

Upper Lachlan Shire Council Biodiversity Planning Framework



June 2008

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Executive Summary

The Upper Lachlan Shire Biodiversity Planning Framework recommends strategic measures to protect and enhance biodiversity values within Upper Lachlan Shire Local Government Area. The data collation and analysis process undertaken for the project identified that important biodiversity values are widespread throughout the Shire and occur on the full range of land tenures, including private property, in national parks and nature reserves, state forests, Council owned land and on Crown Land. The Biodiversity Planning Framework (BPF) has also identified that these important biodiversity values are also present within road reserves, cemeteries, and on lands immediately surrounding the existing towns and villages.

The BPF has ranked the biodiversity values within the Shire into high, medium and low, using standardised criteria through a Conservation Significance Assessment (CSA), which was based on best available environmental data and advice. The BPF identifies how the outcomes of the CSA can be used in the context of biodiversity policy and targets at a regional, state and commonwealth level.

The BPF has also identified a range of processes which threaten the identified biodiversity values of the Shire. The BPF seeks to address these threats, and provide a framework for the protection, recovery and enhancement of the biodiversity values of the Shire.

The BPF recognises that a significant proportion of the biodiversity values of the Shire occur within landscapes where agriculture is the primary landuse, and as such, some of the recommendations of the BPF can only be achieved with support both financially and advisory, from government and with the co-operation of landholders.

In this context, the BPF recognises that the future management of biodiversity in the Shire should aim to:

- Protect biodiversity.
- Achieve a net gain in the extent (and/or quality) of native vegetation.
- Increase the security of regionally significant vegetation communities and fauna habitats through a suitable reserve system, through the planning system, and/or community supported programs.
- Recognise, support, and enhance a comprehensive network of regional biodiversity corridors that have been identified and protected.
- Protect riparian vegetation and waterways.

In order to facilitate these aims, the BPF includes recommendations for strategic planning, and particularly recommendations to inform the new comprehensive Local Environment Plan (LEP) and Development Control Plan (DCP). It also provides objectives for the management of environmentally sensitive land, including high and medium conservation value vegetation, and land in riparian and regional corridors, and provides recommendations for the consideration of conservation values in the execution of Council works.

The BPF also outlines further data and research needed to improve the information base for the CSA and to improve biodiversity management, and the consideration of conservation values in the development assessment process. In addition, the BPF identifies and prioritises a set of Council management actions, including a staff training package, and education and community partnership actions.

1. Introduction

Background

Upper Lachlan Shire Council (ULSC) has prepared the Biodiversity Planning Framework (BPF) to provide guidance for protecting and enhancing the biodiversity values of the Shire, while accommodating sustainable development. The BPF will contribute to the preparation of the new comprehensive Local Environmental Plan (LEP) for the Shire, and will help Council Officers in the management of biodiversity values generally and in the development assessment process.

The BPF identifies the best natural resource information currently available for Upper Lachlan Shire, including the distribution of remnant native vegetation, important wetlands and rivers, wildlife corridors, and habitat for threatened plants and animals and endangered vegetation communities. This information was analysed to assess and map conservation values across the Shire, and provides the basis for the management recommendations within Section 12 of the document. Some field checking of the information has been undertaken to improve the accuracy of the final product.

The BPF project is a partnership between the Hawkesbury - Nepean Catchment Management Authority (HNCMA), Lachlan Catchment Management Authority (LCMA), the Department of Environment and Climate Change (DECC), the Department of Planning (DoP), and Upper Lachlan Shire Council and is funded by the Lachlan and Hawkesbury-Nepean CMAs, with in-kind contributions from ULSC and the DECC.

The project was initiated in July 2007 and is expected to be completed by June 2008.

The Study Area

Upper Lachlan Shire is located on the Southern Tablelands of NSW approximately 60 kilometres west of Goulburn, 100 kilometres north of Canberra, and 130 kilometres south-east of Bathurst.

The study area for the project is the entire Shire, covering a total area of approximately 7,229 km² and bounded by nine Local Government Areas (LGAs). These LGAs are: Boorowa Shire to the west, Goulburn Mulwaree, Wingecarribee Shire and Wollondilly Shire to the east, Yass Valley and Palerang to the south, Cowra Shire to the north-west, Bathurst Regional Shire to the north and Oberon Shire to the north-east.

Upper Lachlan Shire has a population of about 7,500 people, with approximately 2,000 living in the major centre of Crookwell, and the remainder living in the other towns, villages and rural areas. Despite its proximity to major centres, Upper Lachlan Shire is strongly rural in its character and agriculture has always been a feature of the economic and social fabric of the Shire. The Shire is known for its fine wool and potato production, however major shifts are occurring in agriculture within the Shire including the introduction of new farming methods and diversification of many land holdings toward new ventures, such as olive growing, alpaca wool production, and the development of horse studs. The economic base of the Shire is also changing, with tourism becoming the third major industry in the Shire, behind the traditional agricultural industries and retail.

The BPF therefore considers the biodiversity values of the Shire within the context of its traditional and emerging rural landuse setting.

In the current LEP, the environmental conservation, national parks, state conservation areas and water catchments zones comprise approximately 5% of the Shire. The village zones make up approximately 0.1%, with the remainder of the Shire zoned rural (rural small holding, rural environmental and general rural).

Within the Shire elevation ranges from 220 m to 1,160 m above sea level (ASL) in the north, with an average elevation of about 750 m. The landscape varies from flat in the south-west, to the rugged terrain of the Blue Mountains in the north-east. Much of the Shire features the rolling hills that characterise the tablelands with elevations varying between 700 m and 1,000 m ASL.

The Shire includes the headwaters of two major river systems: the west-flowing Lachlan River, and the east-flowing Wollondilly River. The Wollondilly River and its tributaries, including the Tarlo River, are part of the catchment of Warragamba Dam, which is the main water storage for the Sydney's drinking water supply system.

The Shire is particularly complex geologically and a detailed description of the geology of the Shire is beyond the scope of this document. However, the geology of the Shire can be summarised as being characterised by:

- A broad band of granite running north to south-east of the Lachlan River, with smaller bands in the valleys of the Bolong and Wollondilly Rivers and minor outcrops elsewhere.
- A large basalt outcrop occurs around Crookwell and east towards Taralga.
- The remainder of the Shire being underlain by either Silurian or Ordovician sediments, consisting of slates, tuffs, lavas and limestone.

The Wombeyan Caves area is noted for its high grade limestone and marble formations.

The vegetation communities of the Shire include dry forest, grassy woodlands, native grasslands and secondary grasslands derived from these communities, including native pastures. The condition of these vegetation communities ranges from relative intact both structurally and floristically to highly modified.

These biophysical characteristics, along with the landuses of the region help, shape the Shire's biodiversity values.

2. Steering Committee

A Steering Committee was established at the outset of the project to guide the preparation of the Upper Lachlan Biodiversity Planning Framework.

The functions of the Steering Committee were to:

- manage the development of the Biodiversity Planning Framework (BPF);
- guide technical content of the BPF;
- provide agency input as relevant (for example, policy, spatial data, etc);
- create awareness of the project within agencies; and
- be chaired by an Upper Lachlan Shire Councillor.

The Steering Committee appointed a Project Officer whose role was to:

- provide an executive officer role to the Steering Committee;
- provide an interface between the Steering Committee and the appointed consultant; and
- arrange minute taking.

The Steering Committee comprised the following people and organisations:

- Councillor Charlie Prell (Chairperson) – Upper Lachlan Shire Council
- Councillor Brian Moloney (alternate Chairperson) – Upper Lachlan Shire Council
- Amanda Sullivan – Department of Environment and Climate Change
- Jacqueline Impey – Upper Lachlan Shire Council
- Martin Brown – Department of Planning
- Narelle Sargent – Department of Planning
- Robert Adam – Hawkesbury Nepean Catchment Management Authority
- Robert Mowle – Upper Lachlan Shire Council
- Susan Hewitt – Lachlan Catchment Management Authority

The Steering Committee appointed Bushfire and Environmental Services Pty Ltd (BES) as the project consultant. BES were responsible for the vegetation mapping around the priority 1 and 2 villages, the potential regional corridor mapping, the development of recommendations and conclusions, and the collation, formatting and printing of the report in consultation with the steering committee. Ryan Smithers managed the BPF project on behalf of BES.

3. Biodiversity in the Upper Lachlan Shire

Biodiversity is described as the variety of all life forms, including not only plants and animals but the genes they contain, and the ecosystems in which they live. In this context, maintaining and enhancing biodiversity, which is a primary objective of the BPF, involves more than just protecting wildlife and their habitats in conservation reserves. It is also involves the sustainable use of biological resources, and the safeguarding of the earth's life-support systems, which are the foundation of our economic and social capital. It recognises that the ecologically sustainable management of terrestrial and marine environments is essential not only for the conservation of biological diversity but for sustainable growth in our standard of living.

The benefits of conserving biological diversity are numerous. Biological diversity is the primary source for fulfilment of humanity's needs and also provides a basis for human adaptation to changing environments. An environment rich in biological diversity offers the broadest array of options for sustainable economic activity, for nurturing human welfare and for adapting to change (Department of the Environment, Sport and Territories, 1996).

Upper Lachlan Shire has a long history of farming and pastoral land uses and is known internationally for its fine wool. The natural grasslands and grassy woodlands of the Shire attracted graziers to the area in the very early parts of the nineteenth century. Grazing quickly changed the composition of these native grasslands and grassy woodlands and extensive areas of native forest and woodland were cleared to support farming and grazing, particularly on the fertile basalt plateaux in the central half of the Shire. These more fertile areas within the Shire have been used for cropping including potatoes, as have the more fertile creek and river flats. Many areas have also been subject to pasture improvement, which replaces native pasture species with exotic species.

Notwithstanding these impacts, significant areas of native forest remain within the Shire, particularly in less fertile areas such as those on the northern and eastern margins of the Shire. There are also a number of large, isolated regionally significant forest and woodland remnants, mainly on Crown Land, and many smaller remnants, predominantly on private property, which continue to support important conservation values and in many instances retain considerable recovery potential. The diversity of landforms, vegetation communities and associated habitats within the Shire support a diverse range of flora and fauna species, including rare, threatened and endangered species, as well as endangered ecological communities.

Biodiversity Values

Conservation Reserves

Two National Parks and two Nature Reserves occur entirely within the Shire, as do parts of another three. These conservation reserves, which are managed by the DECC, cover approximately 32,457 ha or 4.57% of the Shire. They are:

- Abercrombie River National Park.
- Blue Mountains National Park.
- Tarlo River National Park (entirely within Upper Lachlan Shire).
- Mundoonen Nature Reserve.
- Razorback Nature Reserve (entirely within Upper Lachlan Shire).

There are also a number of proposed additions to the conservation reserve system not yet gazetted for the Blue Mountains National Park and proposed conservation reserves identified in the Comprehensive Regional Assessment (CRA) process, which occur within the Shire.

Other Crown Land Reserves

Keverstone State Forest is the only state forest in the Shire, and is managed by NSW Department of Primary Industries. There are also several Crown Land reserves and Travelling Stock Reserves (TSRs) within the Shire and Grabine Lakeside State Park, which comprises an 800 ha State Park on the north-eastern shores of Lake Wyangala. Some of these lands support important conservation values.

Private Conservation Areas

There is currently only one Voluntary Conservation Agreement (VCA) within the Shire, covering a property south of Gunning. This VCA has been gazetted under the *National Parks and Wildlife Act 1979* and is registered on the title of the property.

Vegetation

There has been no single comprehensive survey of the vegetation of the Shire. In its absence, three vegetation modelling projects have been conducted using site sampling, aerial photo interpretation, satellite imagery and limited ground verification. These modelling projects are:

- The South Coast and Illawarra Vegetation Integration (SCVI) (Tozer *et. al.* 2006).
- The Comprehensive Regional Assessment (CRA) (Gellie 2005).
- The Planning Framework (Fallding 2002).

The vegetation modelling projects have identified approximately 60 native vegetation communities in the Shire, six of which have been listed as Endangered Ecological Communities (EECs) under the NSW *Threatened Species Conservation Act 1995* (TSC Act) or under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). A further twenty vegetation communities have been identified as over-cleared (with less than 30% of their original extent remaining) and approximately 29 vegetation communities considered as under-represented in conservation reserves (less than 15% occurring in conservation reserves).

The pattern of historic clearing is reflected in the presence and distribution of over-cleared landscapes. Where these landscapes (called Mitchell Landscapes) are more than 70% cleared of native vegetation, they are considered over-cleared. There are 23 Mitchell landscapes in the Shire, 14 of which are considered over-cleared.

See Appendix B for a list of EECs, over-cleared vegetation communities and Mitchell landscapes, and vegetation communities that are under represented in conservation reserves, which occur within the Shire.

Flora

The DECC Wildlife Atlas records approximately 196 species of native plants as occurring within the Shire, six of which have been identified as threatened under the TSC Act and one as endangered under the EPBC Act (see Appendix B for a list of threatened flora known from the Shire).

Fauna

There has been no single comprehensive fauna survey of the Shire. The DECC Wildlife Atlas, made up of incidental sightings of fauna species, includes records of 253 species of native fauna (birds, mammals, amphibians and reptiles) within the Shire. Of these, 25 have been identified as threatened (see Appendix B for a list of threatened fauna known from the Shire).

Regional Biodiversity Corridors

Parts of an identified regional biodiversity corridor occur in the eastern part of Upper Lachlan Shire. This is the Burratorong Valley to Tarlo River National Park and Abercrombie River to Morton National Park Biodiversity Corridor. These biodiversity corridors provide a link between the Blue Mountains World Heritage Area, through Morton National Park, to the coast and act as an east-west corridor linking habitats on the coast to the north-south national biodiversity corridor along the Great Dividing Range.

Riparian Areas and Wetlands

There are three major rivers in the Shire the Lachlan, Abercrombie and Wollondilly Rivers. In addition, other important watercourses include the Bolong, Crookwell and Tarlo Rivers, and Blakney, Wheeo, Mulgowie, Humes, Burra Burra, Peelwood, Tuena, and Meglo Creeks.

There are also many wetlands within the shire which provide important biodiversity values. Many of these wetlands are relatively small, however there are a few large natural and man-made wetlands.

Important wetlands in the Shire include:

- Burra Burra Lake.
- Pejar Dam.
- Lake Pejar.
- Wet Lagoon (Breadalbane).
- Wyangala Dam.
- Crookwell/Kentgrove Dam.
- Todkill Dam (Crookwell).
- Lake Edward (Crookwell).

Significant Geological Features

Upper Lachlan Shire contains three main karst/limestone areas: Tuena and Tuena east, Limeburners Creek and Little Wombeyan Creek, and Wombeyan Caves Karst Reserve. These areas are all considered significant geological features in the Department of Primary Industries Geological Survey data.

4. Threats to Biodiversity in the Upper Lachlan Shire

Biodiversity within the Shire is threatened by a number of key threatening processes listed under the TSC Act and EPBC Act.

The TSC Act currently lists 31 Key Threatening Processes (KTPs) which can be grouped into threats pertaining to weeds, pest animals, habitat loss/change, disease and other threats. The KTPs that are most relevant to the Shire are summarised below:

KTPs most relevant to the Upper Lachlan Shire

Threatening Process	Mechanism
Invasion of native plant communities by exotic perennial grasses	Weed
Competition and grazing by the feral European Rabbit	Pest animal
Competition and habitat degradation by feral goats	Pest animal
Competition from feral honeybees	Pest animal
Herbivory and environmental degradation caused by feral deer	Pest animal
Introduction of the large earth bumblebee (<i>Bombus terrestris</i>)	Pest animal
Predation by feral cats	Pest animal
Predation by the European Red Fox (<i>Vulpes vulpes</i>)	Pest animal
Predation by the Plague Minnow (<i>Gambusia holbrookii</i>)	Pest animal
Predation, habitat degradation, competition and disease transmission by Feral Pigs (<i>Sus scrofa</i>)	Pest animal
Alteration to the natural flow regimes of rivers, streams, floodplains & wetlands	Habitat loss/change
Bushrock removal	Habitat loss/change
Clearing of native vegetation	Habitat loss/change
Ecological consequences of high frequency fires	Habitat loss/change
Human-caused climate change	Habitat loss/change
Loss and/or degradation of sites used for hill-topping by butterflies	Habitat loss/change
Loss of hollow-bearing trees	Habitat loss/change
Removal of dead wood and dead trees	Habitat loss/change
Infection by Psittacine circoviral (beak & feather) disease affecting endangered psittacine species	Disease
Infection of frogs by amphibian chytrid fungus causing the disease chytridiomycosis	Disease
Infection of native plants by <i>Phytophthora cinnamomi</i>	Disease

In addition, the following threats have been identified to the natural ecosystems of the Shire.

Threats to the natural ecosystems of the Shire (After Fallding 2002)

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 urban development, roads or cultivation
Over-extraction of natural resources, such as water or removal of bushrock (L)	Farm dam construction, irrigation, firewood removal
Local Scale	
Land subdivision, building construction and design, especially urban development	Land characteristics, including slope, erodability 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 such as clearing and slashing, maintenance of habitat, 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 dead timber, destruction of isolated paddock trees, simplification of understorey through grazing
Inappropriate mowing or grazing regimes	Continuous heavy grazing, leading to soil compaction and elimination of native species
Inappropriate fire regimes (L)	Long periods without fire, too frequent fire or inappropriate season or intensity
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 weeds, weed control practices, roadside vegetation management
Introduction of non-native animals (L)	Feral animal control, domestic animal management

Note: (L) - means the threat is listed or linked to a key threatening process under the TSC Act, NSW Fisheries Management Act 1994, or EPBC Act, and therefore must be considered in determining development proposals.

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

5. Project Methodology

The Steering Committee developed the project methodology for the BPF project through a collaborative approach which primarily involved the collation of all relevant digital spatial datasets pertaining to native vegetation, threatened fauna and flora, riparian areas, wetlands, geological significant areas, conservation tenures, and biodiversity corridors within the Shire. These datasets were assembled as separate layers within a Geographic Information System (GIS) where they could be analysed and interrogated to generate relevant information to inform the BPF.

To increase the level of accuracy of information for this project, the Steering Committee decided to invite representatives from key natural resource management groups, such as Landcare, to contribute to the data analysis. A targeted consultation session with these groups was held in September 2007.

The relevant natural resource dataset included:

- Native vegetation – modelled vegetation mapping compiled from the three different studies (SCVI, CRA and Planning Framework) to produce a vegetation map covering the whole Shire.
- Regional biodiversity corridors – those corridors believed to be regionally significant as areas of habitat and for the movement of plants and animals through the tablelands and from the tablelands to the coast.
- Wetlands, watercourses and known locations of threatened flora and fauna.
- EECs – vegetation communities listed under the TSC and EPBC Acts.

After the targeted consultation process, the data sets were analysed as part of a Conservation Significance Assessment (CSA). This assessment ranks areas of native vegetation in terms of relative conservation values (high, medium and low) and is therefore useful for strategic biodiversity conservation planning. The CSA methodology is outlined further in Section 6.

The results of the CSA and the field verification undertaken by BES informed the recommendations in Section 12 that will guide the production of the new LEP and the Development Control Plan (DCP), and will assist Council staff in the planning and development assessment process. The data will also be of assistance to government agencies and local conservation groups in protecting biodiversity values across the Shire, for example in the strategic allocation of funding and resources for natural resource management projects.

A key component of the BPF project is the production of a staff-training package for Council staff. The package will be developed by members of the Steering Committee and the consultant and will instruct Council Officers in the use of the BPF and associated datasets to assist in the strategic planning and development assessment process, to plan Council's own activities, and to advise the general public of biodiversity considerations as required.

6. Conservation Significance Assessment Methodology

The methodology for attributing conservation significance to the various biodiversity layers was based on an analysis of the best biodiversity information available for the Shire, the results of the targeted consultation with natural resource management groups, outcomes of consultation within the Steering Committee, and the standardised conservation value criteria used by NSW government agencies.

The CSA utilises a GIS to map the conservation values across the Shire based on the criteria used to define the relative conservation values *i.e.* high, medium and low. The resultant map provides a graphical representation of conservation values across the landscape and with the help of a GIS, the criteria used to derive the values can be looked up by using a simple query tool. The data can also be overlayed with other information, to provide contextual information such as roads, LEP zones and cadastral information.

The CSA was based upon the following criteria:

Native vegetation

- Over-cleared vegetation types were defined by the BioMetric Terrestrial Biodiversity Tool for the NSW PVP Developer *Native Vegetation Act 2003* (NV Act).
- Vegetation in over-cleared landscapes as defined by the DECC Mitchell landscape mapping (See Appendix B).
- Poorly reserved vegetation types as defined by the JANIS Criteria (see Appendix B).
- EECs as defined by the TSC and EPBC Acts (see Appendix B).

Riparian areas and wetlands

- Buffer widths were applied each side of watercourses.
- Wetlands included a buffer area as defined in the Water Quality Tool Reference Guide to the Property Vegetation Plan (PVP).

Regional corridors

- Based on the existing HNCMA mapping for the eastern parts of the Shire.
- The potential regional corridors mapped by BES for the western portion of the Shire based on the criteria identified in Section 11.

Geological significant areas

- Based upon mapping by Department of Primary Industries.

Once this information was analysed and mapped, the Steering Committee adopted a three class conservation significance hierarchy for native vegetation and biodiversity values as identified below:

Criteria for the three class conservation value definition for native vegetation and biodiversity values within the Upper Lachlan Shire

Dataset	Rationale	Value
Known biodiversity hotspot for selected threatened species	Known threatened species habitat	HCV
Known threatened species habitat	Known threatened species habitat	HCV
Riparian zone: <ul style="list-style-type: none"> • 40 m buffer on major watercourses • 30 m buffer for minor rivers and major creeks • 10 m buffer distance for minor watercourse flood-runners and effluents • 20 m buffer for minor creeks and lagoons 	Important ecosystem processes Landscape value	HCV
Important wetlands and buffers (within 40 m from important wetland or 30 m from other wetlands)	Recognised national habitat value Important ecosystem processes	HCV
Endangered ecological communities	Rarity	HCV
Vegetation communities where less than 30% of pre-European extent is extant (<i>i.e.</i> over 70% cleared)	Rarity	HCV
Vegetation which is poorly reserved (<i>i.e.</i> less than 15% of extent in formal conservation reserves)	Rarity	HCV
Vegetation in over-cleared (Mitchell) landscape <i>i.e.</i> more than 70% cleared	Rarity	HCV
Vegetation within confirmed as regional corridor	Landscape value – connectivity	HCV
Vegetation within mapped roadside buffer (15 m) in High or Medium condition (where data exists)	Landscape value – connectivity	HCV
Conservation Reserves (National Parks and Nature Reserves, VCAs and other public lands identified as potential reserves).	Security	HCV
Areas of geological significance	Recognised important areas	HCV
Areas identified as Environmental zones under the current Crookwell and Mulwaree LEPs	Recognised important areas	HCV
Predicted Key Habitat (conservation values) [where data exists]	Threatened species	MCV
Identified potential regional corridor	Landscape value – connectivity	MCV
Other vegetation and area not covered by mapped vegetation	Identifies potential location of vegetation not captured during vegetation mapping	LCV

7. Results of the Conservation Significance Assessment

The results of the Conservation Significance Assessment are identified in Figure 1 below. The CSA used a three class system of high, medium and low conservation value based upon the definitions outlined in Section 6 of this Report.

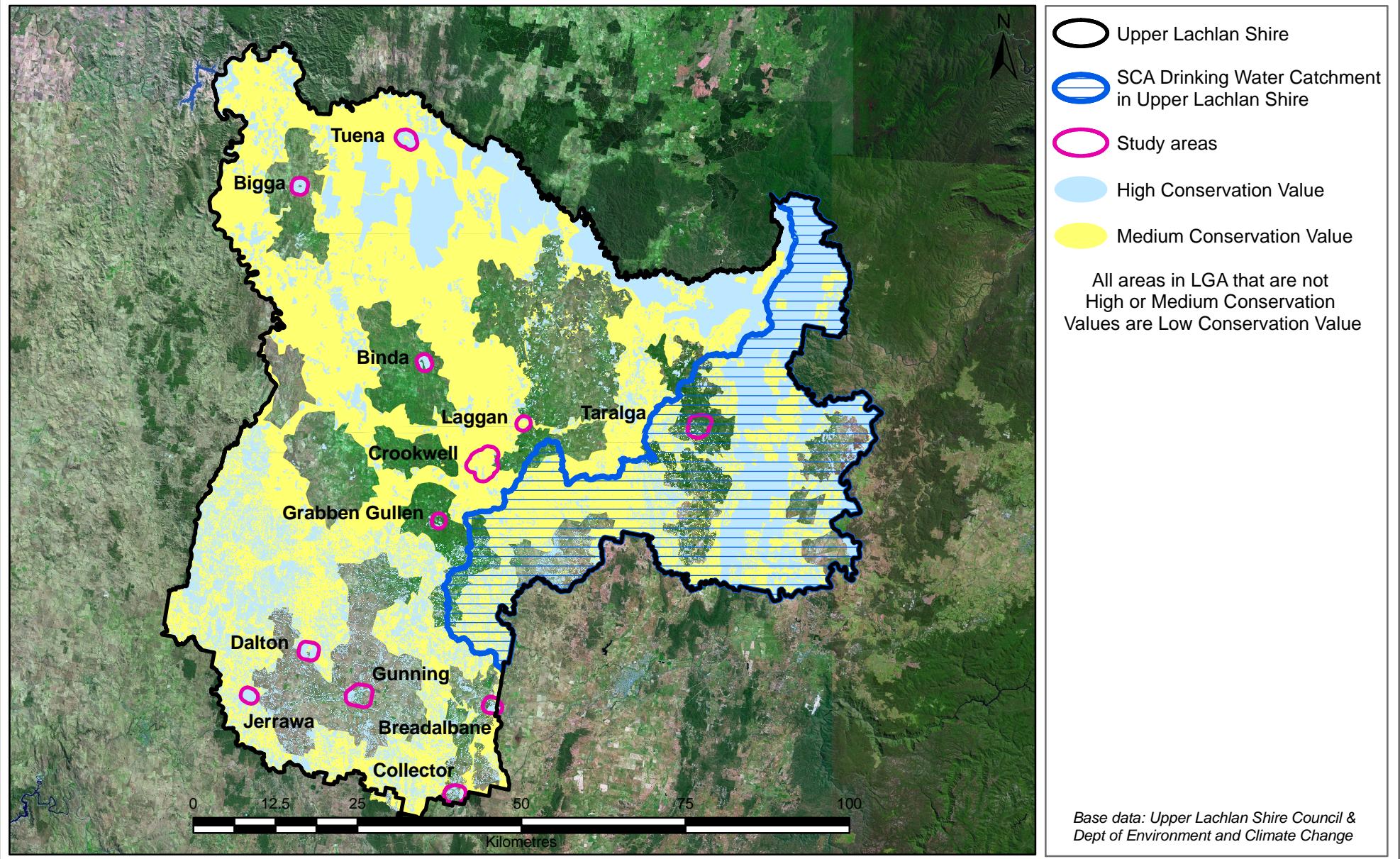
The analysis found that within the Upper Lachlan Shire:

- 26% of vegetation is considered High Conservation Value.
- 48% of vegetation is considered Medium Conservation Value.
- 26% of vegetation is considered Low Conservation Value.

Whilst the CSA provides a useful tool for assessing relative biodiversity values across the Shire, it is limited in the following ways:

- Native vegetation has been used as a surrogate for biodiversity values, it is acknowledged that vegetation type and condition only captures a subset of diversity of plants and animals that occurs in a region.
- The three modelled vegetation maps were not verified on the ground for the majority of the Shire (with the exception of the ground truthing completed by the consultant around the towns and villages), so accuracy is not guaranteed.
- The three modelled vegetation maps used different criteria for identifying native vegetation communities.
- The CRA mapping to the north and north-west only mapped woody vegetation, and subsequently native grasslands have not been mapped in this area.
- Only the presence of native vegetation was considered, the condition of vegetation (high medium or low) was not assessed as part of this project (with the exception of the ground verification around town and villages).
- Information on threatened species habitats, key habitats and hotspot areas were not available.
- Information on the condition of regional and roadside corridors was not available.

The limitations of the CSA need to be considered when interpreting and using the CSA outcomes. Recommendations for further works aimed at improving the certainty of the CSA outcomes are documented in Section 12.

Figure 1: Conservation Significance Assessment

8. Limitations to the Project

The Upper Lachlan Biodiversity Planning Framework project and associated work undertaken by BES have been limited by the data available at the time of the project, the level of funding available and the time frame imposed by the preference of the Steering Committee to have a product available in time to inform preparation of the comprehensive LEP. Notwithstanding the limitations to the project, the BPF provides the best available ranking of relative conservation values across Upper Lachlan Shire.

Data limitations

There is virtually no data available on micro organisms, non-vascular plants or invertebrates despite it being accepted these groups comprise the largest component of biodiversity. Similarly, no data was available on aquatic flora and fauna. As a result, the Biodiversity Planning Framework has a strong bias towards macro terrestrial biodiversity. It also relies heavily on using vegetation communities as a surrogate for biodiversity and aims to protect and conserve biodiversity primarily through the management of native vegetation. However, it must be noted that this approach is consistent with other peer reviewed approaches to determining the conservation value of ecosystems at the national, state, and regional scales.

The most significant data limitation relevant to the project is the absence of a Shire-wide high quality vegetation mapping study. As noted elsewhere in this report, the best available vegetation mapping for the Shire occurs as three separate studies, each covering different areas and using different methodologies. The most rigorous of these was the P5MA vegetation mapping study, subsequently incorporated into the SCIVI dataset, covering the eastern third of the Shire. The CRA mapping of the northern third of the Shire focussed on woody vegetation, particularly forests and did not identify native grassland communities. The Planning Framework study covering the southern third of the Shire relied heavily on modelling of broad native vegetation types.

Other data limitations

Biodiversity Corridors: While regional biodiversity corridors have been identified in the eastern part of the Shire no study has been undertaken to identify them elsewhere in the Shire. The current project includes a desk-top study to identify potential regional corridors, however there has only been very limited ground-truthing of the identified potential regional corridors.

Local Corridors: These have not been identified. As a consequence, the occurrence, extent and contribution of regional and local biodiversity corridors to conservation value is substantially underestimated by the CSA.

Condition: The condition of native vegetation has not been mapped across the Shire and has therefore not been considered in the determination of conservation value. Vegetation condition has been described and mapped around towns and villages as part of this project. This is intended to provide fine scale ground verified information for Council on native vegetation in those areas subject to more intense development pressure.

Scale: Any regional vegetation mapping or other study has limitations on use at a scale finer than that which the data was collected at. Therefore use of the CSA layer at a site scale must be subject to site verification before the CSA outcomes are used for determining development applications, or making statements regarding actual or confirmed site values.

Threatened Species: Comprehensive data relating to the distribution of threatened species and their habitats is not currently available within the Shire and was not included in the CSA. This is a significant limitation of the CSA and consequently the new LEP will not fully address threatened species matters through zoning and associated clauses.

9. Vegetation Mapping Around Priority 1 Villages

Methodology

The vegetation mapping around the priority 1 and 2 villages mapped all patches of native vegetation (woody and non-woody), down to a minimum 2500 m², plus any smaller patches deemed to be of significance. Native vegetation was classified with reference to the SCIVI (Tozer *et. al.* 2006) and CRA (Gellie 2005) vegetation mapping datasets, on the basis of the floristic and structural information available, and with reference to the landforms and geographic locations associated with the respective vegetation communities.

As much information was collected as possible given the limitations on access. Private property was only accessed where permission was obtained from landholders during the surveys. Where access was not available, floristics and condition were assessed with the aid of binoculars and with reference to nearby accessible vegetation, where more comprehensive floristic and structural data had been collected. In general, given the concentration of public roads and other vantage points around the villages, the limitations on access did not substantially limit the vegetation mapping. Without exception, at least one and often a number of samples of the vegetation communities within each village were available, including the respective condition classes. However, the limitations on access did limit the accuracy of the definition of boundaries between communities in some areas and limited the ability to map any fine-scale variations in condition in areas remote from public access. As such, it is possible, that some small patches of Natural Temperate Grasslands (NTG) or secondary grasslands, were not captured.

Condition classes were mapped with reference to the floristic and structural descriptions of the respective communities identified in Tozer *et. al.* (2006) and Gellie (2005). Vegetation was considered to be in high condition if it retained something approximating the original structure in the canopy, a reasonable diversity and abundance of the characteristic understorey and groundcovers, and exotic species were not abundant or predominate. Where the original canopy was relatively intact, but the understorey and groundcover had been heavily modified, and had been replaced by native pasture or supported an abundance of exotic species, the vegetation was classified as medium condition. Secondary grasslands derived from native forests and woodlands were also classified as medium condition. Where the structure of the vegetation had been severely modified *i.e.* woodland modified to paddock trees, or the understorey and groundcover were dominated almost entirely by exotic species, or comprised low diversity native pasture *i.e.* dominated by Speargrasses *Austrostipa* spp., the vegetation was classified as low condition.

The boundaries of each map unit were annotated onto aerial photography and satellite imagery in the field and later digitised.

CROOKWELL

The vegetation within 1 km of the Crookwell village boundary is generally highly modified in association with long-term grazing, and the cultivation of potatoes and other crops. As such the vegetation is characterised by pastures dominated by exotic grasses and herbs, and particularly Phalaris *Phalaris* spp., Cocksfoot *Dactylis glomerata*, Fescues *Festuca* spp., Oats *Avena* spp., Yorkshire Fog *Holcus lanatus*, Paspalum spp., Scotch Thistle *Onopordum acanthium* subsp. *acanthium* and Nodding Thistle *Carduus nutans* subsp. *nutans*, ornamental plantings of predominantly exotic trees, and widespread occurrences of weedy shrubs such as Hawthorn *Crataegus monogyna*, Sweet Briar *Rosa rubiginosa*, Cotoneasters *Cotoneaster* spp., Orange Firethorn *Pyracantha angustifolia*, Blackberry *Rubus fruticosus* aggregate, Broom *Cytisus scoparius*, Cherry Laurel *Prunus laurocerasus*, Tree Lucerne *Chamaecytisus palmensis* and, along watercourses, Willows *Salix* spp., particularly along Kiamma Creek and the Crookwell River.

Notwithstanding the generally highly modified nature of the vegetation within the Crookwell study area, there are patches of remnant native vegetation in road reserves and on private property, some of which are in medium to high condition.

Five native vegetation communities occur within the Crookwell study area: Frost Hollow Grassy Woodland, Tableland Basalt Forest, Riparian Herbfield (Tozer et. al. 2006), Natural Temperate Grassland and Central Northern Tablelands Dry Shrub/Grass Forest (Gellie 2005).

The distribution of the vegetation communities and other known biodiversity values within the Crookwell study area are identified in Figure 2.

Frost Hollow Grassy Woodland

Location - Frost Hollow Grassy Woodland occurs on the flats and lower slopes adjacent to Kiamma Creek, Licking Hole Creek and the Crookwell River, and also in the Licking Hole Flats area.

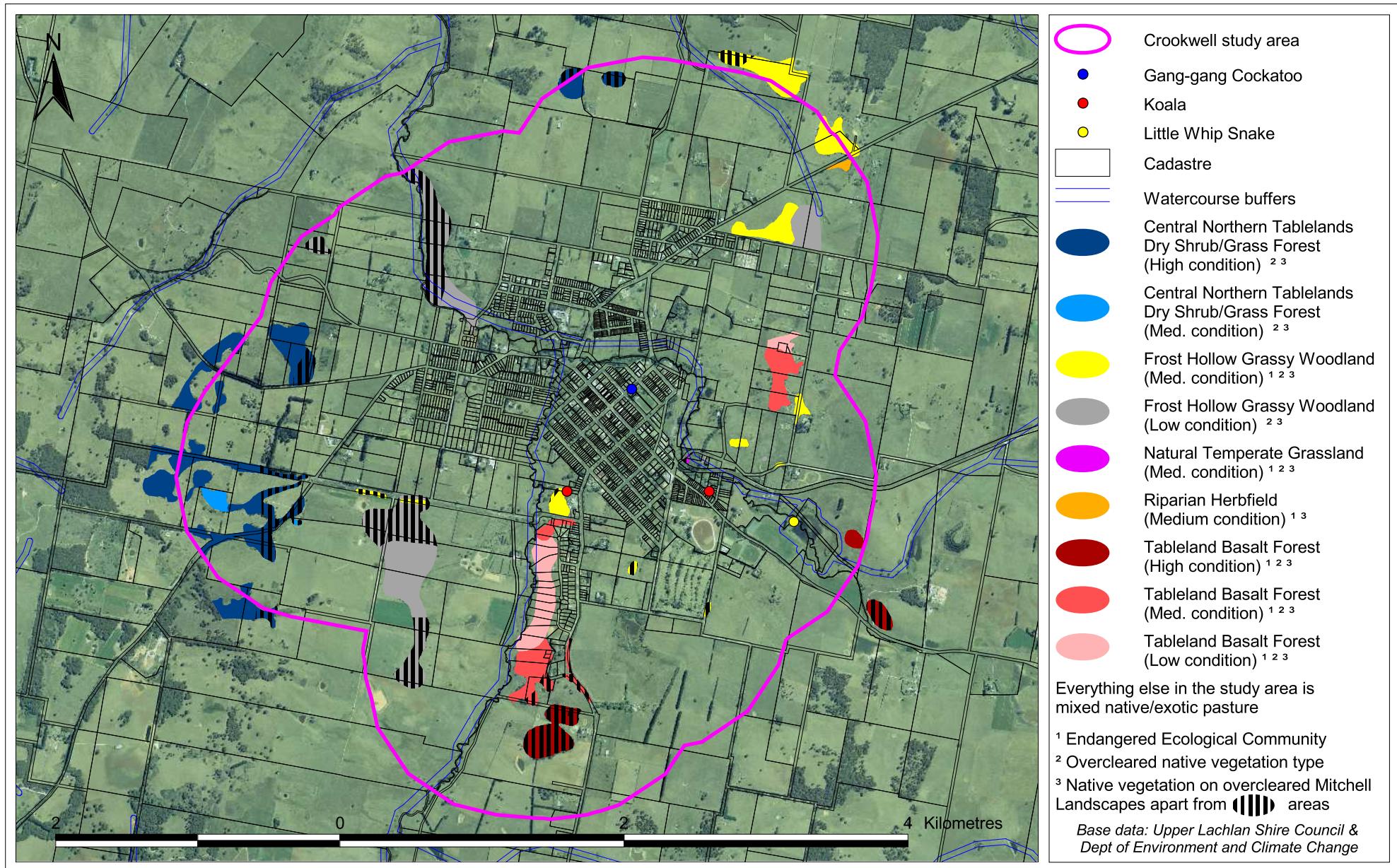
Structure, Floristics and Condition - In the study area the community is characterised by patches of remnant Snow Gums *Eucalyptus pauciflora*, and to a lesser extent Black Sallee *Eucalyptus stellulata*, Black Gum *Eucalyptus aggregata*, Candelbark *Eucalyptus rubida*, Broad-leaved Peppermint *Eucalyptus dives* and Mountain Gum *Eucalyptus dalrympleana*, over a predominately exotic groundcover. However where the community occurs within road reserves there is generally a greater abundance of native groundcover species. In most areas there is a lack of recruitment of the canopy species as a result of ongoing grazing, and the vast majority of the community is in low condition.

Frost Hollow Grassy Woodland typically has a very sparse shrub cover and a dense diverse groundcover of grasses and forbs (Tozer et. al. 2006). It typically would have occurred in a mosaic of Natural Temperate Grasslands, in association with broad valley flats and other areas where cold air accumulates and frosts occur frequently. These areas, given the naturally open tree and shrub cover and grassy groundcover, would have been particularly attractive to early graziers. Given the long history of grazing and in many places pasture improvement, there are almost no remnants today within the study area that retain any of the original groundcover floristics of the Frost Hollow Grassy Woodland or NTG, apart from a few of the hardier grass species.

The shrub cover within the study area is almost entirely composed of weedy shrubs and in particular Hawthorn, Sweet Briar, and Broom, although there are a few individuals of Silver Wattle *Acacia dealbata* and Hop Bitter-pea *Daviesia latifolia* in places in road reserves. Similarly the groundcover typically is dominated by exotic pasture grasses such as Phalaris, Cocksfoot, Fescues, and exotic forbs but also includes some of the hardier native groundcovers such as Kangaroo Grass *Themeda australis*, Weeping Grass *Microlaena stipoides*, River Tussock *Poa labillardieri*, Poa Tussock *Poa seiberiana*, Wallaby Grass *Austrodanthonia* spp., Wheatgrass *Elymus scaber*, Hairy Panic *Panicum effusum*, Sheep's Burr *Acaena ovina*, Common Woodruff *Asperula conferta*, Variable Plantain *Plantago varia* and Wattle Mat-rush *Lomandra filiformis* particularly, and almost exclusively, in road reserves as they are the only areas that have not been subject to long-term heavy grazing pressure or cultivation.

Conservation Significance - Frost Hollow Grassy Woodland is an over-cleared and poorly conserved vegetation community and those parts of the community where the canopy cover is less than 10% and where there is a reasonably diverse grassy native groundcover, comprise the Natural Temperate Grasslands of the Southern Tablelands of NSW and ACT EEC (NTG), which is listed under the EPBC Act. Under these circumstances, all occurrences of Frost Hollow Grassy Woodland within the study area are considered to be HCV regardless of their condition, however not all the community comprises the EEC.

Figure 2: Vegetation communities and other known biodiversity values within the Crookwell study area



Threatened Species Habitat Values – The Frost Hollow Grassy Woodland within the study area usually supports a reasonable abundance of hollow-bearing trees which provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, and hollow-dependent woodland birds. It also provides potential habitat for the threatened flora species Aromatic Peppercress *Lepidium hyssopifolium* and Hoary Sunray *Leucochrysum albicans* subsp. *albicans* var. *tricolor*.

Related Vegetation Communities - The community appears to equate with Vegetation Group 153: Tablelands and Slopes Herb/Grassland/Woodland of Gellie (2005).

Photo 1: Low condition Frost Hollow Grassy Woodland in the Licking Hole Flats area



Natural Temperate Grassland

Location - Only one small patch of Natural Temperate Grassland (NTG) was identified within the study area, in the road reserve of Roslyn Road just above Kiamma Creek.

Structure, Floristics and Condition - The community is characterised by a dense groundcover of native grasses and forbs such as Kangaroo Grass, Poa Tussock, Common Woodruff, Many-flowered Mat-rush *Lomandra multiflora* and Common Everlasting *Chrysoccephalum apiculatum*.

Conservation Significance - The small patch of NTG within the study area is in medium condition and comprises the NTG EEC listed under the EPBC Act. It is thus considered HCV.

Threatened Species Habitat Values – The NTG within the study area provides potential habitat for the threatened flora species Aromatic Peppercress and Hoary Sunray.

Related Vegetation Communities - The community appears to equate with Vegetation Group 153: Tablelands and Slopes Herb/Grassland/Woodland of Gellie (2005).

Tableland Basalt Forest

Location - West of the Kialla Road above Crookwell Creek, in the upper catchment of Kiamma Creek adjacent to the Goulburn Road, and Whinstone Hill.

Structure, Floristics and Condition - Tableland Basalt Forest is characterised by a dense forest canopy dominated by Narrow-leaved Peppermint *Eucalyptus radiata*, Ribbon Gum *Eucalyptus viminalis*, or Mountain Gum, with occasional individuals of Snow Gum. As its name suggests, Tableland Basalt Forest is associated with, but is not entirely restricted to, fertile soils derived from basalt.

Within the study area the community is typically dominated by Narrow-leaved Peppermint, with occasional individuals of Mountain Gum, with individuals of Snow Gum restricted to the margins of the community, typically in the ecotone with adjacent areas of Frost Hollow Grassy Woodland. Patches like this occur to the west of the Kialla Road above Crookwell Creek and on the margins of the study area in the upper catchment of Kiamma Creek adjacent to the Goulburn Road. A patch dominated almost exclusively by Ribbon Gum occurs on Whinstone Hill.

Photo 2: Low condition Tableland Basalt Forest west of the Kialla Road. The understorey and groundcover have been highly modified by historic grazing and more recent mowing.



As with most other remnant native vegetation within the Crookwell study area, the Tableland Basalt forest is generally heavily disturbed with characteristic groundcovers absent or in very low abundance outside of the road reserves. However the patch on Whinstone Hill, despite an abundance of weeds, continues to support a reasonably diverse native groundcover, and most of the other patches continue to support canopy covers characteristic of the community. In places, such as in the new subdivisions to the west of the Kialla Road, the community is reduced primarily to remnant canopy trees amongst dwellings and ornamental gardens.

The understorey is dominated by shrubby weeds where it is present i.e. Whinstone Hill and road reserves, although there are a few individuals of Blackwood *Acacia melanoxylon* in places. The groundcover appears to primarily comprise hardy native grasses i.e. Speargrasses *Austrostipa* spp. and Weeping Grass, in those places that are subject to moderate or heavy sheep grazing. In road reserves and on Whinstone Hill, remnant native groundcovers include Kangaroo Grass, *Poa Tussock*, Common Woodruff, Many-flowered Mat-rush, Wattle Mat-rush, Variable Plantain, Native Geranium *Geranium solanderi*, Sheep's Burr, Redgrass *Bothriochloa macra* and Wallaby Grass *Austrodanthonia racemosa*.

Conservation Significance - The Tableland Basalt Forest within the study area is in medium or low condition and comprises the Tableland Basalt Forest EEC listed under the TSC Act. It is thus considered HCV.

Threatened Species Habitat Values – The Tableland Basalt Forest is likely to support some hollow-bearing trees although few obvious hollows were detected during the vegetation surveys. Any hollows in the community provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, and hollow-dependent woodland birds. Tableland Basalt Forest also provides potential habitat for the threatened flora species Aromatic Peppercress and Hoary Sunray.

Related Vegetation Communities – No equivalent community is identified by Gellie (2005), however it has affinities with Vegetation Group 117: Central Northern Tablelands Dry Shrub/Grass Forest.

Central Northern Tablelands Dry Shrub/Grass Forest

Location - Within the Crookwell study area, Central Northern Tablelands Dry Shrub/Grass Forest occurs predominantly in the western parts of the study area along the Grabben Gullen Road, Andersons Lane, and north to Wades Hill. Two small patches also occur on the northern margins of the study area near "Cherry Hill".

Structure, Floristics and Condition - Central Northern Tablelands Dry Shrub/Grass Forest occurs within the Crookwell study area and also at Laggan and Grabben Gullen, and is not described well by any of the communities of Tozer *et. al.* (2006). It has affinities floristically with the Tableland Basalt Forest but appears to be associated with less fertile soils and has a shrubbier understorey, and an understorey and groundcover that while grassy, include many species associated with less fertile substrates. The major difference between the communities is the dominance of the canopy by Broad-leaved Peppermint rather than Narrow-leaved Peppermint, which appears to be absent from the community. However, the other canopy species are remarkably similar, typically comprising occasional individuals of Mountain Gum and to a lesser extent Candlebark and Snow Gum, again typically on the margins where the community transitions to Frost Hollow Grassy Woodland. Ribbon Gum appears to be absent from the community.

The understorey, apart from typical weedy shrubs includes, Cherry Ballart *Exocarpus cupressiformis*, Grey Guinea Flower *Hibbertia obtusifolia*, Urn Heath *Melichrus urceolatus*, Hop Bitter-pea, Silver Wattle, and *Cassinia longifolia*. The diverse groundcover includes *Poa Tussock*, Kangaroo Grass, Redanther Wallaby Grass *Joycea pallida*, Purple Coral Pea *Hardenbergia violacea*, Black-anthered Flax Lily *Dianella revoluta*, Wattle Mat-rush, Native Geranium, Sheep's Burr, Stinking Pennywort *Hydrocotyle laxiflora*, Common Raspwort *Gonocarpus tetragynus*, Creeping Hovea *Hovea linearis*, Common Bracken Fern *Pteridium esculentum*, Common Woodruff, Curved Rice-flower *Pimelea curviflora* and *Pimelea linifolia*.

Conservation Significance - Central Northern Tablelands Dry Shrub/Grass Forest is an over-cleared and poorly conserved vegetation community and thus HCV. Within the Crookwell study area some parts of the community also occur on over-cleared Mitchell Landscapes.

Threatened Species Habitat Values – The Central Northern Tablelands Dry Shrub/Grass Forest is likely to support some hollow-bearing trees although few obvious hollows were detected during the vegetation surveys. Any hollows in the community provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, and hollow-dependent woodland birds. Tableland Basalt Forest also provides potential habitat for the threatened flora species Aromatic Peppergrass and Hoary Sunray.

Related Vegetation Communities – No equivalent community is identified by Tozer et. al. (2006).

Riparian Herbfield

Location - A narrow band of what appears to be the Riparian Herbfield of Tozer et. al. (2006) occurs along the upper parts of Licking Hole Creek. The community is likely to have once been much more widespread in association with Kiamma Creek, Licking Hole Creek and particularly the Crookwell River, but has been highly modified as a result of grazing and ploughing in most places. Even where it has been mapped the community appears to have been substantially modified as a result of historic and ongoing cultivation and grazing. Some un-mapped narrow bands of the community may occur elsewhere within the study area however these would be contained within the mapped riparian buffers.

Structure, Floristics and Condition - Within the study area the community is characterised by a dense sward of native and exotic grasses, sedges, rushes and herbs such as Tall Sedge, *Carex gaudichaudiana*, River Tussock, Native Geranium, *Epilobium* sp. Willowherb, and Common Rush *Juncus usitatus*. Occasional trees of species such as Snow Gum, Apple Box, Candle Bark and Black Gum occur on the margins of the community. Where it is mapped the community appears to be in medium condition.

Photo 3: A small patch of Riparian Herbfield on Licking Hole Creek adjacent to the Laggan Road.



Conservation Significance - Those areas of Riparian Herbfield within the study area that are in medium or high condition comprise the Montane Peatlands and Swamps EEC which is listed on the TSC Act. These occurrences are considered HCV.

Threatened Species Habitat Values – Patches of Riparian Herbfield provide potential temporary habitats for Painted Snipe *Rostratula benghalensis australis* and other wetland birds when they are migrating to larger wetlands.

Related Vegetation Communities – No equivalent community is identified by Gellie (2005).

GUNNING

The vegetation within the Gunning study area is generally highly modified in association with long-term grazing and some cropping on the more fertile alluvial soils associated with Meadow Creek. Notwithstanding the disturbances associated with historic and ongoing agriculture, patches of remnant native vegetation remain, including Box-Gum woodlands in good condition.

A conspicuous feature of the vegetation surrounding Gunning is the Native Pastures, which are dominated by hardy native grasses and in particular Speargrasses *Austrostipa* spp., and Wallaby Grasses such as *Autrodanthonia carphoides*, but also occasionally including Kangaroo Grass, Redgrass, Wheatgrass, and Weeping Grass. Exotic grasses and herbs are also widespread and abundant, and particularly Phalaris, Cocksfoot, Fescues, Oats *Avena* spp., *Paspalum* spp., Scotch Thistle and Nodding Thistle. The native pastures occur primarily in heavily grazed former Box-Gum Woodland, but also appear to have replaced what was once NTG, in the north-eastern parts of the study area.

Photo 4: Native pasture dominated by Speargrass in areas that were probably formerly NTG.



Ornamental plantings of predominantly exotic trees are largely restricted to the village area, windbreaks and around farmhouses, however the Hume Highway road reserve also includes abundant plantings of non-endemic native species. As with much of the Southern Tablelands, there are widespread occurrences of weedy shrubs and particularly Hawthorn, Sweet Briar, African Boxthorn *Lycium ferocissimum*, Thornapple *Datura* sp., and Orange Firethorn and, along Meadow Creek, Willows *Salix* spp.

Photo 5: Native pasture dominated by Speargrass and weeds in areas that were probably formerly NTG and which have been ploughed and heavily grazed.



Remnant patches of native vegetation within the Gunning study area are generally highly modified in the understorey and groundcover stratum with less modified patches restricted to a few patches of road reserve, some remnant woodland at the showground, the Golf Club and golf course, and the hill where the reservoir is located. The village area however includes many remnant endemic native trees some of which have hollows.

One native vegetation community remains within the Gunning study area: Tableland Grassy Box-Gum Woodland (Tozer *et. al.* 2006).

The distribution of the vegetation communities and other known biodiversity values within the Gunning study area are identified in Figure 3.

Tableland Grassy Box-Gum Woodland

Location – The Tableland Grassy Box-Gum Woodland within the Gunning study area and is likely to have once occurred in a mosaic with NTG. The community remains primarily in the western and eastern extremities of the study area including within the residential area.

Structure, Floristics and Condition - The community is characterised by a canopy dominated by Yellow Box *Eucalyptus melliodora*, Blakely's Red Gum *Eucalyptus blakelyi*, and to a lesser extent Apple Box *Eucalyptus bridgesiana*, with occasional Candlebark. Near the Golf Club there is a small patch where the canopy is dominated by Brittle Gum *Eucalyptus mannifera*.

The community is generally heavily modified with a groundcover of native pasture in those areas that are most heavily grazed. In a few areas where grazing pressure has been lighter, such as parts of the Old Hume Highway and Crookwell Road road reserves, the remnant woodland to the south-west of the showground, the golf course, and the hill where the reservoir is located, a more diverse native groundcover, and to a lesser extent, understorey persists. The understorey where it is present typically comprises occasional weedy shrubs but also includes occasional individuals of Hickory Wattle *Acacia implexa*, Cherry Ballart, Kurrajong *Brachychiton populneus*,

and Silver Wattle. Near the Golf Club there is a small patch where the understorey includes Drooping She-oak *Allocasuarina verticillata*.

The groundcover includes Kangaroo Grass, Speargrass *Austrostipa bigeniculata* and *Austrostipa scabra*, Wallaby Grasses including *Austrodanthonia racemosa*, Hairy Panic, Purple Wiregrass *Aristida ramosa*, Twining Pea, Smooth Flax Lily *Dianella longifolia*, Many-flowered Mat-rush, Wattle Mat-rush, Poa Tussock, Stinking Pennywort, Native Geranium, Sheep's Burr, Ivy Goodenia *Goodenia hederacea*, Bluebell *Wahlenbergia* spp., Love Creeper *Glycine* spp., Rock Fern *Cheilanthes sieberi*, Common Everlasting, New Holland Daisies *Vittadinia* spp., and Climbing Saltbush *Einzadria nutans*.

Recruitment of the canopy species is generally very low or absent except for those places where grazing pressure is lighter and is generally restricted to those sites described above where a more diverse native groundcover persists.

Photo 6: Tableland Grassy Box-Gum Woodland adjacent to the showground. Despite considerable weed invasion in the understorey and groundcover the community is otherwise in high condition.

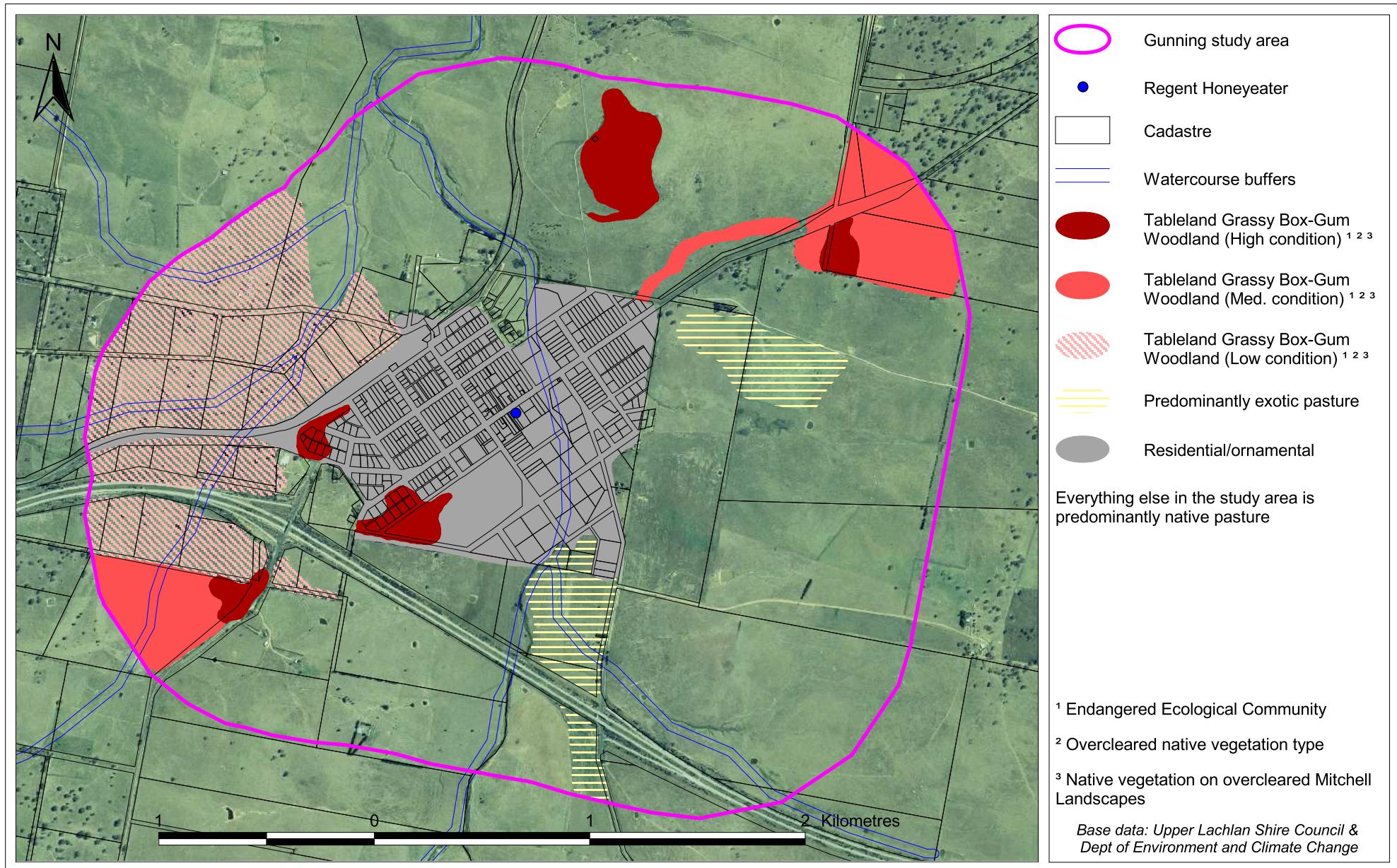


Conservation Significance - Those parts of the community within the study area comprise the EEC White Box, Yellow Box, Blakely's Red Gum Woodland which is listed under the TSC Act.

Threatened Species Habitat Values – The Tableland Grassy Box-Gum Woodland supports some hollow-bearing trees which provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, and hollow-dependent woodland birds. The larger patches which are in better condition also provide habitat for smaller woodland birds such as the Speckled Warbler *Pyrrholaemus sagittatus* and Diamond Firetail *Stagonopleura guttata*. Tableland Grassy Box-Gum Woodland also provides potential habitat for the threatened flora species Yass Daisy *Ammobium caspedoides*, Aromatic Peppergrass and Hoary Sunray.

Related Vegetation Communities – The community appears to equate with Vegetation Group 154: Tableland Dry Grassy Woodland of Gellie (2005).

Figure 3: Vegetation communities and other known biodiversity values within the Gunning study area



TARALGA

The vegetation within the Taralga study area is generally very highly modified in association with long-term grazing, and to a lesser extent cultivation. As such the vegetation is characterised by pastures dominated by exotic grasses and herbs, and particularly Phalaris, Cocksfoot, Fescues, Brome *Bromus* spp., Yorkshire Fog, Paspalum, Scotch Thistle and Nodding Thistle, ornamental plantings of predominantly exotic trees, and widespread occurrences of weedy shrubs such as Hawthorn, Sweet Briar, Cotoneaster, Orange Firethorn, Blackberry and, along watercourses and particularly Corroboree Creek, Willows *Salix* spp.

It is likely that the Taralga study area originally supported extensive Natural Temperate Grasslands with patches of grassy Snow Gum woodlands (Frost Hollow Grassy Woodland) and Tableland Basalt Forest. The NTG has almost entirely been replaced by pastures dominated by exotic species, however there are a few small patches which have persisted in the road reserves on the margins of the village. There are also a few patches of woodland and forest where the characteristic canopy trees persist above a highly modified groundcover. Almost without exception there is no evidence of recruitment of the canopy trees within these patches.

Three native vegetation communities occur within the Taralga study area: Frost Hollow Grassy Woodland, Tableland Basalt Forest (Tozer *et. al.* 2006) and Natural Temperate Grassland. The distribution of the vegetation communities and other known biodiversity values within the Taralga study area are identified in Figure 4.

Frost Hollow Grassy Woodland

Location - Patches of Frost Hollow Grassy Woodland occur on the ridge to the immediate west of the village between the Golspie Road and the Laggan Road, and also on the southern margins of the study area on the slopes above Corroboree Creek.

Structure, Floristics and Condition - In the study area the community is characterised by what appear to be almost pure stands of remnant Snow Gums, however there may be a few Black Sallee individuals in places. The remnant canopy trees occur over a predominately exotic groundcover. However, there is one small patch on the Golspie Road where remnants of the original groundcover persist in the road reserve. In this location the groundcover is dominated by Kangaroo Grass, Poa Tussock, Wallaby Grass *Austrodanthonia* spp., Hairy Panic, Common Woodruff, Climbing Saltbush and Love Creeper, and also includes Common Everlasting, Australian Bindweed *Convolvulus erubescens*, Native Geranium, Grassland Wood Sorrel *Oxalis perennans*, Sheep's Burr, Smooth Flax Lily, Many-flowered Mat-rush and Willowherb *Epilobium billardierianum*. The abundance of Speargrass, Sheep Sorrel *Acetosella vulgaris*, Cocksfoot, Phalaris, Paspalum and other weedy forbs suggests that despite the lower historic grazing pressure this remnant is subject to occasional adverse disturbance.

Conservation Significance - Frost Hollow Grassy Woodland is an over-cleared and poorly conserved vegetation community and those parts of the community where the canopy cover is less than 10% and where there is a reasonably diverse grassy native groundcover, comprise the NTG EEC, which is listed under the EPBC Act. Under these circumstances, all occurrences of Frost Hollow Grassy Woodland within the study area are considered to be HCV regardless of their condition, however only one or two small areas would comprise the NTG EEC.

Threatened Species Habitat Values – The Frost Hollow Grassy Woodland within the study area usually supports a reasonable abundance of hollow-bearing trees which provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, and hollow-dependent woodland birds. It also provides potential habitat for the threatened flora species Aromatic Peppergrass and Hoary Sunray.

Related Vegetation Communities - The community appears to equate with Vegetation Group 153: Tablelands and Slopes Herb/Grassland/Woodland of Gellie (2005).

Natural Temperate Grassland

Location - Several small patches of NTG occur within the study area, the largest of which are in the Bannaby Road road reserve just above the tennis courts, in the paddocks to the immediate south of the Laggan Road on "Hillview", and in the Hill Street and Halls Road road reserves.

Structure, Floristics and Condition - The community is characterised by a dense groundcover of native grasses and forbs such as Kangaroo Grass, Poa Tussock, Common Woodruff, Native Geranium, Grassland Wood Sorrel, Australian Bindweed, Many-flowered Mat-rush and Common Everlasting.

Conservation Significance - The small patches of NTG within the study area are in medium condition and comprise the NTG EEC listed under the EPBC Act and are thus HCV.

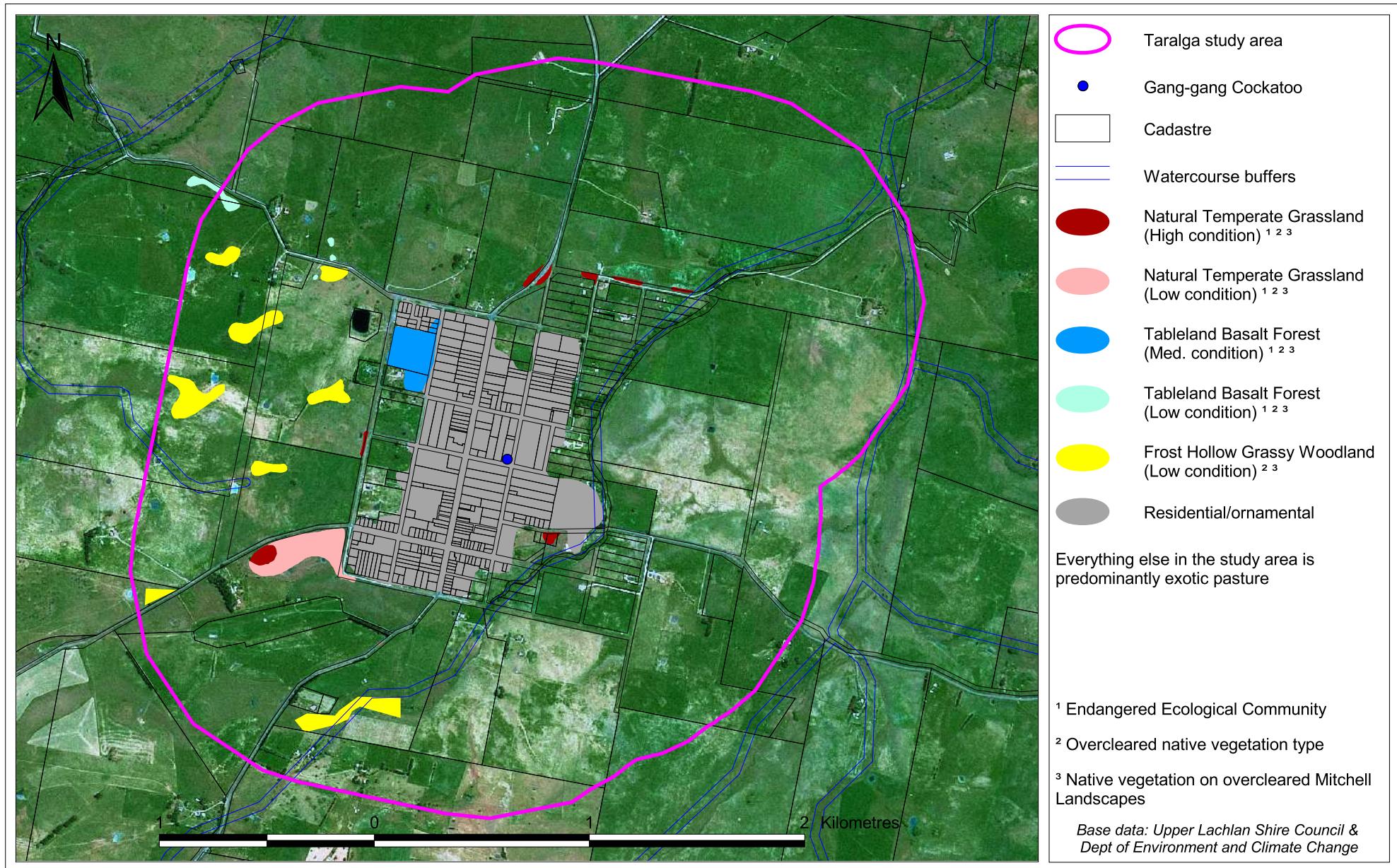
Threatened Species Habitat Values – The NTG within the study area provides potential habitat for the threatened flora species Aromatic Peppercress and Hoary Sunray.

Related Vegetation Communities - The community equates to Vegetation Group 152: Tableland Herb/Grassland of Gellie (2005).

Photo 7: A small patch of medium condition NTG in the Halls Road road reserve. The small patches of NTG within the study area are threatened by road works and inappropriate plantings such as those which are shown in the photo.



Figure 4: Vegetation communities and other known biodiversity values within the Taralga study area



Tableland Basalt Forest

Location – The one substantial remnant patch of Tableland Basalt Forest within the study area occurs on the slopes in the north-western extremities of the village between Martyn Street and Chisholm Street.

Structure, Floristics and Condition - Within the study area the community is characterised by a remnant tall open-forest canopy of pure Ribbon Gum with occasional individuals of Snow Gum on the margins. Within the study area, the Tableland Basalt forest is very heavily disturbed with occurrences generally reduced to remnant paddock trees isolated amongst extensive swathes of exotic pasture. There is one substantial remnant patch of the community on the slopes in the north-western extremities of the village, however despite the persistence of something approaching the original canopy cover, the characteristic understorey and groundcovers are absent or in very low abundance, and have been replaced by an abundance of weedy shrubs and groundcovers. The Tableland Basalt Forest within the study area is in medium or low condition.

Conservation Significance - The Tableland Basalt Forest within the study area comprises the Tableland Basalt Forest EEC listed under the TSC Act and is thus HCV.

Threatened Species Habitat Values – The Tableland Basalt Forest is likely to support some hollow-bearing trees although few obvious hollows were detected during the vegetation surveys. Any hollows in the community provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, and hollow-dependent woodland birds. Tableland Basalt Forest also provides potential habitat for the threatened flora species Aromatic Peppercress and Hoary Sunray.

Related Vegetation Communities – No equivalent community is identified by Gellie (2005), however it has affinities with Vegetation Group 117: Central Northern Tablelands Dry Shrub/Grass Forest.

Photo 8: A small patch of Tableland Basalt Forest on the north-western study area boundary.



COLLECTOR

More than half of the land within 1 km of the Collector village boundary is within the floodplain of Collector Creek, and thus was outside the study area given its unsuitability for future development. Remote sensing analysis (ERIC 2001) suggests that these lands continue to support predominantly native species and are likely to have originally support the Tablelands Flats Grassland of Tozer *et. al.* (2006), which is likely to have affinities with Vegetation group 191: Tableland Alluvial Valley Floor Wetlands of Gellie (2005).

The remnant native vegetation within the Collector study area (those areas above the 1:100 year flood level) is generally highly modified in association with long-term grazing, crop cultivation, and existing rural and residential development. As such the vegetation is characterised by an abundance of exotic grasses and herbs, and, ornamental plantings of predominantly exotic trees, and widespread occurrences of weedy shrubs such as Hawthorn, Sweet Briar, Cotoneaster, Orange Firethorn, and Blackberry. Notwithstanding these disturbances there are patches of relatively undisturbed vegetation within the study area primarily in association with the knoll in the centre of the village, on the northern outskirts of the village, and on the eastern margins in the vicinity of the rubbish tip.

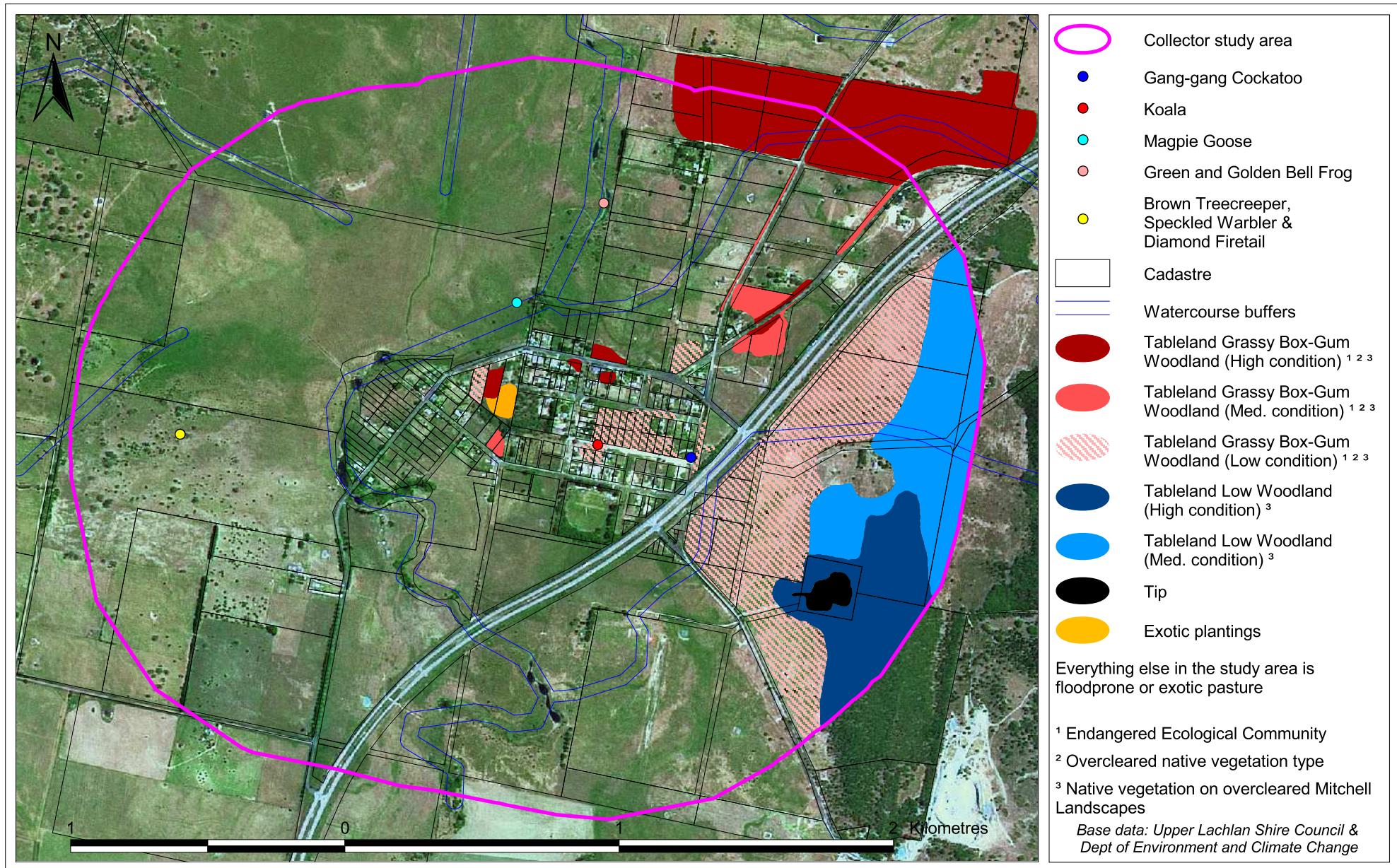
Photo 9: A diverse and high condition native groundcover in Tableland Grassy Box-Gum Woodland on the knoll in the centre of the village. This vegetation is surrounded by new residential development.



Two native vegetation communities occur within the Collector study area: Tableland Grassy Box-Gum Woodland and Tableland Low Woodland (Tozer *et. al.* 2006).

The distribution of the vegetation communities and other known biodiversity values within the Collector study area are identified in Figure 5.

Figure 5: Vegetation communities and other known biodiversity values within the Collector study area



Tableland Grassy Box-Gum Woodland

Location – Patches of Tableland Grassy Box-Gum Woodland occur in association with the knoll in the centre of the village, on the Breadalbane Road, and on the lower slopes on the eastern side of the Hume Highway.

Structure, Floristics and Condition - In the study area the community is characterised by a canopy dominated by Yellow Box, Apple Box, Blakely's Red Gum, Candlebark, and to a lesser extent Argyle Apple *Eucalyptus cinerea*. In a few locations there are individuals of Snow Gum, Black Sallee, and Broad-leaved Peppermint which are evidence of the frequency of cold-air drainage and frosts in the study area and suggest that the original vegetation was probably ecotonal with the Frost Hollow Grassy Woodland. In places, the canopy is likely to have been sufficiently sparse that a mosaic of Grassy Woodland and NTG existed. A few individuals of Scribbly Gum *Eucalyptus rossii* occur in places.

In most instances, the remnant canopy trees occur over a predominately exotic groundcover. However, there are patches of the community within road reserves, the knoll in the centre of the village, the cemetery, and the crown reserve on the northern margins of the study area, where a predominantly native groundcover persists. In these locations there is a sparse understorey of exotic shrubs and Silver Wattle, with a few individuals of Hickory Wattle and Native Indigo *Indigofera australis*. Where grazing pressure and other disturbances have been light the groundcover is generally dominated by Kangaroo Grass, Poa Tussock, Wallaby Grass, Weeping Grass, Hairy Panic, Wattle Mat-rush, Many-flowered Mat-rush, and Common Raspwort. Other groundcovers include Speargrass, Daphne Heath *Brachyloma daphnoides*, Urn Heath, Common Woodruff, Common Everlasting, Love Creeper, Stinking Pennywort, Native Geranium, Grassland Wood Sorrel, Sheep's Burr, Smooth Flax Lily, Beauty Heads *Calocephalus citreus*, *Bossiaea prostrata* and Hairy Stinkweed *Opercularia hispida*.

The condition of the community is generally medium to high although there are some heavily grazed areas and locations where the ecological integrity of the remnants is threatened by roadside plantings. Recruitment of the canopy species is generally good except for those places where grazing pressure continues to be heavy.

Photo 10: High condition Tableland Grassy Box-Gum Woodland at the “Racecourse”.



Conservation Significance – The Tableland Grassy Box-Gum Woodland within the study area comprises the EEC White Box, Yellow Box, Blakely's Red Gum Woodland which is listed under the TSC Act and is thus considered HCV.

Threatened Species Habitat Values – The Tableland Grassy Box-Gum Woodland supports some hollow-bearing trees which provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, and hollow-dependent woodland birds. The Gang-gang Cockatoo *Callocephalon fimbriatum* was observed within the study area during the survey period and it is possible that the species may breed or roost there in suitable hollows. The larger patches which are in better condition also provide habitat for a range of threatened woodland birds. Tableland Grassy Box-Gum Woodland also provides potential habitat for the threatened flora species Yass Daisy, Aromatic Peppergrass and Hoary Sunray.

Related Vegetation Communities – The community appears to equate with Vegetation Group 154: Tableland Dry Grassy Woodland of Gellie (2005).

Tableland Low Woodland

Location – Tableland Low Woodland occurs on the mid-slopes of the hill in the eastern extremities of the study area in the vicinity of the rubbish tip, and to the north and south in similar topographical positions.

Structure, Floristics and Condition -The Tableland Low Woodland within the study area is characterised by a low canopy dominated by Scribbly Gum and Red Stringybark *Eucalyptus macrorhyncha*. Occasional individuals of Argyle Apple, Brittle Gum, and Broad-leaved Peppermint also occur in places, mainly on the lower slopes. The understorey is dominated by Grey Guinea Flower, and also includes *Dillwynia sericea*, Pale Wedge Pea *Gompholobium huegelii*, Ploughshare Wattle *Acacia gunnii*, Poverty Wattle *Acacia dawsonii*, *Daviesia leptophylla*, Daphne Heath, Peach Heath *Lissanthe strigosa* and occasional Narrow-leaved Geebung *Persoonia linearis*. The sparse groundcover is dominated by Redanther Wallaby Grass and includes a range of other native grasses, sedges and forbs such as Poa Tussock, Hairy Panic, Wallaby Grass *Austrodanthonia racemosa*, Wattle Mat-rush, Many-flowered Mat-rush, Common Raspwort, Purple Coral Pea, Ivy Goodenia, Grass Trigger-plant *Stylidium graminifolium*, Curved Rice-flower, Creeping Hovea and Black-anthered Flax Lily.

The community is generally in high condition within the study area however north of the rubbish tip a large area of the community has been reduced to a secondary grassland as a result of clearing for grazing. Recent grazing pressures appear to have been light in this area however and it appears to be recovering well and is considered to be in medium condition.

Conservation Significance – The Tableland Low Woodland within the study area occurs on an over-cleared Mitchell Landscape and is thus considered HCV.

Threatened Species Habitat Values – The Tableland Low Woodland supports some hollow-bearing trees which provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, hollow-dependent woodland birds and threatened arboreal mammals such as the Squirrel Glider *Petaurus norfolcensis*. It provides habitat for a range of threatened woodland birds.

The Tableland Low Woodland also provides potential habitat for the threatened flora species including the Buttercup Doubletail *Diuris aequalis* and Hoary Sunray.

Related Vegetation Communities – The community equates to Vegetation Group 114: Tableland Dry Shrub/Tussock Grass Forest of Gellie (2005).

Photo 11: Typical high condition Tableland Low Woodland on the slopes above Collector Tip.



BREADALBANE

The remnant native vegetation within the Breadalbane study area is generally highly modified in association with long-term grazing and crop cultivation on the floodplains of Hannans Creek. As such the vegetation is characterised by an abundance of exotic grasses, particularly Phalaris, and exotic herbs in the low-lying parts of the landscape. Elsewhere, grazing pressures have resulted in the replacement of the diverse native groundcovers that are likely to have once been present with native pastures dominated by Speargrass *Austrostipa* spp. Ornamental plantings of predominantly exotic trees occur around the existing homesteads and there are windbreak plantings in places.

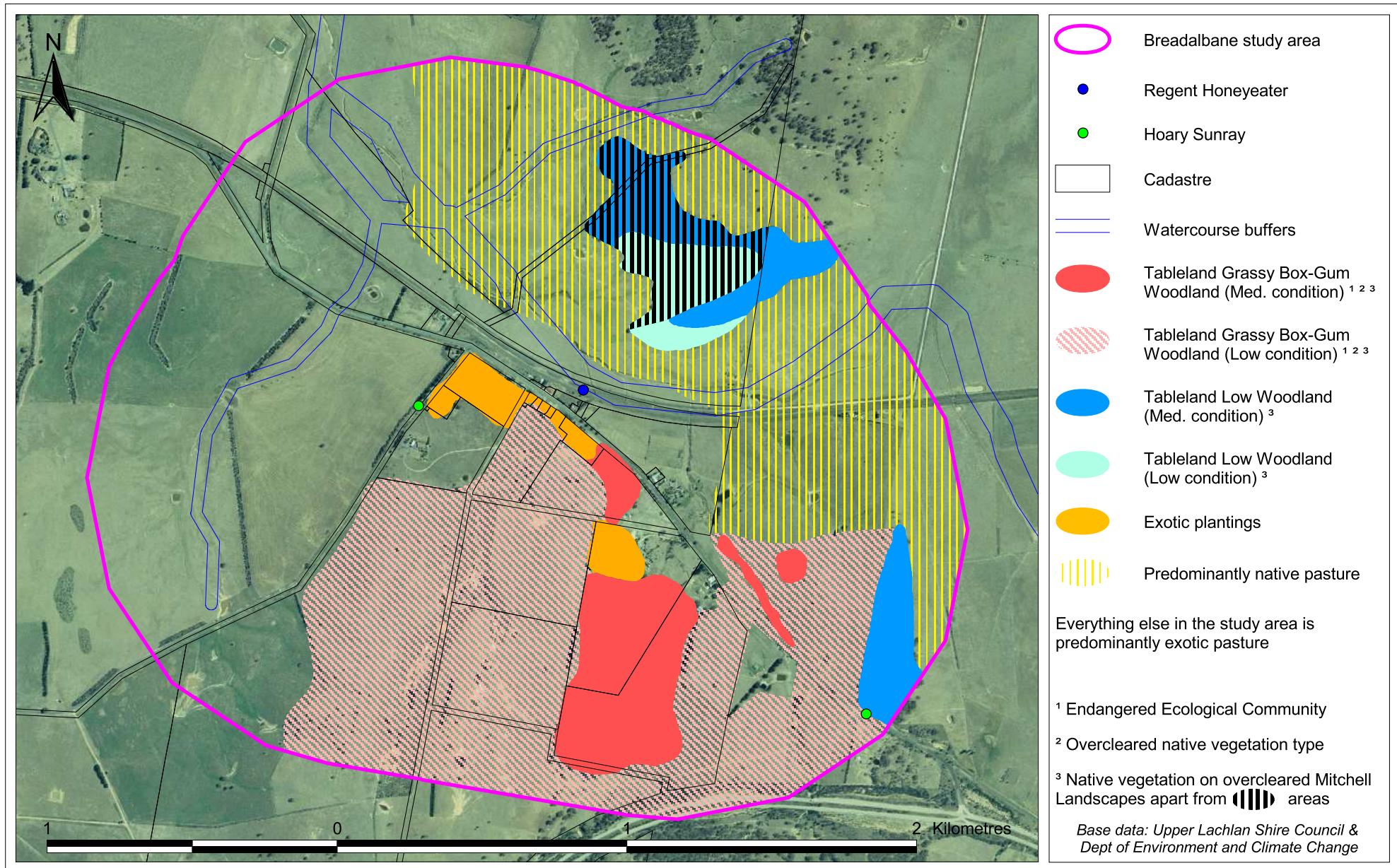
It is likely that the study area originally supported extensive areas of NTG and Frost Hollow Grassy Woodland in the lower parts of the landscape. However these communities have been modified to the extent that they are currently represented by the occasional remnant Snow Gum or Candlebark individual and the occasional very small patch of native groundcover in some of the road reserves. However, there may be more extensive areas of NTG in the easement of the Southern Railway, as predicted by ERIC (2001). Some areas of Box-Gum Woodland persist within the study area on the mid-slopes, with patches of Dry Forest occurring on upper-slopes.

Almost all the native vegetation within the study area is heavily grazed and consequently the groundcover floristics have been substantially simplified and mostly replaced with native pasture. However in the road reserve of the Old Hume Highway and the road to Collector, small patches supporting a more diverse native groundcover persist in a few locations. These patches support populations of Hoary Sunray, which is listed as endangered under the EPBC Act.

Two native vegetation communities occur within the Collector study area: Tableland Grassy Box-Gum Woodland and Tableland Low Woodland (Tozer *et. al.* 2006).

The distribution of the vegetation communities and other known biodiversity values within the Breadalbane study area are identified in Figure 6.

Figure 6: Vegetation communities and other known biodiversity values within the Breadalbane study area



Tableland Grassy Box-Gum Woodland

Location – Patches of Tableland Grassy Box-Gum Woodland occur on mid-slopes in the south-eastern parts of the study area.

Structure, Floristics and Condition - In the study area the community is characterised by a canopy dominated by Yellow Box, Apple Box, and Brittle Gum with occasional individuals of Snow Gum and Broad-leaved Peppermint in a few locations. In most instances, the remnant canopy trees occur over a highly modified groundcover of native pasture dominated by Speargrass. A few individuals of Silver Wattle occur in the understorey within road reserves in places.

Recruitment of the canopy species is generally non-existent or poor except for one paddock where grazing pressures have been lighter and some recruitment has occurred. As such the majority of the community within the study area is in low condition with one patch classified as medium.

Conservation Significance – Notwithstanding the modified nature of the Tableland Grassy Box-Gum Woodland within the study area, it comprises the EEC White Box, Yellow Box, Blakely's Red Gum Woodland listed under the TSC Act and is thus considered HCV.

Threatened Species Habitat Values – The Tableland Grassy Box-Gum Woodland within the study area is generally highly modified but may support some hollow-bearing trees which may provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, and hollow-dependent woodland birds. Tableland Grassy Box-Gum Woodland also provides known habitat for the threatened flora species the Hoary Sunray.

Related Vegetation Communities – The community appears to equate with Vegetation Group 153: Tablelands and Slopes Herb/Grassland Woodland of Gellie (2005).

Tableland Low Woodland

Location – Tableland Low Woodland occurs on the upper-slopes of the eastern extremities of the study area and to the north of the Southern Railway in a similar topographical position.

Structure, Floristics and Condition - The Tableland Low Woodland within the study area is characterised by a low canopy dominated by Scribbly Gum with occasional individuals of Yellow Box on the margins. The understorey is almost entirely absent however there are a few individuals of Sifton Bush *Cassinia arcuata* in the road reserve in one location. The sparse groundcover is dominated by Speargrass, *Austrostipa scabra* and to a lesser extent *Austrostipa bigeniculata*, but in road reserves also includes some Wallaby Grass *Austrodanthonia racemosa*, Ivy Goodenia, Hoary Sunray and Common Everlasting. The community is generally considered to be in medium condition within the study area as it is characterised either by a highly modified native pasture groundcover below a canopy approaching the likely original cover, or has been reduced to a secondary grassland as a result of clearing.

Conservation Significance – Part of the Tableland Low Woodland within the study area occurs on an over-cleared Mitchell Landscape and is thus considered HCV.

Threatened Species Habitat Values – The Tableland Low Woodland supports some hollow-bearing trees which provide potential roosting and breeding habitat for hollow-dependent threatened fauna. It also provides marginal habitat for a range of threatened woodland birds. The Tableland Low Woodland also provides potential habitat for the threatened flora species Buttercup Doubletail and known habitat for the Hoary Sunray.

Related Vegetation Communities – The community equates to Vegetation Group 114: Tableland Dry Shrub/Tussock Grass Forest of Gellie (2005).

10. Vegetation Mapping Around Priority 2 Villages

BIGGA

The remnant native vegetation within the Bigga study area is characterised by Tableland Grassy Box-Gum Woodland in various conditions states. The community is generally highly modified in association with long-term grazing and existing residential development, and as such is generally characterised by occasional remnant or regrowth canopy trees over native pasture dominated by Speargrass, Wallaby Grass, occasional Kangaroo Grass, often with abundant Phalaris and St John's Wort *Hypericum perforatum*. The residential area is characterised by mainly ornamental plantings of predominantly exotic trees however there are a few remnant native trees.

Notwithstanding these disturbances there are patches of relatively undisturbed vegetation within the study area primarily in association with crown lands and road reserves but also on the golf course and on some private property. These patches are generally in high condition.

Two native vegetation communities occur within the Bigga study area: Tableland Grassy Box-Gum Woodland and Tableland Hills Grassy Woodland (Tozer *et. al.* 2006). The distribution of the vegetation communities and other known biodiversity values within the Bigga study area are identified in Figure 7.

Tableland Grassy Box-Gum Woodland

Location – Patches of Tableland Grassy Box-Gum Woodland and secondary grasslands derived from the community dominate the study area.

Structure, Floristics and Condition - In the study area the community is characterised by a canopy dominated by Yellow Box, Blakely's Red Gum, Apple Box, and to a lesser extent Red Box *Eucalyptus polyanthemos*, Red Stringybark, Bundy *Eucalyptus goniocalyx*, and Mealy Bundy *Eucalyptus nortonii*. A few individuals of White Box *Eucalyptus albens*, Kurrajong and Black Cypress Pine *Callitris endlicheri* occur on the western margins of the study area. The presence of these species suggests that the community is transitional with the Western Slopes Grassy Woodlands of Keith (2004).

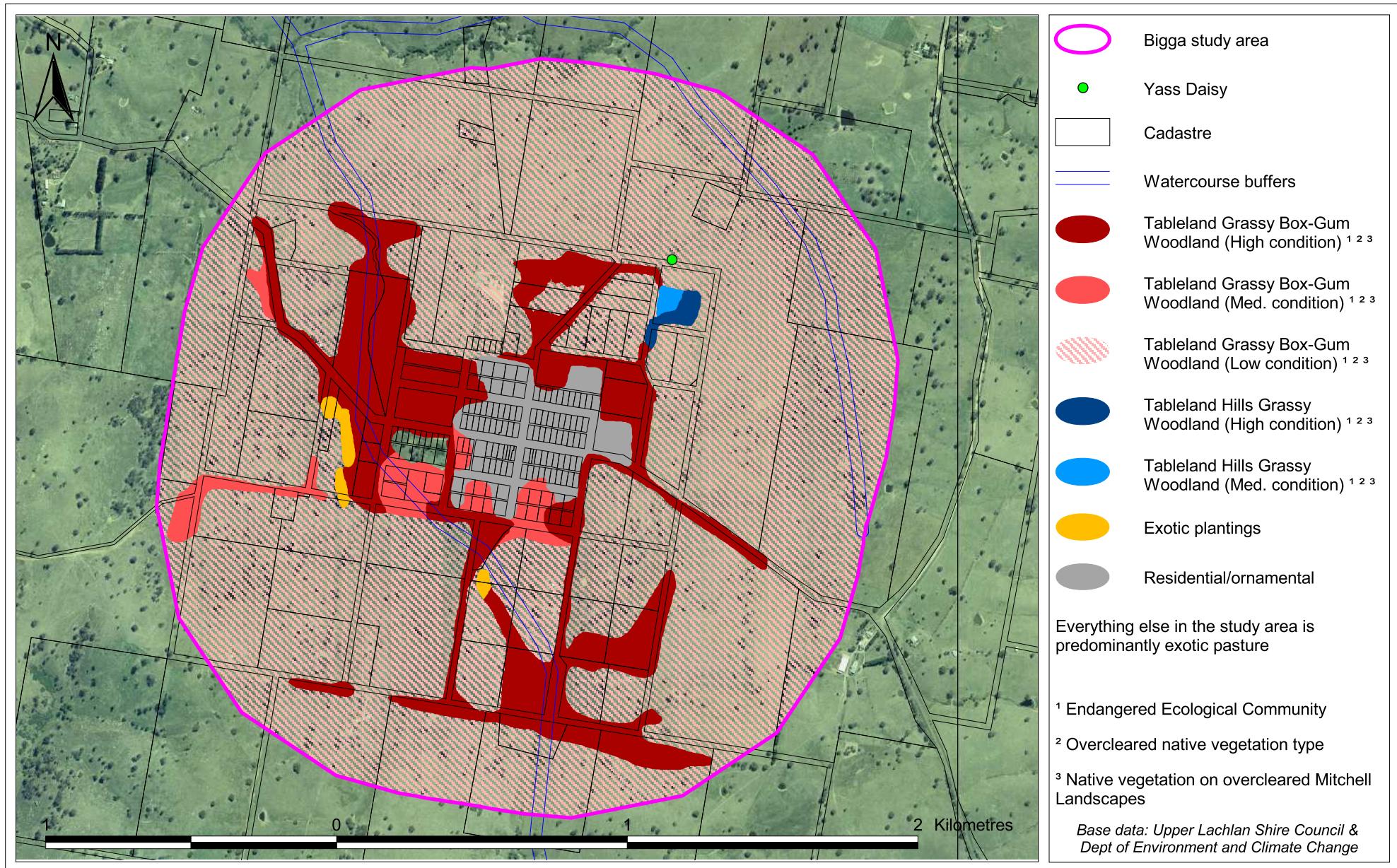
Apart from Kurrajong and Black Cypress Pine there is occasional Hickory Wattle *Acacia implexa* in the sparse mid-canopy. The understorey is basically non-existent apart from occasional Orange Firethorn and Small-leaved Privet *Ligustrum sinense*, and occasional Daphne Heath.

Where grazing pressure and other disturbances have been light the groundcover is generally dominated by Kangaroo Grass, Speargrass, Wallaby Grass *Austrodanthonia racemosa*, Poa Tussock, Wallaby Grass *Austrodanthonia* spp., Weeping Grass, Wheatgrass, Purple Wiregrass, Wattle Mat-rush, Many-flowered Mat-rush, Curved Rice-flower and Common Everlasting. Other common native groundcovers include Common Raspwort, Stinking Pennywort, Grassland Wood Sorrel, Sheep's Burr, Smooth Flax Lily, Rock Fern, Tall Sedge *Carex appressa*, *Opercularia diphyllea*, Variable Plantain, Bitter Cryptandra *Cryptandra amara*, Bluebell *Wahlenbergia* spp., and Erect Guinea-flower *Hibbertia riparia*. Exotic groundcovers such as Quaking Grass *Briza maxima*, Paspalum, Sheep Sorrel, Phalaris, St John's Wort, and Dog's Tail *Cynosurus* sp. are also common in places.

Recruitment of the canopy species is generally only occurring in those places where grazing pressure is light.

Conservation Significance – The Tableland Grassy Box-Gum Woodland within the study area comprises the EEC White Box, Yellow Box, Blakely's Red Gum Woodland which is listed under the TSC Act and is thus considered HCV.

Figure 7: Vegetation communities and other known biodiversity values within the Bigga study area



Threatened Species Habitat Values – The Tableland Grassy Box-Gum Woodland within the study area supports some hollow-bearing trees which provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, and hollow-dependent woodland birds. Tableland Grassy Box-Gum Woodland also provides potential habitat for the threatened flora species Hoary Sunray, Aromatic Peppercress and known habitat for the Yass Daisy.

Related Vegetation Communities – The community appears to equate with Vegetation Group 154: Tableland Dry Grassy Woodland and Vegetation Group 159: Northern Slopes Dry Grass Woodland of Gellie (2005).

Photo 12: High condition Tableland Grassy Box-Gum Woodland in a road reserve on the southern edge of Bigga village.



Tableland Hills Grassy Woodland

Location – In the Bigga cemetery.

Structure, Floristics and Condition - The low canopy is dominated by Red Stringybark, Red Box, and Bundy, with a sparse mid-canopy of Blackthorn *Bursaria spinosa* and Hickory Wattle. The understorey is dominated by Daphne Heath, Grey Guinea Flower, Poverty Wattle, Urn Heath, *Dillwynia sericea*, Native Indigo, and occasional Black She-oak *Allocasuarina littoralis*.

The dense groundcover is dominated by a diverse range of native grasses, sedges and forbs such as Kangaroo Grass, Redanther Wallaby Grass, Poa Tussock, Hairy Panic, Wallaby Grass, Wattle Mat-rush, Many-flowered Mat-rush, Black-anthered Flax Lily, Smooth Flax Lily, Common Raspwort, Purple Coral Pea, Rock Fern, Hairy Stinkweed, Grass Trigger-plant, Love Creeper, Native Cranberry *Astroloma humifusum*, Curved Rice-flower, Creamy Candles *Stackhousia monogyna*, Milkmaids *Burchardia umbellata* and Clustered Everlasting *Chrysocephalum semipapposum*.

Conservation Significance – The Tableland Grassy Box-Gum Woodland within the study area comprises the EEC White Box, Yellow Box, Blakely's Red Gum Woodland which is listed under the TSC Act and is thus considered HCV.

Threatened Species Habitat Values – The community provides some foraging habitat for woodland birds and also provides potential habitat for the threatened flora species Hoary Sunray and Aromatic Peppercress, and known habitat for the Yass Daisy.

Related Vegetation Communities – Whilst it correlates best with the Tableland Hills Grassy Woodland of Tozer et. al. (2006), it appears transitional with the Southern Tablelands Dry Sclerophyll Forests of Keith (2004).

BINDA

As with the Bigga study area, the remnant native vegetation within the Binda study area is characterised primarily by Tableland Grassy Box-Gum Woodland in various conditions states. The community is generally highly modified in association with long-term grazing and existing residential development, and as such is generally characterised by occasional remnant or regrowth canopy trees over native pasture dominated by a mix of native and exotic species. The residential area is characterised by mainly ornamental plantings of predominantly exotic trees however remnant native trees are reasonably common.

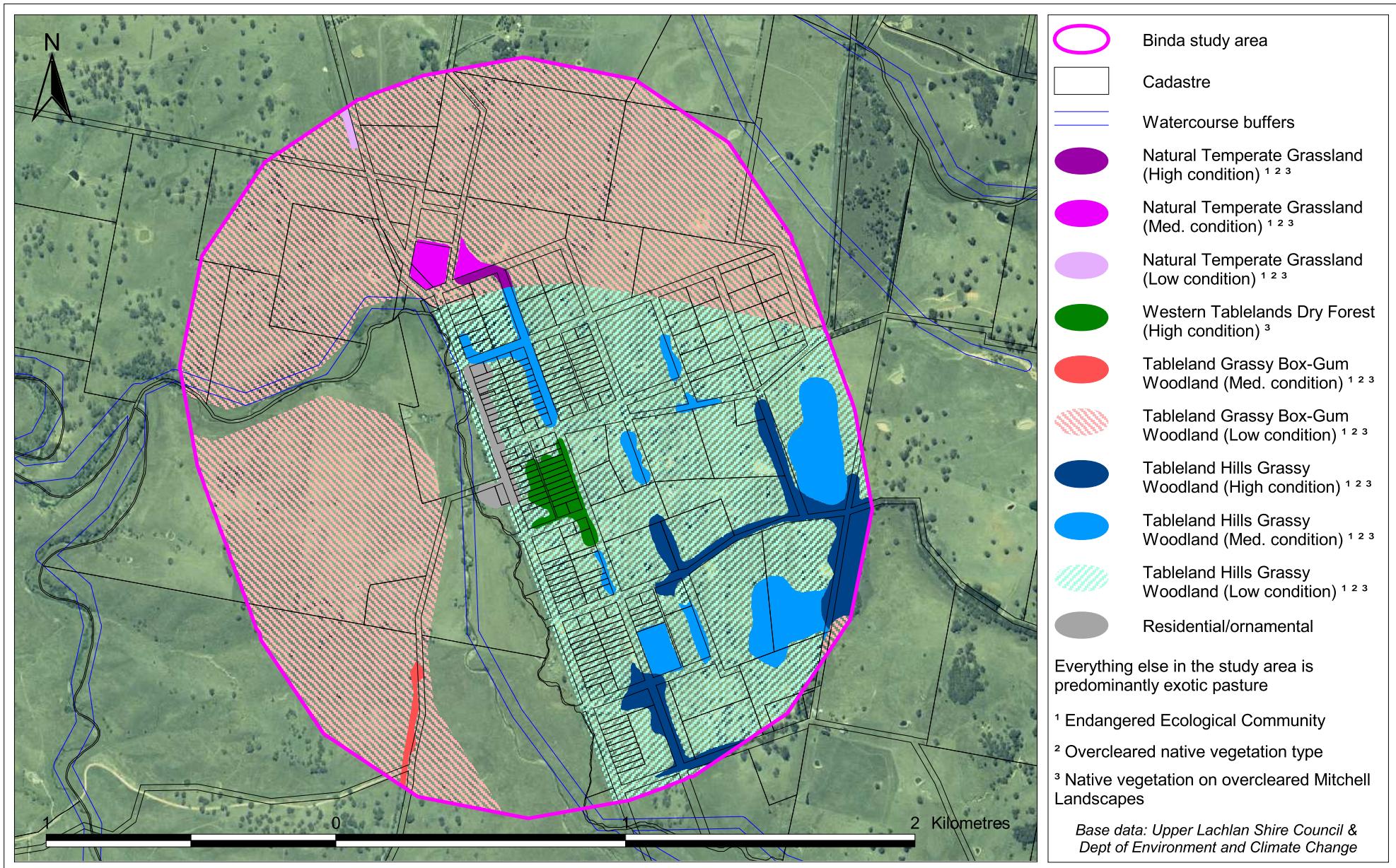
In contrast to the Bigga study area, the Binda study area is likely to have also originally included more extensive areas of NTG and Frost Hollow Grassy Woodland in association with more frequent cold air drainage and frosts, particularly along Binda Creek. Two small patches of NTG persist in a road reserve and within the cemetery.

Areas along Binda Creek probably originally supported the Tableland Swamp Meadow and Riparian Herbfield vegetation communities of Tozer et. al. (2006), which have subsequently been highly modified by cropping and grazing. Parts of the Binda Creek channel and banks continue to support native vegetation associated with creek-line habitats such as Common Reed *Phragmites australis*, Cumbungi *Typha* sp., Tall Sedge, Rushes *Juncus* spp. and River Tussock, however they are restricted to a very narrow band along the creek. Willows *Salix* spp. are also common along Binda Creek.

Photo 12: Narrow band of native sedges, rushes and herbs along Binda Creek.



Figure 8: Vegetation communities and other known biodiversity values within the Bindia study area



Notwithstanding these disturbances there are relatively undisturbed patches of vegetation within the study area, primarily in road reserves but also on some private property. These patches are generally in medium to high condition.

Four native vegetation communities occur within the Binda study area: Tableland Grassy Box-Gum Woodland, Tableland Hills Grassy Woodland, Natural Temperate Grassland and Western Tablelands Dry Forest (Tozer *et. al.* 2006).

The distribution of the vegetation communities and other known biodiversity values within the Binda study area are identified in Figure 8.

Tableland Grassy Box-Gum Woodland

Location – Tableland Grassy Box-Gum Woodland in various condition states dominates the western and northern margins of the study area.

Structure, Floristics and Condition - In the study area the community is characterised by a canopy dominated by Yellow Box, Apple Box, Blakely's Red Gum and Red Stringybark with occasional individuals of Snow Gum, Black Sallee, Candlebark and Broad-leaved Peppermint in areas that are more frequently exposed to frosts. The groundcover typically comprises native pasture or mixed exotic and native pasture. Where grazing pressure and other disturbances have been lighter the groundcover typically includes Kangaroo Grass, Wallaby Grass Poa Tussock, Weeping Grass, Wheatgrass, Wattle Mat-rush, Many-flowered Mat-rush, Curved Rice-flower, Common Woodruff, and Common Everlasting. Other groundcovers include Grassland Wood Sorrel, Sheep's Burr, Tall Sedge, Native Geranium, Smooth Flax Lily and Bidgee Widgee *Acaena novae-zelandiae*. Exotic groundcovers such as Perennial Ryegrass *Lolium perenne*, Fescues, Paspalum, Phalaris, Cocksfoot, Couch *Cynodon dactylon* and Sheep Sorrel are also common except in the highest condition parts of remnants. Recruitment of the canopy species is generally only occurring in those places where grazing pressure is light.

Conservation Significance – The Tableland Grassy Box-Gum Woodland within the study area comprises the EEC White Box, Yellow Box, Blakely's Red Gum Woodland which is listed under the TSC Act and is thus considered HCV.

Threatened Species Habitat Values – The Tableland Grassy Box-Gum Woodland within the study area supports some hollow-bearing trees which provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, and hollow-dependent woodland birds. Tableland Grassy Box-Gum Woodland also provides potential habitat for the threatened flora species Hoary Sunray, Aromatic Peppercress and Yass Daisy.

Related Vegetation Communities – The community appears to equate with Vegetation Group 154: Tableland Dry Grassy Woodland of Gellie (2005).

Natural Temperate Grassland

Location – Two small patches of NTG occur within the study area, in the cemetery and in the road reserve approximately 150 m to the south-east of the cemetery.

Structure, Floristics and Condition - The community is characterised by a dense groundcover of Kangaroo Grass and to a lesser extent Poa Tussock but also with other native grasses and forbs such as Wallaby Grasses, Common Woodruff, Native Geranium, Grassland Wood Sorrel, Many-flowered Mat-rush and Common Everlasting. In places there are also patches of Small-fruit Hakea *Hakea macrocarpa*, which is associated with the margins of swamps.

Conservation Significance – The small patches of NTG within the study area in medium condition comprise the EEC listed under the EPBC Act and are thus considered HCV.

Threatened Species Habitat Values – The NTG within the study area provides potential habitat for the threatened flora species Aromatic Peppercress, Yass Daisy and Hoary Sunray.

Related Vegetation Communities - The community equates to Vegetation Group 152: Tableland Herb/Grassland of Gellie (2005).

Photo 13: NTG in road reserve with low condition Tableland Grassy Box-Gum Woodland in background.



Tableland Hills Grassy Woodland

Location – In the central and south-eastern parts of the Binda study area.

Structure, Floristics and Condition – The community is most appropriately classified as the Tableland Hills Grassy Woodland of Tozer *et. al.* (2006), although it appears in places to be transitional with the Southern Tablelands Dry Sclerophyll Forests of Keith (2004). The canopy is dominated by Yellow Box, Apple Box, Blakely's Red Gum, Red Stringybark with some Candlebark and Broad-leaved Peppermint in places. The understorey and groundcover are similar to the Tableland Grassy Box-Gum Woodland but also include species more typically associated with drier forests. Within the study area the community includes patches in high to low condition including diverse secondary grasslands.

Threatened Species Habitat Values – The community supports some hollow-bearing trees which provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, and hollow-dependent woodland birds. It also provides potential habitat for the threatened flora species Hoary Sunray, Aromatic Peppercress and Yass Daisy.

Conservation Significance – The Tableland Hills Grassy Woodland within the study area comprises the EEC White Box, Yellow Box, Blakely's Red Gum Woodland EEC listed under the TSC Act and is thus considered HCV.

Related Vegetation Communities - The community best equates to Vegetation Group 154: Tableland Dry Grassy Woodland of Gellie (2005).

Photo 14: High condition Tableland Hills Grassy Woodland showing good canopy recruitment.



Western Tablelands Dry Forest

Location – There is one patch of vegetation within the study area, in between Arthur Street, Queen Street and south of the Binda Limerick Road, that is best described as Western Tablelands Dry Forest.

Structure, Floristics and Condition – Within the study area the community is characterised by a low canopy dominated by Broad-leaved Peppermint with occasional individuals of Yellow Box and Apple Box. The understorey is shrubby and dominated by *Pultenaea procumbens*, Daphne Heath, *Daviesia leptophylla* and Poverty Wattle and also includes Varnish Wattle *Acacia verniciflua*, Urn Heath, Sifton Bush, Blackthorn and Silver Wattle. The groundcover is dominated by Redanther Wallaby Grass, Kangaroo Grass, Purple Wiregrass, Wattle Mat-rush, Many-flowered Mat-rush, Black-anthered Flax Lily and Common Everlasting, but also includes a range of other native grasses, sedges and forbs such as Poa Tussock, Speargrass *Austrostipa scabra*, Purple Coral Pea, Ivy Goodenia, Grass Trigger-plant, Curved Rice-flower, Creeping Hovea and *Dillwynia sericea*. The exotic groundcovers St John's Wort and Dog's Tail *Cynosurus* sp. are also common.

Whilst the community is predominantly shrubby the community appears to be ecotonal with the surrounding grassy woodlands. The community is generally in medium to high condition within the study area however parts of the community support dense infestations of Broom.

Threatened Species Habitat Values – The community provides foraging habitat for woodland birds. It also provides potential habitat for the threatened flora species Hoary Sunray.

Conservation Significance – The Western Tablelands Dry Forest within the study area occurs on an over-cleared Mitchell Landscape and is thus considered HCV.

Related Vegetation Communities - The community equates to Vegetation Group 109: Widespread Tablelands Dry Shrub/Tussock Grass Forest of Gellie (2005).

DALTON

The vegetation within Dalton study area is generally highly modified in association with long-term grazing. Notwithstanding the disturbances associated with historic and ongoing agriculture, there are some reasonably large patches of remnant native vegetation, including Box-Gum woodlands, many of which are in medium to high condition. A conspicuous feature of the vegetation surrounding Dalton is the native pastures, which are dominated by hardy native grasses and in particular Speargrasses and Wallaby Grasses. Exotic grasses and herbs are also widespread and abundant, and particularly Phalaris, which dominates on the more fertile alluvial soils associated with Oolong Creek. The native pastures predominantly occur in heavily grazed former Box-Gum Woodland but also occur in some areas of Dry Forest that have been cleared for rough grazing. Ornamental plantings of predominantly exotic trees are largely restricted to the village area, a few windbreaks, and around farmhouses. The village area however includes many remnant endemic native trees some of which have hollows.

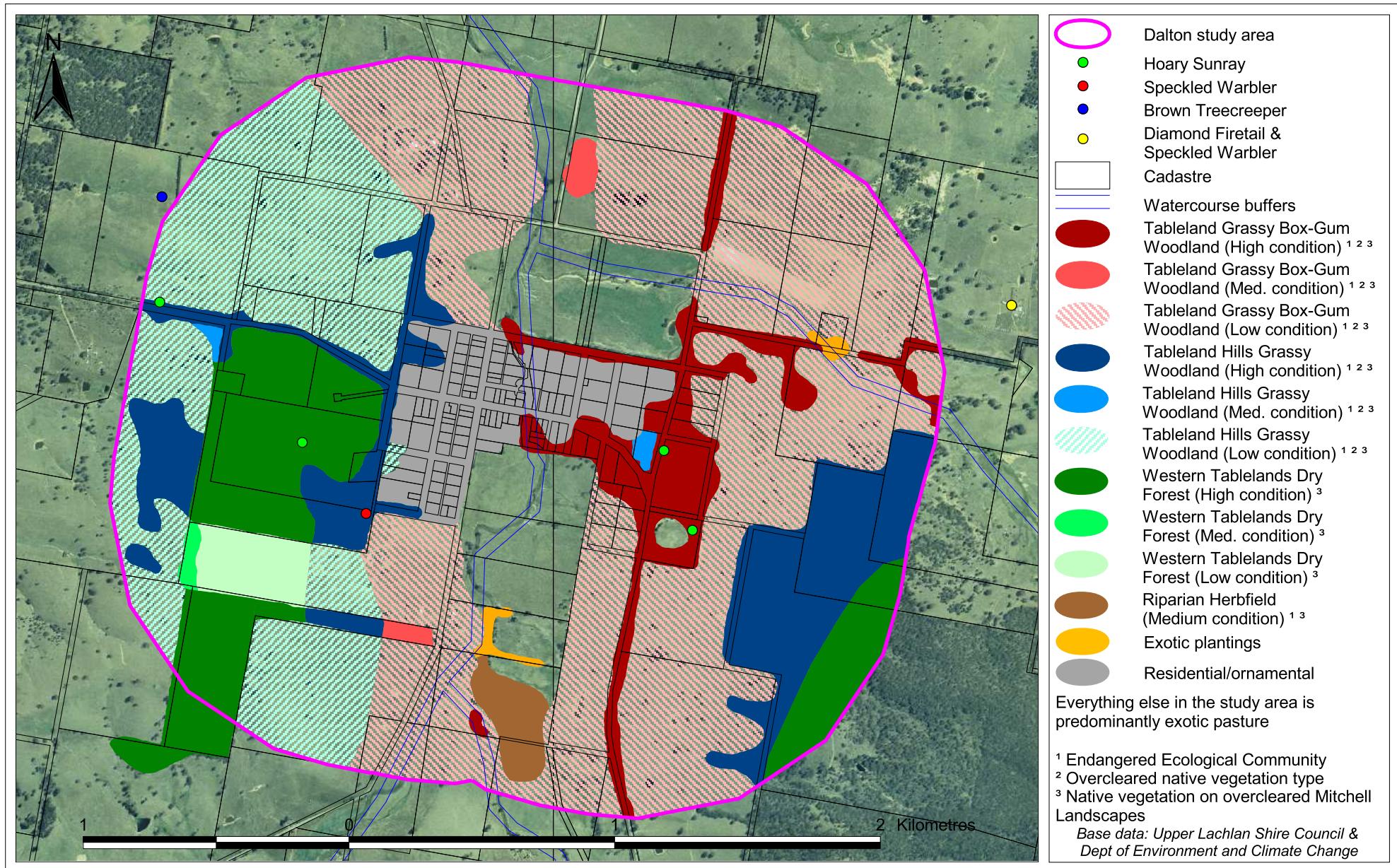
Four native vegetation communities remain around Dalton: Tableland Grassy Box-Gum Woodland, Tableland Hills Grassy Woodland, Riparian Herfield and Western Tablelands Dry Forest (Tozer *et. al.* 2006).

The distribution of the vegetation communities and other known biodiversity values within the Dalton study area are identified in Figure 9.

Photo 15: Low condition Tableland Grassy Box-Gum Woodland within the north-eastern parts of the study area showing native pasture groundcover resulting from heavy long-term grazing.



Figure 9: Vegetation communities and other known biodiversity values within the Dalton study area



Tableland Grassy Box-Gum Woodland

Location – Tableland Grassy Box-Gum Woodland occurs in the lower parts of the landscape on the lower slopes of the broad valleys of Oolong Creek and tributaries.

Structure, Floristics and Condition – The community is characterised by a canopy dominated by Yellow Box, Blakely's Red Gum, and to a lesser extent Apple Box, with occasional Candlebark and Brittle Gum. The community is generally heavily modified with a groundcover of native pasture in those areas that are most heavily grazed. In a few areas, such as around the oval, cemetery, firing range and in road reserves, a more diverse native groundcover and understorey persists. The understorey where it is present typically comprises occasional weedy shrubs but also includes occasional individuals of Hickory Wattle, Cherry Ballart, Kurrajong, Dean's Wattle *Acacia deanei*, Early Wattle *Acacia genistifolia* and Silver Wattle. The groundcover includes species such as Kangaroo Grass, Speargrass, Purple Wiregrass, Hairy Panic, Shorthair Plumegrass *Dichelachne micrantha*, Twining Pea, Wattle Mat-rush, Black-anthered Flax Lily, Common Raspwort, Sheep's Burr, Ivy Goodenia, Common Everlasting, Climbing Saltbush, Grassland Wood Sorrel, and Hoary Sunray. Recruitment of the canopy species is generally very low and is generally restricted to those sites described above where a more diverse native groundcover persists. However there is good recruitment in some of the grazing pastures as a result of lower grazing pressure in recent years.

Conservation Significance – Those parts of the community within the study area comprise the EEC White Box, Yellow Box, Blakely's Red Gum Woodland which is listed under the TSC Act and are thus considered HCV.

Threatened Species Habitat Values – The community supports some hollow-bearing trees which provide potential roosting and breeding habitat for hollow-dependent threatened fauna. It also provides potential habitat for the Aromatic Peppergrass and Yass Daisy and known habitat for the Hoary Sunray.

Related Vegetation Communities – The community appears to equate with Vegetation Group 153: Tablelands and Slopes Herb/Grassland Woodland of Gellie (2005).

Photo 16: High condition Tableland Grassy Box-Gum Woodland in the Dalton firing range.



Tableland Hills Grassy Woodland

Location – Tableland Hills Grassy Woodland (Tozer *et. al.* 2006), occurs generally on mid-slopes within the study area.

Structure, Floristics and Condition – The community is characterised by a slightly more shrubby understorey than the Tableland Grassy Box-Gum Woodland and additional canopy species such as Argyle Apple, Red Stringybark, and occasional Bundy.

The understorey is dominated by Daphne Heath, *Daviesia leptophylla*, *Dillwynia sericea*, *Pultenaea procumbens*, Grey Guinea Flower, Green Wattle *Acacia decurrens*, Dean's Wattle, and occasional Early Wattle. The dense groundcover is dominated by a diverse range of native grasses, sedges and forbs such as Kangaroo Grass, Poa Tussock, Hairy Panic, Wallaby Grass, Speargrass *Austrostipa scabra*, Weeping Grass, Purple Wiregrass, Black-anthered Flax Lily, Wattle Mat-rush, Many-flowered Mat-rush, Common Raspwort, Purple Coral Pea, Curved Rice-flower, Common Everlasting, Hoary Sunray, Small St John's Wort *Hypericum gramineum* and Grassland Wood Sorrel. Other groundcovers include Rock Fern, Variable Swordsedge *Lepidosperma laterale*, Ivy Goodenia, Hairy Stinkweed, Love Creeper, Common Woodruff, Redanther Wallaby Grass, *Bossiaea prostrata*, *Bossiaea buxifolia*, and Cut-leaved Burr-daisy *Calotis anthemooides*.

Conservation Significance – The Tableland Hills Grassy Woodland within the study area comprises the EEC White Box, Yellow Box, Blakely's Red Gum Woodland which is listed under the TSC Act and is thus considered HCV.

Threatened Species Habitat Values – The community supports some hollow-bearing trees which provide potential roosting and breeding habitat for hollow-dependent threatened fauna. It also provides potential habitat for the Aromatic Pepper-cress and Yass Daisy and known habitat for the Hoary Sunray.

Related Vegetation Communities – The community appears to equate with Vegetation Group 154: Tableland Dry Grassy Woodland of Gellie (2005).

Photo 17: High condition Tableland Hills Grassy Woodland in the Jerrawa Road road reserve.



Riparian Herbfield

Location – A patch of what appears to be the Riparian Herbfield of Tozer *et. al.* (2006) occurs on Oolong Creek in the eastern parts of the study area.

Structure, Floristics and Condition – The community is likely to have once been much more widespread in association with Oolong Creek, but has been highly modified as a result of grazing and ploughing in most places. Even where it has been mapped the community appears to have been substantially modified as a result of historic and ongoing cultivation and grazing, however the area was not able to be accessed and was assessed remotely.

Conservation Significance - Those areas of Riparian Herbfield within the study area that are in medium or high condition comprise the Montane Peatlands and Swamps EEC which is listed on the TSC Act. These occurrences are thus considered HCV.

Threatened Species Habitat Values – Patches of Riparian Herbfield provide potential temporary habitats for Painted Snipe *Rostratula benghalensis australis* and other water birds when they are migrating to larger wetlands.

Related Vegetation Communities – No equivalent community is identified by Gellie (2005).

Western Tablelands Dry Forest

Location – Western Tablelands Dry Forest occurs in a band on the upper-slopes in the south-western and south-eastern extremities of the study area.

Structure, Floristics and Condition – The Western Tablelands Dry Forest within the study area is characterised by a low canopy dominated by Scribbly Gum, Brittle Gum and Red Stringybark and to a lesser extent Bundy with occasional individuals of Yellow Box and Blakely's Red Gum, particularly on the margins of the community. The understorey is dominated by Daphne Heath and Sifton Bush but also includes *Daviesia leptophylla*, *Pultenaea procumbens*, *Bossiaea ulicifolia*, Pale Wedge Pea, Ploughshare Wattle, Poverty Wattle, Peach Heath, Grey Guinea Flower, *Dillwynia sericea*, Early Wattle and *Astrotricha ledifolia*. The sparse groundcover is dominated by Redanther Wallaby Grass, Poa Tussock, Wattle Mat-rush, Black-anthered Flax Lily and also includes Wallaby Grass, Variable Swordsedge, Common Raspwort, *Hibbertia riparia*, Urn Heath, Ivy Goodenia, Kangaroo Grass and *Opercularia diphylla*.

The community is generally in high condition within the study area however relatively small areas have been reduced to secondary grassland or converted to native pastures as a result of clearing for grazing.

Threatened Species Habitat Values – The Western Tablelands Dry Forest supports some hollow-bearing trees which provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, hollow-dependent woodland birds and threatened arboreal mammals such as the Squirrel Glider. It also provides habitat for a range of threatened woodland birds including the Speckled Warbler which was detected within the study area.

The Tableland Low Woodland also provides potential habitat for the threatened flora species Buttercup Doubletail and known habitat for the Hoary Sunray.

Conservation Significance - The Western Tablelands Dry Forest within the study area occurs on an over-cleared Mitchell Landscape and is thus considered HCV.

Related Vegetation Communities – The community equates to Vegetation Group 109: Widespread Tablelands Dry Shrub/Tussock Grass Forest of Gellie (2005).

GRABBEN GULLEN

The vegetation within the Grabben Gullen study area is generally highly modified in association with long-term grazing, and to a lesser extent cultivation and residential development. As such the vegetation is characterised by pastures dominated by exotic grasses and herbs, and particularly Phalaris, Cocksfoot, Fescues, Yorkshire Fog, Paspalum, Scotch Thistle and Nodding Thistle, ornamental plantings of predominantly exotic trees, and widespread occurrences of weedy shrubs such as Hawthorn, Sweet Briar, Cotoneaster, Orange Firethorn, Blackberry and Tree Lucerne.

Notwithstanding the generally highly modified nature of the vegetation within the study area, there are patches of remnant native vegetation in road reserves and on private property, some of which are in medium to high condition.

Two native vegetation communities occur within the Grabben Gullen study area: Frost Hollow Grassy Woodland (Tozer *et. al.* 2006) and Central Northern Tablelands Dry Shrub/Grass Forest (Gellie 2005).

The distribution of the vegetation communities and other known biodiversity values within the Grabben Gullen study area are identified in Figure 10.

Frost Hollow Grassy Woodland

Location – Frost Hollow Grassy Woodland occurs in patches primarily in the northern half of the study area in association with areas that are more exposed or where cold air drainage and frosts are more frequent and severe.

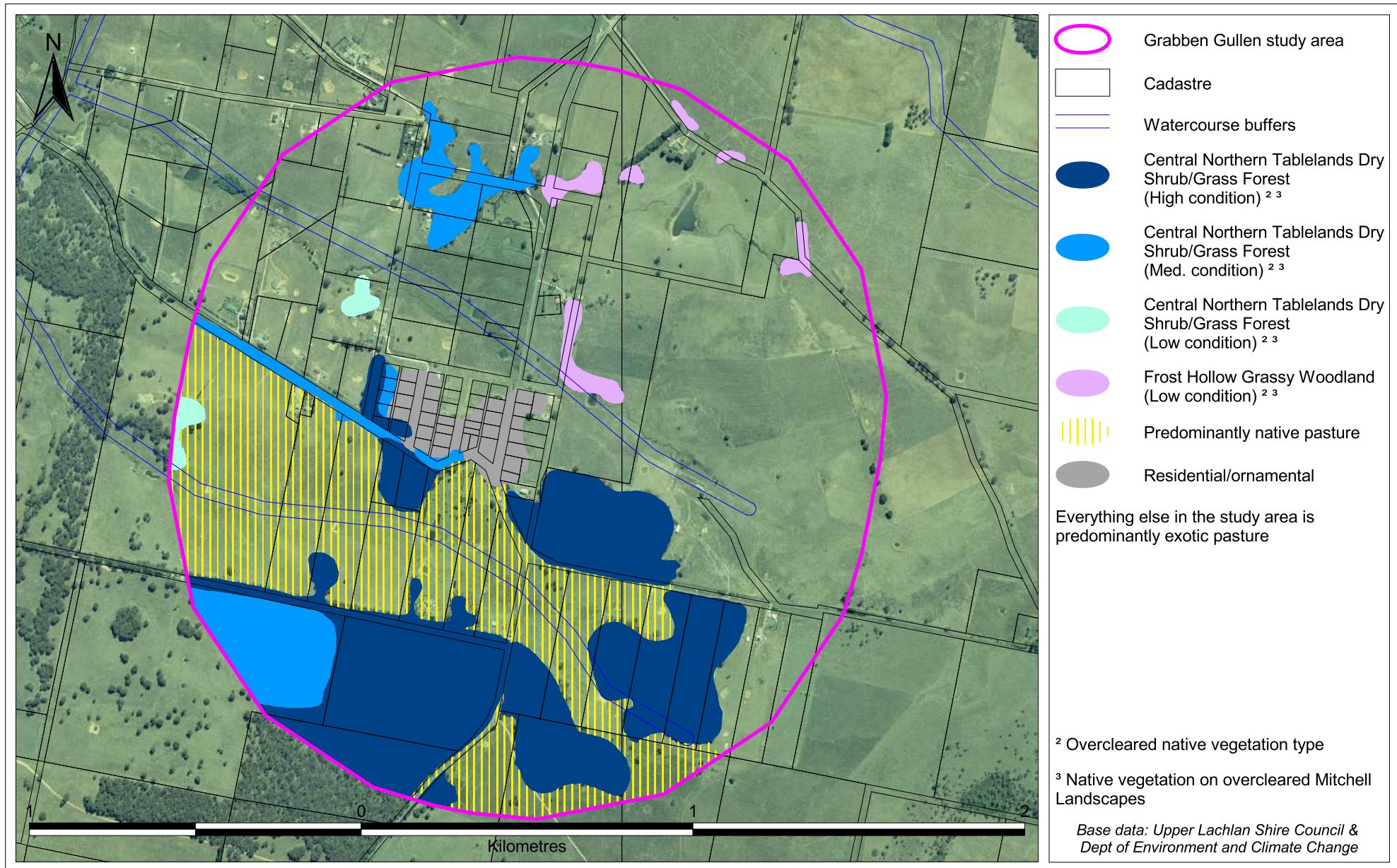
Structure, Floristics and Condition – In the study area the community is characterised by patches of remnant Snow Gums and Black Sallee and occasionally other species such as Candelbark, Broad-leaved Peppermint and Mountain Gum individuals over a predominately exotic groundcover. However where the community occurs within road reserves there is generally a greater abundance of native groundcover species. In most areas there is a lack of recruitment of the canopy species as a result of ongoing grazing.

Frost Hollow Grassy Woodland typically has a very sparse shrub cover and a dense diverse groundcover of grasses and forbs (Tozer *et. al.* 2006). It typically would have occurred in a mosaic of NTG, and it is likely that relatively extensive areas of NTG would have occurred within the northern parts of the Grabben Gullen study area. However as with the NTG around Crookwell, Laggan, and Taralga, the NTG around Grabben Gullen has been almost entirely replaced by exotic pastures.

The shrub cover within the study area is almost entirely composed of weedy shrubs and in particular Hawthorn, Sweet Briar, and Broom. Similarly the groundcover is typically dominated by exotic pasture grasses such as Phalaris, Cocksfoot, Fescues, and exotic forbs, but also includes, in some locations, some of the hardier native groundcovers in a few locations such as Kangaroo Grass, Weeping Grass, Poa Tussock, Sheep's Burr, Common Woodruff, Native Geranium and Common Bracken Fern.

Conservation Significance - Frost Hollow Grassy Woodland is an over-cleared and poorly conserved vegetation community and parts of the community where the canopy cover is less than 10% and where there is a reasonably diverse grassy native groundcover, comprise the NTG EEC which is listed under the EPBC Act. Under these circumstances, all occurrences of Frost Hollow Grassy Woodland within the study area are considered to be HCV regardless of their condition, however none is likely to comprise the NTG EEC.

Figure 10: Vegetation communities and other known biodiversity values within the Grabben Gullen study area



Threatened Species Habitat Values – The Frost Hollow Grassy Woodland within the study area usually supports a reasonable abundance of hollow-bearing trees which provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, and Hollow-dependent woodland birds. It also provides potential habitat for the threatened flora species Aromatic Peppercress and Hoary Sunray.

Related Vegetation Communities - The community appears to equate with Vegetation Group 153: Tablelands and Slopes Herb/Grassland/Woodland of Gellie (2005).

Central Northern Tablelands Dry Shrub/Grass Forest

Location – Mainly in the southern parts of the study area. Also at Laggan and Crookwell.

Structure, Floristics and Condition – Within the Grabben Gullen study area the community is characterised by a medium to tall forest dominated by Broad-leaved Peppermint with regular tall individuals of Mountain Gum and occasional Candlebark and Snow Gum, generally on the margins of the community.

The cover and complexity of the understorey varies dependent upon the grazing pressure, and apart from typical weedy shrubs includes occasional individuals of Cherry Ballart, Hop Bitter-pea, Silver Wattle, and Sifton Bush. The diverse groundcover is dominated by Poa Tussock, Kangaroo Grass, Sheep's Burr, *Poranthera microphylla*, Common Bracken Fern, Variable Plantain, Common Raspwort, Stinking Pennywort, Love Creeper *Glycine clandestina*, Native Violet *Viola betonicifolia*, Redanther Wallaby Grass and Weeping Grass but also includes River Tussock, Small St John's Wort, Wattle Mat-rush, Grass Trigger-plant, Creamy Candles, Common Buttercup *Ranunculus lappaceus*, Grey Guinea Flower, Purple Coral Pea, Black-anthered Flax Lily, Common Woodruff, Native Geranium, Button Everlasting *Helichrysum scorpioides*, Many-flowered Mat-rush, Smooth Flax Lily, Urn Heath, Cranberry Heath, Milkmaids and Common Onion Orchid *Microtis unifolia*.

Photo 18: High condition Central Northern Tablelands Dry Shrub/Grass Forest showing hollow-bearing stag at right which provides important potential habitat for hollow-dependent threatened fauna. The patches within the study area also include good levels of fallen timber.



Conservation Significance - Central Northern Tablelands Dry Shrub/Grass Forest is an over-cleared and poorly conserved vegetation community. Within the study area the community also occurs on over-cleared Mitchell Landscape and is thus considered HCV.

Threatened Species Habitat Values – The community supports a relatively high abundance of hollow-bearing trees some of which are large. These provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, and hollow-dependent woodland birds. The community also provides potential habitat for the threatened flora species Aromatic Peppercress and Hoary Sunray.

Related Vegetation Communities – No equivalent is identified by Tozer *et. al.* (2006).

JERRAWA

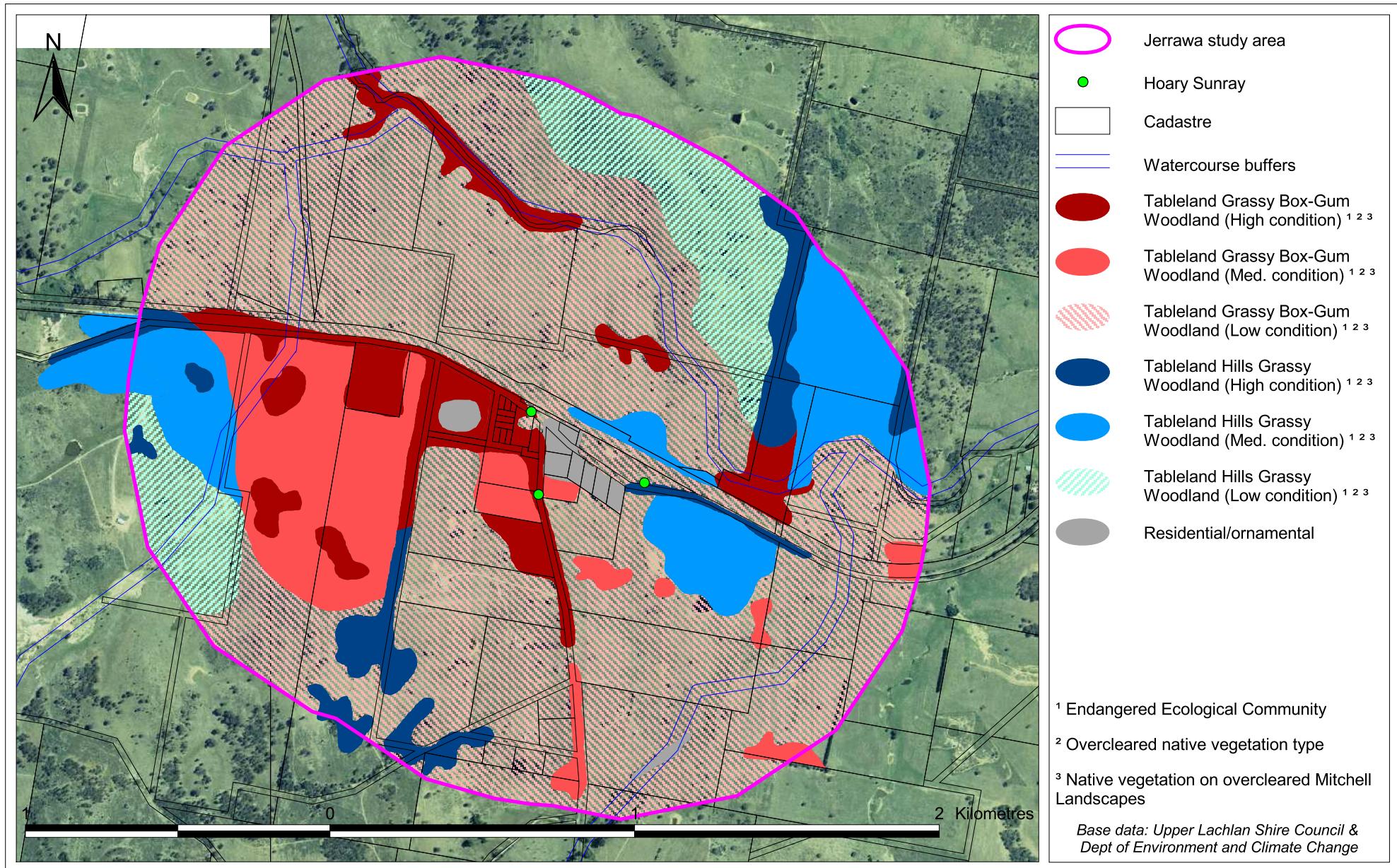
The vegetation within the Jerrawa study area is generally highly modified in association with long-term grazing and to a lesser extent residential development. Notwithstanding the disturbances associated with historic and ongoing agriculture, there are some reasonably large patches of remnant native vegetation, including Box-Gum woodlands, many of which are in medium to high condition, and which exhibit considerable recovery capacity.

A conspicuous feature of the vegetation surrounding Jerrawa is the native pastures, which are dominated by hardy native grasses and in particular Speargrasses and Wallaby Grasses. The native pastures predominantly occur in heavily grazed former Box-Gum Woodland that have been cleared for grazing. However there are also considerable areas that are more accurately described as secondary grasslands, where a more complex native groundcover persists, and in many instances where considerable recruitment of canopy and shrub species is occurring, presumably as a result of lighter grazing pressures in recent years.

Photo 19: A mix of high and medium condition Tableland Grassy Box-Gum Woodland where grazing pressures have been relaxed and a diverse native groundcover exists with good canopy recruitment in places.



Figure 11: Vegetation communities and other known biodiversity values within the Jerrawa study area



Ornamental plantings of predominantly exotic trees are largely restricted to the village area, a few windbreaks, and around farmhouses. The village area however includes many remnant endemic native trees some of which have hollows.

Two native vegetation communities remain around Jerrawa: Tableland Grassy Box-Gum Woodland and Tableland Hills Grassy Woodland (Tozer *et. al.* 2006), although the vegetation in the northern and north-eastern margins of the study area are transitional with the Western Tablelands Dry Forest (Tozer *et. al.* 2006) that occurs just beyond the study area boundary.

The distribution of the vegetation communities and other known biodiversity values within the Jerrawa study area are identified in Figure 11.

Tableland Grassy Box-Gum Woodland

Location – Within the Jerrawa study area Tableland Grassy Box-Gum Woodland occurs in the lower parts of the landscape on the lower slopes of the broad valleys of Catherines Creek and tributaries.

Structure, Floristics and Condition – The community is characterised by a canopy dominated by Yellow Box, Blakely's Red Gum, and to a lesser extent Apple Box, with occasional Red Box, Argyle Apple, Candlebark and Brittle Gum.

The community is generally heavily modified with a groundcover of native pasture in those areas that are most heavily grazed. In a few areas where grazing pressure has been lighter, such as around the showground, on the properties to the south-west of the showground, and in road reserves, a more diverse native groundcover, and to a lesser extent, understorey persists. The understorey where it is present often includes occasional weedy shrubs such as Briar Rose and Tree Lucerne but also includes occasional individuals of Silver Wattle, Early Wattle and Kurrajong. The groundcover is typically dominated by species such as Kangaroo Grass, Wallaby Grass *Austrodanthonia* spp., Speargrass *Austrostipa* spp. Purple Wiregrass, Hairy Panic, Wattle Mat-rush, Black-anthered Flax Lily, Climbing Saltbush, Common Everlasting, and Curved Rice-flower. Other common groundcovers include, Australian Bindweed, Sheep's Burr, Bidgee Widgee, Common Raspwort, Wheatgrass, Poa Tussock, River Tussock, Narrow-leaf New Holland Daisy *Vittadinia muelleri* and Hoary Sunray.

Recruitment of the canopy species is generally very low or absent except for those places where grazing pressure is lighter and is generally restricted to those sites described above where a more diverse native groundcover persists. However there is considerable recruitment in some of the grazing pastures, particularly on the margins, as a result of lower grazing pressure in recent years.

Conservation Significance – The Tableland Grassy Box-Gum Woodland within the study area comprises the EEC White Box, Yellow Box, Blakely's Red Gum Woodland which is listed under the TSC Act and is thus considered HCV.

Threatened Species Habitat Values – The community supports some hollow-bearing trees which provide potential roosting and breeding habitat for hollow-dependent threatened fauna. It also provides potential habitat for the Aromatic Peppercress and Yass Daisy and known habitat for the Hoary Sunray.

Related Vegetation Communities – The community appears to equate with Vegetation Group 153: Tablelands and Slopes Herb/Grassland Woodland of Gellie (2005).

Tableland Hills Grassy Woodland

Location – Tableland Hills Grassy Woodland (Tozer *et. al.* 2006), occurs generally on the midslopes within the study area.

Structure, Floristics and Condition – The community is characterised by a slightly more shrubby understorey than the Tableland Grassy Box-Gum Woodland, a greater abundance of canopy species such as Argyle Apple, and additional canopy species such as Red Stringybark, Broad-leaved Peppermint, and Scribbly Gum.

The understorey is dominated by Silver Wattle, but also includes other species such as Daphne Heath, Urn Heath, Sifton Bush, Cherry Ballart, *Dillwynia sericea*, *Daviesia leptophylla*, Grey Guinea Flower, Poverty Wattle, Woolly Wattle *Acacia lanigera*, Dean's Wattle, Ploughshare Wattle and occasional Early Wattle. The dense groundcover is dominated by a diverse range of native grasses, sedges and forbs such as Kangaroo Grass, Poa Tussock, Wallaby Grass, Weeping Grass, Purple Wiregrass, Tufted Hedgehog Grass *Echinopogon caespitosus*, Redanther Wallaby Grass, Black-anthered Flax Lily, Wattle Mat-rush, Common Raspwort, Purple Coral Pea, Common Everlasting, Hoary Sunray, Ivy Goodenia and Variable Swordsedge.

Conservation Significance – The Tableland Hills Grassy Woodland within the study area comprises the EEC White Box, Yellow Box, Blakely's Red Gum Woodland which is listed under the TSC Act and is thus considered HCV.

Threatened Species Habitat Values – The community supports some hollow-bearing trees which provide potential roosting and breeding habitat for hollow-dependent threatened fauna. It also provides potential habitat for the Aromatic Peppercress and Yass Daisy and known habitat for the Hoary Sunray.

Related Vegetation Communities – The community appears to equate with Vegetation Group 154: Tableland Dry Grassy Woodland of Gellie (2005).

LAGGAN

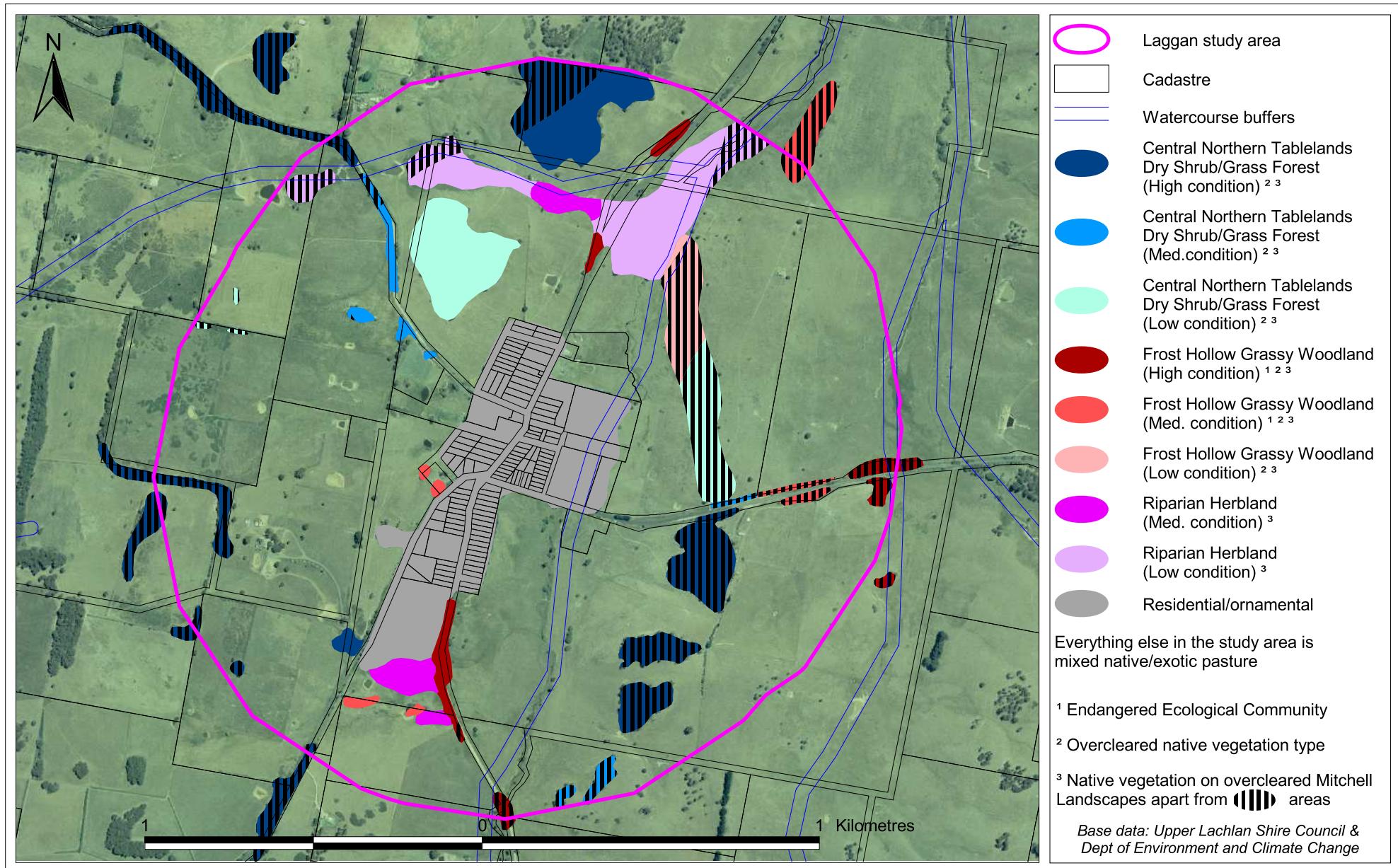
The vegetation within the Laggan study area is generally highly modified in association with long-term grazing, and to a lesser extent cultivation and residential development. As such the vegetation is characterised by pastures dominated by exotic grasses and herbs, and particularly Phalaris, Cocksfoot, Fescues., YorkShire Fog, Paspalum, Scotch Thistle and Nodding Thistle, ornamental plantings of predominantly exotic trees, particularly around the village, and occurrences of weedy shrubs such as Hawthorn, Sweet Briar, Cotoneaster, Orange Firethorn, Blackberry and Tree Lucerne in areas that are not regularly cultivated or grazed. Willows are common along Reedy Creek.

Notwithstanding the generally highly modified nature of the vegetation within the study area, there are patches of remnant native vegetation in road reserves and on private property, some of which are in medium to high condition.

Three native vegetation communities remain around Laggan: Frost Hollow Grassy Woodland, Riparian Herbfield (Tozer *et. al.* 2006) and Central Northern Tablelands Dry Shrub/Grass Forest (Gellie 2005).

The distribution of the vegetation communities and other known biodiversity values within the Laggan study area are identified in Figure 12.

Figure 12: Vegetation communities and other known biodiversity values within the Laggan study area



Frost Hollow Grassy Woodland

Location – Frost Hollow Grassy Woodland occurs in patches primarily in the eastern half of the study area in association with areas that are more exposed or where cold air drainage and frosts are more frequent and severe, particularly in association with Reedy Creek.

Structure, Floristics and Condition – In the study area the community is characterised by patches of remnant Snow Gums and Black Sallee and occasionally other species such as Black Gum, Candelbark, Broad-leaved Peppermint, Apple Box and Mountain Gum over a predominately exotic groundcover. However where the community occurs within road reserves there is generally a greater abundance of native groundcover species. In most areas there is a lack of recruitment of the canopy species as a result of ongoing grazing.

Frost Hollow Grassy Woodland typically has a very sparse shrub cover and a dense diverse groundcover of grasses and forbs (Tozer *et. al.* 2006). It typically would have occurred in a mosaic of NTG, and it is likely that areas of NTG would have occurred within the eastern parts of the Laggan study area, however these, as with the NTG around Crookwell, Taralga, and Grabben Gullen, appear to have now been almost entirely replaced by exotic pastures.

The shrub cover within the study area is almost entirely composed of weedy shrubs and in particular Hawthorn and Sweet Briar, but in less disturbed areas also includes Silver Wattle, Hop Bitter-pea and Dwarf Cherry *Exocarpos strictus*. Similarly the groundcover typically is dominated by exotic pasture grasses such as Phalaris, Cocksfoot, Fescues, and exotic forbs. However there are a few patches where the groundcover is in better condition, particularly within the Laggan – Taralga Road road reserve. In these areas the groundcover includes species such as Kangaroo Grass, Weeping Grass, Poa Tussock, River Tussock, Sheep's Burr, Common Woodruff, Common Raspwort, Grassland Wood Sorrel, Native Geranium, Black-anthered Flax Lily, Smooth Flax Lily, Wattle Mat-rush, Many-flowered Mat-rush, Variable Plantain, Narrow Plantain *Plantago gaudichaudii*, Creeping Speedwell *Veronica plebeia*, Button Everlasting, Native Violet *Viola betonicifolia* and Common Onion Orchid.

Conservation Significance – Frost Hollow Grassy Woodland is an over-cleared and poorly conserved vegetation community and parts of the community where the canopy cover is less than 10% and where there is a reasonably diverse grassy native groundcover, comprise the NTG EEC which is listed under the EPBC Act. Under these circumstances, all occurrences of Frost Hollow Grassy Woodland within the study area are considered to be of high conservation significance regardless of their condition, and some small patches would comprise the NTG EEC.

Threatened Species Habitat Values – The Frost Hollow Grassy Woodland within the study area usually supports a reasonable abundance of hollow-bearing trees which provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, and hollow-dependent woodland birds. It also provides potential habitat for the threatened flora species Aromatic Peppercress and Hoary Sunray.

Related Vegetation Communities - The community appears to equate with Vegetation Group 153: Tablelands and Slopes Herb/Grassland/Woodland of Gellie (2005).

Central Northern Tablelands Dry Shrub/Grass Forest

Location – In the higher parts of the study area. Also at Grabben Gullen and Crookwell.

Structure, Floristics and Condition – Within the Laggan study area the community is characterised by a medium to tall forest dominated by Broad-leaved Peppermint with regular tall individuals of Mountain Gum and occasional Candlebark and Snow Gum, generally on the margins of the community. In less disturbed remnants there is a sparse mid-canopy of Silver Wattle and Blackwood.

The cover and complexity of the understorey varies dependent upon the grazing pressure, and apart from typical weedy shrubs includes occasional individuals of Hop Bitter-pea, *Platyllobium formosum*, Silver Wattle, *Cassinia longifolia*, Urn Heath, Daphne Heath, Blackwood, Sifton Bush and, in proximity to poorly drained areas, Small-fruit Hakea. The diverse groundcover includes Poa Tussock, Kangaroo Grass, Wallaby Grass, Weeping Grass, Redanther Wallaby Grass, Common Bracken Fern, Wattle Mat-rush, Black-anthered Flax Lily, Purple Coral Pea, Many-flowered Mat-rush, Common Raspwort and Stinking Pennywort but also includes *Poranthera microphylla*, Small St John's Wort, *Hibbertia linearis*, Spiny-headed Mat-rush *Lomandra longifolia*, Grey Guinea Flower, and Common Everlasting.

Conservation Significance - Central Northern Tablelands Dry Shrub/Grass Forest is an over-cleared and poorly conserved vegetation community. Within the study area the community also occurs on over-cleared Mitchell Landscape and is thus considered HCV.

Threatened Species Habitat Values – The community supports a relatively high abundance of hollow-bearing trees some of which are large. These provide potential roosting and breeding habitat for threatened microchiropteran bats, threatened owls, and hollow-dependent woodland birds. The community also provides potential habitat for the threatened flora species Aromatic Peppercress and Hoary Sunray.

Related Vegetation Communities – No equivalent is identified by Tozer *et. al.* (2006).

Riparian Herbfield

Location – A narrow band of what appears to be the Riparian Herbfield of Tozer *et. al.* (2006) occurs along the lower parts of Reedy Creek and several of its tributaries within the study area.

Structure, Floristics and Condition – Within the study area the community is characterised by a dense sward of native and exotic grasses, sedges, rushes and herbs such as Tall Sedge, *Carex gaudichaudiana*, River Tussock, Native Geranium, Willowherb, and Common Rush. In one location within the Binda Road road reserve individuals of Small-fruit Hakea occur on the margins of the community. Occasional trees of species such as Snow Gum, Apple Box, Candle Bark and Black Gum occur within the community, as do exotics such as Pussy Willow *Salix reichardtii*.

The community is likely to have once been much more widespread in association with Reedy Creek, but has been highly modified as a result of grazing and ploughing in most places. Even where it has been mapped the community appears to have been substantially modified as a result of historic and ongoing cultivation and grazing. Some un-mapped narrow bands of the community may occur elsewhere within the study area however these would be within riparian buffers.

Conservation Significance - Those areas of Riparian Herbfield within the study area that are in medium or high condition comprise the Montane Peatlands and Swamps EEC which is listed on the TSC Act. These occurrences are thus considered HCV.

Threatened Species Habitat Values – Patches of Riparian Herbfield provide potential temporary habitats for Painted Snipe *Rostratula benghalensis australis* when they are migrating to larger wetlands.

Related Vegetation Communities – No equivalent community is identified by Gellie (2005).

Photo 20: Patches of Riparian Herbfield associated with Reedy Creek with some remnant Central Northern Tablelands Dry Shrub/Grass Forest on the ridge in the background



TUENA

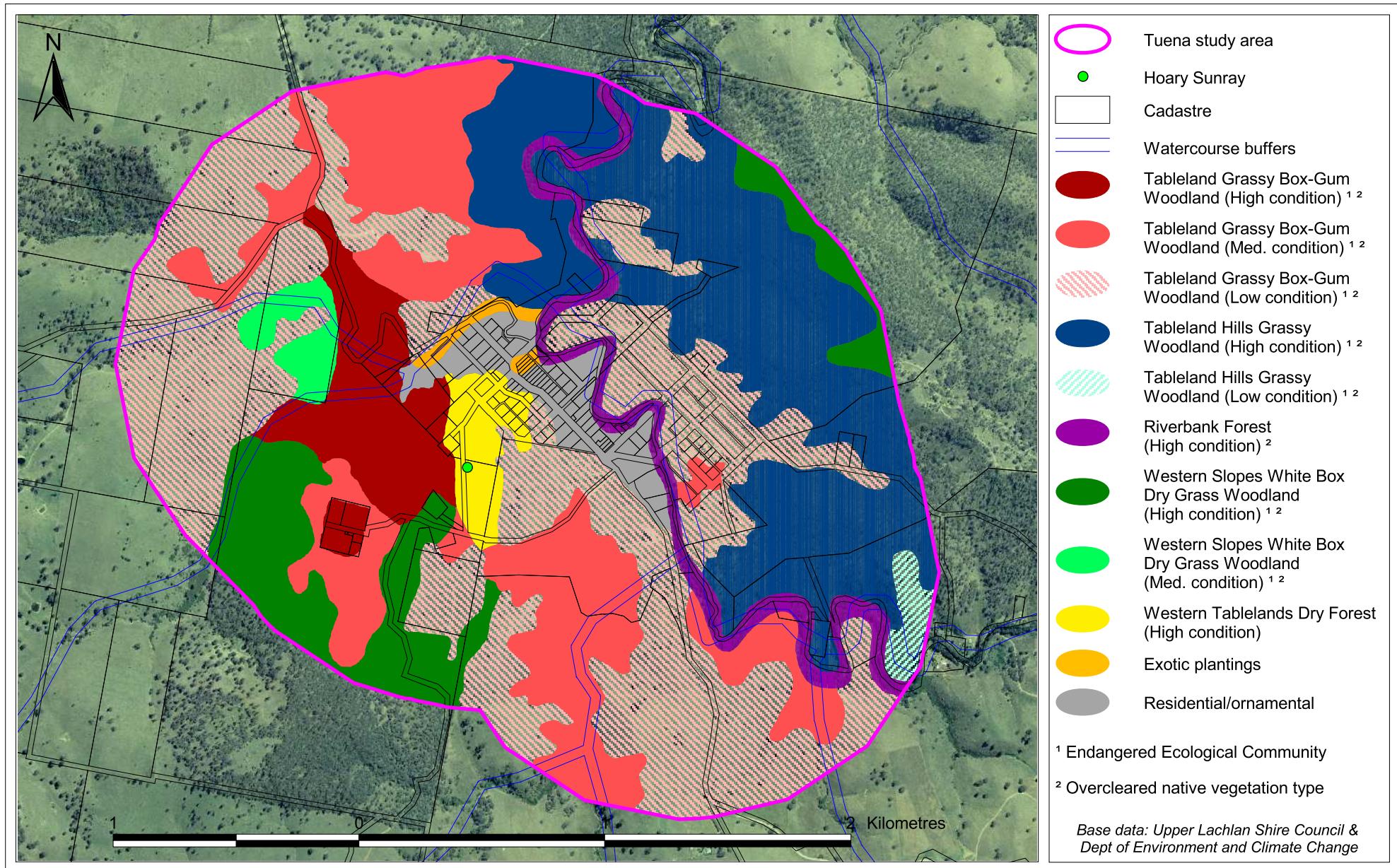
The remnant native vegetation within the Tuena study area is characterised by Box-Gum Woodland in various conditions states on the lower slopes and mid-slopes with drier woodlands on the ridge-tops, poorer soils and more rugged topography. There is also a narrow bank of River Oak *Casuarina cunninghamiana* forest along Tuena Creek. As with the Bigga study area, the vegetation within the Tuena study area supports, in places, elements that characterise the vegetation of the south-western slopes such as White Box, Kurrajong, and Black Cypress Pine.

The vegetation on the flats and lower slopes is generally highly modified in association with long-term grazing, and as such is characterised by occasional remnant or regrowth canopy trees over native pasture dominated by Speargrass *Austrostipa* spp and exotic grasses often with abundant St John's Wort and Serrated Tussock *Nassella trichotoma*. Ornamental plantings of predominantly exotic trees are primarily limited to the residential area and around the few homesteads within the study area.

Notwithstanding these disturbances, relatively undisturbed vegetation dominates the study area.

Five native vegetation communities occur within the Tuena study area: Tableland Grassy Box-Gum Woodland, Tableland Hills Grassy Woodland, Western Tablelands Dry Forest, Riverbank Forest of Tozer *et. al.* (2006), and the Western Slopes White Box Dry Grass Woodland of Gellie (2005).

The distribution of the vegetation communities and other known biodiversity values within the Tuena study area are identified in Figure 13.

Figure 13: Vegetation communities and other known biodiversity values within the Tuena study area

Tableland Grassy Box-Gum Woodland

Location – Tableland Grassy Box-Gum Woodland in various condition states dominate the lower and mid-slopes within the study area.

Structure, Floristics and Condition – In the study area the community is characterised by a canopy dominated by Yellow Box, Blakely's Red Gum and to a lesser extent White Box, Apple Box, Red Box, Red Stringybark and Bundy. The presence of White Box suggests that the community is transitional with the Western Slopes Grassy Woodlands of Keith (2004).

The sparse understorey is characterised by occasional individuals of Kurrajong, Black Thorn, Box-leaf Wattle *Acacia buxifolia*, and *Cassinia longifolia*, and the exotics Briar Rose, Blackberry, and Hawthorn. Where grazing pressure and other disturbances have been light the groundcover is generally dominated by Kangaroo Grass, Poa Tussock, Wattle Mat-rush, Sheep's Burr and also includes Wallaby Grasses, Many-flowered Mat-rush, Variable Plantain and Creeping Speedwell. However typically the groundcover has been heavily grazed and replaced by exotic grasses and herbs or a modified native pasture dominated by Speargrass, Wallaby Grass, Poa Tussock, Wheatgrass, Serrated Tussock, Phalaris, Oats, St John's Wort and Nodding Thistle.

Recruitment of the canopy species is generally only occurring in those places where grazing pressure is light.

Conservation Significance – The Tableland Grassy Box-Gum Woodland within the study area comprises the EEC White Box, Yellow Box, Blakely's Red Gum Woodland which is listed under the TSC Act and is thus considered HCV.

Threatened Species Habitat Values – The community supports some hollow-bearing trees which provide potential roosting and breeding habitat for hollow-dependent threatened fauna. It also provides potential habitat for the Aromatic Peppercress and Yass Daisy and known habitat for the Hoary Sunray.

Related Vegetation Communities – The community appears to equate with Vegetation Group 154: Tableland Dry Grassy Woodland and Vegetation Group 159: Northern Slopes Dry Grass Woodland of Gellie (2005).

Tableland Hills Grassy Woodland

Location – Tableland Hills Grassy Woodland of Tozer *et. al.* (2006) occurs primarily on the lower and mid-slopes within the study area primarily on the eastern side of Tuena Creek.

Structure, Floristics and Condition – The community is characterised by a canopy dominated by Yellow Box, Blakely's Red Gum, Tumbledown Red Gum *Eucalyptus dealbata*, and some Red Stringybark, White Box, Red Box, and Bundy. Kurrajong and Black Cypress Pine occur sporadically as a sparse mid-canopy. The understorey where it is present includes Daphne Heath, Box-leaf Wattle, Grey Guinea Flower, Poverty Wattle, *Cassinia longifolia*, Peach Heath, Silver Wattle and occasional Black She-oak. The sparse groundcover is dominated by a diverse range of native grasses, sedges and forbs such as Wallaby Grass *Austrodanthonia racemosa*, Speargrass *Austrostipa scabra*, Poa Tussock, Wheat Grass, Wattle Mat-rush, Kangaroo Grass, Redanther Wallaby Grass, Hairy Panic, Many-flowered Mat-rush, Stinking Pennywort, Rock Fern, Peach Heath, Common Raspwort, Grassland Wood Sorrel, Love Creeper *Glycine tabacina*, Weeping Grass, Redgrass, Australian Bindweed, Bitter Cryptandra, Black-anthered Flax Lily, *Poranthera microphylla* and Native Geranium.

Conservation Significance – The Tableland Hills Grassy Woodland within the study area comprises the EEC White Box, Yellow Box, Blakely's Red Gum Woodland which is listed under the TSC Act and is thus considered HCV.

Threatened Species Habitat Values – The community supports some hollow-bearing trees which provide potential roosting and breeding habitat for hollow-dependent threatened fauna. It also provides potential habitat for the Aromatic Peppercress and Yass Daisy and known habitat for the Hoary Sunray.

Related Vegetation Communities – The community equates to Vegetation Group 114: Tableland Dry Shrub/Tussock Grass Forest of Gellie (2005).

Photo 21: High condition Tableland Hills Grassy Woodland dominating the foreground with low condition Tableland Grassy Box-Gum Woodland on the hills in the background.



Western Tablelands Dry Forest

Location – Western Tablelands Dry Forest occurs in an isolated band between Limestone Creek and Tuena village.

Structure, Floristics and Condition – The Western Tablelands Dry Forest within the study area is characterised by a low canopy dominated by Red Box with Bundy, Yellow Box and Red Stringybark at lower abundance. The understorey is dominated by Daphne Heath, *Daviesia leptophylla*, Box-leaf Wattle, Poverty Wattle, Peach Heath, Grey Guinea Flower, and *Dillwynia sericea*. There are individuals of Black Cypress Pine along Limestone Creek. The sparse groundcover is dominated by Redanther Wallaby Grass and to a lesser extent Wattle Mat-rush, Many-flowered mat-rush, *Poa* Tussock, Common Raspwort and a Wiregrass *Aristida* sp. Other groundcovers include Ivy Goodenia, Kangaroo Grass, Speargrass *Austrostipa scabra*, Black-anthered Flax Lily, Purple Coral Pea, *Opercularia diphyllea*, Love Creeper, Potato Orchid *Gastrodia sesamoides* and Hoary Sunray.

The community is generally in high condition within the study area however most of it appears to be post clearing regrowth and there is considerable erosion within the community, particularly deep gully erosion along Limestone Creek.

Threatened Species Habitat Values – The Western Tablelands Dry Forest within the study area almost entirely comprises regrowth. It also provides habitat for a range of threatened woodland birds including the Speckled Warbler which was detected within the study area. It provides potential habitat for the threatened flora species Buttercup Doubletail and known habitat for the Hoary Sunray.

Conservation Significance - The Western Tablelands Dry Forest is HCV given it provides known habitat for threatened flora.

Related Vegetation Communities – The community equates to Vegetation Group 109: Widespread Tablelands Dry Shrub/Tussock Grass Forest of Gellie (2005).

Western Slopes White Box Dry Grass Woodland

Location – Western Slopes White Box Dry Grass Woodland occurs predominantly on the upper-slopes and ridge-tops in the western and eastern extremities of the study area.

Structure, Floristics and Condition – The Western Slopes White Box Dry Grass Woodland within the study area is characterised by a moderately tall canopy dominated by White Box with occasional Yellow Box, Tumbledown Red Gum, Bundy, Red Box, Apple Box and Red Stringybark. The understorey is very sparse and includes occasional individuals of *Cassinia longifolia*, Black Thorn, Kurrajong, Hawthorn, Briar Rose and Blackberry. The sparse groundcover is dominated by St John's Wort and to a lesser extent Serrated Tussock, and also Poa Tussock, Wattle Mat-rush, and a Wallaby Grass but also includes Stinking Pennywort, Grassland Wood Sorrel, Common Woodruff, *Pultenaea procumbens*, Purple Coral Pea, Sheep's Burr, Wheatgrass, Speargrass, Many-flowered mat-rush and Small St John's Wort.

The community is generally in high condition within the study area however parts of the community support extensive infestations of St John's Wort and Serrated Tussock.

Photo 22: Tableland Western Slopes White Box Dry Grass Woodland showing naturally sparse understorey and groundcover dominated by Serrated Tussock.



Conservation Significance – The Western Slopes White Box Dry Grass Woodland within the study area comprise the EEC White Box, Yellow Box, Blakely's Red Gum Woodland which is listed under the TSC Act and is thus considered HCV.

Threatened Species Habitat Values – The community supports some hollow-bearing trees which provide potential roosting and breeding habitat for hollow-dependent threatened fauna. It also provides potential habitat for the Aromatic Peppercress and Hoary Sunray.

Related Vegetation Communities – Tozer *et. al.* (2006) does not describe an equivalent community.

Riverbank Forest

Location – Riverbank Forest is restricted within the study area to Tuena Creek.

Structure, Floristics and Condition – Riverbank Forest within the study area is characterised by a tall canopy comprised entirely of River Oak. There is a sparse mid-canopy of Silver Wattle and occasional Kurrajong. The understorey is similarly sparse and dominated by the weeds Hawthorn and Willows *Salix* spp. but also with occasional Silver Wattle. The groundcover is dominated by weedy herbs, creepers, and grasses such as Petty Spurge *Euphorbia peplus*, Blue Periwinkle *Vinca major*, Cocksfoot, Phalaris, and Panic Veldt Grass *Erharta erecta*, but also includes natives such as Persicaria *hydropiper*, Native Geranium, Common Rush and Stinging Nettle *Urtica incisa*. The community is generally in high condition within the study area however it supports a diverse array and abundance of weeds.

Conservation Significance – Riverbank Forest is an over-cleared vegetation type and thus HCV.

Threatened Species Habitat Values – minimal apart from connectivity values.

Related Vegetation Communities – Gellie (2005) does not describe an equivalent community.

Photo 23: Typical Riverbank Forest along Tuena Creek.



11. Identification of Potential Regional Corridors

The field work and desktop analyses identified a number of potential regional corridors as identified in Figure 14. These corridors are important because they provide linkages between larger or important areas of habitat, and thus provide opportunities for animals and plants to disperse to access resources or to exchange genetic material.

Methodology

The general methodology for the potential regional corridor identification is documented in Section 6. The corridor identification was based largely on a desktop analysis of available digital datasets and particularly the best available vegetation modelling. However, during the undertaking of the fieldwork around the priority 1 and 2 villages, some limited ground-truthing was also undertaken. This ground-truthing was useful not only in identifying potential regional corridors, but also in gauging the extent to which local corridors are present within the Shire, and their potential importance in contributing towards regional corridors.

The criteria for identifying potential regional corridors were:

- Follow least distance pathways.
- Use conservation reserves (e.g. national parks, travelling stock reserves, public reserves etc) as core areas.
- Link suitably large and closely located remnants with core areas in a general line of sight exercise.
- Link between landscapes and include overall north-south (along the tablelands) and east-west (between tablelands and coast) alignments where possible.
- Corridors need to be considered in a regional context; that is, they need to link with other corridors/core areas outside Upper Lachlan Shire.
- Ensure that corridors include more than just dry forest, and include native grassland, woodland and over-cleared vegetation remnants where possible, to provide for grassland and woodland fauna and flora species.
- Where remnant vegetation is not available, corridors can follow a river or major creek.
- Corridors can be an accumulation of stepping stones and do not have to be contiguous.
- Corridors are to be broad and conceptual enough to incorporate different tenures and land uses.

Results

The desktop analysis of the vegetation datasets identified the extensive areas of remnant native vegetation within the Shire. Whilst in many instances the vegetation is highly modified and fragmented as a result of historic clearing and agricultural activities, the vegetation remains predominately native across the Shire, with many areas exhibiting considerable recovery potential. In this context, it is generally only those areas, predominantly in the central portions of the Shire, where cultivation, pasture improvement, or extensive grazing of areas formerly dominated by native grasslands has occurred, that do not retain a fine-scale mosaic of remnant native vegetation providing numerous potential local corridors. These myriad potential local corridors in turn contribute to potential regional corridors. The ground-truthing undertaken for the project supported this conclusion.

In many instances local corridors have been supplemented by strategic revegetation as indicated in Figure 15 (Appendix C).

As such, in some areas, it was not possible with the data available to objectively distinguish between the numerous potential local corridors evident in the desktop analysis, with a few exceptions as identified below and in Figure 14. In this context, the regional corridor mapping should be interpreted with the understanding that important local corridors exist beyond those areas identified as regional corridors and in some instances these local corridors may contribute significantly to a regional corridor. The identification of these important local corridors, and indeed the refinement of the identified potential regional corridors, requires further data capture ideally through strategic ground-truthing. Section 12 includes recommendations to undertake such work as a high priority.

The potential regional corridors are characterised generally by broad corridors linking the extensive areas of remnant native vegetation associated with the ranges in the western, central and eastern parts of the Shire, with the similarly relatively extensive areas of remnant vegetation to the north and south of the Shire. However the regional corridors also include east - west aligned corridors which provide linkages between the generally broader and better defined north-south aligned corridors.

The regional corridors along the northern and eastern extremities of the Shire have already been identified in an earlier analysis as part of another project. The analysis for this project has also identified additional north-south aligned potential regional corridors:

- Associated with the extensive areas of remnant native vegetation on the ranges along the western extremities of the Shire from the northern to southern borders.
- Associated with the Dividing Range, Bolong River, Tarlo River and Burra Burra Creek running north – south to the west of Taralga.
- Associated with the ranges to the east of Bigga, Binda, and continuing to the south through the Laggan and Crookwell area east of Grabben Gullen and south to Breadalbane and Collector.

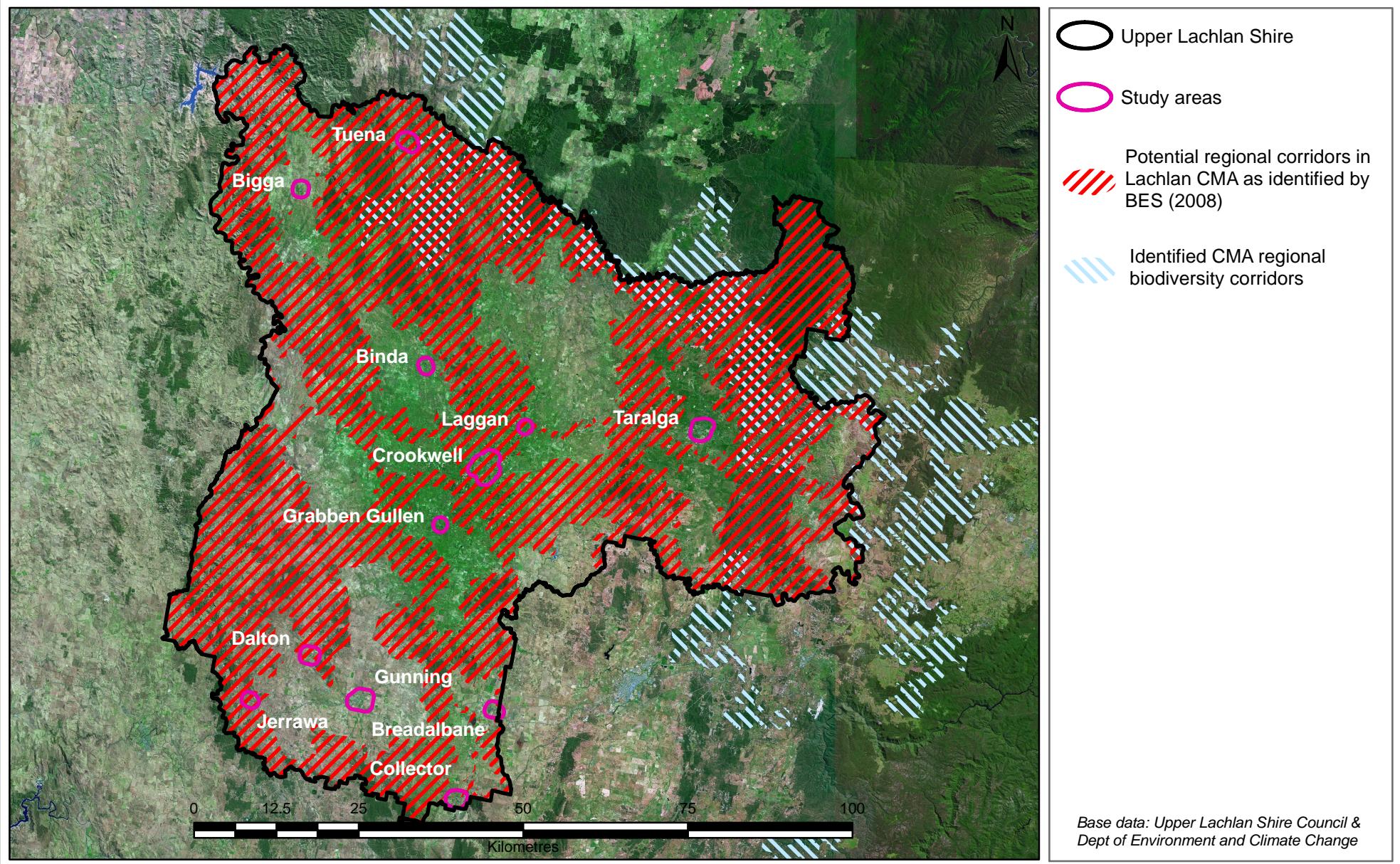
The potential regional corridors also include a number east-west aligned corridors linking patches of remnant vegetation in the central parts of the Shire, with vegetation to the east and west as identified below:

Laggan – Taralga – A fragmented and relatively narrow band of remnant grassy woodlands approximating the line of the Laggan – Taralga Road links the more extensive areas of remnant vegetation north and south of Laggan and Crookwell with the remnant vegetation associated with the Dividing Range and Bolong River to the northwest and southwest of Taralga. This potential regional corridor appears to provide the best east-west corridor of “stepping stones” north of Woodhouselee and south of the Thalaba - Kempton area.

Myrtleveille – Tarlo River – A fragmented band of modelled remnant NTGs, Tableland Basalt Forest, and remnant grassy woodlands provides a tenuous corridor linking the more extensive remnant native vegetation associated with the Dividing Range west of Myrtleveille to the extensive areas of remnant native vegetation associated with the Tarlo River.

Mount Rae – Roslyn – Substantial strategic revegetation has already been undertaken to support a highly fragmented but nevertheless important corridor linking the extensive remnant native vegetation in the Mount Rae area with remnant native vegetation around Roslyn.

Wheeo Creek – Crookwell River – Crookwell – Two relatively narrow potential regional corridors were identified linking the extensive, although modified and fragmented remnant native vegetation to the west of Crookwell, with the vegetation in the Laggan, Crookwell and Grabben Gullen areas. These corridors comprise bands of fragmented vegetation predominantly to the north of Wheeo Creek and south of the Crookwell River.

Figure 14: Potential and identified regional biodiversity corridors in the Upper Lachlan Shire

Mulgowrie – Crooked Corner - A broad band of predominantly highly modified Box-Gum woodlands link the north-south aligned regional corridors on the western boundaries of the Shire with the extensive areas of vegetation associated with the Razorback Range. Whilst these woodlands are highly modified, vegetation modelling and limited ground-truthing suggests they retain considerable recovery potential and thus scope for supporting local corridors and strengthening this potential regional corridor.

Biala – Wheeo - A broad band of predominantly highly modified Box-Gum woodlands link the north-south aligned regional corridors on the western boundaries of the Shire with remnant vegetation on the higher elevated and more fertile lands to the east. This linkage is currently highly fragmented, however the available vegetation datasets suggest the vegetation within this potential regional corridor retains considerable recovery potential.

Tarlo River – Greenwich Park - Gibraltar Rocks - A relatively broad band of predominantly dry forests links the extensive areas of remnant native vegetation in Tarlo River National Park, thorough the Greenwich Park area to the Wollondilly River. The corridor is relatively robust and is only fragmented in a few places and only over relatively short distances.

Tarlo River – Big Hill – Wollondilly River - A band of predominantly highly modified grassy woodlands and to a lesser extent dry forests links the extensive areas of remnant native vegetation in Tarlo River National Park, thorough the Bill Hill area to the Wollondilly River. The corridor is fragmented and disrupted in many places over short distances however the available vegetation datasets suggest the vegetation within this potential regional corridor retains considerable recovery potential.

Tarlo River – Wollondilly River - A relatively narrow band of predominantly highly modified grassy woodlands associated with the lower parts of the Tarlo River link the extensive areas of remnant native vegetation in Tarlo River National Park with remnant vegetation along the Wollondilly River. The corridor is relatively robust, particularly in the Tarlo River Gorge.

Discussion

Some of the potential regional corridors identified are characterised by mostly continuous links of remnant native vegetation in medium to high condition. However others, and particularly the east-west aligned corridors, currently have substantial disruptions to connectivity which would require changes to current land management practices and, in some cases, active revegetation to realise their potential as biolinks.

In many instances, the corridors with the greatest integrity or potential are not associated with major creeks or river systems, as is often the case to the east of the Shire and on the coast. Lands on river and creek flats are generally highly prized for agricultural purposes and consequently are often the most modified. Given their agricultural value, they are also generally the least likely to be transferred into land management regimes that would increase their value as biodiversity corridors.

Given the importance of regional and local corridors to the long-term management of biodiversity within and beyond the Shire, Section 12 includes a number of recommendations aimed at:

- Improving their management including undertaking further survey to overcome some of the limitations of the regional corridor mapping undertaken for this project.
- Improving the consideration of corridors in the planning process.
- Promoting the protection and enhancement of biodiversity corridors on private property.

12. Conclusion and Recommendations

Conclusions

The Biodiversity Planning Framework has identified that the Upper Lachlan Shire continues to support important conservation values including extensive areas of high and medium conservation value vegetation, key threatened species habitats, important wetlands and rivers, and important regional wildlife corridors. These conservation values are widespread throughout the Shire and occur on the full range of land tenures including private property, in national parks and nature reserves, state forest, TSRs Council owned land and on Crown Land. The BPF has also identified that these important biodiversity values are also present within road reserves, cemeteries, and on lands immediately surrounding the existing towns and villages.

The BPF has ranked the biodiversity values within the Shire into high, medium and low, using standardised criteria through a conservation significance assessment. It has also identified a range of threatening processes which threaten the identified biodiversity values of the Shire. The BPF seeks to address these threats, and provide a framework for the protection, recovery and enhancement of the biodiversity values of the Shire. The BPF also recognises that large areas of the Shire support agriculture and some of the recommendations of the BPF can only be achieved with support both financially and advisory, from government and with the co-operation of landholders.

In this context, the future management of biodiversity in the Shire should aim to:

- Protect biodiversity.
- Achieve a net gain in the extent (and/or quality) of native vegetation.
- Increase the security of regionally significant vegetation communities and fauna habitats through a suitable reserve system, through the planning system and/or community supported programs.
- Recognise, support, and enhance a comprehensive network of regional biodiversity corridors that have been identified and protected.
- Protect riparian vegetation and waterways.

In order to facilitate these aims, the following recommendations are made with respect to principles which should be included in the LEP and DCP, and principles that should be adopted in the development assessment process, in the planning and execution of Council works, and in public education programs. Recommendations are also made with respect to priorities for future biodiversity data collection.

Note: The terms used in Section 12 are as per the definitions in the Standard Instrument (Local Environmental Plans) Order 2006.

Recommendations

For inclusion in the draft LEP

Zones

The following recommendations are made with respect to the zoning of lands within the Shire. The zones are consistent with those identified under the Standard Instrument (LEP) Order 2006:

Beyond the Villages

- Retention of current environmental provisions. All HCV lands within lands currently zoned for Environment Protection should be zoned E2 – Environmental Conservation. This is consistent with the Department of Planning's Section 117 Direction: 2.1 Environmental Protection Zones, which applies to land within an existing environmental protection zone or land otherwise identified for environmental protection purposes, to ensure no reduction in the level of environmental protection for that land.
- All HCV lands within lands covered by a registered on-title agreement for conservation should be zoned to reflect the objectives of the agreement to promote biodiversity conservation.
- All HCV and MCV in water catchment areas should be zoned as E3 - Environmental Management.
- Identified important wetlands should be zoned as E zones, with more permanent wetlands zoned E2 – Environmental Conservation.
- Any activities that involve vegetation clearing, including Routine Agricultural Management Activities (RAMAs), should be prohibited without consent in E zones.
- Confirmed regional corridors should be zoned as E zones.

Within the Villages

- Areas identified as LCV should be zoned, where necessary, so as to enable higher intensity types of development *i.e.* R, B and I Zones.
- Areas identified as MCV and HCV should generally be zoned as E3 – Environmental Management or higher *i.e.* E2. However, higher intensity types of development may be considered where biodiversity values are not compromised or are appropriately offset.

Environmental Layers

The following recommendations are made with respect to environmental layers that should be incorporated into the new LEP:

- All HCV and MCV should be identified in the LEP as an environmental overlay.
- Identified potential regional corridors should be identified in the LEP as an environmental overlay.
- The identified riparian and wetland buffer layers should be used as an environmental overlay protecting riparian zones and wetlands.
- Any activities that involve vegetation clearing, including RAMAs, should only be permissible with Council consent in areas affected by environmental overlays *i.e.* HCV, MCV, regional corridors, riparian corridors and buffers, and areas surrounding known threatened flora species records.

- Areas affected by environmental overlays should be identified as priority areas for detailed assessment of impacts in association with any development applications.
- A biodiversity clause should be adopted which applies to all HCV and MCV identified land. Recommended wording of this clause is as follows:
 - (1) The objective of this clause is to protect maintain and improve the biodiversity of landscapes including:
 - a. protecting biological diversity, native fauna and flora, and
 - b. protecting ecological processes necessary for their continued existence, and
 - c. encouraging the recovery of threatened species, communities, populations and their habitats.
 - (2) This clause applies to development on land identified as *Environmentally Sensitive Areas - Biodiversity on the Environmentally Sensitive Areas – Biodiversity Map*.
 - (3) For the purpose of this clause the *Environmentally Sensitive Areas - Biodiversity Map means the Upper Lachlan Local Environmental Plan [year] Environmentally Sensitive Areas - Biodiversity Map*.
 - (4) Development consent must not be granted to development unless the applicant has submitted a report with the development application that addresses, to the satisfaction of the consent authority, the following matters:
 - a. identification of any potential adverse impact on;
 - i. a native vegetation community, and
 - ii. the habitat of any threatened species, populations or ecological communities, and
 - iii. a regionally significant species of plant, animal or habitat, and
 - iv. a habitat corridor, and
 - v. a wetland, and
 - vi. the biodiversity values within a reserve, including a road reserve or a stock route; and
 - b. a description of any proposed measures to be undertaken to ameliorate any potential adverse impact.
 - (5) Where the consent authority is of the opinion that the development will cause a potential adverse impact the consent authority shall not grant development consent unless it is satisfied that;
 - a. the development meets the objectives of this clause, and
 - b. the development is designed, sited and managed to avoid the potential adverse environmental impact, or
 - c. in circumstances where a potential adverse impact cannot be avoided, the development:
 - i. is designed and sited so as to have minimum adverse impact, and
 - ii. incorporates effective measures so as to have minimal adverse impact, and
 - iii. mitigates any residual adverse impact through the restoration of any existing disturbed area on the site.

Planning Provisions

The following recommendations are made with respect to planning provisions that should be incorporated into the new LEP:

- Any activities that involve vegetation clearing, including RAMAs, should only be permissible with Council consent in E zones.
- Any activities that involve vegetation clearing, including RAMAs, should only be permissible with Council consent in areas affected by environmental overlays *i.e.* HCV, MCV, regional corridors, riparian corridors and buffers, and areas surrounding known threatened flora species records.
- Extensive agriculture should generally be excluded from E2 zones. E3 can support occasional grazing, beekeeping etc.
- The Tree Preservation Order (TPO) should be revised to ensure that in zones that are excluded from the TPO, all clearing of native vegetation (other than in specified situations *i.e.* farm forestry, wind breaks) be covered by the TPO and require consent where this is not already prescribed by the NV Act.

Principles for Inclusion in DCP

The following recommendations are made with respect to the principles that should be included in any DCP that covers areas identified as E zones or affected by environmental overlays:

- All native vegetation in medium or high condition should be retained and protected.
- Hollow-bearing trees and other important habitat resources, *i.e.* known or potential feed trees for Glossy Black Cockatoos, should be retained and protected.
- Conservation reserves, native vegetation and important habitat resources should be appropriately buffered from development and associated activities.
- Guidelines should be developed for the management of landuses/activities in areas identified as supporting HCV or MCV.
- Environmental weeds, as part of landscape and rehabilitation plans, should not be permitted in any lands that are known to support HCV or MCV.
- A list of environmental weeds within the Upper Lachlan Shire should be developed.
- Wherever possible development and activities should be designed to achieve net improvements in biodiversity values *i.e.* through the protection and enhancement of MCV, HCV and the enhancement of local and regional corridors.

Principles for use by Council in the Assessment of Development Applications

The following recommendations are made with respect to the principles that should underpin Council's development assessment process:

- Ensure biodiversity issues are appropriately considered at all stages of the site based activity and development assessment process.
- Any activities in areas requiring consent in areas affected by environmental overlays, or within 100 m of these areas, should required a detailed assessment of the potential impacts on biodiversity.
- Where HCV, MCV or areas otherwise affected by environmental overlays are potentially affected by a development or activity requiring consent, then a detailed assessment of the potential impacts on matters of national, state, regional and local significance should be undertaken including an assessment on relevant threatened species, endangered populations and endangered ecological communities. These assessments should have regard to relevant guidelines *i.e.* Threatened Species Assessment Guidelines (DECC 2005), and where appropriate include targeted survey for relevant threatened entities during appropriate seasons.
- Clearing of native vegetation should be avoided. No clearing of native vegetation should be permitted where there will be any significant impacts on threatened species, endangered populations, or endangered ecological communities. If avoiding clearing of native vegetation is not possible, it should be mitigated against. If it cannot be mitigated against, then clearing of native vegetation should only be permitted where appropriate offsets can be achieved and where there will not be any significant impacts on threatened species, endangered populations, or endangered ecological communities.
- The definition of native vegetation clearing should also include the clearing of secondary grasslands derived from native woodland and forest communities.
- Given the absence of comprehensive threatened species information within the CSA, any development applications that involve impacts on native vegetation will require an assessment of the impacts on threatened species and their habitats as per the requirements of the *Environmental Planning and Assessment Act 1979*.
- Hollow bearing trees should not be cleared if they provide key habitat values for threatened species, or if there is a potential for significant impacts on threatened fauna. No further loss of hollow-bearing trees should be permitted without appropriate offsets.
- Opportunities should be explored where assessing development applications to enhance the management of areas identified as supporting HCV or MCV. *i.e.* through the exclusion or relaxing of grazing or other threatening processes.
- Opportunities should be explored where assessing development applications to enhance local and regional corridors. *i.e.* through the recovery of vegetation that comprises part of local or regional corridors.
- Assessment guidelines should be developed to ensure biodiversity issues are considered early in the development assessment and planning process *i.e.* through the use of conservation value mapping and GIS analysis.
- Model development consent conditions should be prepared that address protection, maintenance and improvement of biodiversity values.
- A policy and procedure for managing clearing consents in situations where both Council and the CMA are consent authorities.

Principles for Council Works

The following recommendations are made with respect to the principles that should underpin the undertaking of Council works:

- The undertaking of Council works should be preceded by appropriate Environmental Impact Assessment (EIA) consistent with relevant statutory obligations.
- The EIA should include a review of environmental overlays.
- Given the concentration of biodiversity values within many road reserves, any road works or maintenance that involves disturbances such as the creating of new drains, widening of shoulders, etc, should be preceded by a targeted survey for matters of national, state, regional or local conservation significance by an appropriately qualified person.
- Any areas of MCV or HCV on Council managed land should be appropriately managed for the conservation and enhancement of biodiversity values. This management should ideally be documented in management plans or a management plan for Council management lands with significant biodiversity values.
- Council funding of conservation works should be targeted towards areas of identified HCV and MCV.
- Council funded conservation works should be appropriately planned and prioritise cost effective management activities such as the promotion of vegetation recovery through capitalising on natural resilience and recovery potential, through strategic fencing, and strategic weed control.
- Strategies which capitalise on the natural recovery potential of sites should be favoured over revegetation programs.
- Any revegetation or planting should use local provenance endemic plant species.
- Tree planting should be avoided in areas of Natural Temperate Grasslands (NTG).

For Public Education

The following recommendations are made with respect to the principles that should underpin public education programs:

- Public education programs should seek to raise awareness with respect to the biodiversity values of the Shire, the threatening processes affecting biodiversity values within the Shire, and the key management actions which are required to protect and enhance conservation values.
- Public education programs should seek to raise awareness about the mechanisms available to assist landholders with the management of biodiversity values i.e. Biobanking, PVPs, VCAs, etc.
- Public education programs should seek to raise awareness about the statutory obligations of landholders with respect to vegetation clearing, tree removal, and other activities that may potentially impact adversely on biodiversity values.
- Public education programs should be targeted towards landholders with identified HCV and MCV.
- Public education programs should be targeted towards landholders whose lands support identified key local corridors.

- Public education programs should be targeted towards landholders whose lands support HCV or MCV vegetation communities with considerable natural recovery potential and which could be recovered cost effectively.
- Public education programs should be developed which demonstrate land management practices which protect and enhance biodiversity values.

Future Data Collection

The following recommendations are made with respect to future biodiversity data collection:

Recommendation	Priority
Review the CSA when the superior vegetation dataset for the Shire that is currently under development is finalised and released by DECC.	High
Undertake a detailed assessment of the relative conservation values within the road reserves of the Shire. Road reserves have been identified as supporting concentrations of MCV and HCV, and are particularly vulnerable to adverse impacts associated with road maintenance activities and upgrades. The assessment should prioritize road reserves where substantial maintenance activities or upgrades are planned.	High
Identify and ground-truth key local biodiversity corridors within the Shire. These corridors should be targeted for biodiversity management and incentive programs or acquisition and inclusion in the conservation reserve system.	High
Validate vegetation mapping for the Shire via a systematic ground-truthing and verification process confirming classification, condition and conservation status.	High
Undertake modelling, and ideally ground-truthing, of threatened species habitats within the Shire, with the objective of including the results in the environmental layer for inclusion in the LEP.	Medium
Map protected regrowth across the Shire in accordance with the definition in the <i>Native Vegetation Act 2003</i> .	Medium
Map potential Koala habitat across the Shire in accordance with the SEPP 44 requirements and methods.	Medium
Continue to expand and adjust Councils weed management and bush regeneration strategies to use the HCV and regional corridor mapping to prioritise these programs.	Medium
Prepare a plan of management for lands that trigger SEPP 44 Koala habitat.	Low

13. Staff Training

This section outlines the training proposed for Council Officers following the completion of this project. The training will focus on the use of the CSA for strategic planning, development application (DA) assessment and for planning and conducting Council works.

Council staff involved

Councillors, Council Officers involved in strategic planning, DA assessment, the planning and supervising of Council works, such as road works, and management of Council land and facilities.

Purpose of training:

- To give Councillors an overview of the BPF project, the CSA digital layer and potential uses by Council.
- To give relevant Council Officers an overview of the BPF project, the data layers (including source, method of data collection, limitations), and how to determine conservation value and conservation value attributes for a given area, and potential uses to ensure appropriate assessment of DAs and consideration for Council activities.

Number to be trained: Approximately nine Councillors and 12 Council Officers.

Training format: Two separate sessions:

- Overview session - for Councillors and Council Officers, covering the BPF project, the CSA digital layer and potential uses by Council. Topic to be covered should include a general overview of the BPF, the data layers used, process of CSA analysis, consultant's work, and how the BPF is proposed to be used by Council. The session should also include demonstrations of determining conservation value and attributes of a site.
- User session - for Council Officers, covering the data layers (including source, method of data collection, limitations), and how to determine conservation value and conservation value attributes for a given area. The session should include staff using the CSA layer "hands on" to determine conservation value and attributes for different areas (such as development sites) within the Shire and discussion of the implications of the results for strategic planning, DA assessment and management of Council lands.

Venue: Upper Lachlan Shire Council Chambers, Crookwell.

Indicative times:

Overview session: Approximately 1 hour

User session: Approximately 2.5 hours

Date: As soon as practical following completion of the BPF.

Trainers: Council, DECC, Hawkesbury-Nepean CMA and Lachlan CMA staff involved in the BPF project.

14. Bibliography

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Upper Lachlan Shire Council Website <http://upperlachlan.local-e.nsw.gov.au/>

Appendices

- A. Summary metadata statements for each data set used in CSA**
- B. Fauna/Flora information**
- C. Local Tree Planting**
- D. Weeds**

Appendix A – Summary metadata statements for each data set used in CSA

Layer	Title	Description	Methodology/Accuracy /Limitations	Supporting information	Custodian/ Contact
Vegetation	A Planning Framework For Natural Ecosystems of the ACT and NSW Southern Tablelands	Presents regional-scale information on natural ecosystems and biodiversity, identifying important species and ecological communities.	Modeled vegetation and point location of some species. Satellite image mapping of vegetation cover, with field checking.	Fallding 2002	DECC, Queanbeyan
Vegetation	Native Vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. Version 1.0 (SCIVI)	Classification and descriptions of native vegetation types of southeast NSW and map of extant distribution of vegetation types.	Distribution of vegetation types was modeled from classified sites based on ~ 8,500 field survey sites and aerial photograph interpretation Best viewed at 1:100 000 interpretation scale. Accuracy of extant vegetation boundaries varies across the study area.	Metadata statement; and Report (Tozer <i>et.al.</i> 2006)	DECC, GIS Support Officer, Hurstville, 02 9585 6444
Vegetation	Comprehensive Regional Assessment (CRA) – Forest Ecosystems, South Coast Sub Region	Extant forest ecosystem map for the South Coast sub-region.	Modelled data derived from modelled pre-1750 vegetation, API, topographic and soil patterns. Limited field verification and assessed by expert panel of botanists. Note: the study maps ‘woody vegetation’ only, not grasslands. The map is produced at a resolution of 25 m. However, it is best used at a scale of 1:50,000 upward.	Metadata statement; and Report 1999,	DECC, Data Supply Officer, Hurstville, 02 9585 6834
Landscapes	The NSW Landscapes coverage (Mitchell, 2002)	Mitchell Landscapes is a state-wide map of landscapes, describing land attributes considered to drive ecosystem processes. Mitchell Landscapes may be considered as sub-IBRA regions.	Map compiled using existing resources and describing land attributes such as geologic, geomorphic and pedologic (soil) factors. The map is best used at a scale of 1:250 000. There is a high degree of accuracy at this scale. No ground-truthing completed for this mapping.	Metadata statement	DECC, Manager GIS, Hurstville, 02 9595 6444
Tenure – Conservation Reserves	NSW National Parks and Wildlife Service (NPWS) Estate	Boundaries of areas in NSW which are under the management of the NPWS.	Updates are made on the occurrence of the gazettal of new reserves or additions to reserves. The source maps used are of the best available scales of 1:4 000, 1:10 000, 1:25 000, 1:50 000 or 1:100 000.	Metadata statement	DECC, Data Supply Officer, Hurstville, 02 9585 6834

Layer	Title	Description	Methodology/Accuracy /Limitations	Supporting information	Custodian/ Contact
Tenure – Private Land Conservation	Voluntary Conservation Agreements (VCA)	A digital representation of the boundaries of Conservation Agreements throughout NSW	Boundaries from hardcopy maps related to either/or digital cadastral data or digital 1:25 000 topographic maps. Accuracy of cadastral data will have boundaries to within 5 - 10m accuracy; accuracy of 1:25 000 topographic maps likely to be 25-50m accuracy.	Metadata statement	DECC, Manager, GIS Unit, Hurstville, 02 9585 6611
Geological significant areas	Karst Locations South CCEPG	This dataset contains information on the location of sensitive landforms and prominent Karst areas in NSW.	Location information obtained from site visits, and combining published descriptions with geological maps acquired from DPI and other public sources. Data does not indicate any assessed level of significance for each area.	Metadata Statement	DECC, Karst Conservation Unit, Bathurst, 02 63327680
Riparian - Rivers	New South Wales Dtdb Hydrography Theme Medium Scale Drainage	Drainage details of the NSW topographic map archive corresponding to 1:25 000, 1:50 000 and 1:100 000 mapping areas.	Drainage captured from photogrammetric compilations prepared from Aerial Photography.	Metadata statement	Department of Information Technology and Management (LPI), Data Manager Information Systems, Bathurst, 02 6332 8425
Riparian - Wetlands	Wetlands of New South Wales	Map of the wetlands across NSW	Wetlands identified using a combination of classification of spectral classes of Landsat MSS and TM imagery and ancillary wetland information to create information classes of broad wetland groups (floodplain wetlands, freshwater lakes, saline lakes, reservoirs, estuarine wetlands and coastal lagoons and lakes). Layer prepared from Aerial Photography, Triangulated, Field Completed and Cartographically Enhanced. Estimate accuracy of up to 100m.	Metadata statement	DECC. Coordinator: Spatial Information and Analysis Section, Hurstville, 02 9585 6834
Tenure – public land	NSW Crown Land Information Database Spatial Layer	This data comprises of the following layers: Crown Reserve, Crown Road, Crown Lease, Crown Water, Crown Other and Crown Licence Layers. The layers are a component of the NSW Digital Cadastral Database.	Data was captured from Rural and Urban Cadastral Master Transparencies as represented by DCDB, Parish Maps and the Natural Resources Drainage Layer. All DCDB data are subject to automatic verification, ensuring 100% data integrity.	Metadata statement.	Department of Information Technology and Management (LPI), Data Manager Information Systems, 02 6332 8425

Layer	Title	Description	Methodology/Accuracy /Limitations	Supporting information	Custodian/ Contact
Tenure - public land	State Forests Boundaries	The State Forest Boundary data set shows the dedicated boundaries of all State Forests in New South Wales	The data is based on cadastre with operational boundaries, such as Topographic drainage and State Forest roads. All boundaries are checked by State Forests for accuracy.	Metadata statement	State Forests of New South Wales, Manager GIS Operations - GIS Unit, Pennant Hills, 02 9980 4268
DECC Regional Biodiversity Corridors	Regional Corridor assessment	Identifies a network of corridors within three broad fauna pathways that connect within and outside the Greater Southern Sydney Region. These include regional corridors within the eastern and northern parts of Upper Lachlan Shire.	Regional and sub-regional fauna corridors were identified within the Greater Southern Sydney Region following an extensive investigation of species distribution and habitat use (DEC 2005). These were mapped and a paper prepared by DECC to inform development of the Hawkesbury-Nepean Catchment Action Plan, 2008. Corridors were digitised using 2005 Spot 5 satellite imagery. Likely to be accurate to at least 1:25 000 scale.	Hawkesbury-Nepean Catchment Action Plan 2007-2016. (2008) Appendix 8.	Hawkesbury-Nepean CMA Goulburn 4828 6747
Potential Regional Corridors	Pot_reg_cor_gda55	Potential regional corridors identified by BES in the Upper Lachlan Shire	The potential regional corridors were identified through a desktop analysis of a SPOT 5 Mosaic (04-05) covering the study area in combination with available vegetation datasets. The dataset has not been subject to any ground-truthing and is only likely to be accurate at greater than 1:25 000 scale.	Metadata statement.	Bushfire & Environmental Services – GIS 4443 5555
Vegetation	Veg_villages_gda55	Vegetation within 1 km of the towns and villages within the Upper Lachlan Shire which were identified as priority 1 and 2.	Described in detail in Section 9 of the BPF. All patches of native vegetation were mapped down to a minimum 2500 m ² , plus any smaller patches deemed to be of significance. Location of remnant vegetation accurate to this scale however condition and class data may be less accurate in places as a result of limitations on access for data collection and ground-truthing.	Impact of Metadata statement.	Bushfire & Environmental Services – GIS 4443 5555

DEC (2005) Terrestrial Vertebrate fauna of the Southern Sydney region: Volume 1 – Main Report.

Appendix B – Fauna/Flora information

There is no single vegetation map for the Upper Lachlan Shire. Three vegetation modelling projects have mapped parts and these are:

- Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands (SCIVI).
- Forest Ecosystem Classification and mapping for the Southern Comprehensive Regional Assessment (CRA) Region.
- The Planning Framework for natural ecosystems of the ACT and Southern Tablelands cover the Shire (Fallding, NPWS 2002).

There are 60 native vegetation communities modelled as occurring in the Upper Lachlan. Of these, 20 vegetation types have been identified as over-cleared (less than 30% of pre-1750 layer remaining) and approximately 29 vegetation communities under-represented in conservation reserves (less than 15% occurring in conservation reserves). The vegetation communities under-represented is based on the Janis Criteria (below).

The Commonwealth Government, in their National Forest Policy Statement (NFPS, signed in 1992), provide an undertaking to manage Australia's forests to conserve biological diversity. In order to achieve this it was agreed that a comprehensive, adequate and representative (CAR) reserve system be created (JANIS, 1997, a Commonwealth-State committee addressing the implementation of the NFPS).

The JANIS criteria for a CAR reserve system included numerical targets. Relevant numerical targets for vegetation to be conserved include:

- 15% of pre-1750 distribution of forest ecosystems
- at least 60% of vulnerable ecosystems
- 100% of rare and endangered forest ecosystems

Note: The assessment of native vegetation for this study is drawn from the *BioMetric – A terrestrial biodiversity assessment tool for the NSW Property Vegetation Plan developer*.

BioMetric is a Microsoft Excel-based tool that facilitates preparation of Property Vegetation Plans (PVPs) under the *NSW Native Vegetation Act 2003*. It works alongside separate tools for assessing threatened species, soils, water quality, salinity and invasive native scrub.

Threatened Fauna and Flora Species

Upper Lachlan – Threatened Fauna	
Common Name	Scientific Name
Booroolong Frog	<i>Litoria booroolongensis</i>
Brown Treecreeper	<i>Climacteris picumnus</i>
Brush-tailed Rock-wallaby	<i>Petrogale penicillata</i>
Diamond Firetail	<i>Stagonopleura guttata</i>
Eastern Bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>
Green and Golden Bell Frog	<i>Litoria aurea</i>
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>
Hooded Robin	<i>Melanodryas cucullata</i>
Koala	<i>Phascolarctos cinereus</i>
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>
Large-footed Myotis	<i>Myotis aduersus</i>
Little Whip Snake	<i>Suta flagellum</i>
Magpie Goose	<i>Anseranas semipalmata</i>
Masked Owl	<i>Tyto novaehollandiae</i>
Painted Snipe (Australian subspecies)	<i>Rostratula benghalensis australis</i>
Powerful Owl	<i>Ninox strenua</i>
Regent Honeyeater	<i>Xanthomyza phrygia</i>
Speckled Warbler	<i>Pyrrholaemus sagittatus</i>
Squirrel Glider	<i>Petaurus norfolcensis</i>
Superb Parrot	<i>Polytelis swainsonii</i>
Yellow-bellied Glider	<i>Petaurus australis</i>
Upper Lachlan – Threatened Flora	
Common name	Scientific Name
Aromatic Peppercress	<i>Lepidium hyssopifolium</i>
Buttercup Doubletail	<i>Diuris aequalis</i>
Cabbage Kunzea	<i>Kunzea cabbagei</i>
Floating Swamp Wallaby-grass	<i>Amphibromus fluitans</i>
Prostanthera marifolia	<i>Prostanthera marifolia</i>
Yass Daisy	<i>Ammobium craspedioides</i>

Endangered Ecological Community

Endangered Ecological Communities are listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). Upper Lachlan Shire has six listed EECs.

Upper Lachlan Shire falls into two Interim Biogeographic Regionalisation for Australia (IBRA) regions: approximately 90% of the Shire is in the South East Highlands Region and the remainder in the north west of the Shire is in the NSW South Western slopes.

Endangered Ecological Communities in Upper Lachlan Shire

EEC	Vegetation community	ACT
Montane Peatland and Swamp of the new England, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps	Tablelands Swamp Meadow (SCIVI)	TSC Act
White Box Yellow Box Blakely's Red Gum Woodland	Box Gum Woodland (PFW) Tableland Grassy Box Woodland, Wollondilly-Cox-Shoalhaven Gorge Woodlands, Tableland Granite Grassy Woodland (SCIVI) Central North Slopes Dry Grass Woodland, Lower Snowy White Box Dry Shrub/Herb Woodland, Northern Slopes Dry Grass Woodland, Northern Tablelands and Slopes Dry Shrub/Grass Forest, Tableland Dry Grassy Woodland, Tablelands Acacia/Grass/Herb Dry Forest, Western Slopes Dry Grass Woodland, Western Slopes Herb/Grass Woodland (CRA)	TSC Act
Grassy White Box Woodlands	Tableland Grassy Box Woodland, Tableland Granite Grassy Woodland (SCIVI) Secondary Grasslands (high Probability (PFW))	EPBC Act
Natural temperate Grasslands of the Southern Tablelands of NSW and ACT	Grassland (high probability), (PFW) Frost Hollow Grassy Woodland, Tableland Grassy Box Woodland, Tableland Granite Grassy Woodland (SCIVI) Tablelands and Slopes Herb/Grassland/ Woodland (CRA)	EPBC Act
Temperate Highland Peat Swamps on Sandstone	Tableland Bog, Tablelands Swamp Meadow (SCIVI),	EPBC Act
Southern Highlands Shale Woodlands	North East Tablelands Shrub/Herb/Grass Dry Forest (CRA)	TSC Act
Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions	Tableland Basalt Forest (SCIVI)	TSC Act

Mitchell Landscapes

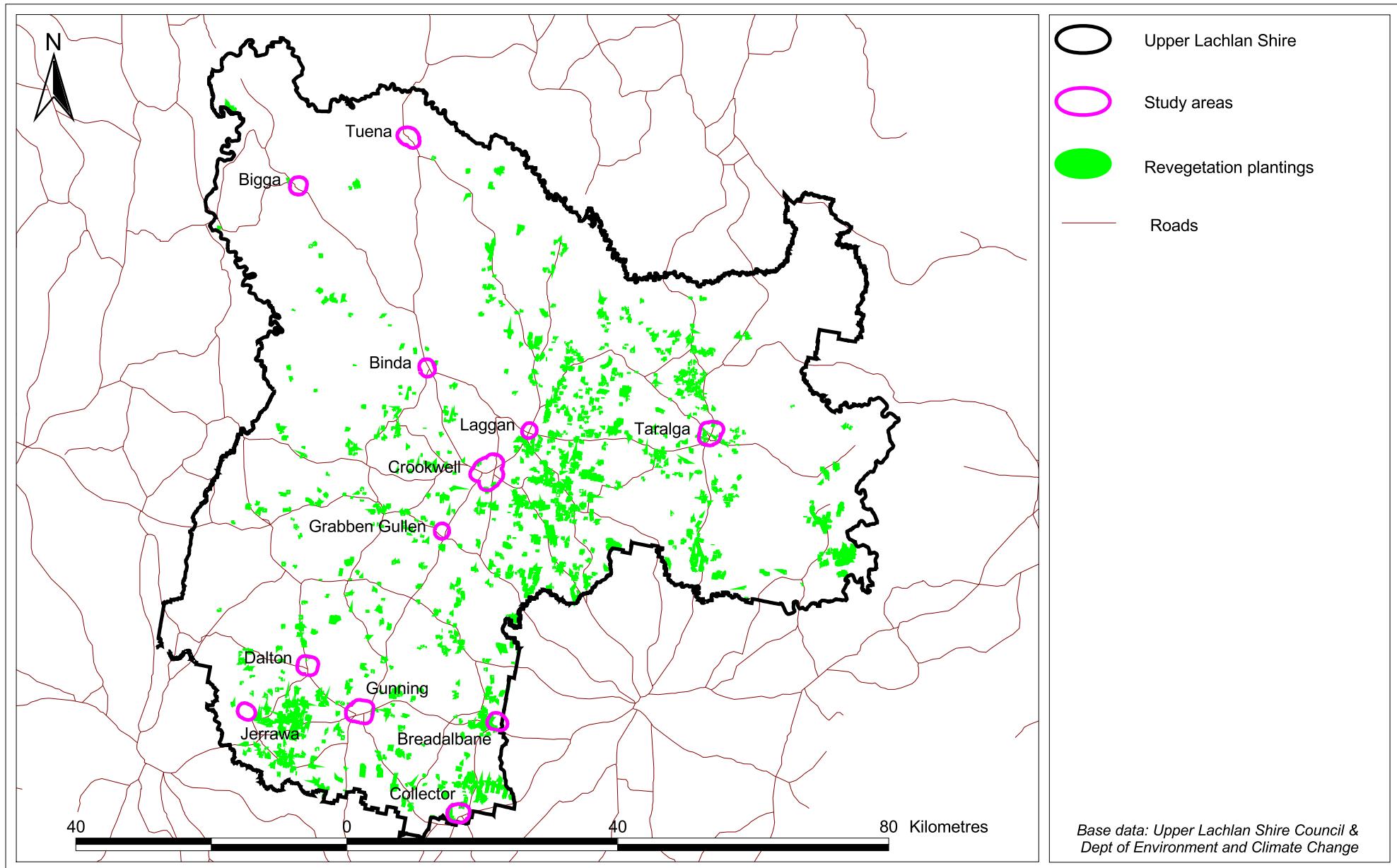
In the *BioMetric tool*, clearing is not allowed in ecosystems (Mitchell Landscapes) that are more than 70% cleared and where the vegetation is not in low condition. In Upper Lachlan Shire, there are 23 Mitchell landscapes, of these 14 are over-cleared i.e. more than 70% cleared.

Mitchell Landscapes in the Upper Lachlan Shire

Mitchell Landscapes	Vegetation clearance (%)	Over Cleared
Gunning Hills	94	Yes
Mandurama Slopes	79	Yes
Wyangla Hills	94	Yes
Gunday Plains	72	Yes
Rockley Plains	62	No
Oberon – Kialla Granites	89	Yes
Mount David Basalts	74	Yes
Sydney Basin Western Escarpment	29	No
Breadalbane Swamps and lagoons	91	Yes
Crookwell Basalts and Sands	92	Yes
Wollondilly – Bindook Tablelands and Gorge	38	No
Dalton Hills	85	Yes
Upper Lachlan Channels and Floodplains	96	Yes
Mossvale Highlands	54	No
Lake George Complex	91	Yes
Towrang Ranges	59	No
Boorowa Volcanics	90	Yes
Boyd Plateau Granites	0	No
Bungonia Tableland and Gorge	39	No
Byng Ultramafics	96	Yes
Jenolan-Wombeyan Karsts	57	No
Lachlan Gorge	55	No
Robertson Basalts	74	Yes

Appendix C - Local Tree Planting

Figure 15: Local tree planting within the Upper Lachlan Shire



Appendix D – Weeds

Noxious weeds

Noxious weeds are listed under the *Noxious Weeds Act 1993*, and Councils are required to direct and control their spread. Pursuant to Sections 7 and 8 of the *Noxious Weeds Act 1993*, the Minister for Primary Industries, by Order on 23 December 2006, declared 97 plants as noxious weeds within the control area of Upper Lachlan.

Weeds are a significant environmental and economic burden within the region and require ongoing management and control to ensure adverse affects are appropriately managed and mitigated against. Most areas within NSW have now been invaded by a diversity of weed species which affect the environment, productivity of agricultural areas and rural aesthetics.

Any control strategy for weeds is dependant on landuse objectives and land management. In undisturbed areas, weed management generally relates to reducing adverse impacts and aesthetic and recreational value of lands. In agricultural areas across the Upper Lachlan, priority should be given to controlling species which have the potential to infiltrate produce and result in adverse economic impact.

Weeds of National significance

In a response to the need for improved management of weeds and in recognition of the significant advantages to be gained from improving coordination, all levels of government have endorsed a *National Weeds Strategy: A Strategic Approach to Weed Problems of National Significance* in June 1997. A second edition of the Strategy was published in March 1999. Weeds of National significance are those weeds which have been identified as causing environmental damage.

The National Weeds Strategy provides the framework to reduce the impact of weeds on the sustainability of Australia's productive capacity and natural ecosystems, through the establishment of a number of goals, objectives for action and outcomes.

The second goal of the National Weeds Strategy is to reduce the impact of existing weed problems of national significance. The first objective under this goal is to develop a process for determining and ranking weed problems of national significance.

Determining weeds of national significance is the first attempt to manage weeds at the national level. This approach draws together indicators on which to base future weed decision-making. It also provides a framework for prioritising weeds at the State, regional and local levels.

There are 16 weeds of national significance and three weeds with potential distribution into NSW located within Upper Lachlan. These include:

alligator weed	mesquite
athel pine	parkinsonia (potential distribution)
bitou bush/boneseed	parthenium weed
blackberry	pond apple
bridal creeper	prickly acacia
cabomba	rubber vine (potential distribution)
chilean needle grass	salvinia
gorse	serrated tussock
hymenachne (potential distribution)	willows (except weeping willows, pussy willow and sterile pussy willow)
lantana	

Source: Thorp and Lynch 2000

Noxious weed declarations for Upper Lachlan Shire Council (at 12 Feb 2008)

Weed	Class
African boxthorn [<i>Lycium ferocissimum</i>]	4
African feathergrass [<i>Pennisetum macrourum</i>]	5
African lovegrass [<i>Eragrostis curvula</i>]	4
African turnipweed [<i>Sisymbrium runcinatum</i>]	5
African turnipweed [<i>Sisymbrium thellungii</i>]	5
Alligator weed [<i>Alternanthera philoxeroides</i>]	2
Anchored water hyacinth [<i>Eichhornia azurea</i>]	1
Annual ragweed [<i>Ambrosia artemisiifolia</i>]	5
Arrowhead [<i>Sagittaria montevidensis</i>]	5
Artichoke thistle [<i>Cynara cardunculus</i>]	5
Athel pine [<i>Tamarix aphylla</i>]	5
Bathurst/Noogoora/Californian/cockle burrs [<i>Xanthium species</i>]	4
Bear-skin fescue [<i>Festuca gautieri</i>]	5
Black knapweed [<i>Centaurea nigra</i>]	1
Blackberry [<i>Rubus fruticosus aggregate species</i>]	4
Bridal creeper [<i>Asparagus asparagoides</i>]	5
Broomrapes [<i>Orobanche species</i>] Includes all except the native <i>O. cernua</i> variety <i>australiana</i> and <i>O. minor</i>	1
Burr ragweed [<i>Ambrosia confertiflora</i>]	5
Cabomba [<i>Cabomba caroliniana</i>]	5
Cayenne snakeweed [<i>Stachytarpheta cayennensis</i>]	5
Chilean needle grass [<i>Nassella neesiana</i>]	4
Chinese violet [<i>Asystasia gangetica subspecies micrantha</i>]	1
Clockweed [<i>Gaura lindheimeri</i> and <i>Gaura parviflora</i>]	5
Cockle burrs [<i>Xanthium species</i>]	
Columbus grass [<i>Sorghum x alnum</i>]	4
Corn sowthistle [<i>Sonchus arvensis</i>]	5
Dodder [<i>Cuscuta</i>] Includes All <i>Cuscuta</i> species except native species <i>C. australis</i> , <i>C. tasmanica</i> <i>C. victoriana</i>	5
East Indian hygrophila [<i>Hygrophila polysperma</i>]	1
English broom [<i>Cytisus scoparius</i>]	
Esparto [<i>Achnatherum brachychaetum</i>]	5
Eurasian water milfoil [<i>Myriophyllum spicatum</i>]	1
Fine-bristled burr grass [<i>Cenchrus brownii</i>]	5
Fireweed [<i>Senecio madagascariensis</i>]	4
Fountain grass [<i>Pennisetum setaceum</i>]	5
Gallon's curse [<i>Cenchrus biflorus</i>]	5
Glaucous starthistle [<i>Carthamus glaucus</i>]	5
Golden dodder [<i>Cuscuta campestris</i>]	4
Golden thistle [<i>Scolymus hispanicus</i>]	5
Gorse [<i>Ulex europaeus</i>]	3
Green cestrum [<i>Cestrum parqui</i>]	3
Harrisia cactus [<i>Harrisia species</i>]	4
Hawkweed [<i>Hieracium species</i>]	1
Hemlock [<i>Conium maculatum</i>]	4
Horsetail [<i>Equisetum species</i>]	1
Hymenachne [<i>Hymenachne amplexicaulis</i>]	1
Italian bugloss [<i>Echium species</i>]	
Johnson grass [<i>Sorghum halepense</i>]	4
Karoo thorn [<i>Acacia karroo</i>]	1

Weed	Class
Kochia [Bassia scoparia] except Bassia scoparia subspecies trichophylla	1
Lagarosiphon [Lagarosiphon major]	1
Lantana [Lantana species]	5
Leafy elodea [Egeria densa]	5
Long-leaf willow primrose [Ludwigia longifolia]	5
Mesquite [Prosopis species]	2
Mexican feather grass [Nassella tenuissima]	1
Mexican poppy [Argemone mexicana]	5
Miconia [Miconia species]	1
Mimosa [Mimosa pigra]	1
Mossman River grass [Cenchrus echinatus]	5
Nodding thistle [Carduus nutans]	4
Onion grass [Romulea species] Includes all Romulea species and varieties except R. rosea var. australis	5
Oxalis [Oxalis species and varieties] Includes all Oxalis species and varieties except the native species	5
Pampas grass [Cortaderia species]	4
Parkinsonia [Parkinsonia aculeata]	2
Parthenium weed [Parthenium hysterophorus]	1
Paterson's curse, Vipers bugloss, Italian bugloss [Echium species]	4
Pond apple [Annona glabra]	1
Prickly acacia [Acacia nilotica]	1
Prickly pear [Cylindropuntia species]	4
Prickly pear [Opuntia species except O. ficus-indica]	4
Red rice [Oryza rufipogon]	5
Rhus tree [Toxicodendron succedaneum]	4
Rubervine [Cryptostegia grandiflora]	1
Sagittaria [Sagittaria platyphylla]	5
Salvinia [Salvinia molesta]	2
Sand oat [Avena strigosa]	5
Scotch broom [Cytisus scoparius]	4
Scotch, Stemless, Illyrian and Taurian thistles [Onopordum species]	4
Senegal tea plant [Gymnocoronis spilanthoides]	1
Serrated tussock [Nassella trichotoma]	4
Siam weed [Chromolaena odorata]	1
Sifton bush [Cassinia arcuata]	4
Smooth-stemmed turnip [Brassica barrelieri subspecies oxyrrhina]	5
Soldier thistle [Picnomon acarna]	5
Spotted knapweed [Centaurea maculosa]	1
St. John's wort [Hypericum perforatum]	4
Sweet briar [Rosa rubiginosa]	4
Texas blueweed [Helianthus ciliaris]	5
Water caltrop [Trapa species]	1
Water hyacinth [Eichhornia crassipes]	2
Water lettuce [Pistia stratiotes]	1
Water soldier [Stratiotes aloides]	1
Willows [Salix species] Includes all Salix species except S. babylonica, S. x reichardtii, S. x calodendron	5
Witchweed [Striga species] Includes all Striga species except native species and Striga parviflora	1
Yellow burrhead [Limnocharis flava]	1
Yellow nutgrass [Cyperus esculentus]	5