indication of the chances of an application to remove or disturb the habitat of such species or communities being approved.

A draft example of a set of landscape unit guidelines (for the Yass Landscape Unit) is provided as an appendix to this framework (see Section 9.4). The guidelines for all units will be finalised by mid 2003.

How can the guidelines be applied?

The guidelines should be referred to as a matter of course in considering any development application or proposal for a major activity.

Industry should also refer to this information as a matter of course when considering purchase of land for development or changing use of existing land assets. Impacting upon any land confirmed as having these values should be avoided. Avoiding lands that have these values will increase the certainty of obtaining the necessary approvals and reduce the costs of environmental impact assessment.

5.8 Establish site design criteria

What are site design criteria?

The planning framework provides for site specific design criteria that could be applied. This may mean that for individual sites, a developer must evaluate the proposal in terms of the regional principles and any landscape unit guidelines. At this scale, an evaluation must also be made of additional information or survey that may be required to satisfy standards required for the landscape unit.

How should site design criteria be applied?

The intention is for the landowner to undertake an evaluation, which provides a starting point for assessment of a development proposal by an approval authority. At the site level, all of the above steps need to be integrated and the way a proposal should work must be specified. Site design criteria may be best management practices, but they are applied to a specific site. They may be linked to a management plan that is part of a formal approval, and therefore a legally binding document.

The intention of this step is to ensure that land use is designed to integrate with natural ecosystems in those ecological planning settings where this is required. In all cases it is suggested that a development proposal should be accompanied by a management plan, with the standard of the management plan dependent on the regional ecological planning setting. In the case of a development within an unreserved area of conservation importance, it might be that a management plan must be approved before a development can physically commence.

Part 6

Applying the planning framework

The planning framework as discussed in Part 5 provides a method for integrating natural ecosystems in land use and land management decision-making. It includes different elements that enable issues to be considered at different scales, and links with regional biodiversity maps and databases. At this stage, many elements have not been finalised and require further work from those agencies that have responsibility for decision-making. Different approaches between the NSW and ACT jurisdictions should also be recognised.

6.1 How should the framework be used?

The framework should be used to:

1 Establish common terminology and approach throughout the region (ie. a common level of understanding of the issues and what to do about them).

2 Provide an updated summary of what is important to know about the natural ecosystems of the region.

3 Outline principles and policy for integrating scientific information with development planning approaches.

The framework is primarily aimed at regional scale and local government area scale, to provide a context for decision-making. Potential applications are outlined below:

- Providing regional context for review of LEP provisions or the Territory Plan.
- Assisting in finding a site to develop for residential purposes which will have a minimal impact on natural ecosystems.
- Determining revegetation priorities and methods.
- Compiling planning or management guidelines for a site.
- Specifying important matters to take into account in managing a travelling stock reserve.
- Writing a catchment management plan, and determining catchment targets.
- Reviewing potential occurrence of species prior to undertaking field survey for threatened species for a development proposal.
- Preparing a threatened species recovery plan for a species occurring in the region.
- Providing comments on a development application.
- Giving pre-lodgement consultation advice to landowners prior to development application.
- Undertaking farm management.
- Assessing the suitability of site for a proposed development.
- The framework proposals focus on reviewing and improving on existing activities and processes rather than establishing new programs. Practical implementation of the framework will require the following:

- Implementation resources, including adequate funding, skills (including GIS) and hardware for relevant agencies, especially local government.
- Acceptance and understanding by users, especially planners, land managers, and the community.
- Training for staff.
- Coordinated provision of outputs to planning processes (regional vegetation committees, water committees, catchment management boards, etc).
- Co-ordination and integration with community groups such as Landcare groups.
- Acceptance by planners, landowners and managers, and the community.
- Undertaking an ongoing monitoring program to inform the process.
- Keeping databases up to date and extending their applicability (possibly geographically, but also in terms of their detail and scale of resolution).

The framework does not have any mandatory requirements, but enables existing functions to be carried out more effectively. This Part outlines ways in which the framework may be applied and includes ideas for consideration by agencies in carrying out their planning functions. It may be used as an implementation strategy.

Additional scientific information relevant to applying the framework is likely to become available in the future. It is therefore important to recognise that the framework will need to adapt over time and be subject to ongoing scientific review.

Table 6.1 Applying the framework to the development process

Planning and development stage	Purpose	Undertaken by	Outcome
Strategic	Identify broad sites and constraints	PlanningNSW, council, NCA, ACT Planning and Land Management	LEP, Territory Plan or National Capital Plan
Development	Determine design requirements	Council, ACT Planning and Land Management	DCP
Master plan	Undertake design	Developer	Site master plan
Development application	Obtain approval under regulatory plan	Developer	Development approval
Construction	Carry out development	Developer	Construction management plan
Operational	Ongoing management and maintenance	Landowner/ lessee/ managers (including government agencies)	Management plan/ property management agreement

6.2 What are the implications for future development?

Where adopted and applied by relevant agencies, the framework will affect future development in the region. In particular, development proposals will be able to be more effectively considered in terms of their regional ecological context and locally specific development requirements will be enabled more effectively within a regional context.

The framework can be directly applied to the development process. The ways that this could occur and the key roles are shown in Table 6.1. It is important to ensure that the information in the framework is made available at all relevant stages of the process at the relevant scale.

6.3 Ideas for implementation

Ideas for consideration to enable effective implementation of the planning framework are as follows:

- The status of the framework should be advisory, with agencies to consider adopting it as a reference document.
- The framework can be adopted and applied immediately, but it should be recognised that the planning maps should be regarded as provisional, and subject to further field checking and peer review.
- Elements of the framework that need further development are; profiles of important species, landscape unit planning guidelines, and activity guidelines.
- Actions for immediate implementation should be promoted, and are shown in Box 4.
- Criteria, guidelines or triggers (eg. numerical measures) could be proposed for species listed under the TSC Act, NC Act, and EPBC Act that are of importance within the region.
- Fisheries and aquatic ecosystems should be integrated into the framework, including the requirements of the FM Act.
- Consider hard copy/ presentation and Website, data sharing between organisations (including a common mapping platform), making data accessible, and keeping data current.
- Skills development for community groups or industry wanting to access and use data.
- Prepare an implementation handbook, including a range of case study examples.
- Remote sensing to monitor change over time and update to fill in current data gaps.
- Develop progress indicators and an evaluation process linked to existing state of the environment reporting processes and planning instruments. This would incorporate links between the framework and regional state of the environment reporting processes.
- Processes to ensure ongoing management of data and information, including periodic updating of records are required. This should ensure electronic access to updated data.

Box 4: Key actions for immediate implementation

1. Incorporate regional planning principles and regional ecological planning settings within all new planning instruments (eg. LEPs).
2. Seek funding to employ a specialist biodiversity officer (to be shared between regional councils) to review development proposals and develop and to update regional biodiversity databases.
3. Investigate incentives to be linked to plan provisions and management plans and conservation agreements.
4. Consider adopting principles or elements of Part 5 of the report in agency plan-making process.
5. Ensure that regional ecological planning settings and landscape units are identified and considered in all subdivision approvals.

Part 7
Finding out more

7.1 Contacts and data

Key contacts for obtaining further information are outlined below. These contacts will be useful for accessing data, maps and other information relating to the framework.

NSW National Parks and Wildlife Service

Manages national parks and reserves and provides technical and information support for biodiversity, threatened species and Aboriginal heritage programs. NPWS also administers various Commonwealth and State funded programs.

Conservation Planning and Programs Division,
Southern Directorate, NSW National Parks and Wildlife Service
PO Box 2115 Queanbeyan NSW 2620
Phone: (02) 62989715 Fax: (02) 62994281

Web: www.npws.nsw.gov.au

Environment ACT

Manages national parks and reserves and provides technical and information support for biodiversity and threatened species within ACT.

Manager, Wildlife Research and Monitoring, Environment ACT
PO Box 144, Lyneham ACT 2602
Phone: 02 6207 2124 Fax: (02) 6207 2122

Web: www.act.gov.au/environ

PlanningNSW

State agency responsible for environmental planning and impact assessment.

Regional Planning Coordinator, Riverina and South-East, PlanningNSW
32 Lowe Street, Queanbeyan 2620
Phone: 02 6297 6911 Fax: (02) 6297 9505

Web: www.planning.nsw.gov.au

Environment Australia (Commonwealth Government)

Administers Commonwealth environment legislation, and funding programs.

Phone: 02 6274 1111

Web: www.ea.gov.au

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Part 8
Glossary

This Part defines and explains terms referred to in the Framework, including many derived from the *Biodiversity Planning Guide for NSW Local Government*. The terms are listed in alphabetical order. Abbreviations and acronyms are shown separately at page vii.

Action plan (see Recovery plan).

Activity means an action, whether a use of land or in association with the use of land, leading to a disturbance or change to the ecosystems on the land.

Baseline information is information relating to a specific time or defined place, from which trends or changes can be assessed or to which they can be related.

Biodiversity (biological diversity) is the variety of life: the different plants, animals and microorganisms, the genes they contain and the ecosystem of which they form a part. The concept is often considered at genetic, species and ecosystem levels. It is a reflection and essential part of the operation of ecological processes. Whilst some ecosystems are naturally more diverse than others, the amount of diversity does not necessarily directly relate to conservation value or management. Conservation of biodiversity is a fundamental principle of ecologically sustainable development.

Bioregion (or biogeographical region) is a region in which the boundaries are primarily determined by (or reflect) similarities in geology, climate and vegetation.

Box-Gum Woodland means one of several natural vegetation communities where either White Box, Yellow Box or Blakely's Red Gum, either alone or in combination are the characteristic tree species. Depending on which legislation is referred to (Commonwealth, ACT or NSW), there may or may not be a native grassy understorey, other tree species may be present, and in some cases, the trees may be largely or completely cleared from the site. Refer to the NSW National Parks and Wildlife Service *Endangered Ecological Community – White Box – Yellow Box –Blakely's Red Gum Woodland fact-sheet*.

Bush regeneration means the rehabilitation of bushland from a weed-infested or otherwise degraded plant community to a healthy community composed of native species. Natural regeneration relies on natural germination and resprouting of plants, and focuses on weed removal, management of disturbance and the maintenance of natural processes. It does not normally include replanting of vegetation. Assisted regeneration uses natural regeneration, but also includes intervention actions such as site replanting with locally indigenous seed or plant material derived from the locality (or other similar plant communities to that occurring on the site), or controlled management of disturbance.

Bushland is land on which there is vegetation which is either a remainder of the natural vegetation of the land, or, if altered, is still representative of the structure and floristics of the natural vegetation. Bushland may include regrowth. At any one time some species may only be present as seeds in the soil.

Catchment is the entire area of land drained by a river and its tributaries.

Connectivity is a measure of the degree of interconnection of habitat for a particular species.

Conservation is one of the approaches to ecosystem management. It aims to maintain the continuity of a system, with or without change and refers to the process and actions of

looking after a place so as to retain its natural significance. Conservation includes protection, maintenance and monitoring.

Conservation priority is a function of irreplaceability and vulnerability.

Covenant is a restriction on the use of land recorded on the property title and binding on successive owners. Covenants may be 'negative' (imposing restrictions) or 'positive' (imposing positive obligations).

Cumulative impacts refers to impacts resulting from a multitude of developments or activities, and their interactions in space and time.

Critical habitat refers to habitat that is critical to the survival of endangered species, populations or ecological communities. Part 3 of the *Threatened Species Conservation Act 1995* and Part 7A of the *Fisheries Management Act 1994* provides for areas of critical habitat to be formally declared.

Data are raw numbers or other uninterpreted descriptive material.

Database is a collection of data or information. The term is often used to refer to data or information held in a computer.

Design means responding to a set of criteria, constraints and opportunities and achieving a desired outcome. It is a futures-oriented process for making meaningful order.

Development is defined by the *Environmental Planning and Assessment Act 1979* (NSW) and the *Land (Planning and Environment) Act 1991* (ACT). It means the use of land, the subdivision of land, the erection of a building, the carrying out of a work, the demolition of a building or work, or any other act, matter or thing controlled by a planning instrument. Development may include building or agricultural development.

Ecological community (or community) is an assemblage of species occupying a particular area.

Ecological parameter (or attribute) is a characteristic of a species or ecosystem that describes elements of that species or ecosystem, and which may be used to describe values, relative importance or objectives.

Ecological planning setting is a categorisation of the ecological role of land at a regional scale according to its contribution to the maintenance of natural ecosystems. The settings reflect the relative importance of land for conservation and also the level of certainty of available information.

Ecological processes are processes that play an essential role in maintaining the integrity and continuity of an ecosystem. Important ecological processes are water and nutrient cycling, the flow of energy, and evolution by natural selection.

Ecologically sustainable development (ESD) refers to development that uses, conserves and enhances the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future can be increased. It is defined in terms of the application of principles adopted by the *Intergovernmental Agreement on the Environment*. These principles relate to precautionary decision-making, intergenerational equity, conservation of biodiversity and valuation of resources.

Ecosystem is a dynamic complex of plant, animal, fungal and microorganism communities and associated non-living environment interacting as an ecological unit.

Extant means current or existing. The opposite of extant is extinct.

Environmental audit means a systematic, documented, periodic evaluation of the environmental performance of an organisation. At the local council level, audits may be

divided into external audits (state of the environment report) or internal audits (such as reviews of policies and practices).

Environmental impact assessment refers to the statutory process for consideration of potential environmental impacts of developments or activities, as required by NSW, ACT and Commonwealth legislation.

Environmental impact statement (EIS) is a document required to accompany certain prescribed types of development applications or proposed activities for which development consent or some other approval is required. An EIS is required to describe a proposal, the existing environmental conditions and the expected impacts of the proposal.

Environmental indicator is a meaningful measure that summarises or reflects environmental change over time and may be used for state of the environment reporting.

Environmental weed is a plant that spreads and invades native vegetation.

Farm dam is a specially constructed artificial water storage for agricultural or domestic purposes. Farm dams may provide wetland habitat, but are normally not constructed for this purpose. They are usually characterised by steep sides and deep water level, to maximise water capacity.

Fauna means animals (including both vertebrates and invertebrates).

Fragmentation is the process of progressive loss and isolation of habitat.

Geographic information system (GIS) is a computer-based system for storing, managing and analysing spatial data, including maps.

Goal is a statement of value to be pursued. It is usually stated in a general (and unmeasurable) form. Goals are sometimes referred to as aims.

Grassland - a plant community where grasses, either native or exotic, dominate the structure and composition; see Native Grassland and Natural Temperate Grassland.

Habitat is an area or place occupied by a species, population or ecological community. It may be occupied permanently, periodically or occasionally.

Habitat corridor is an area of habitat that enables migration, colonisation and interbreeding of plants and animals between two or more larger areas of habitat. Habitat corridors may consist of a sequence of discontinuous areas of habitat (such as feeding trees, caves, wetlands and roadside vegetation).

Habitat loss is the broad-scale removal of vegetation.

Habitat value refers to the extent to which an area is capable of supporting one or more species. It can refer to the number of species supported or the size of the population of a single species. Habitat value is often related to the extent of vegetation diversity (both species and structure), and the availability of resources such as nesting places, food and protection from predators, as required by each species present.

Home range is the area used by a species for day-to-day activities on a seasonal basis such as feeding, breeding and nesting.

Introduced species is a species that is not locally indigenous.

Irreplaceable means having few spatial options for achieving conservation targets.

Issue is a point in question or dispute. It is an expression of public importance, concern or contention. Identification of issues is used as a way of focussing and prioritising attention.

Land use refers to the spatial expression of the aggregation of purposes for which land is occupied or employed, and the activities associated with those purposes.

Landscape unit means an area identified as having distinctive characteristics at the landscape scale, taking into account water catchment, social, economic, geological, vegetation, land use and natural ecological characteristics. These units are used to identify natural features and development and management characteristics specific to each unit.

Local government area (LGA) means an administrative area for which local councils have jurisdiction under the NSW *Local Government Act 1993*. Within the ACT, the roles of NSW local councils are fulfilled by the ACT Government.

Locality, in relation to biodiversity survey work, generally refers to an area within a 5 km radius of a site.

Locally indigenous species is a species that occurs naturally within a local area and which has genetic material deriving from that local area.

Management plan is a plan that specifies a program of action for managing a particular area of land.

Mature tree refers to an older tree with a hollow trunk or outer branches, forming hollow pipes, which are utilised by hollow-dependent fauna species.

Migratory species are those that move from one location to another, then return to the same location on a seasonal or annual basis.

Monitoring is a systematic process involving planned and repeated data collection, analysis, interpretation, reporting and acting on the data.

Native species is normally used to refer to species indigenous to NSW, but is also sometimes used to imply a locally indigenous species.

Native vegetation is vegetation that is indigenous to NSW, that is, of species that existed in NSW before European settlement.

Native Grassland - a native plant community dominated by native species; see Natural Temperate Grassland.

Natural Temperate Grassland is a natural vegetation community in which native grasses dominate, and there are usually other plant species that include daisies, peas, lilies, orchids and many other species of wildflowers. Trees and shrubs may be present, but are sparse (less than 10% of projective foliage cover). Natural Temperate Grassland is a Commonwealth and ACT listed Endangered Ecological Community.

Nomadic fauna are species which move widely in response to availability of resources, such as food or nesting sites. These species do not necessarily return to the same location on a regular basis.

Objectives are similar to goals, but are expressed in measurable terms.

Outputs are the completed activities or products resulting from a project. These differ from outcomes, which are the results of the activities or products.

Permeability refers to landscape resistance to movement. Successful movement of species is a function of size of a dispersing population, dispersal ability of species, landscape permeability and dispersal distance.

Planning framework refers to a series of elements, steps and supporting technical information compiled to inform the planning process carried out under existing processes and legislation.

Plant community (or **vegetation community**) is a group of plants and other organisms living together in a definable region or habitat defined by its vegetation.

Policy is a statement of values that are to be satisfied when choosing amongst alternatives. It guides ongoing decision-making.

Policy instrument is a means by which a policy is implemented. This could include legislation, economic incentives, education, or the like.

Population is a group of organisms, all of the same species, occupying a particular area.

Preservation is one of the approaches to ecosystem management. It aims to minimise change in a system.

Pre-1750 vegetation is that which is thought to have existed in any particular location prior to the Industrial Revolution.

Principle is a rule of conduct or action that is applied when implementing a policy.

Program is an action specification for implementing a policy. A program should include a timetable, specific actions and allocations of resources. It elaborates and implements policy.

Project is a set of tasks or activities undertaken in pursuit of a particular problem or issue.

Protected flora and fauna means species of flora and fauna identified as protected in the *National Parks and Wildlife Act 1974* (NSW), *Nature Conservation Act 1980* (ACT) and *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth).

Rare species is a species considered to be unusual or present in small numbers, usually but not necessarily due to a population decline.

Recovery plan is a plan prepared and approved under one or more of the following Acts; the *Threatened Species Conservation Act 1995* (NSW), the *Fisheries Management Act 1994* (NSW), the *Nature Conservation Act 1980* (ACT) and the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). Such plans detail the actions necessary to achieve the recovery of threatened species, populations or ecological communities. In the ACT the equivalent document is an Action Plan prepared under the NC Act.

Region is a concept used to group geographic areas having some common feature or relationship, generally for the purposes of administration or study. Regions may coincide with natural boundaries such as water catchments, bioregions or landscape units, or with socio-economic or other boundaries. Some legislation allows regions to be determined for the purposes of administration.

Regionally important ecosystem means an ecosystem or vegetation community of which an area of less than 15% of the estimated pre-1750 area remains, and which is not adequately reserved in dedicated publicly owned conservation reserves. Ecosystems also are considered to be important where the only known locations of regionally important species are within these ecosystems.

Regionally important species means a species occurring within the region and being either a threatened species recognised by listing in legislation in any jurisdiction, considered regionally rare, or considered likely to be at risk of extinction within the region.

Rehabilitation is a general concept referring to the restoration and repair of a degraded ecosystem system to a former condition. Rehabilitation may take several forms that, depending upon the degree of naturalness, range between regeneration, restoration, reconstruction, reclamation and stabilisation. Rehabilitation may require implementation of a range of techniques, such as revegetation and weed control.

Restoration is the process of (or end result of) reinstatement of the structure and dynamics of a pre-existing community. It is a form of rehabilitation.

Restoration capacity is a measure of the difficulty of undertaking ecological restoration at a site. It is based on an assessment of resilience and robustness. This will determine the type of restoration or rehabilitation that it is feasible to undertake.

Riparian land means any land which adjoins, directly influences, or is influenced by a body of water. This includes land immediately adjacent to small creeks and rivers, riverbanks, intermittent streams or gullies, and areas surrounding lakes and wetlands on river floodplains which interact with the river during floods. The width of riparian land is largely determined by management objectives, and may need to be defined in terms of distances from water bodies or by mapping.

Scale refers to the level, extent or geographic area to which an issue relates. For example, geographical scales include global, continental, regional, catchment, local and site. Temporal scales range from long-term to short-term.

Species is a group of organisms capable of interbreeding freely with each other but (usually) not with members of other species. It includes any recognised sub-species or other taxon below a sub-species, and any recognisable variant of a sub-species or taxon.

Species composition refers to the floristics of a plant community and means the number, type and relative proportion of different species occurring on a site or in an area. Species composition varies from site to site.

Species distribution means the geographic spread of occurrence of a species across the landscape.

Species presence refers to the fact that a species was observed at a nominated location at the time of a survey.

Species absence refers to the fact that a species was not observed at a nominated location at the time of a survey. Species absence does not necessarily indicate whether or not the species occurs at that location.

State of the environment reporting (SoE reporting) is a process that presents and analyses scientifically-based information about environmental conditions and trends, focusing on the impacts of human activities and their significance for the environment. State of the environment reporting is also often referred to as SoE reporting. Legislative provisions require some agencies to undertake state of the environment reporting on an annual or periodic basis.

Strategies are the mechanisms for carrying of goals and objectives into effect. They are action statements explaining how something is to be achieved. Strategies lead to policies and programs.

Sub-species is a geographically separate population of a species characterised by morphological or biological differences from other populations of that species.

Target is a more detailed example of an objective. It is expressed as the value of some indicator or other variable that should be achieved by a given date or other predefined circumstance. Targets are often confirmed by a political or community process.

Threat abatement plan is a plan prepared under the *Threatened Species Conservation Act 1995* (NSW), or the *Fisheries Management Act 1994* (NSW), or the *Nature Conservation Act 1980* (ACT), or the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) providing for the abatement of threatening processes. The ACT equivalent of a threat abatement plan is an Action Plan prepared under the NC Act (see Recovery plan).

Threatened species is a species considered to be at risk of becoming extinct, or of becoming endangered. Such species are listed in the Threatened *Species Conservation Act 1995* (NSW), or the *Fisheries Management Act 1994* (NSW), or the *Nature Conservation Act 1980* (ACT), or the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth).

Threatening process is a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities.

Vegetation structure means the pattern of the height, form and density of vegetation.

Vision means a very general statement of some future desired state.

Weeds include environmental weeds and those defined as noxious by legislation.

Wetland means land periodically or permanently inundated with water, comprising emergent aquatic vegetation dominated by characteristic wetland species. Wetlands include areas commonly described as swamps, mangroves, ponds, lagoons, and the like. The majority of plant species present normally comprise sedges and rushes. Two general types of wetlands are normally recognised, namely freshwater wetlands and saltwater (or estuarine) wetlands.

Wetland margin means the area surrounding (and not including) a wetland, and directly draining into the wetland. These areas are often described as an edge or a fringe. For the practical purposes of administration, wetland margins are often regarded as being land within 40 metres of a wetland.

Woodland is a plant community in which widely spaced, deep-crowned trees of particular species dominate the upper layer. Grassy Woodland has a grassy groundlayer and few or no shrubs. Shrubby Woodland has a shrubby understorey and may or may not have a grassy groundlayer.

Part 9

Appendices

9.1 Project history and background

The *Planning Framework for Natural Ecosystems - NSW Southern Tablelands and ACT* represents the most recent stage in an ambitious project that commenced in 1995 with the establishment of the Joint Regional Biodiversity Survey Working Group (JRBSWG) comprising representatives from the ACT Government (Environment and Land Bureau, the ACT Planning Authority), the NSW Government (National Parks and Wildlife Service), Local Government (Queanbeyan City Council, Yarrowlumla Shire Council and Yass Shire Council), the Commonwealth Government (National Capital Planning Authority) and the Housing Industry Association (ACT and Southern NSW Region). This group was established in response to the need for a more strategic approach to conservation in the ACT region and for greater certainty in planning for future development of Canberra and surrounding communities.

Since 1995 the working group has been expanded to include other state and local government representatives (PlanningNSW, Cooma-Monaro Shire Council, Goulburn City Council, Gunning Shire Council, Mulwaree Shire Council), and non-government groups (the Upper Murrumbidgee Catchment Co-ordinating Committee and the Conservation Council of the South East Region and Canberra Inc).

The JRBSWG identified a program of studies to compile regional information on biodiversity and threatened species within the ACT and NSW Southern Tablelands. This has required the coordination of financial and in-kind support from all participants, including significant funding for field surveys and remote sensing modelling from the Natural Heritage Trust. The NSW NPWS largely carried out this coordination. The aim of this work was; (i) to identify gaps in knowledge of the distribution of threatened species and ecological communities, (ii) to survey areas to generate a regional information base, and (iii) to develop a conservation strategy for the region.

A summary of key milestones leading up to the preparation of the planning framework are as follows:

1995	Recognition of need for greater certainty in planning for urban development in threatened species habitats by HIA and the region's planning and environment agencies.
1996-97	NSW and ACT Government agencies fund preliminary work to establish the project, pending outcome of applications for funding for regional survey work.
1997	Stage 1 of Project culminates in the publication of *Grassy Ecosystems of the South Eastern Highlands Technical Report* compiled by Rainer Rehwinkel of the NPWS.
1998 – 2001	Commonwealth Natural Heritage Trust contributions accelerate targeted surveys of threatened grassland reptiles and regional surveys of grassy ecosystems, and facilitate remote sensing modelling of the region's grassy vegetation.
2001	Compilation and analysis of regional data-sets, and initiation of project to integrate information with planning and development processes at the strategic, regional level.
2002	Completion of the Planning Framework for Natural Ecosystems - NSW Southern Tablelands and ACT.

The *Planning Framework for Natural Ecosystems - NSW Southern Tablelands and ACT* was prepared under the direction of a sub-committee comprising representatives of the NSW National Parks and Wildlife Service, Environment ACT, PlanningNSW and the Housing Industry Association (ACT and Southern NSW Region).

The preparation of the planning framework included close consultation with government representatives and broad community consultation through a series of workshops. The planning framework was substantially prepared by Martin Fallding from Land & Environment Planning using information provided by participating

agencies. Workshops were held in November 2001 and March 2002 to review the approach to the project and the development of the planning framework. The workshop included a wide range of interest groups including local government, scientists, NSW and ACT Government agencies, community groups and non-government agencies. There was also a program of consultation with each local government authority in the study area during the course of the project.

Key elements undertaken by the project consultant in compiling the planning framework were:

1 Supervision of mapping and data presentation by NSW National Parks and Wildlife Service and Environment ACT.

2 Organising and facilitating 2 consultation workshops.

3 Liaison with staff from the 7 NSW local government authorities and presentations to council meetings.

4 Preparation of 2 project information sheets and circulation to stakeholders.

5 Co-ordination and writing of project report.

6 Attendance at 7 steering group meetings to manage the project.

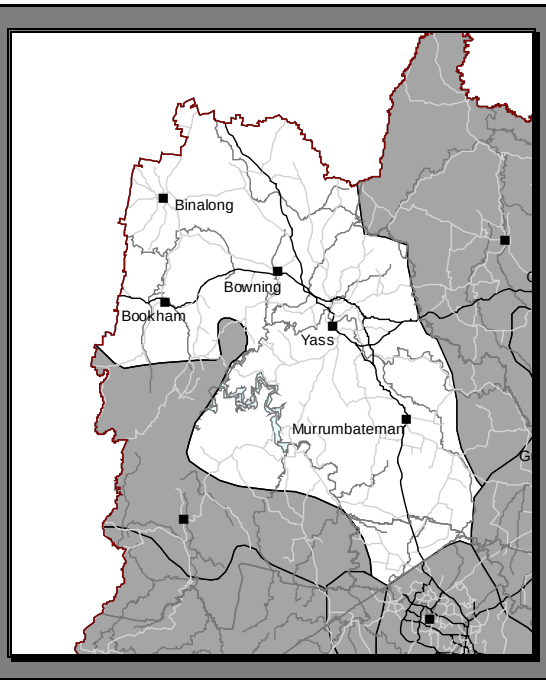
9.2 **Landscape units** (refer to Map P4)

This Part provides summary information for each of the identified landscape units listed below and as shown on map P4.

Landscape unit			
1	Yass	10	Tinderry
2	Wee Jasper	11	Bungendore
3	Gundaroo	12	Captains Flat
4	Canberra-Queanbeyan	13	Tallaganda
5	Tharwa	14	Gunning
6	High Country	15	Cullerin
7	Royalla	16	Taralga
8	Michelago	17	Marulan
9	Lake George Range	18	Goulburn

Note: The order of the numbering of the units is generally from left to right, north to south.

The description of each landscape unit includes a location map, land uses, vegetation status, endemic features, threatened and important species, endangered ecological communities, and planning and management issues. The units have indistinct boundaries on the ground and should be regarded as areas of transition with overlapping characteristics at their edges. Common species names have been used where they exist. Note that the information for each unit is preliminary and will be updated over time, as further data becomes available.



1. Yass Landscape Unit

Planning and management guidelines

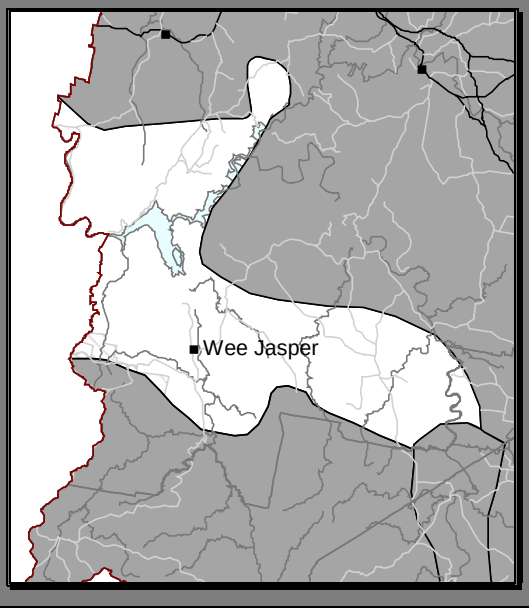
These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
Undulating country fringed to the east by the low Mundoonan Range and in the south-west by the Murrumbidgee valley, including the Burrinjuck Reservoir. Largely occupied by extensive Box-Gum Woodlands, areas of Grassland-Woodland Mosaic and areas of Grasslands, the unit is fringed to the east and south-west by Dry Forest on the low ranges. Riparian Forests of River Red Gum and River Oak occur along the Murrumbidgee River.	Cropping, grazing, a town and several small villages, rural subdivisions, two major transport links, lake-based recreation, one medium-sized and one very small nature reserve (Mundoonan NR, Hatton's Corner NR).
Vegetation status	**Endemic features**
Dry Forests on the fringing hills remain relatively intact in the east, though are largely cleared and fragmented in the south-west. The Box-Gum Woodlands have been severely cleared or modified throughout. The Grasslands are extremely highly cleared, modified and fragmented. The Riparian Forests are similarly fragmented. Burrinjuck Dam has replaced a large area of vegetation. There are: • Several samples of Box-Gum Woodlands and Grasslands of considerable diversity, including Nanima, Coolalie, Eedy's New and Wargeila TSRs, a reserve at Yass Gorge, and Bookham and Bowning Cemeteries.	This unit contains: • The region's core nesting habitat for Superb Parrot • The region's only population of Grey-crowned Babbler • Records of vagrant Major Mitchell's Cockatoos • Records of Striped Legless Lizard and Pink-tailed Worm-lizard • The centre of distribution of Yass Daisy • A minor karst landscape within Hatton's Corner NR.
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Yass Daisy, Silky Swainson-pea, Tarengo Leek Orchid (an introduced population), Australian Anchor-plant **Mammals:** Koala, Eastern Pygmy-possum, Spotted-tailed Quoll, Eastern Quoll (an old record), Eastern Bent-wing Bat, Little Pied Bat **Birds:** Blue-billed Duck, Freckled Duck, Square-tailed Kite, Australasian Bustard (an old record), Major Mitchell's Cockatoo (vagrants), Superb Parrot, Powerful Owl, Grass Owl (a vagrant), Brown Treecreeper, Grey-crowned Babbler, Hooded Robin, Speckled Warbler, Regent Honeyeater, Diamond Firetail **Reptiles** and **frogs:** Striped Legless Lizard, Pink-tailed Worm Lizard, Booroolong Frog **Invertebrates:** Golden Sun Moth **Vegetation communities:** Natural Temperate Grassland, White Box - Yellow Box - Blakely's Red Gum Woodland	In this unit there are: • Small areas secure within nature reserves • Major pressures from rural subdivisions around Yass and Murrumbateman • Substantial areas developed as vineyards • Major areas showing signs of former severe clearing • Substantial areas of dryland salinity • Minor areas of tree dieback • Minor infestations of Chilean Needle-grass in low areas Consists primarily of planning setting D (See Part 5 of report).



2. Wee Jasper Landscape Unit

Planning and management guidelines

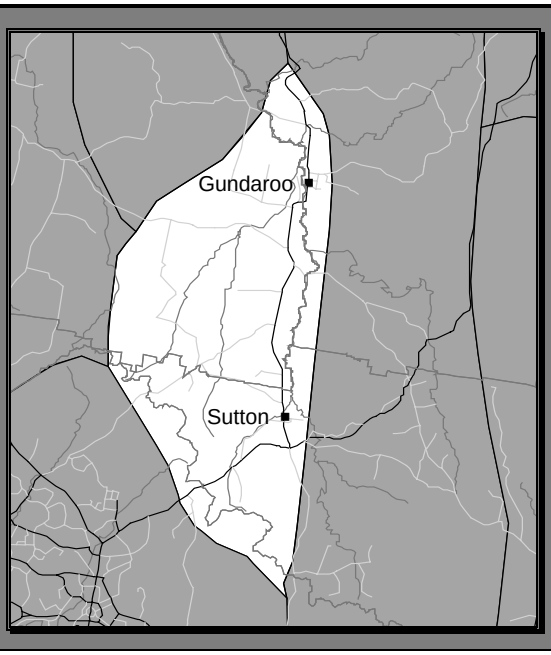
These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
A rugged unit whose major feature is the Murrumbidgee River below Burrinjuck Dam. The vegetation is largely Dry Forest with minor areas of Grassland and Box-Gum Woodland.	Grazing, two small villages, recreation (in caves and bushwalking), several areas of national park and nature reserve.
Vegetation status	**Endemic features**
Large areas of Dry Forest still dominate much of the hilly country and some areas of Box-Gum Woodlands also remain. Grasslands are highly modified or cleared. There are: • Several samples of Box-Gum Woodlands of considerable diversity, including the superb Cavan Woolshed TSR.	This unit contains: • The region's most extensive karst landscapes. The cave system has yielded many records of the Eastern Bent-wing Bat and Large-footed Myotis • The only populations anywhere of the Wee Jasper Grevillea and the only known record of *Caladenia* sp. 'Burrinjuck' (a spider orchid) • The only known regional records of Woolly Ragwort
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Wee Jasper Grevillea, Yass Daisy, Golden Moths Orchid, *Caladenia* sp. 'Burrinjuck' (a spider-orchid), Woolly Ragwort (an early record), Australian Anchor-plant **Mammals:** Spotted-tailed Quoll, Eastern Bent-wing Bat, Large-footed Myotis **Birds:** Powerful Owl, Brown Treecreeper, Hooded Robin, Diamond Firetail, Speckled Warbler **Reptiles** and **frogs:** Rosenberg's Monitor, Pink-tailed Worm-lizard **Vegetation communities:** Natural Temperate Grassland, White Box - Yellow Box - Blakely's Red Gum Woodland	In this unit there are: • Large areas secure within several national parks and nature reserves • A major area of dryland salinity Consists primarily of planning setting C (See Part 5 of report).



3. Gundaroo Landscape Unit

Planning and management guidelines

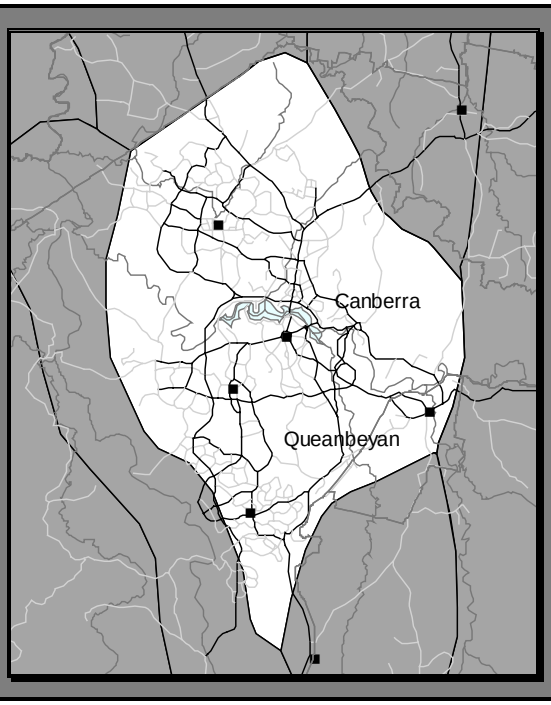
These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
Bounded to the east by the Lake George Range, and to the west by a low range, each occupied by Dry Forests, the Gundaroo unit is dominated by floodplains of the Yass River. The plains are occupied by Grasslands and Box-Gum Woodlands.	Grazing, two villages, rural subdivisions, a major and a minor transport link and one nature reserve (Goorooyaroo NR)
Vegetation status	**Endemic features**
The Grasslands and Box-Gum Woodlands have been largely cleared or modified. Dry Forest still dominates much of the hill country. There are: • Two particularly fine examples of Grasslands and Box-Gum Woodlands at Gundaroo Town Common and a crown reserve at Sutton. • Other samples of Grasslands and Box-Gum Woodlands of considerable diversity.	This unit contains: • The south-easternmost extension of the breeding range of the Superb Parrot • One of very few NSW records of Perunga Grasshopper (listed as threatened only in the ACT)
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Silky Swainson-pea, Golden Moths Orchid, Hoary Sunray (white form) **Mammals:** Koala (an early record) **Birds:** Latham's Snipe, Superb Parrot, Regent Honeyeater, Painted Honeyeater, Brown Treecreeper, Speckled Warbler, Hooded Robin, Diamond Firetail **Reptiles** and **frogs:** Striped Legless Lizard **Invertebrates:** Golden Sun Moth, Perunga Grasshopper **Vegetation communities:** Natural Temperate Grassland, White Box - Yellow Box - Blakely's Red Gum Woodland	In this unit there are: • Considerable pressures from rural subdivisions • Minor invasions by Chilean Needle-grass in low-lying areas • Minor invasions of agricultural weeds Consists primarily of planning settings A and B (See Part 5 of report).



4. Canberra – Queanbeyan Landscape Unit

Planning and management guidelines

These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

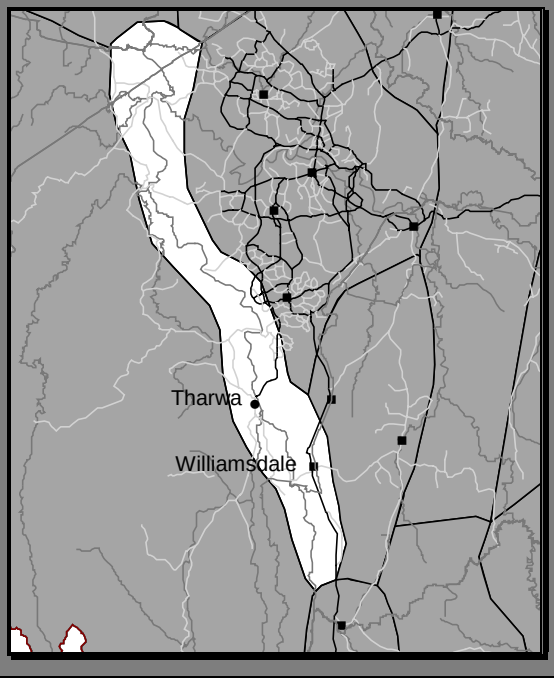
- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
This unit was formerly occupied by some of the most extensive Grassland plains in the region. Surrounding the Grasslands are extensive Box –Gum Woodlands on footslopes and Dry Forests on the hills.	The region's two largest urban centres, major transport networks, many conservation reserves (over 50% of ACT), one small nature reserve (Queanbeyan NR), rural grazing land (leasehold in ACT and freehold in NSW), pine plantations.
Vegetation status	**Endemic features**
Grasslands have been largely cleared and replaced by urban developments and infrastructure. Much of the surrounding Box-Gum Woodland remains, though part of this area in the ACT is occupied by rural land uses. Though somewhat fragmented by road networks, the dry forests are largely intact. Within the ACT section of this unit, substantial proportions of the remaining former extent of Grasslands, Box-Gum Woodlands and forests are protected within nature reserves. No large reserves exist to protect these communities in the NSW section of the unit. There are: • Samples of Grasslands and Box-Gum Woodlands of considerable diversity including the Barton and Majura Grasslands, Ainslie-Majura and Mulligans Flat nature reserves, Queanbeyan Nature Reserve and Woodlands at the Gale Precinct • Many secure Grassland and Box-Gum Woodland sites, and their associated threatened species in the ACT	This unit contains: • The only known regional populations of Grassland Earless Dragons. Other populations occur in the Monaro region to the south • The largest known regional populations of Striped Legless Lizard • The most frequently recorded sightings of Rosenberg's Monitor • The south-eastern-most and largest recorded sites of the Golden Sun Moth • The only known occurrence anywhere of Ginninderra Peppercress • One of only two known regional populations of Tarengo Leek Orchid and the only regional records of *Caladenia tessellata* (a spider orchid) • Populations of the Small Purple-pea (*Swainsona recta*), which is largely confined to this and the Royalla unit • Along with the adjacent Tharwa landscape unit, the largest known regional populations of Pale Pomaderris • The greatest number of populations of Button Wrinklewort • Several ACT and NSW records of Perunga Grasshopper (listed as threatened only in the ACT)

4. Canberra - Queanbeyan Landscape Unit - continued

Threatened and important species and endangered ecological communities	Planning and management issues
Plants: Pale Pomaderris, Button Wrinklewort, Tarengo Leek Orchid, Small Purple-pea, Silky Swainson-pea, Ginninderra Peppercress, Golden Moths Orchid, Hoary Sunray (white form), Australian Anchor-plant, *Caladenia tessellata* (a spider orchid) **Mammals:** Squirrel Glider, Spotted-tailed Quoll, Eastern Bent-wing Bat, Koala **Birds:** Blue-billed Duck, Latham's Snipe, Glossy Black-cockatoo, Superb Parrot, Swift Parrot, Grey-crowned Babbler (early records), Brown Treecreeper, Regent Honeyeater, Speckled Warbler, Olive Whistler, Hooded Robin, Diamond Firetail **Reptiles** and **frogs:** Pink-tailed Worm-lizard, Striped Legless Lizard, Grassland Earless Dragon, Rosenberg's Monitor **Invertebrates:** Golden Sun Moth, Perunga Grasshopper **Vegetation communities:** Natural Temperate Grassland, Yellow Box / Red Gum Grassy Woodland (ACT only), White Box - Yellow Box - Blakely's Red Gum Woodland (NSW only)	In this unit there are: • Urban developments that have occurred in valleys, and hence there has been significant loss of Grasslands and Box-Gum Woodland • Significant areas of Box-Gum Woodland and Grasslands that are secure within ACT reserves • A small area of Box-Gum Woodland secure in Queanbeyan NR • Conflicts between urban expansion needs and nature conservation priorities • Natural values suffering considerable degradation adjacent to urban areas by invasive environmental weeds • Major infestations of Chilean Needle-grass (especially in low-lying areas), African Love-grass and St John's Wort, and minor invasions of Serrated Tussock Consists primarily of planning settings A, B and D (urban areas) (See Part 5 of report).



5. Tharwa Landscape Unit

Planning and management guidelines

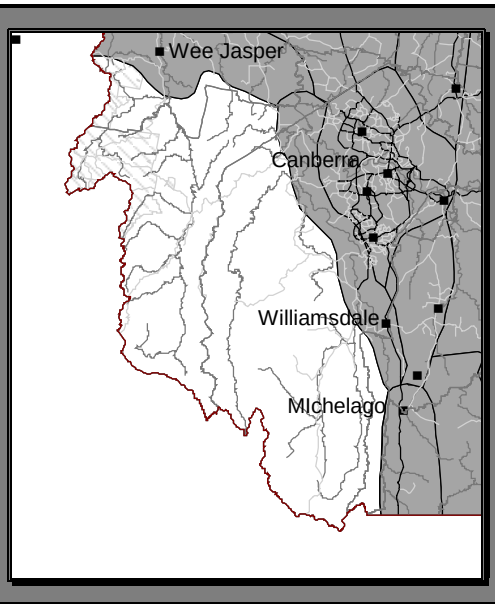
These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
This landscape unit is dominated by the Murrumbidgee River Corridor, and by Dry Forests and Box-Gum Woodlands, and a strip of Riparian Forest.	Urban expansion on fringes, a major transport corridor in part of unit, two small villages, minor areas of grazing, recreation (camping, bushwalking and picnicking), a major sewage treatment plant, several conservation reserves within the ACT.
Vegetation status	**Endemic features**
Some large areas of dry forest remain, though they are now highly fragmented. Many Box-Gum Woodlands have been highly modified or cleared but others retain a diverse flora and fauna. Large areas of riparian forest remain in the ACT section. There are: • Areas of Box-Gum Woodland and Riparian Forest within recreation and nature reserves in the ACT section	This unit contains: • The most densely recorded sites of Pink-tailed Worm-lizard within the region • Along with the High County Unit, the only other known regional population of Austral Toadflax • The only known occurrence anywhere of Tuggeranong Lignum • Along with the adjacent Canberra - Queanbeyan Unit, the largest regional populations of Pale Pomaderris
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Tuggeranong Lignum, Small Purple-pea, Pale Pomaderris, Austral Toadflax, Australian Anchor-plant **Mammals:** Eastern Bent-wing Bat **Birds:** Swift Parrot, Painted Honeyeater, Speckled Warbler, Brown Treecreeper, Hooded Robin, Diamond Firetail **Reptiles and frogs:** Rosenberg's Monitor, Pink-tailed Worm-lizard, Booroolong Frog **Vegetation communities:** Natural Temperate Grassland, Yellow Box / Red Gum Grassy Woodland (ACT only), White Box - Yellow Box - Blakely's Red Gum Woodland (NSW only)	In this unit there are: • Large areas secure within the ACT reserve system • Suburban areas encroaching into its fringes • Major invasions by African Love-grass Consists primarily of planning settings A and B (See Part 5 of report).



6. High Country Landscape Unit

Planning and management guidelines

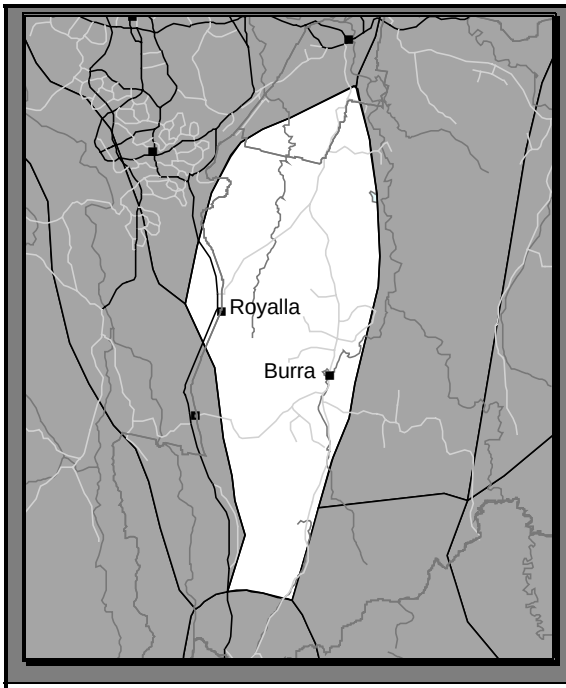
These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
A rugged landscape of foothills and mountains, largely covered by Dry and Wet Forests. The valleys are occupied by Montane Grasslands or Grassland-Woodland Mosaic. Higher areas are occupied by Montane Forests. Minor areas in the eastern and northern fringes are occupied by Box-Gum Woodlands.	Large national parks and nature reserves, grazing leases (ACT only), grazing on freehold lands (NSW only), pine plantations, forestry operations.
Vegetation status	**Endemic features**
Substantial areas of Dry, Wet and Montane Forest and Grassland-Woodland Mosaic remain. The Montane Grasslands are also relatively unmodified. The Dry Forests and Box-Gum Woodlands along the northern and eastern edges of the unit have been largely cleared. There are: • Extensive national parks and nature reserves conserving various Montane Grassland and Forest communities.	This unit contains: • The only regional records of Northern Corroboree Frog and Southern Corroboree Frog • The only regional records of records of montane mammals such as Yellow-bellied Glider, Smoky Mouse and Broad-toothed Rat • The only breeding populations of montane birds such as Olive Whistler and Pink Robin • The only known regional site for Baeuerlen's Gentian • The only regional records for montane plants such as Monaro Golden Daisy, Mauve Burr-daisy, Mountain Leafless Bossiaea, Spinning Top Gum and Leafy Anchor-plant • Along with the Tharwa Unit, the only other regional population of Austral Toadflax
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Baeuerlen's Gentian, Monaro Golden Daisy, Mauve Burr-daisy, Austral Toadflax, Spinning Top Gum, Silky Swainson-pea, Golden Moths Orchid, Mountain Leafless Bossiaea, Leafy Anchor-plant, Australian Anchor-plant **Mammals:** Koala, Tiger Quoll, Yellow-bellied Glider, Eastern False Pipistrelle, Broad-toothed Rat **Birds:** Powerful Owl, Glossy Black-cockatoo, Swift Parrot, Olive Whistler, Pink Robin, Hooded Robin, Brown Treecreeper, Speckled Warbler, Diamond Firetail **Reptiles** and **frogs:** Rosenberg's Monitor, Northern Corroboree Frog, Southern Corroboree Frog	In this unit there are: • Substantial areas secure within large national parks (Kosciuszko NP, Brindabella and Namadgi NPs), and a number of large nature reserves • Large areas occupied by pine plantations • Native forests that are subject to invasion of pine wildings from pine plantations • Forest areas that are subject to invasion by blackberries Consists primarily of planning settings B and C (See Part 5 of report).



7. Royalla Landscape Unit

Planning and management guidelines

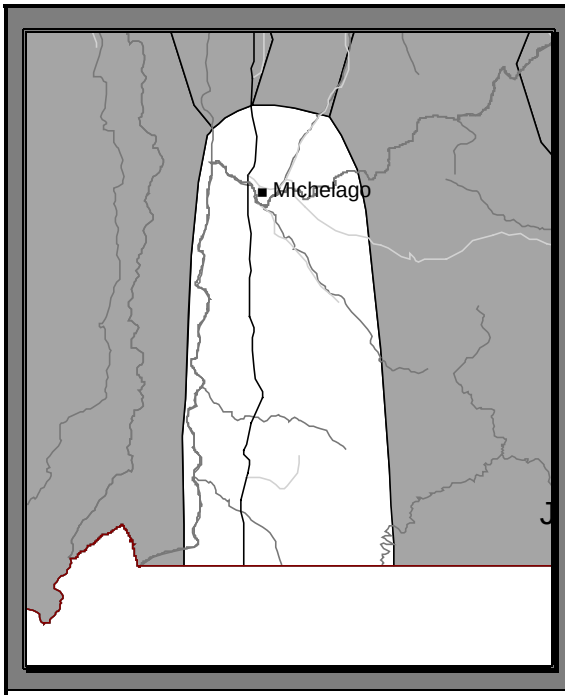
These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
Flats and undulating hills with Grasslands and Box-Gum Woodlands, and higher slopes occupied by Dry and Wet forests.	Grazing, a major transport corridor, rural subdivisions.
Vegetation status	**Endemic features**
Grasslands and Box-Gum Woodlands are highly modified and cleared. The Wet and Dry Forests are partly cleared. There are: • Samples of Grasslands and Box-Gum Woodlands of considerable diversity, including Royalla and Burra TSRs and a railway reserve.	This unit contains: • A population of Small Purple-pea, which is the country's largest, found in a railway reserve within the Unit. Within this region, this species is largely confined to this, and the adjacent Canberra-Queanbeyan Landscape Units
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Small Purple-pea, Silky Swainson-pea, Button Wrinklewort, Hoary Sunray (white form), Golden Moths Orchid, Michelago Parrot-pea **Mammals:** Koala, Spotted-tailed Quoll, Little Bent-wing Bat, Eastern Bent-wing Bat **Birds:** Latham's Snipe, Glossy Black-cockatoo, Diamond Firetail, Hooded Robin, Speckled Warbler, Brown Treecreeper **Reptiles** and **frogs:** Pink-tailed Worm-lizard, Rosenberg's Monitor, Giant Burrowing Frog, Green and Golden Bell Frog (early records), Southern Bell Frog (early records) **Vegetation communities:** Natural Temperate Grassland, White Box - Yellow Box - Blakely's Red Gum Woodland	In this unit there are: • Large areas occupied by rural subdivisions and further areas planned for development • A small area of Box-Gum Woodland proposed for addition to the NR system • A small, though highly significant area containing the Small Purple-pea which is secure within a VCA • Minor invasions of agricultural weeds, especially St John's Wort Consists primarily of planning settings A and B (See Part 5 of report).



8. Michelago Landscape Unit

Planning and management guidelines

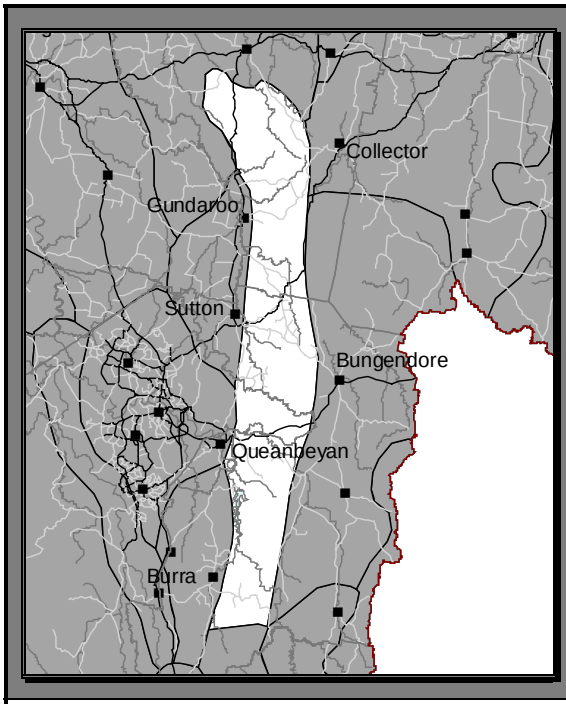
These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
Fringed by Dry and Wet Forests of the Namadgi NP and the Tinderry NR on either side, in the rainshadow valley of the Murrumbidgee, this northern extension of the Monaro Plains was formerly occupied by extensive Grasslands, fringed by minor areas of Box-Gum Woodlands and with Dry Forests on undulating hills.	Grazing, a major transport corridor, one village, minor rural residential development, quarries.
Vegetation status	**Endemic features**
Large areas of Grasslands are highly modified. The Box-Gum Woodlands and Dry Forests are partly cleared. There are: • Samples of Grasslands of considerable diversity on private lands in this unit.	This unit contains: • A newly discovered leek orchid (*Prasophyllum* sp. aff. *truncatum*) which was recently found on a rail easement; this species is found nowhere else • The largest populations of *Creeping Hopbush* in region • One of the region's few populations of Michelago Parrot-pea • The southernmost regional populations of Button Wrinklewort
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Creeping Hopbush, Michelago Parrot-pea, Silky Swainson-pea, Button Wrinklewort, Australian Anchor-plant **Birds:** Diamond Firetail, Hooded Robin **Reptiles and frogs:** Rosenberg's Monitor, Little Whip-snake **Vegetation communities:** Natural Temperate Grassland, White Box - Yellow Box - Blakely's Red Gum Woodland	In this unit there are: • Pressures from planned rural subdivisions • A small area secure within one of the largest Voluntary Conservation Agreements (VCA) within the region • Major invasions by Serrated Tussock and African Love-grass Consists primarily of planning settings B and C (See Part 5 of report).



9. Lake George Range Landscape Unit

Planning and management guidelines

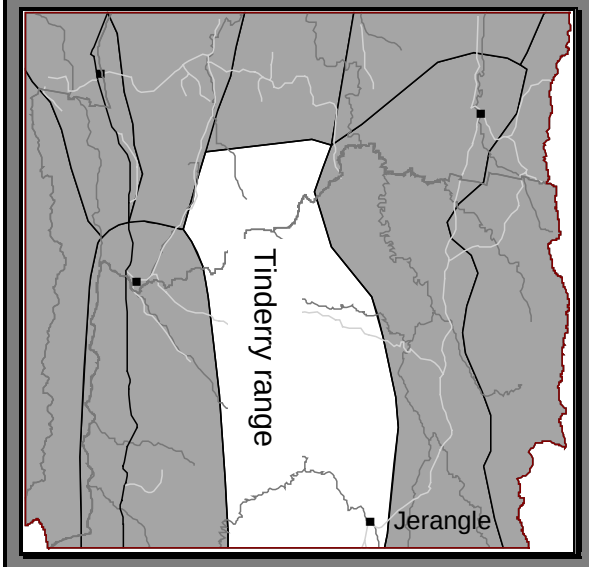
These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
Undulating hills with Dry Forests, and Box-Gum Woodlands and Grasslands occupying the lower parts of the landscape.	Light grazing, rural subdivisions, nature reserves and water catchment reserves, pine plantations, former gold mining
Vegetation status	**Endemic features**
Box-Gum Woodlands and Grasslands are largely cleared or modified. Dry Forests are cleared in places. There are: • Reserves, including the extensive area surrounding Googong Reservoir, Brooks Hill Reserve (a crown reserve), and several newly proclaimed nature reserves in the Queanbeyan area; and • Samples of Box-Gum Woodlands and Grasslands of considerable diversity, including Brooks Hill Reserve and various sites on private land.	This unit contains: • Populations of Rosenberg's Monitor and Hoary Sunray, which are features of this unit, with many of the regional records coming from this unit • The south-easternmost limit of the Golden Sun Moth • One of the few known sites in NSW of *Senecio macrocarpus* (a ragwort)
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Pale Pomaderris, Silky Swainson-pea, Small Purple-pea, Button Wrinklewort, Hoary Sunray (white form), Golden Moths Orchid, Australian Anchor-plant, *Senecio macrocarpus* (a ragwort) **Mammals:** Koala, Spotted-tailed Quoll, Eastern Pygmy-possum, Eastern Bent-wing Bat, Little Bent-wing Bat, Eastern False Pipistrelle **Birds:** Barking Owl, Superb Parrot, Latham's Snipe, Diamond Firetail, Hooded Robin, Speckled Warbler, Brown Treecreeper, Regent Honeyeater, Painted Honeyeater, Pink-tailed Worm-lizard **Reptiles** and **frogs:** Rosenberg's Monitor, Green and Golden Bell Frog (early records), Southern Bell Frog (early records) **Invertebrates:** Golden Sun Moth **Vegetation communities:** Natural Temperate Grassland, White Box - Yellow Box - Blakely's Red Gum Woodland	In this unit there are: • Long-established rural subdivisions in parts • Considerable pressures from newly proposed rural sub-divisions • Areas informally protected within Googong Reserve Brooks Hill Reserve. • Minor invasions of environmental weeds, including pine wildings from pine plantations • Minor invasions by Serrated Tussock and St John's Wort Consists primarily of planning setting B (See Part 5 of report).



10. Tinderry Range Landscape Unit

Planning and management guidelines

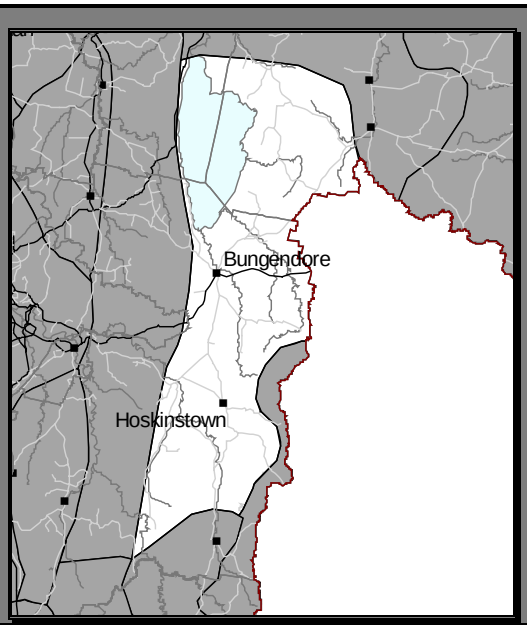
These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
Steep, mountains with Dry, Wet and Montane Forests and various sub-alpine plant communities.	Nature reserve, recreation uses, grazing on edges, a small village.
Vegetation status	**Endemic features**
Forests are largely uncleared, except along the edges of ranges. There are: • Large areas protected within Tinderry NR.	This unit contains: • Several endemic plant species including a daisy-bush (*Olearia montana*) and a wattle (*Acacia costiniana*)
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Pale Pomaderris, Golden Moths Orchid **Mammals:** Koala, Spotted-tailed Quoll, Eastern Pygmy Possum, Eastern False Pipistrelle, Eastern Bent-wing Bat **Birds:** Barking Owl	In this unit there are: • Significant areas are invaded by Serrated Tussock Consists primarily of planning setting C (See Part 5 of report).



11. Bungendore Landscape Unit

Planning and management guidelines

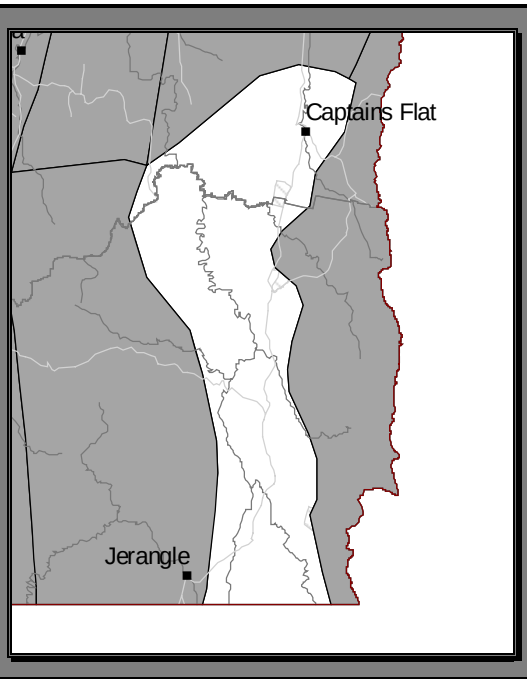
These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
This unit comprises undulating plains and low hills occupied by Grasslands, Grassland-Woodland Mosaic and Box-Gum Woodland. There are some low ranges occupied by Dry Forests.	Grazing, rural subdivisions, a small town, a village, turf farm, sand-mining, former minerals mining, a transport corridor.
Vegetation status	**Endemic features**
Grasslands and Box-Gum Woodlands are largely cleared or modified. The Dry Forest are partly cleared. There are: • Several samples of Grassland and Box-Gum Woodland of considerable diversity, including Sweeny's Reserve, Six-mile TSR and Duck Flat TSR; • One of the most floristically diverse Grassland sites (Turallo Grassland); a nature reserve is proposed to protect this high quality remnant; and • An ephemeral wetland of outstanding quality at Lake George.	This unit contains: • Lake George, a large ephemeral lake of high significance, which when full of water is habitat for a diversity of waterfowl • One of the two regional populations of *Wilsonia rotundifolia* (a wetland forb), which forms extensive populations on Lake George's bed when it is dry • One of very few NSW records of Perunga Grasshopper (listed as threatened only in the ACT) • The region's only known remnant population of the once widespread, and until recently thought to be regionally extinct Green and Golden Bell Frog • The region's largest number of records of the Little Whip-snake • The region's most important populations of Buttercup Doubletails
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Hoary Sunray (white form), Button Wrinklewort, Golden Moths Orchid, Buttercup Doubletails, Australian Anchor-plant, *Euphrasia scabra* (an early record), *Wilsonia rotundifolia* (a wetland forb) **Mammals:** Spotted-tailed Quoll, Koala, Eastern False Pipistrelle **Birds:** Australasian Bittern, Blue-billed Duck, Freckled Duck, Latham's Snipe, Superb Parrot, Powerful Owl, Diamond Firetail, Speckled Warbler, Hooded Robin **Reptiles:** Striped Legless Lizard, Little Whip-snake, Green and Golden Bell Frog **Vegetation communities:** Natural Temperate Grassland, White Box - Yellow Box - Blakely's Red Gum Woodland	In this unit there are: • Considerable pressures from rural and suburban sub-divisions near Bungendore • Low areas that are subject to major invasion by Chilean Needle-Grass, • Hilly areas that have minor invasions of Serrated Tussock and St John's Wort • Minor invasions of environmental weeds Consists primarily of planning settings B and D (See Part 5 of report).



12. Captains Flat Landscape Unit

Planning and management guidelines

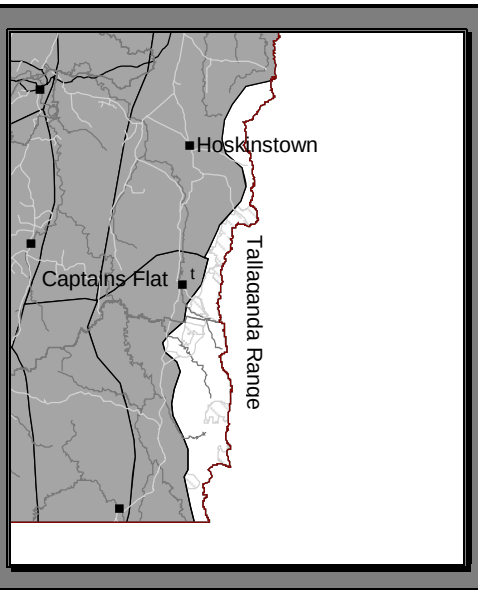
These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
Undulating hills with Grasslands and Grassland-Woodland Mosaic, higher slopes occupied by Dry and Wet Forests, fringed by Tinderry NR to the west and Tallaganda SF to east.	Grazing, a village, and former mineral mining.
Vegetation status	**Endemic features**
Grasslands and Grassland-Woodland Mosaic are modified and partly cleared. The Forests are largely uncleared. There are: • Samples of Grasslands and Grassland-Woodland Mosaic of considerable diversity, including Captains Flat Cemetery and some roadside reserves.	This unit contains: • One of the two regional populations of the Tarengo Leek Orchid (this and the following unit adjoin at the location for this species). • A newly discovered leek orchid (*Prasophyllum sp. nov.* Anembo) which was recently found on a roadside reserve; this species is not found anywhere else
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Tarengo Leek Orchid, Golden Moths Orchid, Hoary Sunray (white form), Australian Anchor-plant **Mammals:** Eastern Pygmy Possum, Spotted-tailed Quoll **Birds:** Powerful Owl, Regent Honeyeater, Brown Treecreeper, Speckled Warbler, Diamond Firetail, Hooded Robin **Vegetation communities:** Natural Temperate Grassland	In this unit there are: • Significant areas are invaded by Serrated Tussock • Minor pressures from rural subdivisions Consists primarily of planning settings B, C and D (See Part 5 of report).



13. Tallaganda Landscape Unit

Planning and management guidelines

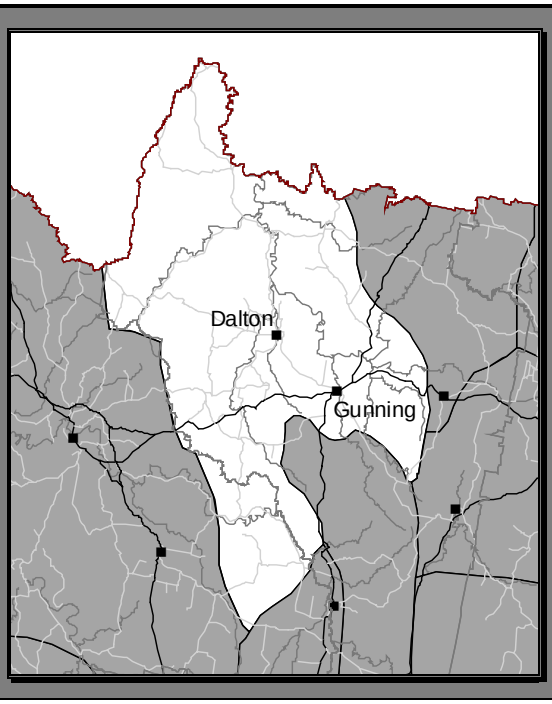
These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
Hill and mountain landscapes with Dry and Wet Forests.	Forestry operations (State Forest), a national park and associated recreation.
Vegetation status	**Endemic features**
Forests are largely intact, though are subject to continuing forestry operations. There are: • Large areas secure within Tallaganda NP.	This unit contains: • Important habitat for the Spotted-tailed Quoll • One of the two regional populations of the Tarengo Leek Orchid (this and the previous unit adjoin at the location for this species)
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Tarengo Leek Orchid, Buttercup Doubletails **Mammals:** Spotted-tailed Quoll **Birds:** Powerful Owl, Olive Whistler	In this unit there are: • Continuing forestry operations in parts Consists primarily of planning setting C (See Part 5 of report).



14. Gunning Landscape Unit

Planning and management guidelines

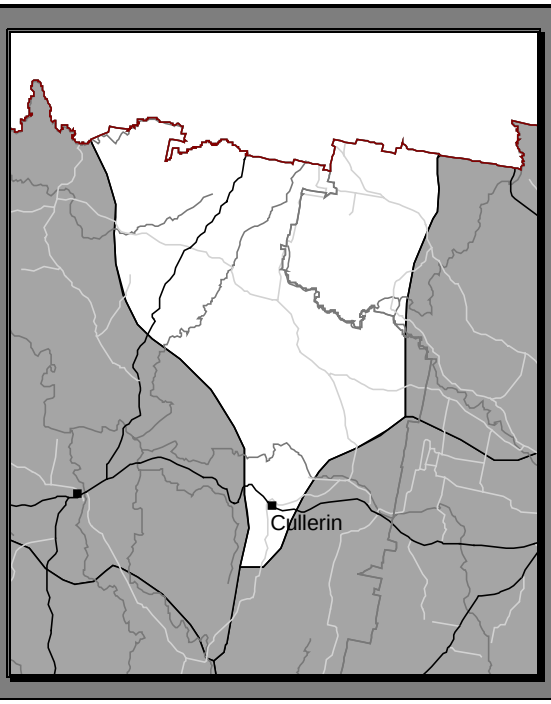
These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
Bounded in the west by Mundoonen NR, this unit contains low, undulating ridges with Dry Forests, interspersed with lower hills and valleys supporting Box-Gum Woodlands and Grasslands.	Grazing, a major transport corridor, a small town, a village, and a nature reserve.
Vegetation status	**Endemic features**
Dry Forests and Box-Gum Woodlands are partly cleared. Grasslands are largely cleared or modified. There are: • Several samples of Box-Gum Woodlands of considerable diversity, including Dalton Cemetery and Broadway TSR; and • Dry Forests conserved within Mundoonen NR, the largest nature reserve in this part of the region.	This unit contains: • The eastern-most unit in the region with records of Yass Daisy • The eastern-most known record of *Rutidosis multiflora* (a tiny annual wrinklewort)
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Yass Daisy, Hoary Sunray (white form), Golden Moths Orchid, *Rutidosis multiflora* (a tiny annual wrinklewort) **Mammals:** Eastern Pygmy-possum **Birds:** Superb Parrot, Brown Treecreeper, Hooded Robin, Speckled Warbler, Regent Honeyeater, Diamond Firetail **Reptiles** and **frogs:** Pink-tailed Worm-lizard, Little Whip-snake **Invertebrates:** Golden Sun Moth **Vegetation communities:** Natural Temperate Grassland, White Box - Yellow Box - Blakely's Red Gum Woodland	In this unit there are: • Minor pressures from rural subdivisions • Small areas of invasion by agricultural weeds, especially Serrated Tussock Consists primarily of planning settings D and B (See Part 5 of report).



15. Cullerin Landscape Unit

Planning and management guidelines

These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
An extension of the Lake George Range to the south, this unit contains a low range with Dry Forests and Box-Gum Woodlands, with small areas of Grassland formerly occupying the low valleys and basalt plateau. Also formerly contained small areas of Wet forests.	Grazing, a major and a minor transport corridor, a small village.
Vegetation status	**Endemic features**
The Wet Forests have been largely cleared. Dry Forests and Box-Gum Woodlands are partly cleared and Grasslands are largely cleared or modified. There are: • A number of samples of Box-Gum Woodland of considerable diversity, including McCabes and Hearley's TSRs.	This unit contains: • The region's only other basalt landscape (see Taralga)
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Golden Moths Orchid **Mammals:** Koala **Birds:** Superb Parrot, Hooded Robin, Speckled Warbler, Diamond Firetail **Vegetation communities:** Natural Temperate Grassland, White Box - Yellow Box - Blakely's Red Gum Woodland	Planning and management issues have not been identified for this unit, due to limitations relating to lack of survey data. Consists primarily of planning settings D and B (See Part 5 of report).

16. Taralga Landscape Unit

Planning and management guidelines

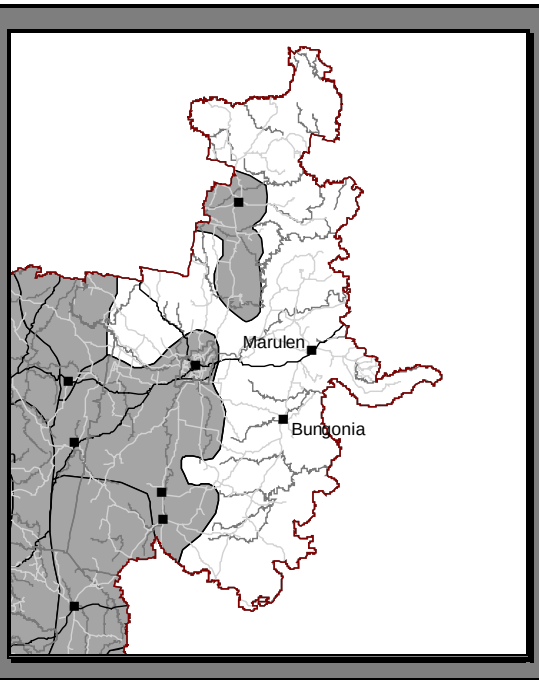
These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
Upland plateau of basalt, and undulating ridges of sedimentary origin with the rugged ranges of Tarlo River NP to the east. Characteristic vegetation types are Grasslands, Grassland-Woodland Mosaic and Box-Gum Woodlands on the basalts and Dry Forests on the ridges.	Grazing, a small town, a minor transport corridor.
Vegetation status	**Endemic features**
Grasslands, Grassland-Woodland Mosaic and Box-Gum Woodlands are largely cleared or modified. There are: • Samples of Grassland, Grassland-Woodland Mosaic and Box-Gum Woodlands of considerable diversity, including a unique remnant Grassland on basalt at Cowpers Creek TSR and the low lying Box-Gum Woodland at Taralga TSR.	This unit contains: • The region's most extensive basalt landscape, which support grasslands that resemble the Monaro Basalts to the south of the region
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Golden Moths Orchid, Hoary Sunray (white form) **Vegetation communities:** Natural Temperate Grassland, White Box - Yellow Box - Blakely's Red Gum Woodland **Note:** This unit has few records of threatened species as few studies have been undertaken here. Threatened species that are likely are those from the adjacent Marulan Landscape Unit.	Planning and management issues have not been identified for this unit, due to limitations relating to lack of survey data. Consists primarily of planning settings D and B (See Part 5 of report).



17. Marulan Landscape Unit

Planning and management guidelines

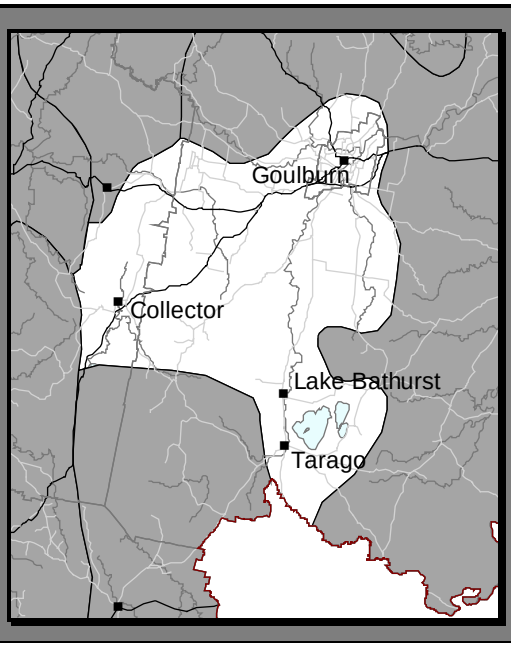
These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
Low ranges and extensive plains with Dry Forests, Box-Gum Woodlands, Grasslands and Grassland-Woodland Mosaic, fringed by the gorges of the Shoalhaven River to the east.	Grazing, two small towns, several villages, a major transport corridor, a number of national parks and nature reserves.
Vegetation status	**Endemic features**
The Dry Forests are partly cleared and the Box-Gum Woodlands and Grasslands are largely cleared or modified. There are: • Samples of Box-Gum Woodland and Grassland -Woodland Mosaic of considerable diversity, including Halfway, South's and Miller's TSRs; and • Areas secure within several nature reserves and national parks, including Bungonia State Recreation Area.	This unit contains: • Karst landscapes within the Bungonia State Recreation Area • The region's second-most extensive remaining forest ecosystems (after the High Country Landscape Unit) • The only known regional populations of Brush-tailed Rock-wallaby • The greatest diversity of threatened bat species in region • One of the three known sites of the endangered Mongarlowe Mallee • The only regional populations of the threatened Cotoneaster Pomaderris, Tallong Midge Orchid, Molyneaux's Grevillea and Windellama Bossiaea • Along with Goulburn Landscape Unit, one of two where Dwarf Kerrawang occurs
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Cotoneaster Pomaderris, Tallong Midge Orchid, Molyneaux's Grevillea, Hoary Sunray (white form), Mongarlowe Mallee, Michelago Parrot-pea, Golden Moths Orchid, Buttercup Doubletails, Windellama Bossiaea **Mammals:** Brush-tailed Rock-wallaby, Koala, Yellow-bellied Glider, Squirrel Glider, Spotted-tailed Quoll, Eastern Bent-wing Bat, Eastern False Pipistrelle, Greater Broad-nosed Bat, Large-footed Myotis, Large-eared Pied Bat **Birds:** Australasian Bittern, Glossy Black-cockatoo, Masked Owl, Powerful Owl, Speckled Warbler, Regent Honeyeater, Hooded Robin, Brown Treecreeper, Diamond Firetail, Black-chinned Honeyeater **Reptiles** and **frogs:** Little Whip-snake, Green and Golden Bell Frog (early records) **Vegetation communities:** Natural Temperate Grassland, White Box - Yellow Box - Blakely's Red Gum Woodland	In this unit there are: • Major pressures from rural subdivisions. Other planning and management issues have not been identified for this unit, due to limitations relating to lack of survey data. Consists primarily of planning settings B, C and D (See Part 5 of report).



18. Goulburn Landscape Unit

Planning and management guidelines

These guidelines summarise important biodiversity information for land within this landscape unit.

The information can be used to assist in:

- **Deciding where and how to develop land**
- **Assessing development proposals**
- **Guiding management of land**

Note: Information for each unit will be updated over time

Description	**Land uses**
Largely defined by extensive, flat plains and rimmed and bisected by low to medium ranges, this unit also contains two ephemeral lakes. Low hills are dominated by Dry Forests. Several areas support Box-Gum Woodlands. Grasslands or Grassland-Woodland Mosaic occupies the major part of the region.	A major city, several small villages, rural sub-divisions, a major transport link, grazing, one small Crown reserve (Alison Hone Reserve).
Vegetation status	**Endemic features**
Dry forests on the ranges are partly cleared and fragmented. The Box-Gum Woodlands and Grassland-Woodland Mosaic have been severely cleared or modified. The Grasslands are highly cleared, modified and fragmented. There are: • Several samples of Box-Gum Woodland and Grassland of exceptional diversity and integrity, including the outstanding Gundary TSR and Woodland at Kenmore Dam; • Other excellent examples of Box-Gum Woodland, Grassland and Grassland Woodland are at Collector and Lerida TSRs, Rose Lagoon and Tarago Cemetery; and • Wetlands of outstanding quality at Rose Lagoon, Breadalbane, Lake Bathurst and the Morass.	This unit contains: • Two ephemeral lakes of considerable significance for wildlife • The northernmost regional population of Striped Legless Lizard • One of the largest, and the northernmost known population of Button Wrinklewort • The northern-most and quite isolated population of Creeping Hopbush • Along with Marulan, one of the two regional populations of Dwarf Kerrawang • Along with Bungendore, one of the two regional populations of *Wilsonia rotundifolia* (a wetland forb)
Known threatened and important species and endangered ecological communities	**Planning and management issues**
Plants: Button Wrinklewort, Buttercup Doubletails, Creeping Hopbush *Wilsonia rotundifolia*, Dwarf Kerrawang, Golden Moths Orchid, Hoary Sunray (white form), Australian Anchor-plant **Mammals:** Koala, Eastern Quoll (old records), Bilby (a dubious old record) **Birds:** Blue-billed Duck, Freckled Duck, Magpie Goose, Australasian, Plains-wanderer (an old record), Latham's Snipe, Australasian Bittern, Glossy Black-cockatoo, Superb Parrot, Powerful Owl, Speckled Warbler, Hooded Robin, Brown Treecreeper, Regent Honeyeater, Diamond Firetail **Reptiles** and **frogs:** Rosenberg's Monitor, Striped Legless Lizard, Green and Golden Bell Frog (old records) **Vegetation communities:** Natural Temperate Grassland, White Box - Yellow Box - Blakely's Red Gum Woodland	In this unit there are • considerable peri-urban and rural sub-division pressures surrounding the city of Goulburn Consists primarily of planning settings D and B (See Part 5 of report).

9.3 Key to regional ecological planning settings map (Map P4)

Planning setting A *Areas of known conservation importance*	
Description (map key)	Areas of known conservation importance (endangered ecological communities and/or threatened species habitat).
Setting characteristics	Areas known to contain listed endangered ecological communities and threatened species habitat (Grassland and Box-Gum Woodland ecosystems). Setting shows all areas known to be listed endangered ecological communities (White Box - Yellow box - Blakely's Red Gum Woodland, Yellow Box/ Red Gum Grassy Woodland and Natural Temperate Grassland), and sites where listed threatened flora and fauna species are known to exist.
Suggested planning and development principles	Areas important for conservation, which should be appropriately managed in cooperation with landowners or land managers (includes some areas within national parks and nature reserves which are currently conserved). There should be minimal development if any, land use changes or site disturbance. If any further land subdivision or development is to occur it must proceed with extreme care and would require detailed scientific assessment. Management plans and conservation incentives should be encouraged.
Map limitations	Areas mapped within this setting are highly accurate. However, the data sets are incomplete due to lack of comprehensive surveying in many areas therefore it is probable that other setting A areas occur within the region. Identified sites on freehold land (NSW) and roadside reserves, and threatened species locations are shown as point locations (6.25 ha areas) to enable presentation at the scale of the maps showing the entire region. Some areas on freehold land are mapped to their cadastral boundaries, and, in some cases, extensive field checking has been undertaken within these sites. ACT Natural Temperate Grasslands and Yellow Box/ Red Gum Grassy Woodland areas are from the relevant ACT action plans. NSW endangered ecological community sites on Crown lands (eg. VCLs and TSRs) are modelled to relevant ERIC categories within the cadastral boundaries of the sites).

Key to regional ecological planning settings map (Map P4) - continued

Planning setting B *Areas of predicted conservation importance*	
Description (map key)	Areas predicted to contain endangered ecological communities and threatened species habitat (for those species identified as having the highest priority in the context of the planning framework).
Setting characteristics	Areas likely to contain listed endangered ecological communities and threatened species habitat (Grassland and Box-Gum Woodland ecosystems). Derived from modelled distributions of endangered ecological communities and threatened species occurring in grassland and woodland ecosystems. Note that models are predictions only. The accuracy of the prediction of endangered ecological communities is variable, and good for threatened species habitat. Includes areas other than identified as planning setting A and predicted by modelling to contain listed endangered ecological communities and/or habitat for listed threatened fauna species. The states and conditions of sites containing endangered ecological communities, and the quality of habitats are variable. Prediction of endangered ecological communities is based on modelling of remote sensing data for Grassland and Box-Gum Woodland ecosystems, and includes known and modelled distributions of communities. These communities are White Box - Yellow Box - Blakely's Red Gum Woodland (NSW), Yellow Box/ Red Gum Grassy Woodland (ACT), and Natural Temperate Grasslands (NSW and ACT). The models are based on the distribution of pre-1750 and extant native vegetation (Maps P1 and P2). Areas modelled as likely to provide habitat for threatened species are derived from modelled distributions of Grassland and Box-Gum Woodland ecosystems and threatened species occurring in these ecosystems. Modelling is based on species records, modelling of extant native vegetation and the distribution of the following selected fauna species: Hooded Robin, Speckled Warbler, Diamond Firetail, Rosenberg's Monitor, Grassland Earless Dragon, Striped Legless Lizard, Pink-tailed Worm-lizard and Golden Sun Moth. Note that not all threatened species are included, since expected habitat is believed to be either substantially included within an endangered ecological community, and/or to overlap with the modelled selected species, and/or to rely on habitat conserved within national parks and nature reserves.
Suggested planning and development principles	Areas important for conservation, which should be appropriately managed in cooperation with landowners and/or managers (includes some areas within national parks and nature reserves which are currently conserved. There should be minimal development, land use change or site disturbance. Any further land subdivision or development that is to occur must only proceed with care and requires evaluation and scientific assessment. Management plans and conservation incentives should be encouraged. May be important for rehabilitation. Field checking is required to determine: 1. whether the site contains an endangered ecological community 2. if so, what state or condition this is in, and 3. value of the site as habitat for threatened species.
Map limitations	Because vegetation and threatened species models are predictions only, it is possible that some areas predicted to be endangered ecological communities may be another community and the habitat present may not represent threatened species habitat. Accuracy of areas of predicted threatened species habitat is very good for areas in ACT predicted to be Yellow Box - Blakely's Red Gum Woodland, fair for areas predicted to be White Box - Yellow box – Blakely's Red Gum Woodland in NSW, and variable for Natural Temperate Grassland. Validation of predictions is required, with further investigation of natural habitat values normally required prior to making land use decisions.

Key to regional ecological planning settings map (Map P4) - continued

Planning setting C *Areas of uncertain importance for biodiversity conservation - more investigation required*

Description (map key)	1. Areas containing forest ecosystems that may contain threatened species habitat and/or minor areas of endangered ecological communities (models for threatened forest fauna were not prepared as part of this project). 2. Areas not covered by the vegetation and threatened species models derived from the remote sensing data (may contain threatened species habitat and/or endangered ecological communities).
Setting characteristics	This setting includes areas with potential to be endangered ecological communities or threatened species habitat. Requires further investigation. Planning setting shows land not included within settings A, B, or D mainly because: 1. it largely contains forested ecosystems or small areas of endangered ecological communities, or 2. a lack of ERIC remote sensing mapping and modelling (in the northwest and northeast of region), and therefore an inability to undertake sufficient modelling, as in Setting B. Includes areas with ecosystems other than Grassland and Box-Gum Woodland where endangered ecological communities and threatened species habitat were not modelled (usually containing Dry or Wet Forests, though may contain minor areas of Grassland and Box-Gum Woodland in the lower parts of landscapes), and areas with a lack of data available for modelling. Areas within this unit are predicted to contain native vegetation that is not habitat for those threatened species used in the models in settings A or B. Listed endangered ecological communities are less likely to occur, though areas supporting paddock trees, especially those of the White Box - Yellow Box - Blakely's Red Gum Woodland may support Superb Parrots, Regent Honeyeaters and other threatened species. No models for threatened forest fauna are included, and these species may occur within this setting.
Suggested planning and development principles	Requires more adequate field survey prior to making development decisions. May have threatened species and contain important areas for rehabilitation to maintain connectivity of natural ecosystems. Development may be suitable, subject to criteria outlined for landscape units. Further fragmentation of natural ecosystems should be avoided, impacts on adjacent areas of conservation importance minimised and development designed to maintain and enhance biodiversity values.
Map limitations	These areas contain natural habitat values and require further detailed investigation, especially for the purpose of maintaining regional habitat connectivity. Though modelling has not been undertaken for these areas, it is possible that some areas may support threatened species (especially forest-dependent species) and may include small areas of listed endangered ecological communities. Further investigations of natural habitat values will normally be required prior to land use decisions being made. Accuracy of information is variable within this setting is as follows: 1. The forest ecosystems are based on CRA mapping, and the accuracy of the extent is high. 2. Accuracy of information for non-forested landscapes in the north-west and north-east of the region not covered by remote sensing data and modelling is very low, and requires validation.

Key to regional ecological planning settings map (Map P4) - continued

Planning setting D *Areas likely to have limited conservation values*	
Description (map key)	Areas known or predicted to have relatively limited natural habitat values (may contain isolated trees or clumps of trees that provide habitat for threatened species as well as small areas of Native Grassland)
Setting characteristics	Areas known or predicted to have relatively limited natural habitat values. Setting shows areas from which native vegetation has mostly been cleared. These include urban areas, or land managed largely for production purposes (eg. pine forest, cultivation or exotic pastures), likely to have no or minimal conservation importance. However, may include habitat elements important for some threatened species (eg. small patches of Native Grassland, isolated individuals or clumps of paddock trees, Box-Gum Woodlands with an exotic groundlayer, or Grassland and Box-Gum Woodland remnants within forest plantations).
Suggested planning and development principles	Consideration of natural ecosystems will be a secondary consideration in decision-making. Development should take into account important threatened species habitat elements where applicable (as provided in landscape unit guidelines).
Map limitations	Some areas, particularly pastures dominated by exotic grassland, still retain either native tree cover which may provide important natural habitat values for species such as the Superb Parrot, or small areas of Native Grassland. Other small remnants of Grassland and Box-Gum Woodland remnants may exist within this setting, but are not detectable in the maps. Further investigations of natural habitat values will normally be required prior to land use decisions being made. Overall accuracy is reasonable.

Notes:

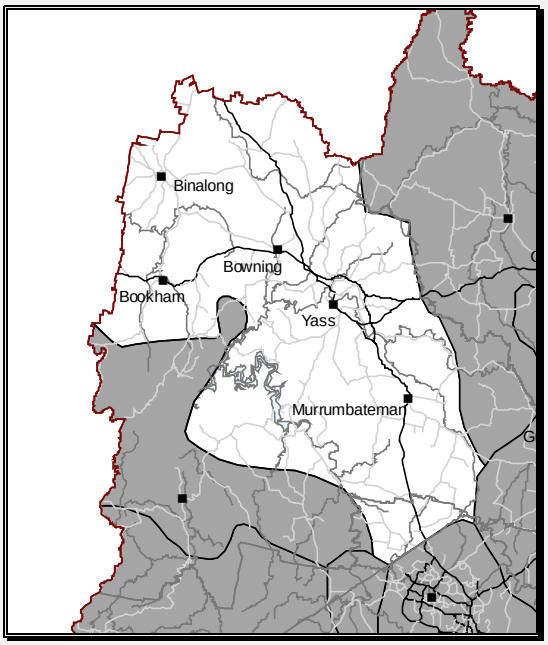
1 Different ecological planning settings represent different levels of certainty of data.

2 The resolution of the map units is at an accuracy of 25m X 25m on the ground.

3 Data has been developed on a computer-based GIS system, which is capable of presenting the information at variable scales.

9.4 Draft indicative example of Landscape Unit Guidelines

Assessment & Land Management Guidelines for the Yass Landscape Unit



Key Issues in the Yass Landscape Unit

- Major areas have been cleared. Riparian and roadside vegetation provide an essential biodiversity resource.
- The reserve system is unrepresentative of the various ecosystems that occur within the Unit.
- There are major pressures from rural subdivisions around Yass and Murrumbateman
- Substantial areas are being developed as vineyards.
- There is a significant dryland salinity problem within this unit.
- Minor areas of tree die-back
- Minor infestations of Chilean Needle-grass occur in low areas

Recommended response to managing landscape features or broad environmental issues in the Yass Landscape Unit

Feature or issue	Recommended action or response
Bushrock collection	▪ Do not permit commercial bushrock collection within areas predicted to be habitat for Striped Legless Lizard or Pink-tailed Worm Lizard. ▪ Encourage use of quarried rock rather than bushrock in landscaping, construction and erosion control work.
Dryland salinity	▪ No further clearing of native vegetation in salinity susceptible areas ▪ Identify the maximum sustainable number of dams
Firewood collection	▪ Strictly police illegal firewood collection from roadside vegetation, Travelling Stock Reserves, Council Reserves and other public land. ▪ Ensure that fire-wood collectors are aware of their obligations to protect threatened species and their habitat under the NP& Wildlife Act
Riparian vegetation	▪ No further clearing of native riparian vegetation ▪ Remove weeds ▪ Minimise entry of stock into riparian areas ▪ Use as target for revegetation/rehabilitation programs using locally indigenous species
Roadside vegetation	▪ Roadside vegetation often supports threatened species or endangered ecological communities. Identify their natural values and protect from disturbance during roadworks or weed-control programs. ▪ Avoid any action that removes dead trees or fallen timber. ▪ Use as target for revegetation/rehabilitation programs using locally indigenous species. ▪ Undertake Unit-wide audit of the biodiversity values of roadside vegetation and derive a roadside vegetation management plan.

Recommended management actions or response of decision making authorities with regard to threatened species and endangered ecological communities in the Yass Landscape Unit	
Species or community	**Recommended action or response**
Birds: Brown Treecreeper	**Known populations** ▪ Impacts should be considered on a case-by-case basis via the 8 part test ▪ Avoid any action that removes dead trees or fallen timber ▪ A covenant on ownership of cats should be placed on any new developments in or adjacent to areas known to support species. **Impact assessment** ▪ Targeted survey should be undertaken in suitable habitat (woodlands) as part of the development/activity approval process
Diamond Firetail	**Known populations** ▪ Impacts should be considered on a case-by-case basis via the 8 part test ▪ A covenant on ownership of cats should be placed on any new developments in or adjacent to areas known to support species. ▪ Protect populations from inappropriate grazing regimes **Impact assessment** ▪ Targeted survey should be undertaken in suitable habitat (woodlands) as part of the development/activity approval process
Grey-crowned Babbler	**Known populations** ▪ Very rare. Only some forms of development or activities may be compatible with the protection of these populations, therefore they must be very carefully considered. Any impact on known habitat is likely to be significant therefore a SIS will be required. ▪ A covenant on ownership of cats should be placed on any new developments in or adjacent to areas known to support species. **Impact assessment** ▪ Targeted survey should be undertaken in suitable habitat (grassy woodlands) as part of the development/activity approval process
Hooded Robin	**Known populations** ▪ Very rare. Only some forms of development or activities may be compatible with the protection of these populations, therefore they must be very carefully considered. Any impact on known habitat is likely to be significant therefore a SIS will be required. ▪ Avoid any action that removes dead trees or fallen timber ▪ A covenant on ownership of cats should be placed on any new developments in or adjacent to areas known to support species. **Impact assessment** ▪ Targeted survey should be undertaken in suitable habitat (partially cleared or open dry forest, grassy woodland) as part of the development/activity approval process
Speckled Warbler	**Known populations** ▪ Impacts should be considered on a case-by-case basis via the 8 part test ▪ Avoid any action that removes dead trees or fallen timber ▪ A covenant on ownership of cats should be placed on any new developments in or adjacent to areas known to support species. **Impact assessment** ▪ Targeted survey should be undertaken in suitable habitat (woodlands) as part of the development/activity approval process
Superb Parrot	▪ Protect all nest trees (living and dead) and protect adequate numbers of future nest trees of the appropriate species by retaining trees of all age classes. ▪ Any hollow-bearing tree that must be removed must be surveyed for use by Superb Parrots in the nesting season. ▪ Use known nest sites as targets for revegetation/rehabilitation programs using locally indigenous species.

Species or community	Recommended action or response
Invertebrates: Golden Sun Moth	**Known populations** ▪ All sites should be protected from changes in land use or direct disturbances such as ploughing; no sort of development is likely to be compatible. Any impact on the species or the site is likely to be significant therefore a Species Impact Statement (SIS) will be required. · **Impact assessment** ▪ Targeted survey should be undertaken in suitable habitat (wallaby grasses within native grasslands or grassy woodlands) within range of species as part of the development/activity approval process
Mammals: Koala	**Known populations** ▪ Only a few populations are known. Only some forms of development or activities may be compatible with the protection of these populations, therefore they must be very carefully considered. Any impact on known habitat is likely to be significant therefore a Species Impact Statement (SIS) will be required. ▪ Areas known to support species must be protected from wildfire preferably with perimeter burns. Fuel management programs must be conducted in a manner that does not result in crown scorch. ▪ The loss of preferred browse tree species must be avoided. ▪ A covenant on ownership of dogs should be placed on any new developments in or adjacent to areas known to support species. ▪ Support or enhance feral predator control in and adjacent to known populations. ▪ Actions that fragment known habitat must be avoided. ▪ Promote the use of locally indigenous Koala Browse species in replanting and revegetation where appropriate. **Impact assessment** ▪ Targeted survey should be undertaken in suitable habitat (woodland or forest with preferred browse species) as part of the development/activity approval process**.**
Microchiropteran bats including: Eastern Bent-wing Bat Little Pied Bat	▪ Avoid any action that removes hollow-bearing trees or dead trees. ▪ Any hollow-bearing tree that must be removed must be surveyed to determine if it is used as a roost site by bats. ▪ Protect all roost trees (living and dead) and provide for future roost trees by retaining trees of all age classes.
Plants: Silky Swainson-pea	**Known populations** ▪ Only a few populations are known. Only some forms of development or activities may be compatible with the protection of these populations, therefore they must be very carefully considered. Any impact on the species or the site is likely to be significant therefore a Species Impact Statement (SIS) will be required. ▪ Protect populations from inappropriate grazing regimes **Impact assessment** ▪ Targeted survey should be undertaken in suitable habitat (grassland, grassy woodland) within this landscape unit as part of the development/activity approval process.
Yass Daisy	**Key populations identified in Recovery Plan** ▪ Only some forms of development or activities may be compatible with the protection of these populations, therefore they must be very carefully considered. Any impact on the species or the site is likely to be significant therefore a Species Impact Statement (SIS) will be required. ▪ Protect populations from inappropriate grazing regimes **Other populations** ▪ Impacts on other populations should be considered on a case-by-case basis via the 8 part test ▪ Protect populations from inappropriate grazing regimes **Impact assessment** ▪ Targeted survey should be undertaken in suitable habitat (dry forest, grassy woodland, secondary grassland) within this landscape unit as part of the development/activity approval process

Species or community	Recommended action or response
Reptiles: Pink-tailed Worm Lizard	**Known populations** ▪ Very rare. Only some forms of development or activities may be compatible with the protection of these populations, therefore they must be very carefully considered. Any impact on the species or the site is likely to be significant therefore a SIS will be required. · ▪ Do not permit commercial bushrock collection within areas predicted habitat. ▪ A covenant on ownership of cats should be placed on any new developments in or adjacent to areas known to support species. **Impact assessment** ▪ Targeted survey should be undertaken in suitable habitat (native grasslands) within this landscape unit as part of the development/activity approval process.
Striped Legless Lizard	**Known populations** ▪ Very rare. Only some forms of development or activities may be compatible with the protection of these populations, therefore they must be very carefully considered. Any impact on the species or the site is likely to be significant therefore a SIS will be required. · ▪ Do not permit commercial bushrock collection within predicted habitat. ▪ A covenant on ownership of cats should be placed on any new developments in or adjacent to areas known to support species. **Impact assessment** ▪ Targeted survey should be undertaken in suitable habitat (native grasslands) within this landscape unit as part of the development/activity approval process.
Other species: Tarengo Leek Orchid, Australian Anchor-plant, Eastern Pygmy-possum, Spotted-tailed Quoll, Square-tailed Kite, Powerful Owl, Boorolong Frog	All of these species have been recorded within the Yass Landscape Unit but are unlikely to be encountered within development areas. Should they be recorded in such areas, the NSW National Parks and Wildlife Service should be consulted.
Communities: Natural Temperate Grassland of the Southern Tablelands of NSW & ACT (an Endangered Ecological Community)/	▪ All sites should be protected from changes in land use or direct disturbances such as ploughing; no sort of development is likely to be compatible. ▪ Apply prescriptions/covenants to avoid use of environmental weeds (eg. those listed in the ACT Weed Strategy) in area in or adjacent to development. ▪ Protect remnants from inappropriate grazing regimes ▪ In the assessment and planning stages, consider whether the site may be important for buffering or linking other sites of NTG, Box-Gum Woodland or other remnants, or whether the site, though of relatively low diversity, is important regionally because it is of a type poorly represented in the landscape unit.
White Box - Yellow Box - Blakely's Red Gum Woodland (an Endangered Ecological Community)	**(i) Structurally and floristically diverse remnants or (ii) remnants with a structurally diverse upper layer which constitutes high value fauna habitat but with a ground cover of poor quality or exotic, (iii) remnants with an upper layer wholly or largely cleared but with a floristically diverse ground layer** ▪ All sites should be protected from changes in land use or direct disturbances such as ploughing; no sort of development is likely to be compatible. Any impact on the community is likely to be significant therefore a Species Impact Statement (SIS) will be required. · ▪ Apply prescriptions/covenants to avoid use of environmental weeds (eg. those listed in the ACT Weed Strategy) in area in or adjacent to development. ▪ Apply a covenant on ownership of cats in or adjacent to areas known to support the community ▪ Protect remnants from inappropriate grazing regimes. **(iv) Upper layer structurally simple (even age stand, no hollows), ground layer native grasses but with low diversity, (v) upper layer wholly or largely cleared but with a native grasses ground cover with low diversity or (vi) Isolated trees in exotic pasture or cropped land** ▪ Impacts should be considered on a case-by-case basis via the 8 part test ▪ Apply prescriptions/covenants to avoid use of environmental weeds (eg. those listed in the ACT Weed Strategy) in area in or adjacent to development. ▪ Protect remnants from inappropriate grazing regimes. ▪ In the assessment, planning and management stages, apply appropriate measures to enhance habitat (compensatory habitat) by fencing, plantings and linking or buffering of sites.

9.5 Metadata statement

This appendix is a copy of the NSW National Parks and Wildlife Service metadata information identifying data from which the maps supporting the planning framework were prepared (NPWS Queanbeyan office reference G:\workdir\tsu\sthn_tablelands\). Information is organised according to subject, and includes data supplied by Environment ACT and other agencies for this project.

1. Administration

File name	Description	Derivation	Preparation date
Eric_bndry.shp	Boundary for ERIC image analysis	"Remote Sensing Detection of Native Grasslands using Multi-Image Spectral Analysis - Raster Layers and final report" by Environmental Research and Information Consortium Pty Ltd (ERIC)	September 2001
Stdyarea_bndry.shp	Conservation Strategy for the Southern Tablelands study area boundary in vector format (shape)	Derived from Local Government Area boundaries. The study area boundary cuts through Cooma-Monaro shire 20km north of Michelago township	Prepared July 2001
Stdya_bndry	Conservation Strategy for the Southern Tablelands study area boundary in raster format (grid)	Derived from Local Government Area boundaries. The study area boundary cuts through Cooma-Monaro shire 20km north of Michelago township	Prepared July 2001
lga.shp	Local Government Area boundaries in Study Area	Derived from Local Government Area boundaries	Prepared July 2001
Sub_n_east.shp	North-east Subregion (Mulwaree and Goulburn shires)	Derived from Local Government Area boundaries	Prepared August 2001
Sub_n_west.shp	North-west Subregion (Yass and Gunning shires)	Derived from Local Government Area boundaries	Prepared August 2001
Sub_south.shp	Southern Subregion (ACT and Yarrowlumla and Queanbeyan shires)	Derived from Local Government Area boundaries	Prepared August 2001
cm_mnr.shp	Northern Section of Cooma-Monaro shire	Derived from Local Government Area boundaries	Prepared August 2001
Sa_catch_mgt_board.shp	Relevant Catchment Management Board boundaries in the study area	NSW Department of Land and Water Conservation	January 2001
Sub_ne_bndry.shp	North-east Subregion boundary	Derived from Local Government Area mapping	Prepared August 2001
Sub_nw_bndry.shp	North-west Subregion boundary	Derived from Local Government Area mapping	Prepared August 2001
Sub_sth_bndry.shp	Southern Subregion boundary	Derived from Local Government Area mapping	Prepared August 2001

2. Environmental			
File name	**Description**	**Derivation**	**Preparation date**
Sa_dryland_salinity.shp	Dryland Salinity affected areas in study area	NSW Department of Land and Water Conservation	December 2000
Sa_lndfrm.shp	Landform categories (from CSIRO Handbook) in study area		
Sa_soils.shp	Soils in study area	Obtained from Commonwealth Bureau of Resource Science for CRA	10/ 09/1999
Sa_catchments	Relevant catchment boundaries in the study area		August 1998
Landscape_units.shp	Broad landscape units within the Planning Framework boundary		June 2002
g:\data\south55\images\ spot_imagery\	Spot Imagery - 10 metre Pan	Spot Imaging Services Pty Ltd www.spotimage.com.au	1998
g:\data\south55\images\ spot_imagery\1995\	Spot Imagery - 10 metre Pan	Spot Imaging Services Pty Ltd www.spotimage.com.au	1993

3. Fauna			
File name	**Description**	**Derivation**	**Preparation date**
amphibians.shp	Amphibian records from the study area	Records compiled from NSW Wildlife Atlas, Australian Museum, CSIRO Aust. National Wildlife Collection, Birds Australia (RAOU), Swift Parrot Database, Grassy Ecosystem Database, Consultant Reports and personal observations by Rainer Rehwinkel and Steve Priday.	August 2001
birds.shp	Bird records from the study area		
Invertebrates.shp	Significant invertebrate records from the study area		
Mammals.shp	Mammal records from the study area		
reptiles.shp	Reptile records from the study area		

4. Fauna models

File name	Description	Derivation	Preparation date
Syn_pla_prdct.shp	Predicted habitat of the Golden Sun Moth *Synemon plana*	Records compiled from consultants field survey reports to NSW NPWS, Queanbeyan (Clarke, 2001, Clarke and O'Dwyer, 1999, Clarke and Dear 1998). BIOCLIM analysis	Analysis by SMC 26/07/01
Cra\amphibians\3042heli_aust	Giant Burrowing Frog (*Helioporus australiacus*)	CRA Predicted Habitat Model in the study area	
Cra\amphibians\3117pseu_bibr	Brown Toadlet (*Pseudophryne bibronii*)	CRA Predicted Habitat Model in the study area	
Cra\amphibians\3168lito_boor	Booroolong Frog (*Litoria booroolongensis*)	CRA Predicted Habitat Model in the study area	
Cra\amphibians\9105pseu_peng	Northern Corroboree Frog (*Pseudophryne pengilleyi*)	CRA Predicted Habitat Model in the study area	
Cra\birds\230_loph_isur	Square-tailed Kite (*Lophoictinia isura*)	CRA Predicted Habitat Model in the study area	
Cra\birds\248_nino_stre	Powerful Owl (*Ninox strenua*)	CRA Predicted Habitat Model in the study area	
Cra\birds\250_tyto_nova	Masked Owl (*Tyto novaehollandiae*)	CRA Predicted Habitat Model in the study area	
Cra\birds\253_tyto_tene	Sooty Owl (*Tyto tenebricosa*)	CRA Predicted Habitat Model in the study area	
Cra\birds\265_caly_lath	Glossy Black Cockatoo (*Calyptorhynchus lathami*)	CRA Predicted Habitat Model in the study area	
Cra\birds\267_caly_fune	Yellow-tailed Black Cockatoo (*Calyptorhynchus funereus*)	CRA Predicted Habitat Model in the study area	
Cra\birds\277_poly_swai	Superb Parrot (*Polytelis swainsonii*)	CRA Predicted Habitat Model in the study area	
Cra\birds\302_neop_pulc	Turquoise Parrot (*Neophema pulchella*)	CRA Predicted Habitat Model in the study area	
Cra\birds\309_lath_disc	Swift Parrot (*Lathamus discolor*)	CRA Predicted Habitat Model in the study area	
Cra\birds\318_eury_orie	Dollarbird (*Eurystomus orientalis*)	CRA Predicted Habitat Model in the study area	
Cra\birds\383_petr_rodi	Pink Robin (*Petroica rodinogaster*)	CRA Predicted Habitat Model in the study area	
Cra\birds\385_mela_cucu	Hooded Robin (*Melanodryas cucullata*)	CRA Predicted Habitat Model in the study area	
Cra\birds\405_pach_oliv	Olive Whistler (*Pachycaphala olivacea*)	CRA Predicted Habitat Model in the study area	
Cra\birds\416_falc_fron	Crested Shrike-tit (*Falcunculus frontalis*)	CRA Predicted Habitat Model in the study area	
Cra\birds\436_cinc_punc	Spotted Quail-thrush (*Cinclosoma punctatum*)	CRA Predicted Habitat Model in the study area	
Cra\birds\493seri_citr	Yellow-throated Scrub-wren (*Sericornis citreogularis*)	CRA Predicted Habitat Model in the study area	
Cra\birds\555_clim_picu	Brown Treecreeper (*Climacteris picumnus*)	CRA Predicted Habitat Model in the study area	
cra\birds\560_clim_eryt	Red-browed Treecreeper (*Climacteris erythrops*)	CRA Predicted Habitat Model in the study area	

4. Fauna models - continued

File name	Description	Derivation	Preparation date
cra\birds\580_meli_gula	Black-chinned Honeyeater (*Melithreptus gularis*)	CRA Predicted Habitat Model in the study area	
cra\birds\598_gran_pict	Painted Honeyeater (*Grantiella picta*)	CRA Predicted Habitat Model in the study area	
cra\birds\603_xant_phry	Regent Honeyeater (*Xanthomyza phrygia*)	CRA Predicted Habitat Model in the study area	
cra\mammals\1008dasy_macu	Spotted-tailed Quoll (*Dasyurus maculatus*)	CRA Predicted Habitat Model in the study area	
cra\mammals\1092isoo_obes	Southern Brown Bandicoot (*Isoodon obesulus*)	CRA Predicted Habitat Model in the study area	
cra\mammals\1097pera_nasu	Long-nosed Bandicoot (*Perameles nasuta*)	CRA Predicted Habitat Model in the study area	
cra\mammals\1133peta_vola	Greater Glider (*Petauroides volans*)	CRA Predicted Habitat Model in the study area	
cra\mammals\1136peta_aust	Yellow-bellied Glider (*Petaurus australis*)	CRA Predicted Habitat Model in the study area	
cra\mammals\1137peta_norf	Squirrel Glider (*Petaurus norfolcensis*)	CRA Predicted Habitat Model in the study area	
cra\mammals\1162phas_cine	Koala (*Phascolarctus cinereus*)	CRA Predicted Habitat Model in the study area	
cra\mammals\1215petr_peni	Brush-tailed Rock-wallaby (*Petrogale penicillata*)	CRA Predicted Habitat Model in the study area	
cra\mammals\1280pter_poli	Grey-headed Flying Fox (*Pteropus poliocephalus*)	CRA Predicted Habitat Model in the study area	
cra\mammals\1281pter_scap	Little Red Flying Fox (*Pteropus scapulatus*)	CRA Predicted Habitat Model in the study area	
cra\mammals\1303rhin_mega	Eastern Horseshoe Bat (*Rhinolophus megaphyllus*)	CRA Predicted Habitat Model in the study area	
cra\mammals\1329morm_norf	Eastern Little Mastiff-bat (*Mormopterus norfolkensis*)	CRA Predicted Habitat Model in the study area	
Cra\mammals\1341mini_shre	Eastern Bent-wing Bat (*Miniopterus shreibersii*)	CRA Predicted Habitat Model in the study area	
Cra\mammals\1353chal_dwye	Large Pied Bat (*Chalinolobus dwyeri*)	CRA Predicted Habitat Model in the study area	
Cra\mammals\1357myot_adve	Large-footed Myotis (*Myotis adversus*)	CRA Predicted Habitat Model in the study area	
Cra\mammals\1369keri_papu	Golden-tipped Bat (*Kerivoula papuensis*)	CRA Predicted Habitat Model in the study area	
Cra\mammals\1372fals_tasm	Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)	CRA Predicted Habitat Model in the study area	
cra\mammals\1438mast_fusc	Broad-toothed Rat (*Mastacomys fuscus*)	CRA Predicted Habitat Model in the study area	
cra\mammals\1458pseu_fume	Smoky Mouse (*Pseudomys fumeus*)	CRA Predicted Habitat Model in the study area	
cra\reptiles\2287vara_rose	Rosenberg's Monitor (*Varanus rosenbergi*)	CRA Predicted Habitat Model in the study area	
cra\reptiles\2444nann_macc	MacCoy's Skink (*Nannoscincus maccoyi*)	CRA Predicted Habitat Model in the study area	
cra\reptiles\2541pseu_spen	Spencer's Skink (*Pseudomia spenceri*)	CRA Predicted Habitat Model in the study area	
cra\reptiles\2676hopl_bung	Broad-headed Snake (*Hoplocephalus bungaroides*)	CRA Predicted Habitat Model in the study area	

4. Fauna models - continued

File name	Description	Derivation	Preparation date
cra\reptiles\2966more_spil	Diamond Python (*Morelia spilota spilota*)	CRA Predicted Habitat Model in the study area	
\model_hr_2	Hooded Robin (*Melanodryas cucullata*)	Distribution model within the Planning Framework boundary	June 2002
\model_sw_4	Speckled Warbler (*Chthonicola sagittata*)	Distribution model within the Planning Framework boundary	June 2002
\model_df_3	Diamond Firetail (*Stagonopleura guttata*)	Distribution model within the Planning Framework boundary	June 2002
\model_superb	Superb Parrot (*Polytelis swainsonii*)	Distribution model within the Planning Framework boundary	June 2002
\model_bt	Brown Treecreeper (*Climacteris picumnus victoriae*)	Distribution model within the Planning Framework boundary	June 2002
\model_tymp	Grassland Earless Dragon (*Tympanocryptus lineata*)	Distribution model within the Planning Framework boundary	June 2002
\model_apras_2	Pink-tailed Worm Lizard (*Aprasia parapulchella*)	Distribution model within the Planning Framework boundary	June 2002
\model_delma3	Striped Legless Lizard (*Delma impar*)	Distribution model within the Planning Framework boundary	June 2002
\model_synm	Golden Sun Moth (*Synemon plana*)	Distribution model within the Planning Framework boundary	June 2002
\model_ggbf_1	Green and Golden Bell Frog (*Litoria aurea*)	Distribution model within the Planning Framework boundary	June 2002

5. Flora

File name	Description	Derivation	Preparation date
Sa_cs_flora	Flora records from the study area (compiled from various sources)	Records compiled from NSW Wildlife Atlas, Royal Botanic Gardens, Canberra Botanic Gardens, CRA Floristic Data, Grassy Ecosystem Database, Consultant Reports and personal observation by Rainer Rehwinkel.	August 2001
coomamonaro_nth_lep1993.shp	Cooma-Monaro Local Environment Plan, 1993 Zone 1(a) Rural	Digitised by Shawn Capararo from hardcopy maps	September 2001

6. Landuse

File name	Description	Derivation	Preparation date
goulburn_lepzones.shp	Goulburn Local Environment Plan, 1990. Zones 1(a) Rural General, 1(b) Rural (Investigation), 1(c) Rural (Closer Settlement), 6 Open Space and 7 Environmental Protection	Digitised by Shawn Capararo from hardcopy maps	September 2001
gunning_lepzones.shp	Gunning Local Environment Plan, 1993. Zones 1(c) Rural 'C' and 6(a) Open Space	Digitised by Shawn Capararo from hardcopy maps	September 2001
mulwaree_lepzones.shp	Mulwaree Local Environment Plan, 1995. Zones 1(b) Rural/Urban Investigation, 1(c) Small Rural Holdings, 7(b) Environmental Protection	Digitised by Shawn Capararo from hardcopy maps	September 2001
queanbeyan_lepzones.shp	Queanbeyan Local Environment Plan, 1998. Zones 1(a)SP Rural 'A' (Scenic Protection), 1(b) Rural 'B', 1(c) Rural 'C', 1(c)SP Rural 'C' (Scenic Protection), 6(a) Open Space 'A', 6(b) Open Space 'B', 6(c) Open Space 'C', 7(a) Environmental Protection 'A', 7(b) Environmental Protection 'B' and Exclusion Area	Digitised by Shawn Capararo from hardcopy maps	September 2001
yass_lepzones.shp	Yass Local Environment Plan, 1987. Zones 1(c) Rural Residential, 1(d) Rural Small Holdings, 6(a) Existing Open Space, 7(c) Reserve (Open Space) and 7(d) Reserve (Environmental Protection – Scenic)	Digitised by Shawn Capararo from hardcopy maps	September 2001
yrrwlmla_draftlep2000.shp	Yarrowlumla Draft Local Environment Plan, 2000. Zones 1(a) Rural (Environmentally Sensitive), 1(d) Rural Residential, 1(d1) Rural Residential, 1(d2) Rural Residential, 1(g) Rural Small Holdings and 7(e) Environmental Protection	Digitised by Shawn Capararo from hardcopy maps	September 2001
yrrwlmla_lepzones1993.shp	Yarrowlumla Local Environment Plan, 1993. Zones 1(d) Rural Residential, 5(a) Water Catchment, 6(a) Open Space (Existing Recreation), 7(e) Environmental Protection (Scenic) and 7(g) Environmental Protection (Scientific)	Digitised by Shawn Capararo from hardcopy maps	September 2001
Yrrwlmla_crrdr_priday	Forest/Woodland corridors in Yarrowlumla shire	Prepared by Steve Priday to accompany the NPWS submission to the Draft Yarrowlumla LEP 2000 (File Reference ZF/0139)	1 September 2001
ACT\corridor\act_corridor.shp	"Corridors for habitat and biodiversity conservation in the ACT with links to the region"	Developed by Environment ACT from the following layers: Road Corridors, Lakes, River Corridors, Urban Open Space, Grassy Ecosystems, ACT Forests, ACT Nature Estate and Woody Vegetation Strict instructions from Mark Dunford NOT to use layers separately.	Obtained August 2001

6. Landuse – continued

File name	Description	Derivation	Preparation date
ACT\mrrmbdg_river_corr.shp	Murrumbidgee River Corridor in the ACT. Contains management units.	Provided by Environment ACT	Obtained August 2001
G:\data\south55\landuse\councils\Queanbeyan_&_Yarrowlumla\Ecologically significant areas stage 2 6-97.shp	"Areas of Ecological Significance within the Queanbeyan City Council Area"	Prepared by Phil Craven. Internal Report, NSW NPWS Southern Zone NHU, Queanbeyan	June 1997

7. Survey sites

File name	Description	Derivation	Preparation date
ge_siteareas_grsslnd.shp	Freehold or non-mapped crown reserves with RR grassland survey sites (NSW)	Analysis using Rainer Rehwinkel Field Survey Site data. Sites are represented by circular polygons corresponding to area estimates of remnants by RR.	Derived September 2001
ge_siteareas_wdlnd.shp	Freehold or non-mapped crown reserves with RR woodland survey sites in the study area	Analysis using Rainer Rehwinkel Field Survey Site data and NSW Crown Land data	Derived September 2001
rr_grsslnd_sites.shp	RR Survey Sites in the study area with grassland present	Rainer Rehwinkel Field Survey Site data	September 2001
rr_wdlnd_sites.shp	RR Survey sites in the study area with woodland present	Rainer Rehwinkel Field Survey Site data	September 2001
sa_crwn_grsslnd.shp	NSW crown land with RR grassland survey sites in the study area	Analysis using Rainer Rehwinkel Survey Sites data. Sites containing grassland are represented by the area of NSW crown land that they fall into.	Derived September 2001
sa_crwn_wdlnd.shp	NSW Crown Land with RR woodland survey sites in the study area	Analysis using Rainer Rehwinkel Survey Sites data. Sites containing woodland are represented by the area of NSW crown land that they fall into.	Derived September 2001
sa_dlwc_grsslnd.shp	NSW DLWC Management Contracts with RR grassland survey sites in the study area	Analysis using Rainer Rehwinkel Survey Sites data. Sites containing grassland are represented by the area of DLWC Management Contract that they fall into.	Derived September 2001
sa_dlwc_wdlnd.shp	NSW DLWC Management Contracts with RR woodland survey sites in the study area	Analysis using Rainer Rehwinkel Survey Sites data. Sites containing woodland are represented by the area of DLWC Management Contract that they fall into.	Derived September 2001
sa_grsslnd_sites.shp	All RR Grassy Ecosystem Survey Sites in Study Area	Rainer Rehwinkel Field Survey Site data	September 2001

7. Survey sites - continued

File name	Description	Derivation	Preparation date
sa_vca_grsslnd.shp	NSW NPWS Voluntary Conservation Agreements with RR grassland survey sites	Analysis using Rainer Rehwinkel Survey Sites data. Sites containing grassland are represented by the area of NSW NPWS Voluntary Conservation Agreement land that they fall into.	Derived September 2001
sa_vca_wdlnd.shp	NSW NPWS Voluntary Conservation Agreements with RR woodland survey sites	Analysis using Rainer Rehwinkel Survey Sites data. Sites containing woodland are represented by the area of NSW NPWS Voluntary Conservation Agreement land that they fall into.	Derived September 2001
g:\data\south55\vegetation\grasslands\ ACT sites.shp	Grassland Survey Sites in the ACT with an associated Community Conservation Rating	Produced by Sarah Sharp from Environment ACT	Approx. 1999
g:\data\south55\vegetation\grasslands\ All boundaries 3-98.shp	Digitised boundaries for RR grassy ecosystem sites	Rainer Rehwinkel	March 1998

8. Tenure

File name	Description	Derivation	Preparation date
Act_np_estate	ACT National Park Estate	Created from Canberra Nature Park, Namadgi National Park and Tidbinbilla Nature Reserve shape files provided by Environment ACT. Contact Graeme Hirth, ACT Parks and Conservation Service for more information. Graeme.hirth@act.gov.au 62073096	Obtained August 2001
Act_forest.shp	Boundary of ACT Forests managed areas	Supplied by ACT Forests	Created by G Hirth 20/7/98 in Arcview 3.1
Act_forest_blocks.shp	Boundaries of exotic plantations	Supplied by ACT Forests	
sa_allcrown.shp	An amalgamation of all crown land categories in the study area		
sa_crown_lease.shp	Crown lease land in study area		
sa_crown_other.shp	Crown other land in study area		
sa_crown_reserve.shp	Crown reserve land in study area		

8. Tenure – continued

File name	Description	Derivation	Preparation date
sa_dlwc_mc.shp	NSW DLWC Management Contracts in the study area	From NSW DLWC Spatial Database for Vegetation Monitoring	April 2001
sa_npws_estate.shp	NSW NPWS National Park Estate within the study area	NSW NPWS Internal Data	August 2001
sa_state_forest	NSW State Forest lands in study area		September 2001
sa_sydney_water	Sydney Catchment Authority lands in the study area	Water Supply Reserve 29	July 1998
sa_vca.shp	NSW NPWS Voluntary Conservation Agreements in the study area	NSW NPWS Internal Data	August 2001
dcdb\dcdb_coomamonaro.shp	Cadastre for Cooma-Monaro Shire		
dcdb\dcdb_goulburn.shp	Cadastre for Goulburn City		
dcdb\dcdb_gunning.shp	Cadastre for Gunning Shire		
dcdb\dcdb_mulwaree.shp	Cadastre for Mulwaree Shire		
Dcdb\dcdb_queanbeyan.shp	Cadastre for Queanbeyan City		
Dcdb\dcdb_yarrowlumla.shp	Cadastre for Yarrowlumla Shire		
Dcdb\dcdb_yass.shp	Cadastre for Yass Shire		

9. Vegetation

File name	Description	Derivation	Preparation date
ge_cra_ext.shp	CRA Forest Ecosystems with a grassy component ()	Derived from CRA vegetation mapping. See “Forest Ecosystem Classification and Mapping for the Southern CRA Region” NSW NPWS report to the NSW CRA/RFA Steering Committee by Virginia Thomas, Nic Gellie and Tanya Harrison	March 2000
Sa_1750cra_fe.shp	Pre 1750 CRA All Forest Ecosystems in the study area		
Sa_1750cra_ge.shp	Pre 1750 CRA Grassy Ecosystems (39, 43, 116, 118, 146, 147, 151, 152, 153, 154, 155, 157, 159, 160, 161, 162, 163) in the study area		
Sa_1750cra_grsslnds.shp	Pre 1750 CRA Grassland Communities (39, 74, 146, 147, 148, 151, 152, 153, 155, 157, 162) in the study area		
Sa_1750cra_wdlnds.shp	Pre 1750 CRA Woodland Communities (43, 73, 74, 79, 116, 118, 146, 154, 155, 159, 160, 161, 162, 163) in the study area		
Sa_1750cra_relate.shp	Pre 1750 CRA Related Grassy Ecosystems (73, 74, 79) in the study area		
Sa_cra_fe_ext.shp	Extant CRA All Forest Ecosystems in the study area		

9. Vegetation - continued

File name	Description	Derivation	Preparation date
Sa_cra_pre.shp	Pre 1750 CRA Grassy Ecosystems (39, 43, 116, 118, 146, 147, 148, 151, 152, 153, 154, 155, 157, 159, 160, 161, 162, 163) in the study area		
Sa_eric_ss	23 Class Summer Spring Vegetation Model for study area	"Remote Sensing Detection of Native Grasslands using Multi-Image Spectral Analysis" Prepared by Environmental Research and Information Consortium Pty Ltd (ERIC)	September 2001
Sa_eric_flt	23 Class Flat Vegetation Model for study area		
Sa_eric_31	31 Class Vegetation Model for study area		
Sa_eric_5	5 Class Vegetation Model for study area		
Sa_frst_wdlnd_crrdr.shp	Forest and woodland corridor in the study area	Prepared by Rainer Rehwinkel	
Sa_nsw_wdlnd_rmnts.shp	Woodland remnants in NSW part of study area	From Rainer Rehwinkel survey sites and land tenure attributes	Produced August 2001
Sa_pre_sttlmt_grsslnds.shp	Pre-settlement grasslands v. 2 1999	Derived by Rainer Rehwinkel from Costin's "Wet and Dry Tussock" and Pryor's "ACT Grasslands" mapping	February 1997
ACT\mel_blak_woodland_community.shp	ACT Yellow Box/Red Gum Grassland – Endangered Ecological Community under *Nature Conservation Act* 1980	Provided by Environment ACT	Obtained 03/08/01
ACT\natural_temperate_grasslands.shp	ACT Natural Temperate Grassland – Endangered Ecological Community under *Nature Conservation Act* 1980	Provided by Environment ACT	Obtained 03/08/01
ACT\vege.shp	Old vegetation map of the ACT	Provided by ACT Forests	Unknown age
\pre1750_04_06	Model of the pre-1750 distribution of broad vegetation types within the Planning Framework boundary	A model derived by combining the Southern CRA pre-1750 model of forest ecosystems, after classifying the forest ecosystems into broad classes, with a grassland model compiled by Rehwinkel	June 2002
\extveg_04_06	Model of extant vegetation within the Planning Framework boundary	Derived by combining grassy ecosystem layer created from interpretation of Landsat images with Southern CRA extant forest ecosystem mapping and overlaying this with pre1750_04_06	June 2002

10. Planning units

File name	Description	Derivation	Preparation date
\Eps_1	Ecological Planning Setting A	Areas known to contain endangered ecological communities and/or threatened species habitat	June 2002
\Eps_2	Ecological Planning Setting B	Areas predicted to contain endangered ecological communities and/or threatened species habitat, based on modelling.	June 2002
\Eps_3	Ecological Planning Setting C	Other areas, mostly containing forest ecosystems but which may contain endangered ecological communities or threatened species habitat	June 2002
\Eps_4	Ecological Planning Setting D	Areas known or predicted to have minimal values for biodiversity	June 2002