

Bland Shire Council

Guide to the

Management of Roadside Vegetation

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1.1 INTRODUCTION

One of Bland Shire Council's core responsibilities is the management of a vast road network system. This includes carrying out new road construction, maintenance, drainage, and vegetation control. While Council gives a high priority to public safety and accessibility, all work has to be carried out cost effectively.

This Guide to the Management of Roadside Vegetation [GMRV] has been prepared to provide assistance to Council staff with responsibility for management of road corridors within Bland Shire. Although Council's prime roles in road management are as stated above, the guide helps to give some direction to other considerations.

The reason for a guide is to ensure Council manages all vegetation on road corridors responsibly. It also assists in the protection of native fauna from accidental or unnecessary work practices. Not only do environmental concerns need to be addressed, community expectations and legislative requirements also need to be met. In a court of law ignorance of such requirements is not a defence. The guide also serves as an essential reference tool when assessing areas for conservation value.

It should be noted that much of the GMRV relates to remnant native vegetation rather than areas where introduced species are dominant.

This GMRV provides guidance on the following issues:

- **an overview of the principal laws that relate to roadside native vegetation management;**
- **assessment of the biodiversity values of individual occurrences of remnant native vegetation; and**
- **management of roadside vegetation.**

It is worthy to note that while the Roads Act outlines the road maintenance responsibilities of road making and maintenance organisations, such as Councils, there are a number of other Acts, both State and Commonwealth, that impact on such activity. Activities which contravene some of these Acts **can potentially result in legal action.**

1.2 THE MAIN LAWS RELATING TO CLEARING OF REMNANT NATIVE ROADSIDE VEGETATION

It is important, when considering the need to manage and conserve remnant native vegetation along roadsides controlled by Councils, that Council's Environmental staff have a good understanding of the main statutes that relate to native vegetation management and conservation.

It is important that all relevant staff members understand the provisions of the relevant Acts as they relate to impacts of road works and other Council activities on remnant native roadside vegetation. Such an understanding provides a good background to the processes required when working in individual patches of native roadside vegetation.

Remnant native vegetation is allowed to be cleared in some circumstances, and not in others, without permission from the appropriate State or Commonwealth Government authority.

The five main Acts pertaining to this issue are:

- **NSW Threatened Species Conservation Act , 1995**
- **NSW Native Vegetation Act, 2003**
- **NSW Fisheries Management Act, 1994**
- **NSW Protection of the Environment Operations Act,1997**
- **Commonwealth Environment Protection and Biodiversity Conservation Act, 1999**

The relevant provisions of each of the above five Acts and other regulations are explained in Addendum 1.

1.3 ROADSIDE VEGETATION MANAGEMENT – CODE OF PRACTICE

There are a number of roadside vegetation management activities that should be addressed in the GMRV. These activities relate to works undertaken by Council staff in the road maintenance and development fields as well as those usually associated with use of roadside vegetation communities by members of the public.

Appendix 1 contains a checklist form prepared by the NSW Roadside Environment Committee for use in minimising the impact of rural road works. This should be incorporated within current checklists to be used on all road maintenance and construction works for roadside vegetation.

Examples of activities that could be of concern are Camp sites, Stockpile sites, Tree Clearing, Mowing, Weed Control, Mitre drains, Rest Areas, Erosion and Sediment Control, Fire Breaks, and Public Activities. A discussion of these and other activities that are undertaken on roadsides is set out in Addendum 2.

1.4 TREES IN ROAD RESERVE AREA

Overhanging branches – Tree branches that are less than 5 metres above the road surface can be removed if they are obstructing traffic. Branches at heights greater than this may also be removed at the discretion of Council’s Environmental Officer.

Non-mature trees – all non-mature trees located in the area of the road corridor between the centre line of the trafficked road and 1m beyond the table drain (or, in a fill or cutting area, foot of batter/top of batter) shall be removed within the constraints of council funding.

Mature trees – can be removed if considered a hazard at the discretion of the Council's Environment Officer and within the constraints of council funding.

Within available funding new trees that are approved by Council's Environment Officer can be planted adjacent to the property boundaries in a road reserve provided the distance from the centre line of the road to the property boundary is greater than 18 meters. The final decision of the appropriateness of the planting shall rest with Council's Environment Officer.

Adjoining landholders to a Council road reserve may remove trees and other vegetation on the reserve for the purpose of boundary fencing activities. This clearing should not be greater than 3 metres outside property boundary. Approval must be obtained from Councils Environmental Officer prior to any works on Council land. Permission may be granted in special circumstances to clear vegetation beyond this limit

1.5 VEGETATION CONTROL WITH HERBICIDES

Herbicide application should be carried out by competent Council staff or approved contractors, with strict adherence to label requirements and best practice management guidelines. All risk management concerns should be addressed, including operator safety, weather conditions, herbicide selection, and protection of non-target species.

Native vegetation may be removed to the minimum extent necessary to allow for the effective control of noxious weeds.

1.6 PEST ANIMALS

Native vegetation can be cleared to the minimum extent necessary without approval, when required to control pest animals under an eradication order or pest control order under Part 11 of the Rural Lands Protection Act 1998.

1.7 FIREBREAKS

Council may on occasions be required to affect firebreaks on road reserves. This work should be done in consultation with the Rural Fire Service to achieve the most strategic outcomes.

Private landholders and other agencies must not install firebreaks without permission from Council.

1.8 OTHER AGENCIES AND UTILITIES

All other agencies and utilities must seek approval from Council prior to any works proposed on Council's road reserve.

1.9 ROADSIDE VEGETATION MAPPING

If Council's Environmental staff are alerted to or otherwise become aware of an area of roadside within the Council boundaries (which is maintained by council) that may be native remnant vegetation, the area shall be inspected by Council's Environmental staff. If it is deemed to be remnant vegetation that needs to be preserved, then the area will be mapped for future reference to the satisfaction of Council's Environment Officer.

The guide to mapping roadside vegetation and, if needed, value assessment, is included in Addendum 3.

1.10 FUTURE DIRECTIONS

The main priorities for Councils in managing roadside vegetation are to ensure that:

- All works programs undertaken by Council are designed to ensure a nil or minimal impact on native vegetation where it exists, if it is deemed necessary to retain.
- The residents of the Shire area are educated by Council staff, and through public releases of the need to conserve native vegetation along road reserves by not undertaking detrimental activities.
- Where a significant section of roadside native vegetation is located Council may erect signage indicating to residents and travelers the value of this vegetation and the need to conserve it.
- All works take consideration of council's controls.

Councils should also ensure that the relevant sections of the Council workforce maintain current listings of threatened species and population of flora and fauna, endangered ecological communities, critical habitat and applicable threat abatement plans that apply within the Council area.

Roadside vegetation community conservation and management should form a component of the induction program for all Council employees.

1.11 REFERENCES

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APPENDIX 1

Annexure 3: SITE MANAGEMENT ENVIRONMENTAL CHECKLIST

To be used for all rural roadside works.

Please note requirements for roadside managers to protect / maintain environmental assets - NPWS Act 1974, Local Government Act 1993, Environment Protection & Biodiversity Conservation Act 1999.

All works to be performed in accordance with the NSW Roadside Environment Roadside Handbook - Environmental Guidelines for Road Construction & Maintenance Workers 1996

Project Activity		
Road Name	From:	To:
Other Details		

Pre Works Checklist	Checked
Site inspection and approved vegetation pruning and removal marked	
Assess work area for possibility of significant vegetation, native fauna, and cultural or historical sites - consult appropriate agency	
Designated stock pile sites marked	
Provision for skimming, storage and return of topsoil to site	
All approved machinery turn around, parking and storage areas marked	
Spoil disposal site marked (include vegetation, soil or rubble)	
Limit of work site / construction zone marked	
Provision for machine and vehicle cleaning prior to entering works	
Road making materials free of weeds and weed seeds	
Exclusion zone, sensitive areas barricaded (significant vegetation / cultural site marked) - including within tree drip zone	
Staff (in house and contractor) briefed on work site operations and boundaries	
Noxious and pest plant removal	
Erosion /sediment/drainage and other pollutant control measures in place	
Survey significant plant, animal, cultural, historic and archaeological relics	
Vegetation disturbance outside table drain reviewed and minimised	
Entire site photographed	
Comments	

Pre works checklist completed		
Overseer/Contractor		Date
Supervisor/Contract Supervisor		Date
Close Down Checklist	Checked	
Machine and vehicle clean down of soil and plant debris on site implemented		
Work site litter removed		
Completed works photographed		
Reinstatement & rehabilitation works (including revegetation) completed		
Final inspection undertaken and approval provided		

Comments

Close down procedure completed		
Overseer/Contractor		Date
Supervisor/Contract Supervisor		Date

Compliance at construction site?

- Site boundaries clearly marked**
- Wheel tracks restricted**
- Fuel store bunded**
- Gravel heaps retained**
- No site vehicles under trees**
- Rubbish in bins**
- Trees fenced off**
- Tree trunks undamaged**
- Branches undamaged**
- Healthy vegetation protected**
- Site draining into holding pond**
- Site protected from the road**

REFERENCE ADDENDUMS

ADDENDUM 1

1.1 Where do Councils Stand in Relation to the Threatened Species Conservation Act?

The Threatened Species Conservation Act [TSC Act] provides for the conservation of threatened species of native flora and fauna, of endangered ecological communities, of endangered populations of native flora and fauna and of critical habitat.

The Act does not contain any particular provision that exempts the Councils from compliance with its requirements. Additionally, **Section 142** of the TSC Act provides that:

'This Act binds the Crown, not only in right of New South Wales but also, so far as the legislative power of Parliament permits, the Crown in all its capacities.'

The interpretation of this Section suggests that there is no specific mention of , or exemption for, roadside vegetation maintenance or clearing etc such as would be regularly undertaken by the Councils and that might affect a threatened species of flora or fauna, an endangered flora or fauna population, an endangered ecological community or critical habitat.

The fact that this issue [along with many others] is not specifically addressed by the TSC Act [and no exemption is specified as in the Native Vegetation Act] suggests that there is, in fact, a requirement for the provisions of the Act to be observed by Councils when roadside vegetation maintenance or road development activity is being carried out within endangered ecological communities.

1.1.1 Impacts on Threatened Flora Species

The usual impacts on threatened flora species from road construction and maintenance are associated with damage to, or removal of, individual plants or groups of plants of the threatened species.

Damage can result from earthmoving, slashing, tree trimming, herbicide spraying, and similar activities.

If such activity is likely to have a significant impact on the species then a licence under the NSW Threatened Species Conservation Act should be obtained and, if the species is listed under the Commonwealth Environment Protection and Biodiversity Conservation Act, then an approval under that Act would be required.

1.1.2 Impacts on Threatened Fauna Species

With threatened fauna species there is not only the risk of killing a species during road works but also the possibility of killing young in nests and removal of nesting sites and food sources.

Fauna species are usually thought of as being relatively mobile; however some listed species may be diurnal in habit and so be resting during the day in hollows, rock crevices and overhangs or under bush rock or logs. Other species hibernate for specific periods during the year in tree hollows and rock crevices. At these times, these species are particularly vulnerable to tree clearing and other earthmoving activities.

Such species are often vulnerable to significant impacts from road works and so all possible precautions should be taken to ensure that this impact is minimised.

Minimisation of impact may include careful removal of logs to an area outside the work zone and inspection of hollows in trees to be removed to ensure that there are no bird, bat or other fauna species present before removal.

Timing of road works to avoid periods when threatened species are hibernating or nesting is always a good policy although it is realized that this is not always possible – particularly in emergency situations.

The example outlined in **section 1.1.4** in relation to the Glossy Black-cockatoo, illustrates the possible impacts on individual species and populations.

If such activity is likely to have a significant impact on the species then a licence under the NSW Threatened Species Conservation Act should be obtained and, if the species is listed under the Commonwealth Environment Protection and Biodiversity Conservation Act, then an approval under that Act would be required.

1.1.3 Impacts on Endangered Ecological Communities

The possible impacts of road works on endangered ecological communities that are located in roadside areas are similar to those listed for individual flora and fauna species and critical habitat.

If a proposed activity is likely to significantly impact on the community, then a licence under the NSW Threatened Species Conservation Act should be obtained. If the species is listed under the Commonwealth Environment Protection and Biodiversity Conservation Act, then an approval under that Act would be required.

The determination of whether or not the impact of an activity is likely to be significant rests with the person responsible for supervising / undertaking the activity and so caution is appropriate.

The trimming of a few overhanging limbs or the removal of some young seedlings from the table drain or road verges may not be regarded as significant but the wholesale trimming of large tree limbs along a number of kilometers of a road reserve may well be seen as having a significant impact on an endangered ecological community.

Consequently, Council staff responsible for programs likely to create significant impacts on endangered ecological communities should always obtain advice from the

Department of Environment and Climate Change during the planning phase of roadwork programs to determine whether or not the likely impact will be significant.

If such activity is likely to have a significant impact on the community then a licence under the NSW Threatened Species Conservation Act should be obtained and, if the community is listed under the Commonwealth Environment Protection and Biodiversity Conservation Act, then an approval under that Act would be required.

In order to obtain a licence or approval or work that has a significant impact on endangered ecological communities it is likely that an Environmental Assessment [EA] would need to be prepared for each section of road [*where the community occurs*] to be treated or an assessment covering the whole length of a particular road if all of the work is to be undertaken within a reasonable time frame.

If work was to be undertaken over a period of years, then it would be inappropriate for the whole to be included in a single EA as the species and communities listed in the Schedules of the TSC Act may well change significantly over time.

Again, preparation of such EAs would require detailed planning of the work so that the programs for the work teams could be approved well ahead of the allotted time slot.

The fact that a section of an endangered ecological community is required to be trimmed or otherwise impacted should not be viewed as an insurmountable problem. What is required is an assessment of the impact that the activity is likely to have and a determination of whether or not this impact is significant.

This involves preparing an assessment similar to that undertaken by persons or companies submitting development applications to Council that involve works that impact on native flora and fauna.

In most cases, in woodland communities, the actions such as tree branch trimming would not be significant if the action taken is the minimum required to achieve the desired road safety outcomes.

The situation may well be different if the work involves tree removal or major damage to individual trees.

Minimisation of impact involves not only the act of trimming or clearing but also the disposal of the debris and any disturbance of the road reserve with temporary facilities etc. To achieve this end it is important that any major disturbance that is required is confined to existing disturbed or cleared sites or areas vegetated by non-native species.

At present, many Councils have a problem in that the vegetation communities along the roads that they control are generally not identified and so there is potential for inadvertent damage to occur and for legal action to be taken under the TSC Act or EPBC Act.

The roadside vegetation assessment program discussed elsewhere in this Plan should be given priority for accessing funding. This will enable information about vegetation community status to be available to the field supervisors and their staff who have to make decisions about whether a particular occurrence of a community is endangered or not when they are engaged in road maintenance and / or development.

Once the communities along each road have been documented, it is a simple matter for their status to be updated if a species or community not originally identified as endangered is subsequently added to the listing of threatened species and communities. Similarly, at irregular intervals, individual species of flora and fauna may be removed from the TSC Act lists with the result that they are no longer a major concern in roadside vegetation management.

One approach to implementation of proper roadside vegetation management is that once the roadside vegetation assessments have been prepared, and just before a work campaign commences, a person with environmental qualifications marks on the carriageway where the endangered ecological communities start and finish so that field staff can apply the appropriate work practices.

Definition of these sites is akin to the road markings that are associated with sign placement etc during periods of extended roadwork.

The procedures required for dealing with endangered ecological communities need to be carefully specified to field staff. Seemingly simple procedures like the disposal of roadside tree trimmings may require the removal of trimmings completely from endangered communities whereas in other communities the material may be chipped and scattered through the community.

In addition, in order to protect the integrity of an endangered ecological community, the disposal of wood chips from another vegetation community within an endangered ecological community should be strictly prohibited.

1.1.4 Impacts on Endangered Flora and Fauna Populations

From time to time, particular populations of flora and fauna are listed in the schedules of the Threatened Species Conservation Act as being endangered. Such populations are those whose numbers may be in decline or those potentially facing major threats from predators or development activity in a specific area such as a particular local government area or definable region such as the Riverina.

Populations that can be listed as endangered can only comprise species of flora or fauna that are NOT already listed as individual threatened species under the TSC Act.

An example of an endangered fauna population that is relevant to the Lachlan Catchment is that of the Glossy Black-cockatoo Population in the Riverina that is recorded for Carrathool Shire.

This endangered population is affected mainly by the clearing of hollow bearing trees in which the species nests as well as the clearing or prevention of regeneration of its main food source - the Drooping She-oak or Hill Oak [*Allocasuarina verticillata*].

Road maintenance and construction activity can have an impact on this population through clearing of its main food source [Drooping She-oak] and nesting trees, often Grey Box [*Eucalyptus microcarpa*]. In the case of the Glossy Black-cockatoo, the food trees are likely to occur on hills and ridges while the nesting sites may be on adjacent lower slopes or plains country.

Mapping of the vegetation communities along Shire roads could provide a basis for identifying locations where endangered flora or fauna populations are likely to occur and be affected by road works.

Again, the procedures required for dealing with endangered flora and fauna populations need to be carefully specified to field staff.

Seemingly simple procedures like the trimming of tree branches and removal of dead trees with hollows can have a major impact on nesting birds, bats and some mammals. Such activity should be avoided during the breeding season [hibernating season for bats] in the period from about March to August.

Similarly the indiscriminate clearing of seedlings and mature Drooping She-oak trees in hilly areas can affect the present and future availability of food for the population and so should be avoided where possible.

1.1.5 Impacts on Critical Habitat

Critical habitat is an area of land that contains habitat of an endangered flora or fauna species, endangered flora or fauna population or endangered ecological community that is critical to the survival of that species, population or ecological community.

Shire Councils are required to recognise the existence of critical habitat on land owned by them or on land on which they wish to undertake certain works. Councils are also required to recognise that regulations under the TSC Act may prohibit the carrying out of certain actions.

Currently, there are no areas of Critical Habitat listed for the Shires covered by this GMRV. However, this situation may change in future and Council staff should keep up-to-date with listings by the NSW Scientific Committee and ensure that a list of Critical Habitat locations is maintained within each appropriate Council department.

1.1.6 Impacts of Key Threatening Processes and Threat Abatement Plans on Councils

Under the Threatened Species Conservation Act and the Fisheries Management Act the relevant Scientific Committees may list certain actions, processes or organisms that are regarded as having significant detrimental impacts on threatened species, populations and ecological communities.

Once a Key Threatening Process has been listed in the schedules of the relevant Act a Threat Abatement Plan may be prepared.

The purpose of a Threat Abatement Plan is to manage the threatening process so as to abate, ameliorate or eliminate the adverse effects of the process [or organism] on threatened species, populations and ecological communities.

Among the features of a Threat Abatement Plan is the provision for a public authority, such as a Shire Council, to be responsible for implementation of measures included in the Plan.

Ideally, any required inputs from particular Councils should be discussed with staff during the period of preparation of the Plan but once prepared there is every likelihood that it will be assumed that each responsible entity is aware of the actions required.

With local government bodies there is often a regular turnover of professional staff that may result in a loss of 'corporate knowledge' with regard to responsibilities in regard to Threat Abatement Plans. Consequently, it is important that each Council maintains a permanent record of any actions required of it under a Threat Abatement Plan and that staff regularly update the listing after reference to the DECC website listing of approved Plans.

This process will ensure that the responsibilities of individual Councils under the various approved Threat Abatement Plans are taken into account in any road construction and maintenance work.

1.1.7 Impacts of Threatened Species Recovery Plans where Such Apply

A species recovery plan is required to be prepared under the NSW Threatened Species Conservation Act and the Commonwealth Environment Protection and Biodiversity Conservation Act [EPBC Act] for every threatened flora and fauna species, endangered population [*not applicable under the EPBC Act*] and endangered ecological community to promote the recovery of that species, population or ecological community.

Again, as with Threat Abatement Plans, there is provision for a public authority, such as a Shire Council, to be responsible for implementation of measures included in the Plan.

Consequently, it is important that each Council maintains a permanent record of any actions required of it under a Recovery Plan and that staff regularly update the listing after reference to the DECC website listing of approved Plans.

This process will ensure that the responsibilities of individual Councils under the various approved Recovery Plans are taken into account in any road construction and maintenance work.

1.2 Where do Councils Stand in Relation to the Fisheries Management Act?

The NSW Fisheries Management Act contains similar provisions to the Threatened Species Conservation Act [TSC Act] that relate to aquatic species such as aquatic vegetation, native fish species and native invertebrates.

The Fisheries Management Act also mirrors the TSC Act in that it provides for the listing of Endangered Populations, Critical Habitat and Endangered Ecological Communities associated with the aquatic environment.

Key Threatening Processes can also be listed under the Fisheries Management Act and there is a requirement for Recovery Plans to be developed for threatened species, populations and ecological communities, just as there is under the TSC Act.

The impacts of these provisions of the Fisheries Management Act on Council activities are similar to those described in **section 2.1** for the NSW Threatened Species Conservation Act with the difference being that the Fisheries Management Act applies specifically to riparian and aquatic environments.

Despite this specificity, there are activities that may be undertaken by Councils during road works at sites not immediately associated with rivers, creeks, lakes etc that may have impacts on the aquatic environment.

The Key Threatening Processes listed under the Fisheries Management Act [at November, 2008] that are relevant to Councils within the Lachlan Catchment are:

- Installation and operation of in-stream structures and other mechanisms that alter natural flow regimes of rivers and streams.
- Degradation of native vegetation along NSW waterways
- Removal of large woody debris [*from rivers and streams*]

Councils may from time to time be required to undertake road works that might be construed as constituting one of these listed Key Threatening Processes in areas associated with bridges, culverts and roads across low-lying areas.

As a consequence, it is important that a listing of Key Threatening Processes under the Fisheries Management Act is kept up to date in the relevant Council department and that all staff are aware of this listing so that impacts of works can be avoided or minimized.

1.3 Where do Councils Stand in Relation to the NSW Native Vegetation Act, 2003?

The Native Vegetation Act has as its objectives:

[a] to provide for, encourage and promote the management of native vegetation on a regional basis in the social, economic and environmental interests of the State, and

[b] to prevent broad scale clearing unless it improves or maintains environmental outcomes, and

[c] to protect native vegetation of high conservation value having regard to its contribution to such matters as water quality, biodiversity, or the prevention of salinity or land degradation, and

[d] to improve the condition of existing native vegetation, particularly where it has high conservation value, and

[e] to encourage the revegetation of land, and the rehabilitation of land, with appropriate native vegetation, in accordance with the principles of ecologically sustainable development.

1.3.1 What Constitutes Native Vegetation?

Native vegetation is defined in **section 6** of the Native Vegetation Act, 2003, as comprising *indigenous* trees, understorey plants, groundcover plants and plants that occur in wetlands. *Indigenous* vegetation is that of a species of vegetation that existed in New South Wales before European settlement.

Much of the tree and shrub vegetation that would cause problems with overhanging trunks and limbs along New South Wales roads, including those in the Lachlan catchment, will be native vegetation. The exceptions would be mainly within some Tableland and Coastal areas where introduced trees may line road corridors and require maintenance trimming.

1.3.2 What Actions are Defined as Clearing?

Under the Native Vegetation Act, each of the following actions is defined in **section 7** as clearing:

Cutting Down Native Vegetation

Felling Native Vegetation

Thinning Native Vegetation

Logging Native Vegetation

Removing Native Vegetation

Killing Native Vegetation

Destroying Native Vegetation

Poisoning Native Vegetation

Ringbarking Native Vegetation

Uprooting Native Vegetation

Burning Native Vegetation

Of these actions the trimming and /or clearing of native vegetation along Council controlled roads could be construed as 'cutting down', 'felling' [in some cases], 'uprooting', 'killing' and 'removing' native vegetation.

1.3.3 Exemption for Organisations Required to Maintain Roads

Under **section 25** of the Native Vegetation Act [NV Act], clearing of native vegetation that is exempt from the provisions of that Act includes

Section 25[o] – '*any clearing that involves the removal or lopping of any tree or other vegetation in accordance with section 88 of the Roads Act 1993*' and

Section 25 [p] – '*any clearing carried out in accordance with a consent under Division 3 of Part 9 of the Roads Act 1993.*'

Section 88 is the most relevant section relating to the activity of trimming overhanging trees that is the subject of this report. **Section 88** states:

A roads authority may, despite any other Act or law to the contrary, remove or lop any tree or other vegetation that is on or overhanging a public road if, in its opinion, it is necessary to do so for the purpose of carrying out road work or removing a traffic hazard.

Given the wording of these sections, it is evident that, if a road safety issue arises or road work is being undertaken, there is no specific impediment to clearing or trimming arising out of the provisions of the NV Act no matter whether the community subject to the action is an endangered ecological community or a native vegetation community that is not listed in the Schedules of the TSC Act.

However, in all instances,

- *there are the provisions of the Threatened Species Conservation Act to be considered; and*
- *there are no exemptions for clearing native vegetation that is not specifically required to be removed to allow road works to proceed.*

1.4 Where do Councils Stand in Relation to the Commonwealth Environment Protection and Biodiversity Conservation [EPBC] Act?

In New South Wales, the immediate source of protection of a threatened [endangered] community, if an activity is judged to *have or be likely to have a significant impact*, comes from the provisions of the TSC Act.

However, the EPBC Act provisions also may be activated if the activity *has, or is likely to have, a significant impact* on:

- A Declared World Heritage Property [listed on the EPBC website]
- A Declared National Heritage Property [listed on the EPBC website]
- A Wetland of International Importance [Ramsar Wetlands] [listed on the EPBC website]
- A Species [flora and fauna] or Vegetation Community Listed as Threatened under the EPBC Act [listed on the EPBC website]
- A Listed Migratory Species [under the EPBC Act] [listed on the EPBC website]

- A Nuclear Action as Specified in the EPBC Act [listed on the EPBC website]
- A Commonwealth Marine Environment [as Defined in the EPBC Act]

There is no provision that allows for exemptions under the EPBC Act for activities such as roadside tree trimming or removal in endangered plant communities.

The responsibility rests with the individual or organization contemplating an activity that could trigger the provisions of this Act to make an assessment of the likely significance of the impact on the endangered ecological community and to refer the proposed action to the Department of Environment, Water, Heritage, and the Arts.

If the preliminary assessment is not undertaken and the referral not made and an individual or organization reports the activity to the Department of Environment, Water, Heritage, and the Arts then a compliance action would be initiated that would be a source of unnecessary annoyance and diversion of resources within Council.

The more prudent course of action would be to undertake an assessment and if the action is likely to have a significant impact on a listed species, community, wetland etc or if the significance of the impact is uncertain then the matter should be referred to the Department of Environment, Water, Heritage, and the Arts to allow that Department to determine if the activity is a controlled action under the EPBC Act and if so to obtain approval for the action.

In relation to World Heritage Properties, National Heritage Properties, Commonwealth Marine Environments and Ramsar Wetlands it should be noted that activities that may cause damage to such areas need not be undertaken adjacent to or within such areas.

An activity undertaken some distance away can have an impact on these properties.

There are no listed sites within the Lachlan Catchment that fall into these categories and so the issue of impacts on these specified sites does not have to be considered in RVMPs.

However, there is still a requirement under this legislation to consider impacts of roadside maintenance and road development activity on threatened flora and fauna species and endangered ecological communities.

1.5 Where do Councils Stand in Relation to the Protection of the Environment Operations Act 1997 [PEO Act]

The objectives of the PEO Act relevant to the roadside vegetation management include:

- [a] to protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development,

- [b] to provide increased opportunities for public involvement and participation in environment protection,
- [c] to ensure that the community has access to relevant and meaningful information about pollution,
- [d] to reduce risks to human health and prevent degradation of the environment by the use of mechanisms that promote the following:
 - [i] pollution prevention and cleaner production.

The issue of relevance to roadside maintenance that could relate to the provisions of the PEO Act relates to the deposition of waste on the road reserve.

If an action was taken under this Act then the materials deposited would have to constitute waste and then it would have to be established that deposition of this waste had caused or has the potential to cause significant environmental harm.

Section 115 of the PEO Act states:

'If a person willfully or negligently disposes of waste in a manner that harms or is likely to harm the environment:

[a] the person, and

[b] if the person is not the owner of the waste, the owner,

are each guilty of an offence'

Waste is defined as any unwanted or surplus substance [whether solid, liquid or gaseous]

Dispose of waste includes to dump, abandon, deposit, discard, reject, discharge or emit anything that constitutes waste, and also includes to cause or permit the disposal of waste.

Threats of prosecution under the provisions of this Act, in recent years, have resulted after road management authorities have dumped tree trunks, branches and trimmings on road reserves – particularly after storm events but also after routine roadside tree trimming campaigns.

The crux of the matter, in such cases, is whether or not the material has harmed or is likely to harm the environment at the site.

Proving environmental harm in such cases may well be difficult, particularly if the Council as owner of the land was responsible for the harm. However, there is a potential for such a prosecution to be mounted in situations where debris or soil is disposed of carelessly and damage to the soils and native vegetation of an area is evident – particularly if the damage affects a threatened species or endangered community.

ADDENDUM 2

2.1.1 Establishment of Camp / Facilities Sites

Worksites should be carefully selected and, where possible, existing disturbed areas should be used for worksite camps and other facility locations.

If such sites do not exist at a particular worksite then areas devoid of remnant native vegetation should be used. Such sites are usually devoid of trees and shrubs and the ground cover is dominated by introduced weed and / or pasture species.

If none of the latter occurs within proximity of the worksite then some native vegetation may have to be cleared. The extent of clearing should be limited to the minimum amount required and the area should be bunded to avoid sediment leaving the site. Runoff water should also be adequately managed.

The removed native vegetation should be mulched and removed if the site is to be a permanent one. If the site is only temporary then the mulch should be stockpiled for later spreading to assist in rehabilitation.

Where the site is to be retained on a permanent basis then appropriate management to ensure its long term stability should be applied.

However, if the site is only temporary, the bunds should be removed once work ceases, the area should be contour ripped and mulched with the stockpiled material and locally collected seed from the native species that were cleared should be sown.

When rehabilitating areas where remnant native vegetation has been cleared to establish a worksite, mulch from other vegetation communities should not be introduced to the site as this can result in weeds and other inappropriate species establishing.

It should always be remembered that remnant native vegetation is not only comprised of trees and shrubs. There are large areas of native grasslands along roads and disturbance of these should be avoided wherever possible in the same way that native woodlands and shrublands should be avoided.

2.1.2 Management of Stockpile Sites

There are already established stockpile sites along many shire roads and highways and these should continue to be used. Such sites should be clearly delineated and, ideally bunded, to avoid sediment and stockpiled material leaving the site.

If new stockpile sites are required then the principles enunciated in **section 2.1.1** should be applied.

2.1.3 Establishment and Management of Plant Parking, Turning, Refuelling and Maintenance Sites

As with any worksite, preference should be given to re-using previously used and disturbed areas.

In the interests of plant and staff safety the site should be mown before occupation or in extreme cases, graded to remove obstructions. Mowing to a low height is preferable from an erosion and sediment reduction viewpoint.

In all cases, these sites should not be established in areas where the removal of a threatened species or an endangered ecological community is involved.

The site should be well drained and transportable buildings, and vehicle parking areas should be sited outside the canopy [drip line] of any trees on or near the site to minimize that chance of impact on the trees by soil compaction or leakage of pollutants including herbicides, fuel and oil.

Any field service, maintenance or refuelling areas within the worksite should also be located well outside the canopy of trees as should storage sites for cement, lime, steel and other materials used in road construction and maintenance.

Provision should be made for the prevention of spillage of materials – particularly hydrocarbons, fuels and herbicides and for the safe collection and removal of any general waste, used oils and the like.

2.1.4 Trimming of Overhanging Limbs and Branches

From time to time, for road safety reasons, there is a need to trim limbs and tree trunks that overhang the carriageway of many roads.

Overhanging limbs and trunks can damage high vehicles and well as fall on the carriageway or vehicles during storms and periods of high winds.

There are two major vegetation management issues related to tree trimming.

The first is the need to check what vegetation community or threatened species is to be trimmed and whether the community is listed as endangered.

As has been previously outlined, there are exemptions for this activity in some of the Acts that govern native vegetation management along roads BUT the NSW Threatened Species Conservation Act and the Environment Protection and Biodiversity Conservation Act contain no such exemptions.

As a consequence, tree trimming within an endangered ecological community or an area where a threatened tree species occurs along a roadside can in some circumstances be regarded as causing significant damage to the community. Such damage may then lead to initiation of a prosecution.

The prudent course of action in situations where trimming is likely to have a significant impact is to contact the Department of Environment and Climate Change

and apply for a license under the Threatened Species Conservation Act to 'pick or harm' the threatened species or endangered ecological community. A similar approach should be made to the Commonwealth Department that administers the Environment Protection and Biodiversity Conservation Act for an approval under that Act.

The second relates to disposal of tree trimmings. In some areas, Councils may wish to dispose of the intact trimmings on the road reserve to improve habitat.

If such a course of action is followed then care should be taken to ensure that the disposal action does not damage other vegetation or result in soil erosion or the creation of soil / branch heaps that are unsightly and an impediment to passage through the road reserve.

If this means of disposal is selected, the issue of whether or not a fire hazard is being created requires consideration

Another option for trimming disposal is to woodchip the material as soon as it is trimmed. If this option is chosen the chipped material should be blown in a thin layer into the remnant vegetation on the road reserve so that it is away from the carriageway and table drain. With care and even distribution of the chipped material in thin layers the mulch eventually breaks down without damage to the community.

It should always be policy to not permanently dispose of any trimmings from one community into another to retain the integrity of each community.

Alternatively, Councils may wish to dispose of trimmings as such or as woodchips in local garbage tips or use the chipped material as mulch on gardens.

In all tree trimming activities the interests of threatened fauna species should be recognized and work scheduled for periods when these species are not breeding or not hibernating.

2.1.5 Clearing of Trees

Most tree clearing activity is associated with construction of new roads or deviations or widening of existing roads.

If regular table drain maintenance is undertaken, there should not be any trees in such areas that are allowed to grow to maturity or a situation where they require significant mechanical inputs to secure their removal.

The same issues arise with regard to clearing as arise in tree trimming programs.

There is a need to consider whether a threatened species or endangered ecological community is present at the site [**see section 2.1.4**] and whether a license or an approval to remove the tree is required.

In addition, there is the disposal of trunks, stumps and branches to consider. The options for addressing this issue are also covered in **section 2.1.4**.

In all tree clearing activities the interests of threatened fauna species should be recognized and work scheduled for periods when these species are not breeding or not hibernating.

2.1.6 Mowing or Spot Herbicide Treatment of Table Drains, Road Shoulders and Mitre Drains

Regular mowing of table drains, road shoulders and mitre drains ensures that tall grass or herbs and problem trees or shrubs do not establish in these areas and cause restricted visibility, water disposal problems, safety hazards and later major maintenance problems.

Mowing and spot spraying allow the vegetation cover in the table drain and on the road shoulders to be maintained to provide protection against soil erosion that can impact on the road carriageway as well as increasing the safety hazards within the road reserve.

Regular maintenance of this nature is unlikely to be regarded as having a significant impact on any remnant vegetation community. It should be Council policy in all local government areas within the Lachlan Catchment for table drains, road shoulders and mitre drains to be regularly maintained to ensure that native vegetation [especially endangered native vegetation] does not establish in these areas and grow to a size where its removal would have a significant impact.

2.1.7 Construction of New Mitre Drains

Existing mitre drains in remnant vegetation that are regularly maintained should not cause any major vegetation management issues.

However, problems may arise if new mitre drains are required and their construction requires damage to a threatened species or endangered ecological community. In such circumstances, a license under the Threatened Species Conservation Act and an approval under the Environment Protection and Biodiversity Conservation Act should be acquired to cover the activity. This issue has been discussed in **section 2.1.4**.

2.1.8 Guide Post Herbicide Spraying

Spraying of the vegetation around the base of guide posts is a routine road maintenance operation that is unlikely to cause any vegetation management problems within any community.

The action is a regular maintenance activity undertaken for road safety reasons.

2.1.9 Disposal of Excess Soil, Used Bitumen Topping, Concrete, Pipes, Masonry

Roadside disposal of these materials not only produces an unsightly appearance but restricts access through the road reserve and damages remnant vegetation.

In all instances excess soil, road surface material, gravel, concrete, pipes and masonry should be removed from the work site and disposed of appropriately – not in the roadside vegetation. The local land fill tip may be appropriate for some materials while others may be recycled at appropriate locations.

2.1.10 Fire Hazard Issues

Fire hazard issues should generally not arise as a consequence of disposal of tree trimmings, cleared tree trunks and stumps [where appropriate] or wood chips within the road reserve.

Such action mimics the natural processes of limb and trunk fall as a consequence of tree and shrub death and damage during storms.

Where there is any doubt as to the impact of disposal of such material within the road reserve, the local Rural Fire Service staff should be consulted.

2.1.11 Noxious and Environmental Weed Control

As the 'landholder' in relation to road reserves, Councils are under the same obligations to control / eradicate noxious weeds as any other landholder in the State.

Noxious weeds as well as some other introduced species can invade remnant native vegetation communities and reduce their condition and biodiversity values. Hence, it is in the interests of Council and the wider community to control these species so that the value of remnant vegetation is not reduced.

2.1.12 Establishment of Rest Areas and Waste Collection Bins and Fireplaces

It should be Council policy not to establish Rest Areas, Waste Collection Bin Sites and Fireplaces within areas occupied by threatened flora species, endangered ecological communities, endangered flora populations or critical habitat.

There may be existing sites where these facilities are located in sensitive areas. It is not envisaged that these facilities would be removed – only that no more would be established in these environmentally sensitive areas.

Similarly, any maintenance work at such sites should be carried out in such a manner that no damage is cause to the endangered ecological community.

2.1.13 Quarrying for Roadbase Materials

In the past many roadsides have been severely impacted by activities associated with the winning of roadbase material at scattered locations and at some designated quarry sites. Generally, in the past, there was no recognition of the need to conserve roadside vegetation or to establish whether the vegetation at a particular site was of significance.

While this has changed in more recent times, many of these areas are still in need of rehabilitation even though they are not in use. The aim of Councils should be to re-

establish, where possible, the community that was destroyed to enable the roadbase material to be removed. However, in some instances, the site will have been so changed by quarrying that it may not be suitable to re-establish the original community.

In such situations, it should be policy to establish a native vegetation community suited to the habitat at the rehabilitated site.

2.1.14 Erosion and Sediment Control

Native vegetation communities can be severely damaged by soil erosion and deposition of wind eroded or water eroded eroded sediment. Soil erosion can commence on road reserves following road works that concentrate water into damaging flows or that bare significant areas of living vegetation.

In all situations where road work is being undertaken, Councils should develop an erosion and sediment control plan for the site to ensure that adequate soil conservation and erosion control measures are incorporated into the design for the road and ancillary works.

In areas with sandy soils, wind erosion can cause significant damage to adjacent roadside vegetation communities if adequate ground cover is not maintained on such sites.

In addition to damage to roadside vegetation, windblown sediment can cause significant safety hazards when deposited on roads, in culverts etc.

2.2 Public Activities

Public roads are obviously established for public convenience, access and travel. They also are locations where representative examples of many relatively rare native vegetation communities survive.

Members of the public also use roadsides for various activities other than travel. They may be used as bird watching, picnicking, walking, horse riding, cycling and motor cycle riding and off-road vehicle driving. Other road reserves are associated with travelling stock routes and some of these are regularly heavily grazed – particularly during dry times and major droughts.

Some of these uses are passive and cause little harm while others, such as motor cycle riding and off-road vehicle driving, can have significant impacts on the roadside vegetation by damaging plants and causing soil erosion.

2.2.1 Collection of Firewood

Collection of firewood by members of the public is a common activity on road reserves. In some instances this may be a useful activity as it removes heavy branches and trunks from areas such as tabledrains.

However, the general impact of firewood collection is a removal of fauna habitat and material that will decompose over time and add humus to the soil.

It is acknowledged that fallen hollow logs can provide shelter for feral animals such as rabbits and foxes but there are ways in which these pests can be controlled that leave the logs in place for use by native mammals and invertebrate fauna.

It should also be noted that collection of firewood is regarded as a key threatening process that is listed in the Schedules of the TSC Act under the title 'Removal of dead wood and dead trees'.

In general, collection of firewood from Council-controlled lands should not be allowed, except in circumstance where there may have been an excess accumulation, [such as after a major storm] and the removal can be supervised.

2.2.2 Motor Cycle and Off-Road Vehicle Use

Regular and concentrated use of road reserves by motor cycles and off-road vehicles can result in destruction of native vegetation, including threatened species, and lead to soil erosion. As a consequence, such activities should generally not be permitted.

If these activities are allowed, they should be located in areas where the native vegetation has already been removed or degraded or in communities that are not in any way rare or endangered and where the soil erosion hazard is low.

2.2.3 Grazing by Travelling Stock

There are some road reserves that are associated with designated Travelling Stock Routes. Grazing of these stock routes is a legitimate activity provided the stock owner has obtained the appropriate permit and abides by its conditions.

It is difficult to prevent travelling stock that are using the stock route from grazing the road reserve and so threatened species, endangered ecological communities and endangered flora populations located on road reserves associated with stock routes can often be subjected to periodic [and at times almost constant] overgrazing, particularly during dry times.

The difficulty in managing these road reserves arises because there is no on-ground marker that shows the boundary between the road reserve and the stock route. Generally the people in charge of travelling stock make no effort to keep the stock off the road reserve. In fact, the vegetation on the road reserve, particularly in the table drains and road shoulders, is often the most palatable forage available.

Overall, little can be done to better manage road reserves associated with travelling stock routes. However, where particular threatened species or communities are present on the road reserve, Councils could erect signage to inform drovers of the sensitivity of the vegetation and make arrangements with the relevant Rural Lands Protection Board for travelling stock to not be permitted to use such areas.

2.2.4 Ploughing of Firebreaks on Road Reserves

Some landholders make a practice of ploughing firebreaks on the road reserve adjacent to their paddocks to save having to use their own land for this purpose.

This practice should not generally be permitted since the ploughing out of native species allows weeds, including noxious weeds, to invade the native vegetation and increase the burden on Councils in terms of roadside weed control requirements.

2.2.5 Planting of Exotic Tree and Shrub Species on Road Reserves

Councils in the Lachlan Catchment should not permit the planting of exotic trees along rural roads reserves. It is accepted that this activity may be acceptable in towns and villages.

However, in rural areas any roadside plantings should be limited to native species that are representative of the existing remnant vegetation or of the community that previously existed if the road reserve has been completely cleared.

2.2.6 Quarrying of Soil, Gravel and Sand

In the past many locations on road reserves have been used by members of the public as sources of soil, gravel and sand.

This practice should not be permitted in order to maintain the integrity of the native roadside vegetation remnants.

Anyone undertaking this activity should be prosecuted.

2.2.7 Collection of Bushrock

Bushrock removal is listed as a key threatening process under the NSW TSC Act.

Bush rock collection for use in garden landscaping has been a popular activity in some areas in the past with the result that much valuable habitat has been lost.

Bush rock provides an important habitat for a wide variety of reptiles, amphibians and invertebrate fauna and so its collection from road reserves should not be permitted by Councils.

2.2.8 Dumping of Waste / Littering by Motorists

Most Councils experience some level of waste dumping on road reserves. While there have been many campaigns aimed at discouraging this practice, it continues to be a problem.

The problems associated with dumped waste are numerous. Firstly, the waste may be toxic or may just smother important plants. Removal of the waste by mechanical means can also damage the remnant vegetation.

In addition, dumped waste and general litter thrown from vehicles can also impact on small fauna species such as reptiles that may get caught in cans, bottles and ring pulls etc. and perish. Some containers thrown from passing vehicles or left on the road reserve can contain poisonous substances that can have fatal consequences for native flora and fauna.

Council policies usually forbid this practice and efforts to trace illegal dumpers are often made. All Councils within the Lachlan Catchment should ensure that current policy outlaws illegal waste dumping on road reserves.

2.2.9 Collection of Wildflowers and Seed

Some road reserve plants are protected under the National Parks and Wildlife Act and their removal from the road reserve [i.e. public land] is not permitted. Others are not protected and may be collected by members of the public. While irregular collection of showy flowers and seed material is probably of little concern, targeted collection every flowering season can result in the removal of a species from the native remnant vegetation.

This activity is probably not of great import within the Lachlan Catchment but in other areas can be a problem. A case in point is the regular removal of Waratah flowers along some Blue Mountains roads.

Councils should establish policies that forbid removal of native vegetation from road reserves.

ADDENDUM 3

3.3.1 Conservation value assessment - Overview

The mapping and description of remnant native roadside vegetation is an essential precursor to the assessment of the significance of an individual vegetation community along a segment of road within a Shire.

There are a large number of environmental attributes that contribute to the overall biodiversity value, or importance, of individual patches of roadside vegetation.

Some of these attributes are relatively difficult, and / or time consuming, to quantify and so are hard to include in the assessment template being developed in this project.

In biodiversity assessments that are carried out for such purposes as the recently introduced Biobanking Scheme, the person collecting the very detailed information really requires a good knowledge of the flora, fauna and soils of the area being examined.

The approach recommended for use in assessing roadside remnant vegetation is somewhat simplified compared to that used in the biobanking assessment.

3.3.2 Recommended Approach

3.3.2.1 Literature Review

The first action for any local government Council interested in preparing a Roadside Vegetation Management Guide is to undertake a literature review of existing published vegetation mapping and description data. This information can be a very useful indicator of what broad communities occur within a Shire area even though the detail may not be as accurate as might be required to identify the exact boundaries of communities along specific roads.

The literature review also highlights areas where there is a lack of data and allows better targeting of resource to complete roadside vegetation mapping. Some Shires within the Lachlan Catchment will have previously published vegetation studies that characterise much of the vegetation within their boundaries. Other will have only small sections of the Shire covered by some studies. However, all Shires are covered at a very large scale by the Report prepared for the Lachlan CMA titled:

Reconstructed and Extant Distribution of Native Vegetation in Lachlan Catchment. Foundation Building for Strategic Investment in Vegetation Management at a Landscape Scale. Department of Environment and Conservation, Information and Assessment Section, North-west Branch, Dubbo May, 2006

It should be noted that this study is very much a broadscale one and requires ground truthing to check what vegetation is present along individual roads.

Table 1 lists a selection of previous studies that relate to the seven Shires that have been involved in the present exercise.

This list is not comprehensive and individual Shires may have additional studies that they have specifically commissioned or that have been prepared by organisations undertaking development or other projects.

Table 1

Selected Studies of Native Vegetation Relating to Individual Shires

SHIRE	SELECTION OF PREVIOUS STUDIES
BLAND	<ul style="list-style-type: none"> • DEC [2006] Reconstructed and Extant Distribution of Native Vegetation in Lachlan Catchment. Foundation Building for Strategic Investment in Vegetation Management at a Landscape Scale • N.C.W. Beadle [1948] The Vegetation and Pastures of Western New South Wales with Special Reference to Soil Erosion
CARRATHOOL	<ul style="list-style-type: none"> • DEC [2006] Reconstructed and Extant Distribution of Native Vegetation in Lachlan Catchment. Foundation Building for Strategic Investment in Vegetation Management at a Landscape Scale • N.C.W. Beadle [1948] The Vegetation and Pastures of Western New South Wales with Special Reference to Soil Erosion • G. Horner <i>et al</i> [2002] Native Vegetation Map Report: Abridged Version. No.2 Dry Lake, Ocley, Hay, One Tree, Moggumbil and Gunbar 1: 100 000 Map Sheets
COWRA	<ul style="list-style-type: none"> • DEC [2006] Reconstructed and Extant Distribution of Native Vegetation in Lachlan Catchment. Foundation Building for Strategic Investment in Vegetation Management at a Landscape Scale

Table 1 [cont]

Selected Studies of Native Vegetation Relating to Individual Shires

SHIRE	SELECTION OF PREVIOUS STUDIES
LACHLAN	<ul style="list-style-type: none"> • DEC [2006] Reconstructed and Extant Distribution of Native Vegetation in Lachlan Catchment. Foundation Building for Strategic Investment in Vegetation Management at a Landscape Scale • N.C.W. Beadle [1948] The Vegetation and Pastures of Western New South Wales with Special Reference to Soil Erosion • S. Lewer <i>et al</i> [2002] Native Vegetation Map Report: Abridged Version. No.1 Bogan Gate, Boona Mount, Condobolin, Dandaloo, Tottenham and Tullamore 1: 100 000 Map Sheets
TEMORA	<ul style="list-style-type: none"> • C.W.E. Moore [1953] The Vegetation of the South-Eastern Riverina, New South Wales 1. The Climax

	<p>Communities.</p> <ul style="list-style-type: none"> • N.C.W. Beadle [1948] The Vegetation and Pastures of Western New South Wales with Special Reference to Soil Erosion
UPPER LACHLAN	<ul style="list-style-type: none"> • DEC [2006] Reconstructed and Extant Distribution of Native Vegetation in Lachlan Catchment. Foundation Building for Strategic Investment in Vegetation Management at a Landscape Scale
WEDDIN	<ul style="list-style-type: none"> • DEC [2006] Reconstructed and Extant Distribution of Native Vegetation in Lachlan Catchment. Foundation Building for Strategic Investment in Vegetation Management at a Landscape Scale

It should be noted that the NSW Roads and Traffic Authority [RTA] has already produced roadside vegetation management guideline booklets for a number of roads including:

- **State Highway 27** – The Golden Highway from Belford to Dubbo via Merriwa and Dunedoo;
- **Main Road 61** - Orange to Parkes; and
- **Main Road 377** – Cudal to Forbes

These guideline booklets are based on biodiversity assessments along the roads by trained botanists.

3.3.2.2 Specifically Targeted Studies

The ideal situation would be for each Council to employ a suitably trained staff member or environmental consultant who could undertake the assessments of the roads within each Shire. However, it is accepted that many rural Shire Councils do not have suitably trained staff employed or available for this task.

Because of the complexity of the roadside vegetation and the difficulty [often] of determining the identity of the individual communities, it is essential that the inventory of roadside vegetation, as it develops within each Shire, is accurate and comprehensive.

It is also essential that all roadside vegetation mapping programs provide an assessment of the value or significance of each occurrence of each community along each road.

This roadside vegetation inventory information will provide the guidance for Council work staff in terms of how, and when, they undertake regular maintenance or road development activity.

3.3.2.3 Prioritising Assessments

The priorities for individual road assessments within a Shire should be determined by Council.

Council may undertake or commission a literature review of the vegetation communities that have been recorded within the Shire, any knowledge gaps will become apparent. Filling these knowledge gaps may then form the basis for setting Council's priorities for roadside vegetation mapping.

However, it is more likely that the priorities for individual road assessments would be based on the forward work plans for individual roads or sections of roads, future funding arrangements and likely needs created by mooted developments.

An exception might be where a major [and priority] Federal or State Government road project was involved and such activity may assume priority. It would be expected that in such situations, the program would include a component for remnant roadside vegetation mapping and assessment.

Finally, it is imperative that the initial inventory of remnant roadside vegetation is accurate in terms of community identification and that the significance of this vegetation is correctly and objectively assessed.

3.3.3 An Alternative Approach to be Considered

Because of financial stringencies and the lack of suitably trained and experienced staff within Councils, an alternative approach to that outlined in **section 3.1** has been considered.

It might be expected that the task of identifying remnant vegetation communities and assessing their significance could be undertaken by an engineer or engineering assistant or by a works supervisor.

In the majority of instances, such staff would not have any specialist training in the flora or fauna fields. The outcome of an inaccurate assessment could be particularly disastrous, and costly, in the case of the failure to identify an endangered ecological community or occurrences of threatened species of flora or fauna.

In view of these inherent dangers, it is recommended that this approach not be adopted.

3.3.4 Required Inventory Data

As previously noted, it is recommended that prior to implementing the GMRV, there may be a need for the roadside vegetation in each Shire to be properly described and assessed by a suitably trained and experienced person. The process involves preparing a detailed description of the vegetation within each community along each section of each road.

Some roads may pass through a number of different communities within the Shire while others may support a single community along the whole length of the road.

It is worthy of note that Parkes Shire Council has already completed this roadside vegetation community mapping and assessment task and has developed a roadside vegetation management protocol.

3.3.5 Basic Requirements in Description of Roadside Vegetation

3.3.5.1 Identification of Vegetation Community Type

Identification of roadside vegetation communities is based on the species present and the structure or height and density of the main native species components.

Photographs of most of the native vegetation communities recorded within the Lachlan Catchment are contained in Appendix 8 of the previously mentioned technical report prepared for the Lachlan CMA by the Department of Environment and Conservation [DEC] in 2006, titled '*Reconstructed and Extant Distribution of Native Vegetation in the Lachlan Catchment – Foundation Building for Strategic Vegetation Management at a Landscape Scale*'.

In all Council areas some communities will be highly altered from the pristine state by clearing, grazing, logging or roadwork activity and the ground cover can often be dominated by non-native, and usually weedy, species.

Other areas will comprise remnant native vegetation in various states of health or significance.

It is important to identify the areas where native vegetation is lacking as such areas may be useful as worksites during road maintenance since there will be less restrictions on activity at these sites.

On the other hand, areas of remnant native vegetation require ongoing management and restrictions on activities that may be undertaken within their boundaries.

It is extremely important for the assessor to be able to identify the main tree and shrub species present – failure to do so may result in serious environmental damage due to a failure to recognise the significance of a particular community.

3.3.5.2 Detailed Vegetation Community Descriptions

Vegetation community descriptions would include, for both remnant native communities and disturbed areas:

- a complete listing of the tree, shrub, sub-shrub and groundcover species present within the community;
- an assessment of the average spacing [in metres] between trees and shrubs
- an estimate of the % groundcover present in the community. Such an estimate may comprise a range of % cover figures if the groundcover is variable.
- a description of the width of the road reserve to place the extent of the vegetation community in context. For example the value of a remnant where the road reserve is wide and may be associated with a travelling stock route is usually greater than that of a remnant where the native vegetation comprises a single line of trees on one or both sides of the carriageway.
- a list of the weed species present and an estimate of the extent of their infestation.

3.3.5.3 Is the Vegetation Type an Endangered Ecological Community?

There are a number of native vegetation communities occurring within the Lachlan Catchment that are listed in the Schedules of the NSW Threatened Species Conservation Act as Endangered or Critically Endangered Ecological Communities. These are listed in **Table 2**.

There is also a single Critically Endangered Ecological Community and two other Endangered Ecological Communities listed under the Commonwealth Environment Protection and Biodiversity Conservation Act.

These communities are listed in **Tables 2 and 3** along with details of the Shires within which the communities are known to occur.

Table 2
Occurrence of Endangered Ecological Communities

NOTE: - '**P**' denotes present within Shire; '**A**' denotes likely to be absent within Shire

ENDANGERED or CRITICALLY ENDANGERED ECOLOGICAL COMMUNITY	BLAND	CARRATHOOL	COWRA	LACHLAN	TEMORA	UPPER LACHLAN	WEDDIN
White Box Yellow Box Blakely's Red Gum Woodland	A	A	P	A	P	P	P
Fuzzy Box Woodland on Alluvial Soils of the South Western Slopes. Darling Riverine Plains and Brigalow Belt South Bioregions	A	A	P	A	A	A	P
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	P	P	P	P	P	P	P
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes Bioregions	P	P	A	P	A	A	P
Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression Bioregions	A	P	A	A	A	A	A
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes Bioregions	A	P	A	A	A	A	A

Table 3**Occurrence of the Endangered Community Listed under the EPBC Act**

ENDANGERED or CRITICALLY ENDANGERED ECOLOGICAL COMMUNITY	BLAND	CARRA- THOOL	COWRA	LACHLAN	TEMORA	UPPER LACHLAN	WEDDIN
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland – EQUIVALENT TO the White Box Yellow Box Blakely's Red Gum Woodland	P	A	P	P	P	P	P
Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory	A	A	A	A	A	P	A
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	A	P	A	A	A	A	A

3.3.5.4 Are Threatened Flora and / or Fauna Species Present?

It is important that road maintenance and construction staff supervisors are aware of the potential for threatened flora and fauna species to be present in roadside corridors.

Some threatened species are very specific in their habitat requirements and may only occur on certain soil types [eg. sandy soils] or in particular situations [eg. swamp margins] while others are less particular.

In order to ensure that staff are aware of potential habitat for threatened flora and fauna species a list of all threatened species should be kept and regularly updated in the relevant Council department[s].

Consolidated lists of the threatened flora and fauna recorded for the Lachlan Catchment are contained in Addendum 3 [flora] and 4 [fauna]. These Addendums also contain a summary of the known habitat requirements for each species.

As the listing of threatened species is regularly revised, usually with additional listings, it is important that each Council keeps its threatened species database current by consulting the Department of Environment and Climate Change [DECC] and Threatened Species websites.

3.4 ROADSIDE VEGETATION CONDITION / BIODIVERSITY VALUE ASSESSMENT

Once the basic description of the vegetation along each segment of road is complete and it has been determined whether or not the different communities are listed endangered or critically endangered ecological communities, the quantitative assessment of the biodiversity values of each community using the template can begin.

3.4.1 Environmental Attributes to be Considered

The following section lists a number of the attributes that would be used by a trained environmental scientist / botanist / fauna expert in making an assessment of the biodiversity values [and hence the significance] of a patch of vegetation.

An assessor who has appropriate environmental training can provide a quantitative assessment of a site based on numerical values assigned to each of the various states or condition classes of each attribute [eg. very poor condition, poor, fair, good, very good, excellent].

The environmental attributes that should be considered in an assessment of the significance of roadside vegetation remnants can be categorized into four groups:

- Vegetation Attributes
- Habitat Attributes
- Soil Attributes
- Fauna Attributes

In the roadside vegetation mapping and description phase described above, areas supporting native and introduced [or weedy] vegetation will be identified in most Shires. Apart from controlling noxious weeds, most Councils will assign a low priority to roadside vegetation management in such areas.

The management requirements for areas where the vegetation is dominated by non-native vegetation will generally be less complex than those relating to remnant native vegetation.

3.4.2 The Assessment Template

The following assessment template has been developed as a simplified form of the more detailed approaches used in the biobanking site assessment methodology. It may still seem overly detailed but any quantitative assessment of vegetation community value must be based on facts.

Alternative approaches to roadside vegetation inventories have used visual assessments based on photo standards with increasing tree and shrub density equating with increasing community value and significance.

However, any approach that lacks the backing of hard data to categorize community value is fraught with problems and is inadequate in both the short and the long term. Such a methodology can fail to record the presence of threatened species, populations and communities with consequent associated issues.

The Roadside Environment Committee's approach to this task is similar in many ways to that presented below with the exception that the level of detail collected may well be less. However, the success of any approach still depends on the assessment being undertaken by a person[s] with a knowledge of the vegetation, soils and fauna of the areas being assessed.

3.4.2.1 The Assessment Process

3.4.2.1.1 Collecting Field Data

It is difficult to be prescriptive in terms of specifying the number of separate assessments that are required to quantify any particular community along a particular road as natural communities are variable.

However, the most appropriate way to undertake an assessment along a particular road or section of road is to begin at one end and drive the total length of road to be assessed, noting each change in vegetation community in terms of GPS locations and recording the main species present.

This level of information usually can be collected from the vehicle as it is parked on the roadside as the dominant species that determine the community identity are usually very easily identified. However, in a few instances, it may be necessary to spend a few minutes in the community if it is particularly complex.

The information collected in this way will provide an excellent overview of the vegetation and assist in gaining an assessment of the number of different communities that are present as well as their variation.

If such an overview is not gained it is very easy to get bogged down in a sampling process that excessively sample individual communities.

Once the initial traverse of the road or section of road is complete, the assessor should review the notes made on communities during the initial 'drive-by assessment' and determine how many communities are present and how variable they are. This, then, allows the number of sample points to be determined.

Experienced and trained assessors will quickly identify variants in a community and determine how many sample points will be required. These should be marked on a map or identified by GPS location details.

It is imperative that each occurrence of each community is sampled and that at least two sample points are identified in communities that may extend for long distances along the road.

If the variability of a community that extends for a long distance along a road is great then more samples will be needed.

The time is then right to begin the sampling using the template that is contained in this document.

3.4.2.1.2 Vegetation Attribute Section of the Template

Use of a template to record and assess the Vegetation Attributes of a roadside community enables such aspects as corridor width, degree of disturbance and departure from a pristine state to be quickly established. (See **Tables 4 and 5**)

Table 4**Vegetation Attributes**

ATTRIBUTE	ASSESSMENT	SCORE
Total Corridor Width – total of both sides of road[m]	<5m = 1; 5-10m = 2; 10-50m = 3; 50-100m=4; >100m = 5	
Community Name		xxxxxxxxxxxx
Community Structure	Eg. forest, woodland, open woodland, grassland, aquatic See Table 5	xxxxxxxxxxxx
Endangered Ecological Community?	Yes = 5; No = 0	
Threatened Flora Species Recorded [LIST]		xxxxxxxxxxxx
Number of Threatened Flora Species Present	Nil = 0; 1 or >1 = 5	
Dominant Tree Species and Average Spacing [in metres] [LIST]		xxxxxxxxxxxx
Percentage of Native Tree Species	Nil = 0; 1-20 = 1; 21-40 =2; 41-60 = 3 61-80 = 4; 81-100 = 5	
Evidence of Regeneration of Native Tree Species	Nil = 0; spaced >50m apart =1; spaced 25-50m apart =2; spaced 10-25m apart= 3; spaced 5-10m apart = 4; spaced <1-5m apart = 5	
Dominant Shrub Species and Average Spacing [in metres] [LIST]		xxxxxxxxxxxx
Percentage of Native Shrub Species	Nil = 0; 1-20 = 1; 21-40 =2; 41-60 = 3 61-80 = 4; 81-100 = 5	
Evidence of Native Shrub Regeneration	Nil = 0; spaced >50m apart =1; spaced 25-50m apart =2; spaced 10-25m apart= 3; spaced 5-10m apart = 4; spaced <1-5m apart = 5	
Dominant Groundcover Species [LIST]		xxxxxxxxxxxx
Percentage of Native Groundcover Species	Nil = 0; 1-20 = 1; 21-40 =2; 41-60 = 3 61-80 = 4; 81-100 = 5	
Evidence of Native Groundcover Seedling Regeneration	Nil = 0; Occasional = 1; Few = 2; common = 3; many = 4; Abundant = 5	
Evidence of Logging / Clearing [pushed trees or cut stumps]	Nil = 5; Occasional = 4; Few = 3; common = 2; many = 1; Abundant = 0	
Evidence of Heavy Grazing by Domestic Livestock	Grazed below1cm = 0; Grazed 1-4cm = 1; Grazed to 4-10cm = 3; Grazed to 10-20cm = 4; Nil grazing evident = 5	
Noxious and Environmental Weeds Recorded [LIST]		xxxxxxxxxxxx
% Cover of Weeds	Nil = 5; 1-20 = 4; 21-40 =3; 41-60 = 2 61-80 = 1; 81-100 = 0	
TOTAL SCORE OUT OF 60		

Table 5

Structural Vegetation Types [for use with **Table 4** Assessment Sheet]

Adapted from McDonald et al [1990]

Vegetation Type	Crowns Touching or Overlapping	Crowns Touching or with Slight separation by a distance of up to 0.25 times the crown diameter	Crowns Clearly Separated by a distance of 0.25 – 1 times the crown diameter	Crowns Well Separated by up to 20 times the crown diameter	Isolated Plants - Crowns Well Separated by up to 20 times the crown diameter
Trees	Closed forest	Open forest	Woodland	Open Woodland	Isolated trees
Mallees	Closed Mallee Forest	Open Mallee Forest	Mallee Woodland	Open Mallee Woodland	Isolated Mallee Trees
Saltbush / Bluebush Shrub	Closed Chenopod Shrubland	Chenopod Shrubland	Open Chenopod Shrubland	Sparse Chenopod Shrubland	Isolated Chenopod Shrubs
Grass	Closed Grassland	Grassland	Open Grassland	Sparse Grassland	Isolated Grasses

3.4.2.2 Habitat Attribute Section of the Template

The Habitat Attributes section [Table 6] looks at the availability of cover and nesting sites for fauna in particular.

Table 6

Habitat Attributes

ATTRIBUTE	ASSESSMENT	SCORE
Presence of Standing Dead Trees	Nil = 0; Occasional = 1; Few = 2; common = 3; many = 4; Abundant = 5	
Presence of Tree Hollows	Nil = 0; Occasional = 1; Few = 2; common = 3; many = 4; Abundant = 5	
Presence of Hollow Logs	Nil = 0; Occasional = 1; Few = 2; common = 3; many = 4; Abundant = 5	
% of Ground Covered by Loose Surface Rock	Nil = 0; 1-20 = 1; 21-40 = 2; 41-60 = 3; 61-80 = 4; 81-100 = 5	
TOTAL SCORE OUT OF 20		

3.4.2.3 Soils Attribute Section of the Template

The Soil Attributes section [Table 7] records the presence of any detrimental soil characteristic and provides a measure of soil stability.

Table 7

Soils Attributes

ATTRIBUTE	ASSESSMENT	SCORE
% Ground Cover	Nil = 0; Occasional = 1; Few = 2; common = 3; many = 4; Abundant = 5	
Presence of Cryptogams	Nil = 0; Occasional = 1; Few = 2; common = 3; many = 4; Abundant = 5	
% of Area affected by Erosion and Type	Nil = 5; Occasional = 4; Few = 3; common = 2; many = 1; Abundant = 0	
% of Area affected by soil salinity	Nil = 5; Occasional = 4; Few = 3; common = 2; many = 1; Abundant = 0	
TOTAL SCORE OUT OF 20		

3.4.2.4 Fauna Attribute Section of the Template

The Fauna Attributes section [Table 8] quantifies the presence of native fauna as well as feral animals

Table 8

Fauna Attributes

ATTRIBUTE	ASSESSMENT	SCORE
List of Native Fauna Species		xxxxxxxxx
Number of Native Fauna Species Recorded	Nil = 0; 1-2 = 1; 2-5 = 2; 5-10 = 3; 10-20 = 4; >20 = 5	
Recorded Presence of Feral Animals by Sighting / other Evidence	Nil = 5; Occasional = 4; Few = 3; Common = 2; Many = 1; Abundant = 0	
TOTAL SCORE OUT OF 10		

3.4.2.5 Summary of Values

Once all of the four attribute categories have been addressed on the assessment sheet, the values for each are totalled in a summary table [Table 9] to provide an overall condition or biodiversity value assessment for the native vegetation remnant.

**Table 9
Summary Table**

ATTRIBUTE	SCORE
VEGETATION	
HABITAT	
SOILS	
FAUNA	
ACTUAL SCORE*	
MAXIMUM TOTAL SCORE	110

3.4.2.6 Establishment of Significance of Vegetation Community Occurrences

Once the template tables [Tables 4, 6 to 9] have been completed, a quantitative assessment of the vegetation quality or significance along a particular section of a particular road is available to Council staff. This assessment provides guidance for works staff in terms of the precautions that will need to be taken to ensure that roadside vegetation is not damaged during maintenance and other activity.

In addition, the status of the community in terms of the TSC Act and EPBC Act flags the need to obtain a licence to impact on threatened species, endangered ecological communities, endangered populations and critical habitat.

The presence of a threatened species, an endangered ecological community or an endangered flora or fauna population may also place further responsibilities on Councils via actions required under approved species, community or population Recovery Plans if these are to be in any way affected by road works.

The total rating for each site can then be assigned to a condition or biodiversity value class based on the following scale.

0-20 –very poor
21-40 – poor
41 – 60 - fair
61-80 – good
80-100 – very good
100 - 110 – excellent

Remnant native roadside vegetation that is assessed as being in the very good to excellent classes should be regarded as having high conservation value and treated accordingly.

There may also be other areas of native vegetation communities that do not achieve these high conservation / biodiversity value ratings, but which may be the best available examples of the community. These should also be classified as having high conservation value.

Further guide tables are at:

Addendum 4 – Simplified Threatened Flora Habitat Requirements

Addendum 5 - Simplified Threatened Fauna Habitat Requirements

ADDENDUM 4

Simplified Threatened Flora Habitat Requirements

[Abridged from the descriptions contained on NSW Government's Threatened Species website.]

SPECIES	HABITAT
Acacia ausfeldii	Associated species include White Box, Blakely's Red Gum and Cypress Pines, with an understorey dominated by <i>Cassinia</i> spp. and grasses; germination is stimulated by fire; flowers from August to October.
Acacia curranii	Grows in <i>Acacia</i> shrubland and mallee. Prefers acidic, skeletal soils in rocky habitats and occupies specialised habitats comprising rocky ridges and deeply weathered sandstone; associated species in NSW populations include <i>Eucalyptus dwyeri</i> , <i>E. populneus</i> subsp. <i>bimbil</i> , <i>E. intertexta</i> , <i>E. microcarpa</i> , <i>E. morrisii</i> , <i>Callitris glaucophylla</i> , <i>Acacia doratoxylon</i> , <i>A. havilandiorum</i> , <i>A. aneura</i> and <i>Eremophila</i> spp.; regenerates from root suckers after fire, with fire disturbance also said to contribute to seedling establishment; forms open to closed shrublands [sometimes with scattered emergent trees], characterized by its distinctive curly bark; flowers from August to September;
Ammobium craspedioides	Found in dry forest, Box-Gum Woodland and secondary grassland derived from clearing of these communities; grows in association with a large range of eucalypts [<i>Eucalyptus blakelyi</i> , <i>E. bridgesiana</i> , <i>E. dives</i> , <i>E. goniocalyx</i> , <i>E. macrorhyncha</i> , <i>E. mannifera</i> , <i>E. melliodora</i> , <i>E. polyanthemos</i> , <i>E. rubida</i>]; apparently unaffected by light grazing, as populations persist in some grazed sites; found in a number of cemeteries in the region; flowers summer
Amphibromus fluitans	There is a recent record of this species near Laggan in Upper Lachlan Shire. Habitats in south-western NSW include swamp margins in mud, dam and tank beds in hard clay and in semi-dry mud of lagoons with <i>Potamogeton</i> and <i>Chamaeraphis</i> species; the species requires periodic flooding of its habitat to maintain wet conditions; has been observed covering several hectares in area. The species is also recorded as occasional to common in populations; <i>Amphibromus fluitans</i> grows mostly in permanent swamps. The species needs wetlands which are at least moderately fertile and which have some bare ground, conditions which are produced by seasonally-fluctuating water levels; flowers from spring to autumn or November to March;
Austrostipa metatoris	Occurs in the Murray Valley, from the central-western slopes to the far south-western plains. Sites include Cunninyeuk Station, Stony Crossing, Kyalite State Forest and Lake Cargelligo; habitats include sandhills, sandridges, undulating plains and flat open mallee country, with red to red-brown clay-loam to sandy-loam soils; associated species include <i>Eucalyptus populnea</i> , <i>E. intertexta</i> , <i>Callitris glaucophylla</i> , <i>Casuarina cristata</i> , <i>Santalum acuminatum</i> and <i>Dodonaea viscosa</i> ; flowers in response to rain
Austrostipa wakoolica	confined to the floodplains of the Murray River tributaries of central-western and south-western NSW, with localities including Manna State Forest, Matong, Lake Tooim, Merran Creek, Tulla, Cunninyeuk and Mairjimmy State Forest; grows in open woodland on grey, silty clay or sandy loam soils; habitats include the edges of a lignum swamp with box and mallee; creek banks in grey, silty clay; mallee and lignum sandy-loam flat; open Cypress Pine forest on low sandy range; and a low, rocky rise; associated species include <i>Callitris glaucophylla</i> , <i>Eucalyptus microcarpa</i> , <i>E. populnea</i> , <i>Austrostipa eremophila</i> , <i>A. drummondii</i> , <i>Austrodanthonia eriantha</i> and <i>Einadia nutans</i> ; flowers from October to December, mainly in response to rain; seed dispersal is mainly by wind, rain and flood events; the awn and sharp point of the floret appear to be an adaptation for burying the seed into the soil; grass seed is traditionally believed to be viable for three to five years, so a long-lived seed bank is considered unlikely for this species; recorded as common in the Mairjimmy State Forest population; flowers in response to rain.

Caladenia arenaria	Found mostly on the south west plains and western south west slopes. <i>Caladenia arenaria</i> is currently only known to occur in the Riverina between Urana and Narranderra; occurs in woodland with sandy soil, especially that dominated by White Cypress-pine [<i>Callitris glaucophylla</i>]; flowers August to October
Distichlis distichophylla	This grass is limited in its NSW range it grows only in coastal situations, except for one existing population at Lake Cargelligo. A coloniser of damp saline soils; found at the edges of salt marshes and on low dunes. Flowers and sets seed in late spring and summer.
Diuris aequalis	Recorded in forest, low open woodland with grassy understorey and secondary grassland on the higher parts of the Southern and Central Tablelands [especially on the Great Dividing Range]; leaves die back each year and resprout just before flowering.; populations tend to contain few, scattered individuals; flowers mainly November
Diuris tricolor	Sporadically distributed on the western slopes of NSW, extending from south of Narranderra all the way to the far north of NSW; localities include the Condobolin-Nymagee road, Wattamondara towards Cowra, Red Hill north of Narranderra, Coolamon, near Darlington Point, Eugowra; usually recorded from disturbed habitats; grows in sclerophyll forest among grass, often with Cypress Pine [<i>Callitris spp.</i>] or Bimble Box; found in sandy soils or red earths, either on flats or small rises; flowers from September to November.
Dodonaea sinuolata subsp. acrodentata	In NSW, known only from near Hillston; grows in red sandy loams on stony ridges in arid and semi-arid areas and in open woodland; Mulga and Bimble Box are associated species; flowers in summer to autumn [January to May].
Eleocharis obicis	Found near Micabil near Condobolin and Hay; usually in ephemeral wet situations such as depressions and drains in low-lying grasslands and shrublands; sites include depressions with heavy clay soils; associated vegetation includes Canegrass, Bladder Saltbush, Old Man Saltbush and Bimble Box; recorded as flowering in November.
Kippistia suaedifolia	Recorded from several collections near Conoble in the Ivanhoe district and elsewhere; grows on loamy soils around saline lakes and depressions, often in association with gypsum; flowers from August to November
Kunzea cambagei	Occurs mainly in the Blue Mountains; restricted to damp, sandy soils in wet heath or mallee open scrub at higher altitudes; flowers between September and November.
Leionema sympetalum	Recorded from Weddin Shire; occurs on exposed rocky sandstone formations in dry sclerophyll forest; the seed generally lies dormant in the soil until fire or disturbance promotes germination; the flowers winter to spring.
Lepidium aschersonii	Known from the West Wyalong, Barmedman and Temora areas, although most records are old; flowers from spring to autumn; populations have been known to immediately disappear following flooding, reappearing several seasons later; an apparent increase in numbers during drought conditions has also been observed; found on ridges of gilgaid clays; flowers from spring to autumn
Lepidium monoplacoides	Previously recorded from Lake Cargelligo; occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm; predominant vegetation is usually an open woodland dominated by Bulloak, Black Box or Bimble Box; groundcover dominated by tussock grasses; recorded in a Canegrass wetland-grassland community and from a Black Bluebush shrubland; intolerant of grazing; flowers from August to October.
Leptorhynchus orientalis	Recorded from Willanthry, east of Hillston, and from Cowl Cowl Station SSW of Hillston along a TSR; grows in woodland or grassland, sometimes on the margins of Canegrass swamps; recorded in Myall and Bimble Box communities on clay to clay-loam soils; flowers August to October.

<i>Monotaxis macrophylla</i>	Recorded from north of Condobolin; plants have a short life span and do not seem to persist longer than six months; appears after fire, on rocky ledges and hillsides; flowers in August
<i>Philotheca angustifolia</i> subsp. <i>angustifolia</i>	Only record is from the Lachlan district in 1882, location unknown; nothing known of habitat; in other States flowers sporadically throughout the year, but predominantly in spring
<i>Philotheca ericifoila</i>	Known near West Wyalong; grows chiefly in dry sclerophyll forest and heath on damp sandy flats and gullies; collected from a variety of habitats including heath, open woodland, dry sandy creek beds, and rocky ridge and cliff tops; flowers in spring
<i>Pilularia novae-hollandiae</i>	Recorded at Lake Cowal; grows in shallow swamps and waterways, often among grasses and sedge; often recorded in drying mud as this is when it is most conspicuous; found in roadside table drains Spores produced - unknown but probably after rains
<i>Senecio garlandii</i>	Found between Temora, Bethungra and Albury and possibly Burrinjuck near Yass; occurs on sheltered slopes of rocky outcrops; flowers in spring.
<i>Swainsoa murrayana</i>	Recorded on the Riverine plain as far north as Willandra National Park; collected from clay-based soils, ranging from cracking clays to red-brown earths and loams; recorded in bladder saltbush, black box and grassland communities on level plains, floodplains and depressions - often found with <i>Maireana</i> [Bluebush / Cottonbush] species; may require some disturbance and has been known to occur in paddocks that have been moderately grazed or occasionally cultivated; flowers in spring to early summer
<i>Swainsona sericea</i>	Recorded from Box-Gum Woodland in the Southern Tablelands and South West Slopes; sometimes found in association with cypress-pines <i>Callitris</i> spp.; habitat on plains unknown. flowers July to October and sometimes after good summer rains
<i>Threlkeldia inchoata</i>	Usually grows on gibber soils but also recorded from slightly saline areas near creeks and water; associated species interstate include Inland Red Box, Old Man Saltbush and Lignum; flowering period unknown
<i>Wilsonia rotundifolia</i>	Recorded from Upper Lachlan Shire; grows in mud around inland saline lakes; flowers mainly in spring and summer

ADDENDUM 5

Simplified Threatened Fauna Habitat Requirements

[Abridged from the descriptions contained on NSW Government's Threatened Species website.]

SPECIES	HABITAT
<i>Anseranus semipalmata</i> [Magpie Goose]	Mainly found in shallow wetlands [less than 1 m deep] with dense growth of rushes or sedges; equally at home in aquatic or terrestrial habitats; often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes; breeding is strongly influenced by water level; nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW
<i>Aprasia inaurita</i> [Mallee Worm Lizard]	Inhabits mallee woodlands on red sands; often shelters in sand, beneath mallee stumps, in leaf litter or in the nests of ants and other insects; thought to be dependent on Spinifex [<i>Triodia scariosa</i>]
<i>Aprasia parapulchella</i> [Pink-tailed Legless Lizard]	Recorded from West Wyalong; inhabits sloping, open woodland areas with predominantly native grassy ground layers, sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks; commonly found beneath small, partially-embedded rocks; appears to spend considerable time in burrows below these rocks that have been constructed by and are often still inhabited by small black ants and termites.
<i>Ardeotis australis</i> [Australian Bustard]	Mainly inhabits tussock and hummock grasslands, though prefers tussock grasses to hummock grasses; also occurs in low shrublands and low open grassy woodlands; occasionally seen in pastoral and cropping country, golf courses and near dams; breeds on bare ground on low sandy ridges or stony rises in areas between grassland and protective shrubland cover; roosts on ground among shrubs and long grasses or under trees.
<i>Botaurus poiciloptilus</i> [Australasian Bittern]	Favours permanent freshwater wetlands with tall, dense vegetation, particularly cumbungi [<i>Typha</i> spp.] and spikerushes [<i>Eleocharis</i> spp.]; hides during the day amongst dense reeds or rushes and feed mainly at night feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains. Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds;
<i>Burhinus grallarius</i> [Bush Stone-curlew]	Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber; largely nocturnal, being especially active on moonlit nights; nests on the ground in a scrape or small bare patch in spring and early summer
<i>Cacatua leadbeateri</i> [Major Mitchell's Cockatoo]	Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water; feeds mostly on the ground, nests in tree hollows, breeds occurs throughout the second half of the year; normally found in pairs or small groups, though flocks of hundreds may be found where food is abundant.
<i>Callocephalon fimbriatum</i> [Gang-gang Cockatoo]	In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests; moves to lower altitudes in winter, preferring more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, nests in tree hollows; favours old growth trees for nesting and roosting.
<i>Calyptorhynchus lathamii</i> [Glossy Black Cockatoo]	In the Riverina area, inhabits open woodlands dominated by Belah [<i>Casuarina cristata</i>]; feeds almost exclusively on the seeds of several species of she-oak [<i>Casuarina</i> and <i>Allocasuarina</i> species], shredding the cones with the massive bill; dependent on large hollow-bearing eucalypts for nest sites; breeds between March and August.
<i>Certhionyx 47tilize47n47</i> [Pied Honeyeater]	Inhabits wattle shrub [primarily Mulga, mallee, spinifex and eucalypt woodlands], usually when shrubs are flowering; highly nomadic, following the erratic flowering of shrubs; can be locally common at times; constructs a relatively large cup-shaped nest of grasses and fine twigs bound with spider webs, in the fork of a shrub or tree up to 5 m above the ground.

SPECIES	HABITAT
<i>Chalinolobus dwyeri</i> [Large-eared Pied Bat]	Found mainly in areas with extensive cliffs and caves; probably forages for small, flying insects below the forest canopy; likely to hibernate through the coolest months; roosts in caves [near their entrances], crevices in cliffs, old mine workings and in the disused, mud nests; frequents dry open forest and woodland close to these features.
<i>Chalinolobus picatus</i> [Little Pied Bat]	Occurs in dry open forest, open woodland, mulga woodlands, saltbush / bluebush shrublands, cypress-pine forest, mallee and Bimble Box country; roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings; needs access to nearby open water
<i>Cinclosoma castanotus</i> [Chestnut Quail-thrush]	Has a scattered distribution west of a line from near Cobar, through Nymagee and Condobolin, to West Wyalong, west to 'Scotia mallee' west of Great Anabranch, and south of line joining Cobar and Kinchega NP, to Cocoparra NP, Euston and Wentworth; occurs in a wide range of arid and semi-arid habitats; mainly in the low shrubs and undergrowth of mallee scrub, but also in Acacia scrubs, dry sclerophyll woodland, heath, and native pine; its nest is a depression in the ground lined with strips of bark, fine grass or sticks, placed near a mallee trunk, against a fallen branch, under a low bush or in a sparse tuft of grass
<i>Climacteris picumnus vistoriae</i> [Brown Treecreeper] [eastern subspecies]	Mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum [<i>Eucalyptus camaldulensis</i>] Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; present in all seasons or year-round at many sites; feed on the ground amongst the litter, tussocks and fallen timber; usually observed in pairs or small groups of eight to 12 birds; nest in hollows in standing dead or live trees and tree stumps;.
<i>Crinia sloanei</i> [Sloane's Froglet]	Recorded from widely scattered sites in the floodplains of the Murray-Darling Basin; rare; since 1958 <i>C. sloanei</i> has been recorded only 45 times in NSW.
<i>Dasyurus 48tilize48n</i> [Spotted-tailed Quoll]	Recorded across a range of habitat types, including open forest, woodland and inland riparian forest, individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites; mostly nocturnal, although will hunt during the day; spends most of the time on the ground, although also an excellent climber and may raid possum and glider dens and prey on roosting birds.
<i>Drymodes brunneopygia</i> [Southern Scrub-robin]	There is an isolated population in an area centred on Round Hill Nature Reserve, from Charcoal Tank Nature Reserve, near West Wyalong, and a site near Temora, west to near Trida, and from Pulletop Nature Reserve and Stackpoole State Forest, north to Red Tank and near Roma Station, northwest of Condobolin; inhabits mallee and acacia scrub, particularly with dense subshrubs including Broombush in the understorey; constructs a shallow cup-shaped nest of twigs, bark and grass, which is normally located on the ground and usually concealed in the shelter of a tree, shrub or fallen branch.
<i>Eppiorynchus asiaticus</i> [Black-necked Stork]	Inhabits permanent freshwater wetlands including margins of billabongs, swamps, shallow floodwaters, and adjacent grasslands and savannah woodlands; ; feeds in shallow, still water; breeds in late summer in the north, and early summer further south. Makes a large nest, up to 2 m in diameter, in a live or dead tree, in or near a freshwater swamp.
<i>Falco hypoleucos</i> [Grey Falcon]	Usually restricted to shrubland, grassland and wooded watercourses in arid and semi-arid regions, also occurs near wetlands where surface water attracts prey; 48tilize48 old nests of other birds of prey and ravens, usually high in a living eucalypt near water or a watercourse; nests in late winter and early spring

SPECIES	HABITAT
<i>Falsistrellus tasmaniensis</i> [Eastern False Pipistrelle]	Prefers moist habitats, with trees taller than 20 m; generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings; hibernates in winter.
<i>Glossopsitta porphyrocephala</i> [Purple-crowned Lorikeet]	Most often seen in the Grey Box and White Box woodlands in the Riverina region, with occasional sightings of the species in box-ironbark habitats across the south-west slopes of NSW; also recorded in mallee; nomadic, with the pattern of distribution varying from year to year according to flowering conditions; Found in open forests and woodlands, particularly where there are large flowering eucalypts; breeds where there is a good supply of nectar and tree hollows.
<i>Grantiella picta</i> [Painted Honeyeater]	Nomadic; inhabits Boree [Myall], Brigalow, Box-Gum Woodlands and Box-Ironbark Forests; nests from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches
<i>Grus 49tilize49</i> [Brolga]	Brolgas often feed in dry grassland or ploughed paddocks or even desert claypans but are dependent on wetlands as well; nest comprises a platform of grasses and sticks, augmented with mud, on an island or in the water; breeding occurs from winter to autumn.
<i>Hylacola cauta</i> [Shy Heathwren]	Occurs between Leeton, Willandra, Nymagee and West Wyalong; inhabits mallee woodlands with a relatively dense understorey of shrubs and heath plants; feeds on the ground; nests built on the ground, dome-shaped, consisting of plant material
<i>Ixobrychus flavicollis</i> [Black Bittern]	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest and woodland; roosts in trees or on the ground amongst dense reeds during the day; feeds at dusk and at night; nests on a branch overhanging water; nest consists of a bed of sticks and reeds on a base of larger sticks; breeds from December to March
<i>Lathamus discolor</i> [Swift Parrot]	Migrates to the Australian south-east mainland between March and October; feeds on flowering eucalypts and lerps; commonly associated with White Box, Mugga Ironbark and Grey Box communities; breeds in Tasmania from September to January
<i>Leipoa ocellata</i> [Malleefowl]	Predominantly inhabits mallee communities, preferring the tall, dense and floristically-rich mallee found in higher rainfall [300-450 mm mean annual rainfall] areas. Less frequently found in other eucalypt woodlands [e.g., mixed Western Grey Box and Yellow Gum or Bimble Box, Ironbark-Callitris Pine, Callitris Pine, Mulga [<i>Acacia aneura</i>], and Gidgee[<i>A. cambagei</i>]; prefers areas of light sandy to sandy loam soils and habitats with a dense but discontinuous canopy, dense and variable shrub and herb layers; incubates eggs in large mounds that contain considerable volumes of sandy soil and litter; mounds distinctive
<i>Litoria aurea</i> [Green and Golden Bell Frog]	Inhabits marshes, dams and stream-sides, particularly those containing cumbungi [<i>Typha</i> spp.] or spikerushes [<i>Eleocharis</i> spp.]; optimum habitat includes water-bodies that are unshaded, free of predatory fish such as the Plague Minnow [<i>Gambusia holbrooki</i>], have a grassy area nearby and diurnal sheltering sites available; active by day and usually breeds in summer when conditions are warm and wet.

SPECIES	HABITAT
<i>Litoria booroolongensis</i> [Booroolong Frog]	Lives along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses; shelters under rocks or amongst vegetation near the ground on the stream edge; sometimes bask in the sun on exposed rocks near flowing water during summer; adults occur on or near cobble banks and other rock structures within stream margins; breeding occurs in spring and early summer
<i>Lophoictinia isura</i> [Square-tailed Kite]	Found in a variety of timbered habitats including dry woodlands and open forests; shows a particular preference for timbered watercourses; in arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland; breeds from July to February nest sites generally located along or near watercourses, in a fork or on large horizontal limbs
<i>Macrotis lagotis</i> [Bilby]	Extinct
<i>Melanodryas cucullata cucullata</i> [Hooded Robin] [South-eastern form]	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas; requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. Breeds between July and November; nest is a small, neat cup of bark and grasses bound with webs, in a tree fork or crevice, from less than 1 m to 5 m above the ground.
<i>Melithreptus gularis gularis</i> [Black-chinned Honeyeater] [eastern subspecies]	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark [<i>Eucalyptus sideroxylon</i>], White Box [<i>Eucalyptus albens</i>], Grey Box [<i>Eucalyptus microcarpa</i>] and Yellow Box [<i>Eucalyptus melliodora</i>]; also inhabits open forests of smooth-barked gums, stringybarks, ironbarks and tea-trees; usually seen in pairs and small groups of up to 12 birds; breeds solitarily or co-operatively, with up to five or six adults, from June to December; the compact suspended, cup-shaped nest is placed high in the crown of a tree, in the uppermost lateral branches, hidden by foliage
<i>Miniopterus schreibersii oceanensis</i> [Eastern Bentwing-bat]	Caves are the primary roosting habitat, but also uses derelict mines, storm-water tunnels, buildings and other man-made structures; cold caves are used for hibernation in southern Australia; forms discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young; hunts in forested areas
<i>Myotis adversus</i> [Large-footed Myotis]	These bats generally roost in groups of 10 – 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage; forage over streams and pools breeds usually in November or December
<i>Neophema pulchella</i> [Turquoise Parrot]	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland; feeds in the shade of a tree and spends most of the day on the ground; nests in tree hollows, logs or posts, from August to December
<i>Nyctophilus timoriensis</i> [Eastern Long-eared Bat] [south-eastern form]	Inhabits a variety of vegetation types, including mallee, bullock and box dominated communities; distinctly more common in box/ironbark/cypress-pine vegetation; roosts in tree hollows, crevices, and under loose bark; young are born in late spring to early summer
<i>Ninox connivens</i> [Barking Owl]	Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses; during the day the owls roost along creek lines, usually in tall understorey trees with dense foliage such as <i>Acacia</i> and <i>Casuarina</i> species, or the dense clumps of canopy leaves in large eucalypts; nests in hollows of large, old eucalypts including River Red Gum [<i>Eucalyptus camaldulensis</i>], White Box [<i>Eucalyptus albens</i>], Red Box [<i>Eucalyptus polyanthemos</i>] and Blakely's Red Gum [<i>Eucalyptus blakelyi</i>]; breeds during late winter and early spring.

SPECIES	HABITAT
<i>Ninox strenua</i> [Powerful Owl]	Inhabits a range of vegetation types, including woodland and open sclerophyll forest and tall open wet forest and rainforest; requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well and occasionally hunts in open habitats; it nests in large tree hollows [at least 0.5 m deep], in large eucalypts [diameter at breast height of 80-240 cm] that are at least 150 years old; pairs of Powerful Owls are believed to have high fidelity to a small number of hollow-bearing nest trees; nesting occurs from late autumn to mid-winter
<i>Pachycephala inornata</i> [Gilbert's Whistler]	occurs mostly in mallee shrubland, but also in box-ironbark woodlands, Cypress Pine and Belah woodlands and River Red Gum forests; within the mallee the species is often found in association with an understorey of spinifex and low shrubs including acacias, hakeas, sennas and grevilleas; in woodland habitats, the understorey comprises dense patches of shrubs; forages on or near the ground in shrub thickets and in tops of small trees; breeding takes place from August to November; patches of dense understorey shrubs associated with mallee or woodland are essential for territorial pairs to breed; nests are built 2 m above the ground in the fork of dense foliage of prickly plants such as acacias; the nest is either a lined cup or sometimes birds use the old nests of other species, .
<i>Petalura 51tilize51n</i> [Giant Dragonfly]	Lives in permanent swamps and bogs with some free water and open vegetation; adults are short-lived surviving for one summer after emerging in October; adults spend most of their time settled on low vegetation on or adjacent to the swamp and fly over the swamp and along its margins hunting for flying insects; eggs laid into moss or other soft vegetation bordering swamps; larvae live in tunnels under the swamp and the larval stage may last up to 10 years
<i>Petaurus australis</i> [Yellow-bellied Glider]	Occurs in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils; nocturnal; live in small family groups of two – six individuals in hollows of large trees;
<i>Petaurus norfolcensis</i> [Squirrel Glider]	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range; prefers mixed species stands with a shrub or Acacia midstorey lives in family groups of a single adult male one or more adult females and offspring; requires abundant tree hollows for refuge and nest sites
<i>Petrogale penicillata</i> [Brush-tailed Rock-wallaby]	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north; browse on vegetation in and adjacent to rocky areas; shelter or bask during the day in rock crevices, caves and overhangs and are most active at night; live in family groups of 2 – 5 adults and usually one or two juvenile and sub-adult individuals; breeding is likely to be continuous
<i>Phascogale tapoatafa</i> [Brush-tailed Phascogale]	Prefers dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter; also inhabit heath, swamps, rainforest and wet sclerophyll forest; an agile climber foraging preferentially in rough barked trees of 25 cm DBH or greater; nests and shelters in tree hollows with entrances 2.5 – 4 cm wide; uses many different hollows over a short time span.
<i>Phascolarctos cinereus</i> [Koala]	Inhabits eucalypt woodlands and forests; feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species; Inactive for most of the day, feeding and moving mostly at night

SPECIES	HABITAT
<i>Polytelis swainsoni</i> [Superb Parrot]	Inhabits Box-Gum, Box-Cypress-pine, Bimble Box and Boree Woodlands and River Red Gum Forest; in the Riverina the birds nest in the hollows of large trees [dead or alive] mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees; species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box; nest in small colonies, often with more than one nest in a single tree; breed between September and January.
<i>Pomatostomus temporalis temporalis</i> [Grey-crowned Babbler] [eastern subspecies]	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains; birds are generally unable to cross large open areas; live in family groups that consist of a breeding pair and young from previous breeding seasons; build and maintain several conspicuous, dome-shaped stick nests about the size of a football; nest is used as a dormitory for roosting each night; nests are usually located in shrubs or sapling eucalypts, although they may be built in the outermost leaves of low branches of large eucalypts; nests are maintained year round, and old nests are often dismantled to build new ones; breed between July and February.
<i>Pyrholaemus sagittatus</i> [Speckled Warbler]	Lives in a wide range of <i>Eucalyptus</i> dominated communities that have a grassy understorey, often on rocky ridges or in gullies; typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy; large, relatively undisturbed remnants are required for the species to persist in an area; the rounded, domed, roughly built nest of dry grass and strips of bark is located in a slight hollow in the ground or the base of a low dense plant, often among fallen branches and other litter; a side entrance allows the bird to walk directly inside; breeds between August and January
<i>Saccolaimus flaviventris</i> [Yellow-bellied Sheath-tail-bat]	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilize mammal burrows; when foraging for insects, flies high and fast over the forest canopy, but lower in more open country; breeding has been recorded from December to mid-March
Scoteanax rueppellii [Greater Broad-nosed Bat]	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest; usually roosts in tree hollows, but also found in buildings; forages after sunset, insects; this species has been known to eat other bat species; young born in January; prior to birth, females congregate at maternity sites located in suitable trees
<i>Stagonopleura guttata</i> [Diamond Firetail]	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum <i>Eucalyptus pauciflora</i> Woodlands also occurs in open forest, mallee, natural grassland, and in secondary grassland derived from other communities; often found along rivers and creeks, and sometimes in lightly wooded farmland; nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests birds roost in dense shrubs or in smaller nests built especially for roosting; breeds between August and January.
<i>Stictonetta naevosa</i> [Freckled Duck]	Prefers permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree; during drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and

	sewage ponds; generally rest in dense cover during the day, usually in deep water. Feed at dawn and dusk and at night; nests are usually located in dense vegetation at or near water level; breeds between October and December but also at other times when conditions are favourable.
..... <i>Tiliqua occipitalis</i> [Western Blue-tongued Lizard]	Inhabits plains, swales, ranges and sometimes dunes of loamy or clayey/sandy soils vegetated by woodlands, especially mallee, shrublands [including chenopods], heaths or hummock grasslands; preferred vegetation type appears to be mixed mallee/ <i>Triodia</i> communities; forages at night

SPECIES	HABITAT
<i>Tyto novaehollandiae</i> [Masked Owl]	Lives in dry eucalypt forests and woodlands from sea level to 1100 m; a forest owl, but often hunts along the edges of forests, including roadsides; Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting
<i>Vespadelus baverstockii</i> [Inland Forest Bat]	Roosts in tree hollows and abandoned buildings; recorded from a variety of woodland formations, including mallee, Mulga and River Red Gum.
<i>Xanthomyza phrygia</i> [Regent Honeyeater]	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak; suitable woodlands support significantly large numbers of mature trees, high canopy cover and abundance of mistletoes; feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum and White Box; also utilises Grey Box, Narrow-leaf Ironbark, Red Stringybark and Rough-barked Apple; nectar and fruit from the mistletoes <i>Amyema miquelii</i> , <i>A. pendula</i> , <i>A. cambagei</i> are also eaten during the breeding season; Regent Honeyeaters usually nest on horizontal branches or in forks in tall mature eucalypts and Sheoaks. Also nest in mistletoe haustoria; the nest is an open cup-shaped nest is constructed of bark, grass, twigs and wool