ROADSIDE MANAGEMENT PLAN

MOORABOOL
SHIRE COUNCIL

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SECTION 1: OBJECTIVES AND MANAGEMENT PLAN OVERVIEW

1.1 Introduction

This plan covers all rural roads within the Shire of Moorabool managed by the municipality.

The roadside is defined as the strip of land between the table drain (or edge of road formation where no drain is present) and the fence. Approximately four hundred roads are considered in the study. Unused road reserves are not generally covered by the plan, but were noted during the survey where relevant (these roads are usually managed by DNRE). State highways, the Western Freeway, and some main roads are managed by VicRoads. These roads were included in the roadside assessment to ensure a complete picture was presented of the vegetation and condition of roadsides in the Moorabool Shire. They have not been included in the subsequent development of management prescriptions.

Public comment was sought on the plan prior to publication through local publicity and the development of a Steering Committee. Changes have been made to the plan as a result of community input.

1.2 Why Have A Roadside Management Plan?

The objectives of roadside management planning are to protect roadside flora and fauna biodiversity, and heritage and landscape values without compromising other essential functions of roadsides, namely road safety, fire management, and the provision of utilities and services (RCAC, 1999).

Perhaps more than any other feature in the region, road reserves visually shape the landscape. Treed roadsides provide the relief or contrast to the extensive open farmland. Road reserves provide shelter for stock, shade, windbreaks and wildlife habitat, and add interest to our journeys. Road reserves link up different areas and are living transects across the country of vegetation communities once far more extensive (prior to European settlement).

Road reserves are corridors of land used for many purposes. While the safe movement of travelling public is a key requirement, road reserves have become increasingly important for conservation reasons due to the removal of vegetation from adjoining land.

Local councils and other road management authorities have a responsibility to maintain adequate levels of safety and efficiency for drivers, but also have a responsibility to retain and protect roadside vegetation wherever possible.

Roadwork programs and other activities that affect roadside vegetation should be subject to environmental assessment in much the same way as they are subject to engineering or technical assessment.

The large number of roads in the region makes road reserves the most important linear corridors. Some have little wildlife or recreational value, having been cleared along with the land they adjoin. Others, however, are important for the rare plants and fragile habitats they contain. Some are a single chain in width and so have little conservation potential, whilst other roadsides, particularly past stock routes, are three chains or more in width and are often very important conservation corridors. [1 chain = 20.1 metres]

Many roadsides in the Shire contain significant remnant native vegetation. Often this vegetation is all that remains of the original vegetation in an area due to the clearing for agriculture and other land uses.

Roadsides are subject to a large range of uses and pressures. Poor management of roadsides has led to a deterioration of the conservation value of many roadsides. The purpose of the plan is to reverse this trend and protect and enhance current values.

Roadsides have a range of benefits. Improved management of roadsides will help:

- maintain biodiversity levels in the region;
- retain and enhance the natural landscape character and aesthetics of the region;
- reduce maintenance costs through altered management techniques;
- reduce the risk or impact of wildfire through fuel reduction (secondary firebreaks);
- provide a network of strategic (primary) firebreaks for the control of wildfire;
- reduce cross wind velocities (treed roadsides) in cleared landscapes and slow the spread of wildfire;
- allow greater natural regeneration;
- protect rare plant communities, such as basalt plains grasslands;
- protect and improve wildlife habitat values;
- allow further development of roadsides as a network of wildlife corridors;
- improve control of weeds;
- reduce soil disturbance and weed invasion;
- limit run-off and erosion problems from roads and reduce stream turbidity levels;
- provide greater recreational values;
- protect cultural and heritage values;
- provide local provenance seed sources for revegetation work;
- improve landholder benefits through the control of roadside weeds and silt run-off onto private land and the revegetation of roadsides that may act as shelterbelts and windbreaks; and
- increase tourism levels in the Shire through promotion of the Ecotourism values of key roadsides.

The roadside management plan should aim to meet the following objectives:

- protect and restore indigenous vegetation communities;
- protect rare, significant or vulnerable species;
- maintain and enhance flora values;
- prevent further land degradation and improve water quality;
- prevent the spread of weeds;
- maintain and enhance visual and landscape qualities;
- protect cultural and heritage values; and
- minimise fire risk.

(Source: Gisborne Roadside Management Plan)

Constraints which may affect the retention or protection of indigenous vegetation include interference with:

- tactical firebreaks;
- power line and other services;
- drains;
- sight distances;
- road structure; and
- road widening.

(Source: Gisborne Roadside Management Plan)

To ensure the success of the roadside management plan it is essential that staff training days are organised on a regular basis. This ensures council staff or contractors can interpret the plan and implement the roadwork practices that are required to improve protection of remnant vegetation. Recognition of marker symbols and indicator species such as Kangaroo grass (which flag there is remnant vegetation present) and the difference between native and exotic vegetation, are key components of the days. A roadside training day for Moorabool staff was held in October 1998 conducted by the Roadside Conservation Advisory Committee (RCAC) and was attended by fifteen staff.

1.3 The Process

1.3.1 Roadside Survey

Many areas in the region have now been surveyed and roads listed with their conservation value (high/medium/low) based on a system developed by the RCAC. The overall score or measure of conservation value on the assessment sheet is based on a number of variables including width of reserve, native species and weeds present, natural regeneration, aesthetic values and degree of disturbance. The sheets are designed for use by volunteers with limited botanical knowledge. Spittle (1992) gives a general definition for roadsides of high, medium and low conservation significance.

These are:

- HIGH - relatively pristine condition, rare, vulnerable or significant flora or fauna species present. Section of vegetation not locally common or of cultural/historical/geological importance.

- MEDIUM - semi-natural indigenous vegetation, modified vegetation with extensive regeneration or a wide reserve with patches of remnant vegetation which could be enhanced for wildlife.

- LOW - substantially modified, predominantly exotic weeds or pasture grasses and weeds, some indigenous vegetation (usually Blackwoods, Black Wattles, Eucalypts and native grasses as isolated specimens or clumps).

In Moorabool Shire high conservation roadsides are generally:

- Forests and woodlands - with intact tree, shrub and groundlayers; and
- Native grasslands - trees and shrubs are absent or occur occasionally.

Medium Conservation roadsides tend to have:

- Forests or woodlands with an intact tree layer and possibly a shrub layer (this may be partly taken over by woody weeds). The ground layer consists mainly of introduced or pasture grasses rather than native grasses; and
- Native grassland with significant weed invasion.

Low Conservation roadsides:

- Consisting of pasture grasses and/or woody weeds and containing little remnant vegetation.

Environmental & Biological Resource Management students at the University of Ballarat have prepared roadside surveys of sections of the region over the last few years as part of their final year studies. Nally (1989) contains some areas around Buninyong now in Moorabool Shire. No other existing roadside surveys are known for the Shire other than a Management Plan for the Midland Highway prepared by VicRoads in 1998.

During 1998, all rural roadsides in the Shire were surveyed using the Roadside Conservation Advisory Committee (RCAC) recording sheet method with minor modifications. Each roadside segment was rated for conservation value (low/medium/high) based on the scoring system developed by the RCAC. Additional information such as the presence of powerlines, material stock piles, historic markers, erosion, salinity and major weed infestations was also recorded. The survey was conducted by Tim D'Ombrain and Beth Jones with assistance from John Endacott.

In addition, a plant species list was compiled for each roadside surveyed. All flora data has been entered on the Ballarat Region Flora Database and the Department of Natural Resources and Environment's (DNRE) Flora Information System (FIS). Public access to the data is provided through the "Wild Plants of the Ballarat Area" CD-ROM (1998), which is available from the Shire and other organisations.

The purpose of roadside assessment in each of the areas is to identify the best or most valuable roadsides so that these may be protected. It is not possible or practicable to protect all roadsides. High conservation value roadsides need to be maintained. Medium value roadsides need to be managed so that values improve over time. Low roadsides should be managed to limit cost to the community through the control of weed invasion and fire risk. The use of alternative treatments such as grazing or cropping may also reduce costs to Council on degraded roadsides.

Spring to early summer is the best time for survey work as most species are in flower or actively growing and are more easily identified. Ideally, sites should be visited in both spring and summer and re-examined every few years to ensure the management practices employed have been effective. A comparison between the recent survey (1998) and Nally (1989) shows that all roadsides identified as 'high' by Nally have retained that rating (albeit, the rating system used was different, these roads still remain in the top category). Woody weed levels may have increased over the period. Pasture grass invasion is also likely to have increased, although at least one un-grazed road now has higher levels of native grass and has moved to the high category. Many of the problems identified by Nally on specific roads still remain and were also noted in the 1998 study.

1.3.2 Data Management

Roadside survey data has been mapped using the MapInfo© software, such that the information collected during the survey is compatible with other mapped road and infrastructure information held by the Shire.

Additional software has been written to allow the inter-linking of the flora data and the mapped roadside data. This also allows the immediate printing of a map and information for any specific road in the Shire in a presentation format. The system also allows for the continual upgrading or modification of roadside or species data without format constraints.

1.3.3 Management Plan and Management Prescriptions

The roadside management plan covers the general policy and guidelines developed by the Shire for the management of all roadsides. An attempt has been made to standardise management across the municipality (through the adoption of a Code of Practice).

Where additional information is required for a specific road, this is contained in a management prescription. Draft Management Prescriptions have been developed for all roads. A management prescription relates to a specific road (in the case of highly significant roadsides) or more commonly, a cluster of roads with similar management requirements (with the same vegetation community, soil type and rainfall). Low conservation value roadsides are covered by generic management prescriptions.

The key elements of the management plan are:

- a discussion of roadside issues;
- a map of the Shire showing the conservation rating of all rural roads, location of utilities and services, historic monuments, features or markers, location of rare plants or animals, material stockpiles, erosion and salinity problems;
- Council policy and regulations regarding use of roadsides;
- a Council road management Code of Practice and guidelines for roadside management; and
- monitoring requirements to gauge the effectiveness of the plan.

The key elements of each management prescription are:

- management methods to be employed (burning/slashing/spraying/grazing/cropping) and a statement of requirements (e.g. slasher height, mow around any regeneration, protection of remnants);
- timing and frequency of works;
- limit of works (e.g. to back of table drain, fence to fence, roadside verge only); and
- requirements to protect remnant vegetation (identification prior to works/signage/fencing/rare plant requirements/revegetation and natural regeneration requirements/techniques to stabilise any land degradation problems (erosion, salinity etc).

The management prescription should be considered in conjunction with the strip-map information and species list for each road derived from the MapInfo© and Flora Databases. The three sheets together in effect form a self-contained plan for the management of each road.

1.4 Management Issues and Policies

Roadside planning can be considered under four headings or issues *(RCAC 1999)*

Functional	Road construction & maintenance, fire management, installation & maintenance of utilities, stack sites, sand, soil & gravel extraction, firewood removal, movement of machinery.
Land Management	Grazing & stock movements, cropping & haymaking, pest plant & animals, ploughing, cultivating & grading, revegetation & site rehabilitation.
Culture & Recreation	Cultural, heritage & archaeological, horse riding, visual amenity & landscape values, wayside stops.
Conservation	Protection of rare and threatened flora & fauna, indigenous vegetation remnants, wildlife habitat & corridors and native grasslands and grassy woodlands.

1.4.1 Aims

- consistent roadside management practices and procedures across the region;
- greater efficiency through improved work practices and techniques;
- consistent signage and marking of roadsides across the region; and
- community participation in management and protection ('Roadside Watch')

(Source: LINCS Strategy (April 1996)

1.4.2 Guiding Documents

The NSW Department of Main Roads has prepared a Code of Practice for works on roadsides, which is a good guide for councils to follow, entitled '*Guidelines for control of sedimentation in roadworks*.'

The EPA publication, '*Construction Techniques for Sediment Pollution Control'* (May 1991), provides the technical information. This publication should be a standard reference for all civil engineers, land managers, planners and officers involved in construction of roads or other works that impact on waterway management.

The RCAC has prepared an excellent video entitled, '*Managing Linear Reserves'*, which gives many examples of management techniques to minimise the impact on roadsides. Council and VicRoads staff (management and road workers) should view this video as part of a training program. The RCAC runs training programs on a semi-regular basis.

The CFA '*Roadside Fire Management Guidelines*' (2001), covers the integration of fire prevention work with other roadside issues. This document plus the CFA '*Municipal Fire Prevention Planning Guidelines*' (May 1997), are the key documents regarding fire management on roadsides.

The '*VicRoads Roadside Management Guide*' is the key reference to guide all works affecting roadsides. The '*VicRoads Roadside Handbook. Environmental Guidelines for Road Construction and Maintenance Workers*' is a handy pocket guide form of the VicRoads Roadside Management Guide.

SECTION 2: CODE OF PRACTICE FOR ROADWORKS AND GUIDELINES FOR ROADSIDE MANAGEMENT

2.1 Introduction

A Code of Practice will be adopted by the Shire to ensure all roadworks have the minimal impact on roadsides and remnant vegetation. The roadside treatment shall be considered as part of the design of all road construction or maintenance jobs rather than as a separate issue (integrated planning). Works such as cleaning of spoon drains, road reconstruction, stockpiling of materials, parking of vehicles, siting of borrow pits and the construction of firebreaks, all impact on road reserves. Defining work zones is a central theme of the Code. These can be built into every tender document along with a range of other environmental requirements. Staff training is essential to ensure compliance with the Code. Major roadworks in sensitive areas should be advertised in public notices to ensure adequate public consultation.

A permit is required for any new works on a roadside involving the removal or trimming of vegetation. A blanket permit will be used to cover trimming of vegetation between the road edge and the outer invert of the table drain (or white post where drains are not present) and the removal of dangerous trees within this same zone. These maintenance works are essential to maintain safe public passage on the roadway. All other works involving vegetation removal will require the preparation of individual permits with consultation from the Department of Natural Resources and Environment as appropriate.

The key elements of the Code of Practice are summarised below followed by guidelines for the management of vegetation on roadsides.

2.2 Road Maintenance

2.2.1 Minimise disturbance and clean up the site as works progress.
2.2.2 Vehicles should be cleaned after use.
2.2.3 Direct spoil to the road rather than the spoon drain or vegetation. Collect and remove material to a suitable designated dump site to prevent the spread of weed seed. Ensure material is not lost from trucks en route, using covers if necessary.
2.2.4 Woody weeds should not be chipped but removed to a dump site taking care not to dislodge or spread the seed in the process.
2.2.5 Use the smallest suitable machine, specialized equipment such as a rotary drain cleaner which can clean drains from the road pavement should be considered where the spread of weeds from spoil is a low risk, clean machinery after use, no work when too wet.
2.2.6 Maintain table drains and existing mitre drains to manage flooding and erosion problems.
2.2.7 Use mitre drains to disperse excess water off the roadway. Create new mitre (Cut-off) drains only after consultation with site supervisor.
2.2.8 Determine suitable locations for stockpiles and dump sites prior to works (not in high conservation roadsides or drainage lines). Use degraded areas, store topsoil do not bring in material, use existing stockpile sites where possible.
2.2.9 Control weeds on stock piles.
2.2.10 Topsoil can be stored and reused where works occur along High Conservation Value roadsides as it will contain native seed. Soil should be reused as soon as possible to retain the viablity of the seed.
2.2.11 Topsoil on degraded sites should not be respread as it will contain a large amount of weed seed and is generally better buried so as not to contribute to future maintenance requirements.
2.2.12 Locate borrow pits in works area and minimise the number of pits used. Do not disturb vegetation.
2.2.13 Grading and other earthworks: Avoid working within the drip line of trees to reduce damage to roots, trunk and limbs. Removal of soil from under trees causes substantial damage to surface roots. As a rule of thumb tree roots extend out at least 2.5 times the height of the tree.
2.2.14 Never use a backhoe bucket or other earthmoving machinery to “trim” branches - use a saw and the approved 3-cut method.
2.2.15 Grade high conservation roadsides first and move onto low conservation roadsides rather than the reverse to limit the spread of weeds. The same applies when slashing roadsides.
2.2.16 Vegetation beyond the table drain should be retained and not disturbed, particularly on medium-high conservation roadsides. On some low conservation roadsides removal of woody weeds on the roadside may be able to be integrated into the works.
2.2.17 Service machinery without polluting the site.

2.3 Road Construction - New Works

2.3.1 Construction of roads should limit as much as possible the impact on remnant vegetation.
2.3.2 For new roads or undeveloped roads - offsetting the road to one side of the road reserve is advocated to conserve a broader strip of vegetation. In cases where there is particularly important vegetation but where adjoining farmland is cleared it may be possible to acquire a strip of cleared land for the new road thus leaving the road reserve intact.
2.3.3 Where significant remnant vegetation exists consider a meandering road to limit the removal of vegetation, control speed and provide scenic interest.
2.3.4 Obtain permits to remove native vegetation from DNRE.
2.3.5 Clearly mark the limits of the construction zone with pegs and stay within it.
2.3.6 Limit the use of temporary tracks (haul roads, exit roads etc). Use the roadway wherever possible and rehabilitate any sites after use.
2.3.7 Park machinery and establish stockpiles on cleared land, wayside stops or private land.
2.3.8 Plan vegetation removal to enable prior seed collection. Millable timer can also be salvaged. Other native vegetation waste can be chipped and used on site as it will contain seed.
2.3.9 Store and reuse topsoil in areas with good native vegetation. Do not use topsoil in degraded areas as it contains weed seed.
2.3.10 Control siltation and erosion through design (gentler slopes on shoulders and batters, rougher batters to hold soil and seed), minimising vegetation removal, establishment of adequate drainage systems, use of matting and sediment traps as appropriate. Sterile Rye grass can give a fast inexpensive cover to stabilise sites whilst other species recolonise. Retain the natural drainage lines. Native grasses and sedges are ideal for slopes and table drain surfaces.
2.3.11 Do not “tidy up” vegetation after construction on high conservation value roadsides. Leave fallen material, rocks, leaf litter and other debris. On low conservation roadsides subject to slashing, some tidying up may be appropriate to remove potential hazards.
2.3.12 Do not grade under tree drip lines. Do not place material around tree trunks.
2.3.13 Avoid mechanical damage to tree trunks and limbs.
2.3.14 Clean down machinery before moving to another site.
2.3.15 Subdivisions should be managed to prevent unnecessary removal of any remnant vegetation from roadsides or private land. Shared road exits can limit the number of road openings required.
2.3.16 Borrowing of material such as gravel from roadsides is generally discouraged as the disturbance to the native vegetation, potential run-off and erosion problems, future management of the roadside after disturbance and costs of revegetation will generally out-weight the cost of trucking material in from a quarry. Movement of stored material between roadwork sites should be done with consideration to the potential spread of weeds and soil pathogens between sites.

2.4 Road Reconstruction

Road reconstruction will often involve widening or realigning sections of road and significant impact upon roadside vegetation is therefore possible. Particular attention needs to be given to the presence of shrub and ground cover species. Road realignment and improved site distances increase traffic speed. This may create a hazard to motorists.

2.4.1 Consider the impact of re-alignment on speed increase through better sight distances. Do current traffic volumes warrant road realignment?
2.4.2 Consider the loss of vegetation, soil disturbance and erosion caused by reconstruction and take steps to limit effects.

2.5 Management of Services

2.5.1 Notification

For effective roadside management, it is imperative that service instrumentalities and the council have good lines of communication. Council will encourage notification by instrumentalities of any proposed works as a courtesy where not legally required (as in the case for Telstra). In most cases, an application for a planning permit is required at least for any new works. This will allow better coordination of the management of roadsides. Benefits include the prevention of similar works by organisations or destruction of recently completed works. Road maintenance works may be able to be postponed if service installation requires the excavation of a section of road. Council can also have a greater input into the location of services. Service providers should comply with Council's Code of Practice for works or a similar standard (such as VicRoads).

2.5.2 Powerlines

New or replacement services should be established on cleared land wherever possible. Where services occur on roadsides, the clearance of native vegetation should be kept to a minimum. The disturbance of understorey vegetation and soil (e.g. through intrusion of vehicles and machinery) should be kept to a minimum. The area under powerlines should be maintained in native vegetation rather than subject to constant disturbance through slashing, blanket spraying or burning. Disturbance encourages weeds and the maintenance of areas under powerlines as bare earth (ploughed, sprayed etc) is unsustainable and strongly discouraged.

The ongoing requirement to provide a safe clearance space for powerlines is a major factor affecting the management of roadsides. The location of powerlines on roadsides was recorded during the roadside survey to ensure proposed management prescriptions for each road are compatible with the powerline clearance controls. Planting of trees that grow >4 metres in height will not be approved by Council on any road under powerlines. Under powerlines the components of the vegetation under 4 metres in height should be restored. A dense shrub layer will limit problems of Eucalypt seedlings appearing (future management cost to maintain the clearance space).

Council will encourage the use of Aerial Bundled Cable (ABC), undergrounding and the placement of powerlines across cleared/private land where there is a substantial impact on significant remnant vegetation. Other alternatives include higher poles, offset cross arms and "zig zag" construction.

Council will scrutinize work by Powercor to ensure it complies with the Powerline Code of Practice.

2.5.3 Communication, Gas, Water and Sewage

Installation of new services or maintenance of existing services can damage native vegetation and spread weeds. Council notification can help ensure any effects are limited. The follow-up spraying of any weeds along a new service is encouraged.

Revegetation of areas disturbed by the placement of services should be carried out as part of the operation. In some instances, natural regeneration will suffice, however in weedy sites revegetation is critical.

2.6 Fire Prevention and Vegetation Management Guidelines

The roadside management plan has been developed in conjunction with the adoption of the new Moorabool Shire Fire Prevention Plan to ensure consistency in approach.

2.6.1 Objectives of Roadside Fire Management

(Primary Source: Roadside Fire Management Guidelines (2001) CFA)

1. Prevent fires starting on roadsides. Most effectively done by altering human behaviour which causes accidental ignitions and by maintaining a graded or slashed road verge.
2. Contain Roadside Ignitions. Fuel load, wind or spotting activity limit effectiveness. Active suppression is required.
3. Manage the safety of road users in the event the fires become large and uncontrollable. When fires become large, the ability to suppress them becomes difficult, if not impossible. In these circumstances, maximum effort must be expended on providing safety to people and their assets. Roads are not good places for people to be during the passage of a fire front. Efforts should focus on reducing the likelihood people are on roads in these conditions. Fuel reduction measures will not make a roadside safe in the event of wildfire.
4. Provide safe and effective control lines. Roads may provide an opportunity to limit the spread of large fires through suppression activities. They provide good access and an existing fuel-free, continuous break, which can be useful for successful suppression. Direct frontal attack on running wildfires is unlikely to be safe or effective unless there is considerable modification in the fire intensity as it approaches the control line. Any spotting activity will limit the success of a control line as will the presence of elevated fuels, which may result in direct flame impingement across the road. Treatments which provide or utilise large fuel modified areas abutting roads will provide the most safe and effective control lines. A treed roadside in a cleared landscape (cropping or pasture) is unlikely to be a suitable place to have a control line. Where the vegetation is similar on the roadside and surrounds (i.e. mostly cleared) the roadside may be suitable in areas of identified wildfire risk because it at least provides access. If the roadside and surrounding area are both forested, the road reserve has little value as a control line. Roadsides meeting all the criteria for an effective control line can be utilised as strategic breaks and built into the Brigade plans and the Municipal Fire Prevention Plan. There is no point including roadsides which cannot provide a realistic control line.
5. Recovery from fires which affect roadsides. Restoring normal function to a community following a major wildfire will help mitigate the effect of the fire on the community. The road infrastructure is an important asset to the community and its serviceability following a major fire will be critical to the community's recovery.

The CFA guidelines focus on identifying wildfire risks which compromise community safety and identifying any objectives in relation to roadside fire management which may reduce risks. These must be considered in regard to whether the objective can be practically achieved and by what treatment, the cost of treatment and impact on other roadside objectives. Treatments meeting these criteria can be built into the Municipal Fire Prevention Plan and Roadside Management Plan process. In addition, roadsides with a documented high level of ignitions should be targeted.

2.6.2 Fire Breaks on Roadsides

2.6.2.1 Strategic (primary) firebreaks

The purpose of a strategic fire break is to provide an opportunity for fire fighters to contain a fire front to limit the fire's spread into a populated area (a control line). This may involve back burning. Fire prevention has as a focus the protection of life and property. Strategic breaks are not designed to prevent the spread of wildfire, but in conjunction with suppression activities may be successful. The removal of fine flammable material and highly flammable weeds such as Gorse and Phalaris is desirable to improve the effectiveness of the break as a control line. Trees can dramatically reduce the effectiveness of a roadside as a control line. A series of roadsides have been identified as strategic breaks by the Brigades across the Shire. Refer to the Municipal Fire Prevention Plan database for further details of particular roadside information.

The management techniques proposed for each strategic break have been developed by the Shire in consultation with local Fire Brigades and the Country Fire Authority as part of the revised Fire Prevention Plan and are based on the techniques outlined below.

It is the basis of both plans that the requirements for maintenance of strategic breaks and the techniques required to more effectively manage remnant vegetation can be complimentary. Indeed, some strategic break roadsides regularly burnt by Brigades also have a high conservation rating. With this in mind, this plan supports the retention of strategic breaks where the dual needs of conservation and fire prevention can be accommodated effectively.

2.6.2.2 Some general principles governing fire breaks

- Locate breaks on private land wherever possible rather than on treed roadsides. Use low conservation roadsides in preference to medium or high conservation value roadsides.
- Avoid areas of regenerating trees or shrubs during fuel reduction burns. Consider the frequency of fuel reduction burns both in respect to the build-up of bulk material and the requirements of native vegetation regeneration.
- Fuse breaks or lateral breaks in the treed vegetation of a roadside have been advocated to prevent the roadside acting as a fuse in spreading fire. Depending on the orientation of the road, fire will rarely travel in the same direction as the road. In these cases the fire is likely to move quicker through surrounding farmland than the road reserve due to the higher wind velocity and availability of fine material (dry grass). Fuse breaks are not advocated as they may create more problems than they solve through the increase in wind speed at any break in the vegetation. Where fuse breaks are considered they should be created in conjunction with a driveway or existing opening in the vegetation.

2.6.2.3 Graded or ploughed fence line breaks

Graded or ploughed firebreaks on treed roadsides are ineffective, encourage weeds and damage remnant vegetation. Wherever possible, firebreaks should be located on cleared private land rather than on treed roadsides or in remnant vegetation. Fences, however, should be kept free of debris.

Where a well vegetated roadside adjoins cleared farmland, any required fence line firebreak should be established on cleared land rather than through clearance of roadside vegetation to be of any benefit in controlling the spread of fire.

Methods which involve repeated soil disturbance are not favoured because of likely problems with weed invasion and erosion. A reasonable degree of fire protection can usually be attained by focusing fuel reduction activities upon exotic vegetation on roadsides. A ploughed fire break (PFB) will not stop the spread of fire any more effectively than the road formation itself. A PFB may stop a small fire which has started on the roadside from spreading past the fence onto adjoining property on days with mild or controllable conditions. On the days with higher fire danger or risk, the PFB will have no effect. The continuing use of PFBs on vegetated roadsides is not supported by this plan. This is consistent with the VicRoads Roadside Management Plan for the region which states, "ploughed fire breaks will not be permitted where there is native vegetation on the road reserve" and, "All firebreaks by written permit".

Ploughed fire breaks on roadsides are currently used in some sectors of the Shire. Generally breaks are constructed by individual landholders rather than as part of the local fire brigades strategic firebreak system. It is recognised that in some areas of the shire, such as Balliang and Mt Wallace, PFBs are constructed to protect fences so that the brigades can effectively burn the balance of the roadsides. In this manner, the PFBs form part of the strategic firebreak as covered in the Municipal Fire Prevention Plan.

It is felt that the labour involved in constructing PFBs could be better utilised on measures likely to be more effective such as fuel reduction burns or the removal of Phalaris or flammable woody weeds such as Gorse from the roadside. The phasing out of PFBs is advocated. No new PFBs should be constructed (a permit is required for any works on roadsides). At the very least, existing PFBs should be re-constructed each year in exactly the same location rather than disturbing or degrading further roadside vegetation. The spread of weeds such as Serrated Tussock through the use of PFBs is a serious concern. Once a PFB is constructed, some form of active management is required over the following years due to the weed bed created through the disturbance and cultivation. This means either perpetuation of the PFB (ploughing again), spraying of weeds in the strip or revegetation. Graded fire breaks are preferable to ploughed fire breaks as weed establishment is more difficult in the uncultivated strip (less nutrients, water infiltration and greater soil compaction).

The aim of the Roadside Management Plan is to move away from labour intensive or active management of roadsides. A more sustainable and cost-effective long term management is advocated involving the balancing of fire risk with the management of native vegetation and weeds.

Any larger fuel-reduced zones to be managed as refuge areas for motorists in a bushfire situation should be established on cleared or highly degraded sites. Slashing or mowing are preferable methods of maintaining fuel breaks to ploughing or grading.

[An article entitled, 'Firebreaks and roadside remnant vegetation' (LFW News Vol. 1 No 9) by Stephen Platt and edited text of a talk by Steve Petris, a Country Fire Authority officer, to the RCAC on the nature of wildfire and the usefulness of firebreaks is reproduced in Appendix 6]

2.6.2.4 Road verges

The road reserve between the edge of the seal and the white posts should be maintained such that it does not present a fire hazard. Keeping grass mown on verges will help prevent a fire starting through long grass touching a catalytic converter of a car parking on the edge of the road. It also limits the chance of a fire from a cigarette butt carelessly thrown from a passing car window. Note that this zone is considered part of the roadway, not the roadside.

2.7 Community Fireguard

A greater emphasis on the protection of life and property is advocated rather than focusing solely on the construction of strategic fire breaks along roadsides. Community Fireguard is an effective program where residents become more aware of fire risks and the steps required to survive wildfire. Community Fireguard members work together to ensure they are prepared for any fire incident. A communication network between residents is a key to surviving fires. Many steps can be taken to ensure property is protected, including the removal of hazards and the installation of sprinkler systems.

There are certain areas within the municipality that are particularly vulnerable to wildfire due to restricted access and the nature of the terrain, which limits the ability to have effective strategic breaks in place (for example narrow roads in forested areas). Communities in the areas of Dales Creek Estate, Blackwood township, the Lal Lal subdivision and Long Forest Road are strongly urged to participate in the program. Areas affected are invariably some of the most attractive areas of the Shire in which to live. A sensible approach and recognition of the threat of wildfire is required by the community if the areas are to retain their natural beauty and pleasant living environment, which attracted residents to these areas in the first place.

The Shire currently issues fire prevention notices to residents which cover works to remove bushfire hazards. The development of land management plans by landowners to cover their property and roadside boundaries is recommended. Plans should be developed in conjunction with council and cover fire prevention and weed control steps. The plans, in effect a contract between the shire and residents, would negate the need for annual fire notices. This would save considerable expense and allow residents greater input and scope.

2.8 Roadside Maintenance

A discussion of the relative merits of control methods to reduce fire risk and maintain native vegetation.

Methods should be seen as a series of management tools. Each is appropriate under a certain set of circumstances or conditions. The careful use of these tools is the key to maintaining and enhancing native vegetation and improving the effectiveness of fire prevention activities. The application of these tools, either individually or in combination, is the basis for a series of management prescriptions that have been prepared for each of the 400 roads and 1800 different roadside segments within the Shire.

2.8.1 Clearance for Road Safety

2.8.1.1 Low shrubs and ground covers generally do not reduce road safety and, where possible should be retained in safety clearance zones. Ground cover species will help prevent weed invasion and erosion and therefore reduce roadside management costs.

2.8.1.2 Prune trees using the three-cut method. Never "prune" using earthmoving equipment. Damaged trees are liable to fall on a road and are a public danger. The use of "hedge trimming" equipment is not recommended as it damages vegetation which may encourage coppice growth and increase future maintenance requirements.

2.8.1.3 Removal of vegetation - use a quick lift platform, truck and a mulching machine to cut back trees that are encroaching on the roadway. Mulched Eucalypt material can be used to suppress weeds at revegetation sites or be given or sold to nearby residents. Local seed collectors may be able to harvest seed prior to mulching of cut branches. Material should not be pushed onto the roadside smothering remnant vegetation. Machinery should remain on the roadside as far as practicable. Always fell timber in a direction that minimises damage to surrounding vegetation.

2.8.1.4 A 5-metre (maximum) height clearance is suitable for all roads.

2.8.1.5 Refer all applications to remove native vegetation from roadsides to DNRE for comment or approval other than routine maintenance tasks. Routine tasks include trimming of vegetation between the road verge and outer invert of the table drain and removal of unsafe trees from this area.

2.8.1.6 The removal of trees (>100mm base diameter) which present a hazard to motorists through compromising sight distances or run-off areas shall be considered with regard given also to the importance of the vegetation.

2.8.1.7 Trees with a potential trunk diameter >100mm will not be planted by the Shire or approved for planting between the table drain outer invert and road edge. Tree planting beyond this zone on the roadside may be approved after due consideration of the suitability of the proposed species, width of the roadside and speed of traffic. A 3- to 6-metre clear zone (area without trees) is desirable on many arterial roads to provide a safe run-off area.

2.8.2 Burning

In terms of remnant vegetation management, burning is generally the preferred option over slashing and other treatments. This is particularly true for native grassland roadsides. In woodland and forest situations, burning can still be utilised as an effective technique to reduce litter levels, provided trees, shrubs and especially clusters of seedlings are wetted down prior to burning or if the section is avoided entirely. Burns in native grassland also tend to be of lower intensity and are easier to control than burns in (predominantly) introduced grass.

A burn of native grassland in spring before the fire season is an effective way of removing bulk dead material. It will also still allow the summer growing native grasses to reproduce. Themeda, the main species along with Tussock Grass, Weeping Grass, Spear Grasses and many others, remain green until seeding in late summer. Fire encourages diversity in the grassland through the creation of inter-tussock spaces where forbs may grow. Management in this way can help knock out the (mostly annual) highly combustible introduced grasses which have usually dried out and seeded by Christmas. Burning native grasslands can also be carried out in autumn to open up the grassland for forbs. It may encourage annual pasture grasses which will be unaffected by the timing of the burn. However, if the grassland is burnt on a regular basis in autumn it benefits the mostly perennial native grasses and forbs over the mostly annual pasture grasses, flat weeds and thistles.

2.8.2.1 The objective of a burn from a fire prevention perspective is to remove fine material (< 6mm diameter) which has a major contribution to the rapid spread of wildfire. Larger material should remain on the roadside.

2.8.2.2 Any burning activities must be consistent with fire prevention works outlined in the Fire Prevention Plan rather than occur on an ad hoc basis. A burn every few years may be sufficient to limit fuel loads.

2.8.2.3 When to burn roadsides (burning regime): The timing of a burn is often limited by grass being too green until it is too late to burn (i.e. requiring burning at the height of the fire season). A pre-Christmas burn will prevent the seeding of most introduced grasses and weeds. Some brigades spray grass in November to facilitate a December burn. This is not appropriate where significant native grass exists. Spraying of introduced grasses and subsequent burning may be beneficial to native grasses if handled carefully. It is however, much easier and cheaper to burn the areas in autumn which will reduce the bulk before the next season. This is the time grasslands would have burnt "naturally" and if done on a regular basis will keep the bulk down and select against introduced grasses and weeds which provide the major fire risk.

2.8.2.4 Position and design of fire breaks: No ploughed, graded or sprayed firebreaks on roadsides – burning or slashing are the preferable options.

2.8.2.5 Authorization: All works to be approved by the Fire Prevention Officer and be in accordance with the Fire Prevention Plan.

2.8.2.5 Burning is the recommended management option for native grasslands on roadsides which are Strategic Firebreaks.

2.8.2.6 A 'cool' burn is preferable in all cases. This may require some damping of vegetation prior to burning or careful selection of conditions.

2.8.2.7 A burn or some other form of biomass reduction every 5 years in a Themeda native grassland is essential to maintain species diversity and grass health. A burn every 1-2 years is recommended where this has been carried out historically. A burn every 3 years is optimal.

2.8.3 Spraying

The practice of blanket spraying of roadsides is strongly discouraged. Spraying in this manner is not sustainable. It is extremely damaging to any remnant vegetation and locks in a cycle of maintenance of annual weeds and introduced grasses as nothing else can survive between seasons. Management by this method ensures the weediness of the roadside and a requirement for high maintenance. Other options should be considered.

Experimentation with light spray applications may knock out some annual introduced grasses and damage perennial grasses such as Phalaris but allow perennial native grasses to remain. Correct timing is essential. Spraying should occur whilst the introduced grasses are actively growing (spring) and most native grasses such as Themeda lie dormant. Spraying beyond November is likely to have the reverse effect and wipe out native grasses. Early ripening native grasses such as most Wallaby Grasses are also likely to be adversely affected by a spring spray.

Another more refined method involves the use of a large roller style "wick wiper" set at a critical height to hit pasture grasses and pass over dormant native grasses such as Themeda. Once again, correct timing is essential. October-November is probably ideal as the vigorous growth of the annual pasture grasses can be targeted prior to seed set.

Spot spraying of noxious weeds and Phalaris on roadsides is strongly encouraged. Weed spraying forms a key part of the management of fire risk and protection of remnant vegetation. Cutting and painting individual woody weed stumps is a useful technique where infestations are light or scattered.

2.8.4 Slashing

Slashing of road verges is desirable on all roads, in particular strategic breaks to prevent grass ignition from the catalytic converters of cars. Slashing of roadsides beyond the table drain may not provide any benefit in terms of fire prevention. Grass cut in summer may look 'neater' and appear to offer a reduced fire risk, but unless cut material is removed from the roadside the effect may be the reverse. Fine dead material lying on the ground offers the greatest fire risk (a concentration of fine material is precisely what is needed if you want to light a fire). In the drier areas of the Shire, slashing should not be conducted in summer and alternative more effective treatments sought. In wetter areas such as Blackwood and Greendale, the slashing quickly promotes further growth and a greening-up of grass so the technique creates less risk. Note, the road verge and table drain also tend to stay greener than the road reserve, so slashing of this area doesn't present the same problems.

2.8.4.1 Consider alternatives to slashing such as spot spraying or removal of woody weeds and fuel reduction burning.

2.8.4.2 A minimum slasher height of 100 mm should be used on roadsides (lower on verges) with higher settings on roadsides with remnant native grassland.

2.8.4.3 Do not slash areas of native grass where burning is a viable option. Use slashing as a technique on roadsides consisting of introduced grasses only. Slash whenever possible prior to seed set by herbaceous weeds and pasture grasses. Slash before seeding of all annuals.

2.8.4.4 Explore options of removing cut material or bailing hay (where viable) as a means of reducing fire risk where slashing is the only option. A gradual reduction in nutrients over the years through this method may also reduce the bulk and vigour of introduced grasses and encourage the sparser native grasses. (Native grasses are generally greener through summer and have less bulk).

2.8.4.5 When slashing, take care to clean machinery before moving from roadsides with known weed problems. No slashing where weeds such as Wild Garlic, Watsonia, Serrated Tussock or Chilean Needle Grass occur after seed set. Onion Grass (*Romulea rosea*) is now possibly the most widespread plant in Australia, spread principally through slashing and the movement of machinery along roadsides. It was noted on almost all roads in the Shire. In most cases, slashing between August and November should prevent weed seed dispersal.

2.8.4.6 Avoid slashing where tree and shrub seedlings are present

2.8.4.7 Where slashing of roadsides containing some native grass is unavoidable, the slasher height should be set at >200 mm.

2.8.4.8 Slash to the table drain, or if deemed necessary, 1 slasher width up to the back of the table drain.

2.8.4.9 Removal of rocks is not recommended to facilitate slashing. Rocks provide habitat for Fat-tailed Dunnarts, Skinks, the rare Legless Lizard and many other animals.

2.8.4.10 A fire will travel across a grassed roadside at the same rate irrespective of whether the roadside has been slashed or not (where grass is 100% cured). Modifying the grass fuel through grazing or slashing will however reduce the flame height of the fire.

2.8.5 Ploughing & Scraping

Ploughed or graded fire breaks lead to a greater fire risk the following year through the soil disturbance and subsequent weed invasion. Soil disturbance dramatically increases the breakdown of organic material in the soil resulting in a much greater nutrient availability. More light reaches the ground (less plant competition and shading) and water can infiltrate the broken up soil more readily providing an ideal environment for weeds. Soil disturbance is the most damaging activity to native grasslands. Creating fire breaks of this kind on a roadside "locks in" this form of active maintenance through the creation of a greater bulk of material which must be controlled. It is also one of the main ways weeds are able to spread along roadsides. This in turn has an economic impact on farming enterprises. The cost of containing the spread of the weeds should also be considered. Ploughing or scraping, however, do have potential application on low conservation value roadsides where there is a major weed problem. Ideally, this will also involve revegetation as described below.

Removal of vegetation and the top 100-200 mm of topsoil by scraping has application on totally degraded roadsides with no remnant vegetation as part of a revegetation program. Scraping to remove the topsoil also removes the weed seed store in the soil and significantly reduces nutrient levels. This allows a fresh start and favours native species with a lower nutrient requirement and will result in a sparser community. In addition, the roadside can then be deep-ripped and direct-seeded with local tree and shrub seed or planted with cells of native grass. The lower nutrient levels in the sub-soil lead to lower rates of weed invasion and "tip the balance" toward the native trees, shrubs and grasses all of which are adapted to lower nutrient levels. Vegetation on the roadside will be sparser, posing a reduced fire risk.

A ploughed or graded firebreak is less effective than a bare earth break due to the presence of organic material. The effectiveness of a break is dependent on fire intensity and the width of the break. It is further reduced by the presence of trees, other vegetation and organic material (the fuel load).

2.8.6 Cropping Along Roadsides

Growing crops on roadsides is only a technique for consideration on low conservation value roadsides with no remnant vegetation. It can be a practical means of reducing current maintenance costs involved in weed suppression or fire prevention. Sowing the roadside to Lucerne, which is green in summer, will significantly reduce the fire risk. It can be cut and bailed to remove bulk as well as provide a benefit to local farmers. As a perennial, Lucerne prevents the need for the soil disturbance required with annual crops.

Use of annual crops, however, may gradually reduce the weed seed in the soil at the site by out-competing weed seedlings. Bailing of material again reduces fire risk in summer. Cropping can been used as an interim step in the long-term revegetation of a roadside as a means of weed control or a solution itself to the management of a degraded roadside or provision of a suitable firebreak.

Licence fees for cropping of currently degraded roadsides should be based on recognition of the benefits provided in fire prevention and weed control. Control of noxious weeds is a licence requirement.

2.8.7 Grazing of Roadsides

Grazing of stock in areas of native vegetation can have a severe impact, damaging existing plants, encouraging weed invasion, compacting and polluting the soil, and preventing natural regeneration. Many roadsides have been degraded to the stage where they consist only of mature trees over weed grasses. The native understorey layers have been lost and the pasture grasses prevent or out-compete any regeneration of native species. In high bushfire risk areas the grasses may present a serious fire hazard. In this situation, controlled grazing could be an acceptable means of hazard reduction. Dung from stock spreads weed seed and nutrients. Low levels of grazing (e.g. 1 dse) can help provide a reduction in biomass in native grasslands and give a similar effect to a cool burn. However, stocking rates on roadsides have historically been much higher and have had a negative effect. It is not practical to graze roadsides at such a low rate.

2.8.7.1 Grazing restrictions: No grazing on medium-high conservation value roadsides.
2.8.7.2 Livestock management. Permits are required for movement of stock other than direct transfer between paddocks. No feeding of stock on roadsides is permitted during transfer.
2.8.7.3 Droving is not permitted in the Shire. Droving is defined as the movement of stock on a roadside in excess of one day.
2.8.7.4 Areas which are suitable for grazing/cropping/slashing and bailing will be identified and advertised. Permits are required in all cases. A permit from Council is required to do any works on a roadside.

2.8.8 Passive Management

The best treatment for many high conservation value roadsides may in fact be to do nothing. "Nothing" doesn't cost anything; it doesn't use up resources or take any time. It also creates no disturbance so doesn't encourage weed invasion. A pristine roadside (for example with an intact overstorey of Eucalypts with an Acacia shrub layer and pea, heath or native grass understorey) is inherently very stable. Any mechanical disturbance will bring in weeds and increase fire risk. This will lead to ongoing maintenance costs where currently there are none. Leave logs, rocks, litter and other material.

An occasional burn is the only management option that should be contemplated (more so on Themeda grassland sites which require regular biomass reduction to encourage biodiversity through the maintenance of inter-tussock spaces and ensure grass remains healthy). A burn will encourage natural regeneration. Significant weed invasion after fire is unlikely in such an intact community. On forested roads, a fifty year burning regime is more than adequate and at this frequency is likely to be covered by the incidence of wildfire. Forest succession after wildfire will occur, meaning that grasses and herbs will first dominate followed by shrubs. Finally, seedlings of Eucalypts and Wattles will suppress a lot of the understorey. Many of these stages have a fire risk at least equal to the current stable climax community. Burning is not recommended unless natural regeneration needs to be encouraged. A cool burn through the ground layer can be considered to reduce debris (fuel loads) and provide the opportunity for regeneration.

Grassland communities dominated by Poa (Tall Tussock grass) are also best left alone as a dense stand can help prevent weed invasion. Unlike Themeda, Poa tussocks appear to be able to last indefinitely without significant biomass reduction (Themeda may start to degrade after 5 years in the absence of grazing, slashing or burning). The requirement for biomass reduction is also greatly reduced on drier, less fertile sites. These grassland sites have low biomass and bare spaces anyway, so have little fire risk and are probably also best left alone. Typical species are Spear and Wallaby Grasses.

2.8.9 Revegetation of Roadsides

It is important that indigenous plants be used in rural road revegetation programs, using seed collected locally. Non-local plants, even if Australian natives, will disrupt the local ecology and may have the capacity to out-compete the local species and to become weeds. For roadsides in and around rural townships a more flexible approach to species selection may be adopted. However, care should be taken to avoid species which have the capacity to spread into nearby bushland. Revegetating with local trees, shrub, grasses and groundcovers can have the following benefits:

- improved aesthetics;
- weed and pasture grass suppression;
- restoration of degraded plant communities and wildlife habitat;
- improved connection of corridors;
- shade, shelter and wind breaks for adjacent land and travellers;
- stabilisation of land degradation problems; and
- lower long term maintenance costs.

The following points should be noted:

2.8.9.1 Priority areas for planting are potential wildlife corridors and linkages.

2.8.9.2 Replant near powerlines in accordance with guidelines.

2.8.9.3 Natural regeneration: On roadsides containing some remnants of native vegetation it may be possible to achieve revegetation through natural regeneration. Natural regeneration may be encouraged through the control of exotic weeds and grasses, by burning or by restricting current grazing or slashing practices.

2.8.9.4 Generally natural regeneration of native vegetation is excellent in the absence of grazing and slashing.

2.8.9.5 Weed and pasture grass control dramatically increases establishment rates of regeneration or planted seedlings.

2.8.9.6 Where natural regeneration is not an option, direct-seeding may be a cheap and effective approach using seed collected from nearby. Site preparation is essential for satisfactory results.

2.8.9.7 Planting on roadsides by residents: A permit is required to plant on roadsides. Council will consider the suitability of the species, impact on sight distances, fire prevention, services, road structure and the safety of road users. Only indigenous species will be considered on rural roads with the exception of historic avenue or commemorative plantings. Wholesale tree planting in native grassland communities will not be approved.

2.8.9.8 Tubestock or seedlings of trees and shrubs and cells of native grasses are recommended as the most cost-effective planting technique given price and success rates. As a general rule, the smaller the seedlings the quicker the establishment as roots are not compacted.

2.8.9.9 Residents are requested to consider the siting of private plantations such as a windbreak, shelterbelt, row of Pines, etc. along the inside of fence lines with regard to the impact on existing medium - high conservation value vegetation on the roadside. Advice should be sought on the effect on native grasslands. Careful species selection may add to the value of the roadside remnant by effectively broadening it and expanding habitat or diversity.

2.8.9.10 Seed collection guidelines: Where native vegetation must be removed for road construction or other works, seed collection should be maximized. In other cases, seed collection should be undertaken on road reserves with care not to damage remnants. A small amount of seed should be collected from a large number of individuals to ensure genetic diversity. No more than 10% of the available seed should be harvested from each tree or shrub. A permit is required from DNRE for collection on public land and permission is required from the road manager (usually a municipality or VicRoads).

Further Information:

Guidelines covering the collection of seed or the propagation of local plants are available from the Department of Natural Resources and Environment or Greening Australia. Powercor provide a guide to species to plant near powerlines. The "Wild Plants of the Ballarat Area" CD-Rom can be used to generate lists of suitable species for each area of the Shire and/or particular requirements such as height (near powerlines), erosion control or other uses. The CD also contains photographs, descriptions, seed collection and propagation requirements for each species. The Ballarat Region Seed Bank located at the Creswick Landcare Centre can provide a list of available local seed and seed collectors within the Moorabool Shire.

2.9 Protection of Remnant Vegetation and Biodiversity

Consider the use of any unused road reserves which are identified with conservation value or as potential Flora and Fauna Reserves and wildlife corridors. Existing roads that are no longer used or have minimal use (e.g. do not service any properties) should be considered for closure. These may have some application as corridors.

2.9.1 Roadside Marking

Based on the roadside survey, sites of high conservation significance will be marked or sign-posted where appropriate to assist the preservation and management of reserves. By identifying significant sections of roadside with marker pegs or signs, unnecessary damage is more likely to be avoided. Damage through ignorance is far more common than deliberate destruction of remnants. Standardized Significant vegetation signs and "no mowing" markers are available from the RCAC.

Example: In 1994, a small but significant stand of Snow Gum, *Eucalyptus pauciflora*, on the Glenelg Highway near Smythesdale was partly felled. This is the only stand on a major highway in the region. Appropriate signage to raise awareness of the significance of these trees may have prevented their destruction. Various levels of management were aware of the significance of the trees, however, this information presumably was not passed on to the ground staff. A sign can alert ground crews to seek further advice. This cluster of trees has been felled several times in the last twenty years despite it not affecting site distances or other considerations. Fortunately some coppice growth has occurred from the stumps. The Smythesdale-Scarsdale Landcare Group has subsequently erected signs which describe the vegetation. There has been no further damage to date.

2.9.2 Fencing of Remnants

Fencing is a technique for consideration to protect vulnerable remnants. There are some advantages and drawbacks to fencing a remnant. Fencing can prevent compacting of soil or mechanical damage to vegetation. It can allow revegetation in the absence of stock and rabbits (the latter if netting is used). Drawbacks include a detraction in aesthetic appeal, cost of materials and labour to erect fencing, unlawful removal of fencing materials and possible restrictions on future management practices or potential hazard to motorists.

Fencing may be appropriate as a means to protect rare plants or threatened plant communities. It may be better to fence part of the remnant so that monitoring of the effects can be carried out. Some remnant grassland plants and orchids for example require or respond to disturbance. Vehicle access to remnants can be restricted in other ways through table drain design or a post barrier

2.9.3 Wildlife Habitat

Shallow wetlands, rocks, fallen branches, prickly shrubs, trees with hollows all provide habitat for a range of animals and birds. Habitat values should be retained and improved rather than destroyed. Rocks can be placed in native grassland to provide habitat for Dunnarts and skinks. Dead or hollow trees can be retained as nesting sites for larger birds, possums and gliders. Fallen logs should be left on the roadside as they do not constitute a fire risk (it is the fine dry material which poses a threat). Prickly shrubs such as Sweet Bursaria, Tree Violet and Hedge Wattle can be encouraged to provide nesting sites for small birds and replace woody weeds such as Gorse. These aforementioned plants are often removed when "cleaning up" roadsides in the mistaken belief that everything with "prickles" is a noxious weed.

2.9.3.1 Maintain all artificial wetland areas on roadsides unless there is a detrimental effect to existing flora and fauna values.

2.10 Control of Pest Plants and Animals

Only one State prohibited weed has been recorded in the Shire (Black Knapweed). State prohibited weeds are controlled by DNRE when an outbreak is recorded on any land. Regionally prohibited weeds are the responsibility of DNRE on local roads and their agents (VicRoads or Councils) on declared roads or state highways. Regionally controlled weeds are also the responsibility of VicRoads or Councils on declared roads or state highways but adjoining landholders on all other (i.e. local) roads.

Landholders are also encouraged to control environmental weeds on roadsides that may have spread from their properties (plantations, windbreaks or gardens) such as Pine wildlings, Pampas Grass, Giant Honey-myrtle and Blue Periwinkle. Established pest animals such as rabbits and foxes on roadsides are also the responsibility of the adjoining landowner.

2.10.1 Weed Identification

Identification of weeds and native plants requires some experience and training but a good working knowledge can be quickly gathered. It is easier to learn to recognise the common woody weeds and pasture grasses than to attempt to learn all the native plants. As a general rule introduced plants are leafier, have softer foliage and larger leaves. Kangaroo grass is distinctive amongst pasture grass between February and June with its green/purple/brown foliage which contrasts with the bright green new growth of pasture grasses or straw coloured dead material at that time.

Table 1. ***Some regionally prohibited, regionally controlled and common environmental weeds on roadsides in the Moorabool Shire***

Common Name	Scientific Name	Category
Bent Grass	*Agrostis capillaris*	Environmental weed
Boneseed	*Chrysanthemoides monolifera*	Regionally controlled
Spear Thistle	*Cirsium vulgare*	Regionally controlled (C)
Hemlock	*Conium maculatum*	Regionally controlled
Pampas Grass	*Cortaderia selloana*	Environmental weed
Hawthorn	*Crataegus monogyna*	Regionally controlled (C)
English Broom	*Cytisus scoparius*	Regionally controlled (C)
Paterson's Curse	*Echium plantagineum*	Regionally controlled
Spanish Heath	*Erica lusitanica*	Environmental weed
Fennel	*Foeniculum vulgare*	Regionally controlled
Cape Broom	*Genista monspessulana*	Regionally controlled (C)
St. John's Wort	*Hypericum perforatum*	Regionally prohibited
Spiny Rush	*Juncus acutus* subsp. *acutus*	Regionally controlled
Boxthorn	*Lycium ferocissimum*	Regionally controlled
Horehound	*Marrubium vulgare*	Regionally controlled
Bridal Creeper	*Myrsiphyllum asparagoides*	Environmental weed
Serrated Tussock	*Nassella trichotoma*	Regionally prohibited (C) Regionally controlled (P)
Phalaris	*Phalaris aquatica*	Environmental weed
Prairie Ground Cherry	*Physalis viscosa*	
Red Ink Weed	*Phytolacca octandra*	Environmental weed
Pine	*Pinus radiata*	Environmental weed
Blackberry	*Rubus* spp.	Regionally controlled
Willow	*Salix* spp.	Environmental weed
Ragwort	*Senecio jacobaea*	Regionally controlled
Variegated Thistle	*Silybum marianum*	Regionally controlled (C)
Apple of Sodom	*Solanum linnaeanum*	Regionally controlled (P)
Chilean Needle Grass	*Nassella neesiana*	
Gorse	*Ulex europaeus*	Regionally controlled
Blue Periwinkle	*Vinca major*	Environmental weed

(C = Corangamite CMA Region, P = Port Phillip CaLP Region)

2.10.2 Weed Management

The value of native vegetation in suppressing weeds is now being recognised by VicRoads and Councils. In some areas, roadsides are being revegetated as a means of suppressing weeds and reducing maintenance costs in the long term. In areas with little or no remnant vegetation (no capacity for natural regeneration), it is less successful to control weeds unless it is done as part of a revegetation program (i.e. replacing the weeds with more desirable plants).

The following points should be considered:

2.10.2.1 Avoid off-target damage by herbicides. Remnant vegetation and crops can be affected by spray drift. Spray only when conditions are suitable and use appropriate sprays and nozzle sizes to limit the potential of drift occurring. Susceptible crops include grapes and tomatoes.

2.10.2.2 Use all herbicides in accordance with labels. Use the most appropriate chemical. Glyphosate- based sprays are the safest but will not control all noxious weeds adequately.

2.10.2.3 Ensure all operators are licensed.

2.10.2.4 Hand pull small infestations of weeds, except where it may encourage weed spread (avoid sprays).

2.10.2.5 Cut and paint stumps of woody weeds or use stem injection methods or ring-barking where appropriate.

2.10.2.6 Work from areas of low weed infestation in towards more densely infested sections.

2.10.2.7 Always ensure vehicles and machinery are cleaned before moving into areas of little weed infestation or High Conservation Value.

2.10.2.8 Pasture grasses and non-local Australian natives can also degrade native vegetation.

2.10.2.9 Pine wildlings will not re-grow if cut off at ground level. Care should be taken to not remove Black She-oaks which look superficially similar to pines at first glance. They occur together in some parts of the Shire. Pines removed from roadsides can be mulched. Consider the removal of small Pines for Christmas trees.

2.10.2.10 Use techniques such as burning, grazing, spraying and slashing with care to alter the balance between the success of weeds versus native vegetation in the direction of the latter. Timing is critical to the successful use of these techniques.

2.10.2.11 When burning a site containing woody weeds, ensure follow up spraying is carried out on regrowth.

2.10.2.12 Only use sprays on targeted weed species (spot spraying) - never “blanket” spray roadsides as this will remove all vegetation including desirable species and ensure the roadside only contains weeds in the following year. Where this practice has been conducted in other areas, difficult to control species such as Phalaris (high fire risk) and Angled Onion have thrived. It is important to use the desirable elements of the vegetation to out-compete the weed species as much as possible. The cost of blanket spraying roadsides on an annual basis is also prohibitive.

2.10.2.13 The use of residual herbicides is not generally recommended. Their use is envisaged only after due consideration of all effects at certain sites to solve a specific and serious weed problem.

2.10.2.14 Ensure all slashing operations are carried out to the standard specified in tender documentation.

2.10.2.15 Do not slash when weeds are seeding i.e. cut as early in season as possible to limit potential seed spread.

2.10.2.16 Use appropriate slasher heights (200mm on HCV’s, 100mm elsewhere, verges - road edge to white posts - should be cut to lowest practical height).

2.10.2.17 Clean equipment before and after use.

2.10.2.18 Slash moving from high conservation value roadsides to low roadsides rather than the reverse.

2.10.2.19 Avoid areas with good regeneration of tree and shrub seedlings or non-grass groundcovers.

2.10.2.20 Where weeds are removed, dispose of weed material at a municipal dump site. Take care not to spread weed seed during transport. (It is essential to remove noxious weeds when not in seed).

2.10.2.21 Let contracts for the control or removal of noxious weeds or the slashing of roadsides with careful regard to the timing of proposed works. This will ensure the problem of the spread of weed seed is reduced.

The Surf Coast Shire has introduced a program called RIDS (Roadside Identification System for Serrated Tussock). Roadsides are marked with green, yellow or red triangular markers. Red signifies a high risk zone, yellow a buffer zone and green a conservation zone. Work requirements in each zone are specified in an attempt to limit the spread of Serrated Tussock by machinery and road works. This system should be considered for adoption in the eastern end of the Shire, which has a significant Serrated Tussock problem.

2.10.3 Pest Animal Control

2.10.3.1 Baits and poisons should be selected and used in a way which minimizes the risk to native animals.
2.10.3.2 Avoid extensive ripping of warrens where there is a good cover of native vegetation.
2.10.3.3 Contact DNRE for advice where insect or possum defoliation is severe.
2.10.3.4 Bee keeping on roadsides is prohibited.

2.11 Public Involvement, Monitoring and Regional Planning

2.11.1 Formation of a Roadside Vegetation Advisory Group

(Source: Adapted from *Guidelines for the management of roadside vegetation* (1992) SA, Native Vegetation Council)

Within South Australia several district councils have formed groups or sub-committees to provide advice on the management of native vegetation on road reserves and other council lands. This has proven to be very useful in several respects:

- promoting community interest and involvement in roadside vegetation management;
- providing the local council with direct access to local expertise;
- resolving particular local management issues;
- involving local people in roadside revegetation projects and other management programs (e.g. weed control); and
- in preparing applications to relevant funding bodies.

Councils are strongly encouraged to adopt this approach. Representation such as the following could be considered.

- Councillors (1 or 2)
- Animal and plant control officer
- District bushfire prevention officer
- Representative of local Landcare Group
- Representative of local naturalist group
- Representative of local community with interest in native vegetation management.
- Representative of service instrumentality (Powercor, Telstra etc)

2.11.2 The LINCS Project

The LINCS Project centred on the Ballarat Region involves the coordinated management of remnant vegetation. It concerns the management of road, rail and stream reserves to maintain and enhance their conservation and recreation values. The "linking" of organisations and the community is a central theme. Revegetation and rehabilitation works including weed control are far more effective if they involve local Municipalities, other agencies, Landcare and community groups and local landholders.

Joint Council LINCS projects include the rehabilitation of the Yarrowee/Leigh River, development of the Ballarat-Skipton Rail Trail and the development of a consistent approach to roadside management across the Shires of Moorabool, Golden Plains and the City of Ballarat. All three municipalities were also involved in the preparation of the revised Ballarat Region Conservation Strategy (1999). The LINCS project is the major implementation project arising from the strategy.

The LINCS Strategy (April 1996) provides additional information on techniques suitable for the management of linear reserves and remnant vegetation of the region. Public involvement is a key component of the strategy.

2.11.3 Monitoring

To determine the effectiveness of roadside management techniques and to ascertain whether a gradual improvement or deterioration of roadsides is occurring the following is recommended:

- Changes in species composition: Establish photo points on a number of key roadsides in each category. An annual photograph should be taken preferably in spring to early summer when most plants are flowering. Alternatively, an autumn to winter photo can be effective in determining the extent of Kangaroo Grass present.
- Fuel loads can be monitored by CFA brigades.
- Deterioration of a roadside: Photo points may also indicate the spread of weeds.
- Reassessment of a selection of key roadsides every five years as a comparison with the 1998 survey.

As a result of monitoring, management techniques may require revision or modification.

APPENDICES

Appendix 1: References and Further Information

The following material has been referred to or quoted in the text:

Code of Practice for Fire Management on Public Land (1995). Department of Conservation and Natural Resources, Victoria.

Construction Techniques for Sediment Pollution Control (May 1991). Environment Protection Authority. (Publication No. 275)

Cropping and Haymaking (Draft 1999) Roadside Conservation Advisory Committee

D'Ombrain, T. (1996). *LINCS Strategy.* City of Ballarat

Guidelines for control of sedimentation in roadworks.. (1984). Department of Main Roads, NSW

Guidelines for the Management of Roadside Vegetation (1992). SA Native Vegetation Council

Managing Linear Reserves. (Video) RCAC

Municipal Fire Prevention Planning Guidelines (May 1997). Country Fire Authority

Nally, S. (1989). *The Conservation Significance of Roadsides in the (former) Shire of Buninyong.* University of Ballarat

Petris, Stephen & Spittle, Jeanette (January 1994). *Roadside Management Guidelines for Fire Prevention Planners.* CFA

Planning Tools to Protect Roadside Vegetation Discussion Paper (March 1999) Roadside Conservation Advisory Committee

Roadside Assessment Handbook (undated). Roadside Conservation Advisory Committee

Roadside Fire Management Guidelines (2001). Country Fire Authority

Roadside Management Guide (1990), VicRoads

Roadside Vegetation and Hazard Management (Draft 1999) Roadside Conservation Advisory Committee

Spittle, Jeanette (1992*). Gisborne Roadside Management Plan Part 1 Policies and Guidelines and Part 2 Operators Manual.* RCAC/Shire of Gisborne

The Midland Highway Roadside Management Plan (1998). VicRoads South West & Western Regions.

Roadside Management Goals and Codes of Practice (undated). VicRoads South West Region.

VicRoads Roadside Handbook. Environmental Guidelines for Road Construction and Maintenance Workers.(1992) VicRoads

Wild Plants of Ballarat Area CD-ROM (August 1998*)*. Viridans

Wimmera Regional Roadside Management Strategy (August 1998). Wimmera Catchment Management Authority

Appendix 2: Definitions and Abbreviations

Definitions

Indigenous plant - a locally occurring native plant

Noxious Weed - a declared pest plant, controllable by law. A threat to agriculture (and generally native vegetation)

Environmental Weed - plants that threaten native vegetation

Regionally Prohibited Weed - It is reasonable to expect that they can be eradicated from a Region and they must be controlled or eradicated in the Region. Private landholders are responsible for control on private land but not on roadsides adjoining their property. Regionally Prohibited Weeds on roadsides are the responsibility of either Vic Roads, municipalities, or NRE, depending on the class of road.

Regionally Controlled Weed - These weeds are usually widespread and are considered important in a particular region. To prevent their spread, continuing control measures are required. Land owners have the responsibility to take all reasonable steps to control and prevent the spread of Regionally Controlled Weeds on their land and the roadsides that adjoin their land.

Roadside - **1.** the area between the made surface and the boundary of the land adjoining the road if the road is sealed, formed or graded;
2. the half-width of the road in the case of an unmade road on Crown land not occupied under a lease or licence;
3. land alienated in fee simple by the Crown or Crown land occupied under a lease or licence.

Abbreviations

CCMA Corangamite Catchment Management Authority
CFA Country Fire Authority
DNRE Department of Natural Resources and Environment
EPA Environment Protection Authority
FFG Flora & Fauna Guarantee
HCV High Conservation Value Roadside
LCV Low Conservation Value Roadside
MCV Medium Conservation Value Roadside
MFPO Municipal Fire Prevention Officer
MFPP Municipal Fire Prevention Plan
RCAC Roadside Conservation Advisory Committee

Appendix 3: Roadside Legislation and Local Laws

Table A: *Summary of State legislation relating to roadside management*

Title of Act or Policy	*Management Implications*
Archaeological & Aboriginal Relics Preservation Act, 1972	Aboriginal and Archaeological sites protected
Catchment and Land Protection Act, 1994	Adjoining landholders responsible for controlling noxious weeds on roadside.
Conservation, Forests and Lands Act, 1987	Prior to works which may disturb crucial habitat, a plan of works must be submitted to the Director-General of Conservation and Natural resources.
Country Fire Authority Act, 1958	Allows fire prevention works to be carried out on roadsides.
Crown Land (Reserves) Act, 1978	Gives Crown ownership rights over vegetation on roadsides.
Environmental Effects Act, 1978	Requires statutory bodies to prepare Environmental Effects Statements if proposed works are considered to have 'significant impact'.
Environment Protection Act, 1970	Provides for the control of polluted run-off.
Flora and Fauna Guarantee Act, 1988	Public authorities must have regard for flora and fauna conservation and management objectives.
Forests Act, 1958	Gives Municipalities responsibility for removal of timber from roadsides.
Land Act, 1958	Allows prosecution for removal of timber from roadsides.
Litter Act, 1964	Makes it an offence to litter roadsides.
Local Government Act, 1989	Gives Municipalities responsibility for the management of undeclared roads and to create local laws.
Planning and Environment Act, 1987	Sets guidelines for removal of native vegetation from roadsides under the native vegetation retention controls.
State Conservation Strategy, 1987	Recognises the value of roadside vegetation and commits the State Government to prepare Roadside Management Plans.
Transport Act, 1983	VicRoads is responsible for the management of 'declared roads'.
Servicing Acts	Permits servicing authorities to locate assets on roadsides and gives then right of access for maintenance works.
Livestock Act	Defines and sets conditions for the movement of stock along roadsides.
Codes of Practice	Contain guidelines for roadside works for various authorities (EG VicRoads).

(Source: *Roadside Conservation Advisory Committee*)

Table B: ***Public use of roadsides – Issues, regulations and policy summary***

No work may be carried out on roadsides without a permit from the Shire (Local Government Act, 1989)

Issue	Control and relevant Act	Definition	Policy and Management Implications
Collection of firewood	Permission required from Land Manager (Shire) *Land Act, 1958*	Any plant material living or dead	Prohibited except under direction from Shire as part of road widening or trimming operations. Storm damage should be reported to council and may be removed from roadway to provide safe passage
Grazing of stock /erection of fences	Permission required from Land Manager (Shire) *Local Govt. Act, 1989*	Other than the movement of stock between paddocks	Prohibited on high and medium conservation sections of road. May be permitted on low conservation roadsides. A grazing licence must be obtained
Cropping of roadsides	Permission required from Land Manager (Shire) *Local Govt. Act, 1989* *FFG Act, 1988*	Any form of cultivation	A technique for roadsides with no conservation value as a means of reducing costs, controlling weeds and/or fire risk
Droving of stock	*Livestock Act*	Movement of stock taking longer than one day	Prohibited A local livestock permit is required to move stock (in cases other than directly across a road)
Construction of ploughed firebreaks	Permission required from Land Manager (Shire) *Country Fire Authority Act, 1958* *Local Government Act, 1989*	Any soil disturbance on roadsides	Unauthorized interference of a council asset. Ploughed fire breaks are ineffective in the control of wildfire and can only ever contain a small fire starting on a roadside under mild conditions. Their use on roadsides is strongly discouraged as they tend to create more problems than they solve through the spread and subsequent growth of weeds. No works may be conducted on a roadside without a permit. Permits will be issued to Fire Brigades for strategic works covered in the Municipal Fire Prevention Plan i.e. all PFB's must be part of the plan Removal of sand, soil, gravel or other material by the public is prohibited on all roads
Collection of seed and plant material	DNRE permit and Shire permission required *FFG Act, 1988* *Local Government Act, 1989*	Taking of any parts of plants. Seeds, cuttings, or root material	Generally seed collection is encouraged by council for Landcare revegetation activities. A seed collection permit is required from DNRE for public land. A royalty may be charged. Permission is also required from the Shire. In the absence of a permit seed can be obtained from the Ballarat Region Seed Bank based at the Creswick Landcare Centre
Dumping of rubbish	*Litter Act, 1964* *EPA Act, 1970*	Dumping of any waste material (litter, liquid pollutants etc),	Offence under the litter act. Council staff are able to enforce the Litter Act and issue infringement notices The EPA may take action against any individual or organization polluting the environment
Damage or removal of vegetation	*FFG Act, 1988* *Land Act, 1958*	Hand or mechanical damage to living trees, shrubs or groundcovers	All native vegetation is protected by State legislation. Damage to vegetation is an offence. Removal of any native vegetation requires a planning permit from Council and approval from DNRE A number of exemptions exist. Further information is available from the Shire A planning permit is required to remove vegetation to facilitate movement of farm machinery along a road
Spraying or removal of weeds	*Catchment and Land Protection Act, 1994*	Any declared noxious weed	Removal of noxious weeds by adjacent landowners is a legal requirement. Council will assist with the control of weeds on roadsides where resources allow and minimise the impact of road maintenance and construction works on the spread of weeds through adoption of the roadside management code
Planting of vegetation	Permission required from	Planting of trees,	Permit required from council. Information will be supplied on suitable species. Generally

	Land Manager (Shire) *Local Government Act, 1989 (sect 11/5 obstructions)*	sowing of grass, fodder crops or any other plant material	only indigenous species will be considered on rural roads to preserve the natural landscape character of the area Council will also assess the site in regard to impact proposed vegetation will have on site distances, safety to road users, fire prevention and aesthetic appeal.
Burning of a roadside	Permit required from MFPO *CFA Act, 1958*	Fuel reduction burning	Permit required from the Municipal Fire Prevention Officer prior to activity. Burning should be consistent with the Fire Prevention Plan. Native trees and shrubs should be damped down to minimise impact. Areas with good seedling regeneration should be avoided until vegetation is mature

Table C: *Planning controls under the Victorian Planning Provisions (VPP) Framework*

The State Planning Policy Framework comprises general principles for land use and development and specific policies which planning authorities and responsible authorities must be taken into account.

State Planning Policy Framework (SPPF)	Clause 15 – Environment, Clause 15.09-2 Conservation of native flora & fauna, Clause 15.10 Open space, Clause 15.11 Heritage	15.09 implementation through identification & mapping of flora & fauna, regard to threatening processes, recognition of environmental strategies, development of management plans, minimise degradation through land use & development, fragmentation of vegetation
Local Planning Policy Framework (LPPF)	Clause 21 Municipal strategic statement, Clause 22 Local policies	Clause 21: Provides a vision for the future development of the municipality including strategic planning, land use & development objectives (including roadside management) Clause 22: provides detailed directions
Zones	Clause 35.01 Rural zone, Clause 35.02 Environmental rural, Clause 35.03 Rural living zones	These 3 zones are the most appropriate for rural roadsides
Overlays	Clause 42.01 Environmental significance, Clause 42.02 Vegetation protection, Clause 42.03 Significant landscape	Overlays are applied to control development (not use). Three can be applied to roadsides: ESO (Environmental significance overlay), VPO (Vegetation protection overlay) and SLO (Significant landscape overlay) and all contain provisions relating to the removal of vegetation. An ESO can also be used to control works associated with routine maintenance by utility companies, removal of dead vegetation, fencing, grazing, stock movements, buildings and rural activities
Particular Provisions	Clause 52.17 Native vegetation	All roadside vegetation clearance requires a permit from NRE. Many exemptions exist including fire prevention and these are open to interpretation
General Provisions	Clause 66.04 Referrals Use & development plans	Detrimental impact of works on native vegetation must be considered prior to decision on an application irrespective of the zone, overlay or policy provisions
Definitions	Clause 71	
Incorporated documents	Clause 81	

In some municipalities the overlay has been placed over the major road network with the Roadside Management Plan and the assessments used as reference documents to indicate how the planning provisions will be applied to different parts of the road network. The MapInfo database prepared for roadside values in the Shire may be able to be used directly as the ESO which would be a more desirable alternative.

Table D: ***Existing Local Laws relevant to roadsides***

Number	Description or intent
301	No person may destroy, damage or interfere with any tree or plants on any road under the care and management of the Council
303	No person may (1) destroy, damage or interfere with any Council land (2) destroy, damage or interfere with anything on any Council land (3) remove anything from Council land
514 No fires on roads	No person may on any road light, or allow to be lit, or remain alight any fire in the open air, unless that person is an officer or employee or authorised contractor of a public body and engaged in an activity for or on behalf of that public body
412	(No Bee keeping on roads)
415 Driving of cattle	(Permits and conditions apply)
520	(No camping on roads)
908-915	Permits and infringement notices (provisions for)

Table E: ***Recommended Local Law Provisions***

Number	Description or intent
301	As above
303	As above
514 No fires on roads	As above
412	As above
415 Driving of cattle	(Permits and conditions apply). Prohibition of droving
520	As above
908-915	Permits and infringement notices (provisions for). Add extra items
	No spraying of roadsides other than spot spraying of noxious weeds without a permit
	No grazing or erection of fences without a permit. Permits will be considered only on LCV roadsides
	No cropping or soil disturbance on roadsides without a permit. Permits will be considered only on LCV roadsides or as part of the MFPP
	No planting on roadsides without a permit

Appendix 3: Roadside Management Prescriptions

Table A: ***Key to Roadside Management Prescriptions***

MP	Land system	Natural vegetation	Description
MA	Pvf6	Grassland	Low conservation roads on basalt soils
MB	Pvf6	Grassland	Medium conservation roads on basalt soils
MC	Pvf6	Grassland	High conservation roads on basalt soils
MD	Pvf7, Pvf8	WSF	Medium or high conservation roadside on red volcanic soils
ME	Pvf7, Pvf8	WSF	Low conservation roadside on red volcanic soils
MF	Gs5, Gs6, Ss6	DSF	Low conservation roadsides on Ordovician soils
MG	Gs5, Gs6, Ss6	DSF	Medium conservation roadsides on Ordovician soils
MH	Gs5, Gs6, Ss6	DSF	High conservation roadsides on Ordovician soils
MI	Ss7, Ss8, Gs7,Gs8	WSF	Medium or high conservation roadsides on mainly Ordovician soils (higher rainfall)
MJ	Pf4, Pf55, Pf56, Pvf4, Pvf5, Ss5, Ss6b, Gs5b	Semi-arid vegetation	Medium or high conservation roadsides on a range of soil types with low rainfall (around Bacchus Marsh)
MK	Pf4, Pf55, Pf56, Pvf4, Pvf5, Ss5, Ss6b, Gs5b	Semi-arid vegetation	Low conservation roadsides on a range of soil types with low rainfall (around Bacchus Marsh)
MM	Pf55b, Pf63, Pf64, Gg7		Low conservation roadsides on a range of sandy soils
MN	Pf55b, Pf63, Pf64, Gg7		Medium to high conservation roadsides on range of sandy soils
MO	Ss7, Ss8, Gs7,Gs8	WSF	Low Conservation value roadsides on Ordovician soils
ML			Segments with Banksia/Casuarina woodlands
MR1			Long Forest Rd and offshoots

Roadside Management Prescriptions

CODE MA

Name of road/category	Low conservation roadsides on basalt	
Vegetation type	Introduced grasses and weeds (formerly native grassland or grassy woodlands)	
Management methods (Fuel reduction, land and vegetation management)		
Burning	✖	Not recommended where there is a strong occurrence of woody weeds such as Gorse unless follow up spraying of regrowth is undertaken
Slashing	✓	The usual control method. It is recommended that the cut material is removed where practicable to reduce fire risk. Encourage farmers to cut and bail material. An early cut (before December in most areas) will prevent seeding of most herbaceous weeds and annual grasses
Weed control	✓	Many roadsides in this category have a high incidence of woody weed invasion and/or Phalaris (pasture grass) dominance. Weed control by landholders, Landcare groups and the Shire (as part of fuel reduction works) is recommended by spot spraying
Grazing	?	Grazing may be appropriate on some roadsides of this category. Grazing licence fee to adjoining landowner to be nominal. Conditions apply that landholder will keep noxious weeds under control
Cropping	?	Should be considered for roadsides completely dominated by Phalaris or woody weeds (completely devoid of remnants) as a means of reducing management costs or problems. Licence to adjoining owner
Fencing	✖	No significant remnants to fence
Signage	✖	No significant remnants
Natural regeneration	✓	Scattered trees and or shrubs may be present on the roadside. Slash around seedlings. Leave a zone under tree canopy (drip zone) to encourage regeneration. Consider spraying woody weeds and grasses around trees to allow regeneration
Revegetation	✓	Degraded roadsides with high amenity should be considered for revegetation with local trees, shrubs or grasses to improve aesthetic values and reduce long term management costs and problems
Salinity	✓	Planting and stabilisation of saline sites can be tackled in conjunction with the local Landcare group
Erosion/run-off control	✓	Road grading or management should attempt to disperse rather than concentrate water (correct road camber, run-off points, table and mitre drains). Active eroding areas should be stabilised and revegetated
Rare plant specific requirements	✖	No rare species present
Description	Degraded or heavily modified roadsides with little conservation value. Some scattered remnant trees, shrubs and native grasses may be present. These should be retained and natural regeneration encouraged where practical. Any roadsides considered for grazing or cropping should be assessed for suitability prior to issue of a licence	

C-compaction, L-leaching, Wa-water erosion, S-salting, Wi-wind erosion

Land Systems	Rainfall (mm)	Soil limiting processes	Major Weeds	Soils	Original Vegetation
Pvf6	600-700	L/Wa/C	Gorse Phalaris	Yellow duplex soils, grey clays, red friable earths	Themeda Grassland or Manna Gum/Swamp Gum /Blackwood/Black Wattle Grassy Woodland

CODE MB

Name of road/category	Medium conservation value basalt roadsides	
Vegetation type	A mix of introduced grasses and remnant native grassland. Occasional trees and shrubs and some woody weeds may be present	
Management methods (Fuel reduction, land and vegetation management)		
Burning	✓	Burning prior to seedling of annual grasses (before December) will allow Summer growing native grasses to flower and seed and may help restore native grassland. This will also remove fine fuel and lower fire risk.
Slashing	?	Slashing of introduced grass sections may be acceptable. Mowing of native grass is not necessary or recommended. If undertaken set slasher above 200mm height and slash by December.
Weed control	✓	Spot spraying or hand removal of woody weeds is recommended
Grazing	✖	
Cropping	✖	
Fencing	✖	
Signage	✖	
Natural regeneration	✓	Encourage natural regeneration of trees and shrubs by avoiding slashing in the vicinity of existing plants
Revegetation	✓	Encourage native grassland species through careful timing of burning and/or slashing practices
Salinity	✓	Planting and stabilisation of saline sites can be tackled in conjunction with the local Landcare group
Erosion/run-off control	✓	Road grading or management should attempt to disperse rather than concentrate water (correct road camber, run-off points, table and mitre drains). Active eroding areas should be stabilised and revegetated
Rare plant specific requirements	✖	
Description	With careful use of burning or slashing as a management tool the integrity of the native grassland remnant can be improved. The removal of grazing pressure and the control of woody weeds will also assist Rocks and other debris should be retained to provide habitat value	

C-compaction, L-leaching, Wa-water erosion, S-salting, Wi-wind erosion

Land System	Rainfall (mm)	Soil limiting processes	Major Weeds	Soils	Original Vegetation
Pvf6	600-700	L/Wa/C	Gorse Phalaris	Yellow duplex soils, grey clays, red friable earths	Themeda Grassland or Manna Gum/Swamp Gum /Blackwood/Black Wattle Grassy Woodland

CODE MC

Name of road/category	High Conservation value basalt plains roadsides		
Vegetation type	Native grassland usually dominated by Kangaroo Grass (*Themeda triandra*) with Wallaby or Spear grasses in drier sections and Tall Tussock Grass (*Poa labillardieri*) in wetter sections		
Management methods (Fuel reduction, land and vegetation management)			
Burning	✓	Burning is the recommended management practice. A cool burn should be carried out approximately every 5 years. Strategic break roadsides may be burnt more regularly. Burns should take place before seeding of annual introduced grasses (before December)	
Slashing	✖	There is no need to slash native grass as it remains green in Summer and has less bulk than introduced grasses	
Weed control	✓	Spot spray or remove any noxious weeds or inappropriate plants	
Grazing	✖	Constant grazing in particular is incompatible with the conservation of native grasslands	
Cropping	✖		
Fencing	✓	Consider fencing any fragile remnants where it becomes apparent that a lack of a physical barrier to vehicles/grazing threatens the future of the community or rare plant.	
Signage	✓	Signage of all high conservation roadsides is recommended to raise awareness and protect values from inadvertent damage	
Natural regeneration	✓	Encourage through burning and removal of threats (grazing, slashing, weeds). Burning will allow regeneration of native grasses and also provide inter-tussock spaces for forbs.	
Revegetation	✖		
Salinity	✓	Planting and stabilisation of saline sites can be tackled in conjunction with the local Landcare group	
Erosion/run-off control	✓	Road grading or management should attempt to disperse rather than concentrate water (correct road camber, run-off points, table and mitre drains). Active eroding areas should be stabilised and revegetated	
Rare plant specific requirements	✓	Consult the species list for the roadside. Rare, threatened or endangered plants are noted with a code. Seek advise regarding management required to protect and enhance the species . (DNRE)	
Description	Native grasslands and grassy woodlands dominated by Kangaroo Grass (*Themeda triandra*) These are the most threatened and depleted ecosystems in Australia. Remnants survive primarily on roadsides. Correct management is vital to protect these grasslands from further decline.		

C-compaction, L-leaching, Wa-water erosion, S-salting, Wi-wind erosion

Land Systems	Rainfall (mm)	Soil limiting processes	Major Weeds	Soils	Original Vegetation
Pvf6	600-700	L/Wa/C	Gorse Phalaris	Yellow duplex soils, grey clays, red friable earths	Themeda Grassland or Manna Gum/Swamp Gum /Blackwood/Black Wattle Grassy Woodland

CODE MD

Name of road/category	Medium or High conservation value roadsides on Red Volcanic coils	
Vegetation type	Mixed open forest (WSF) or woodland. Manna Gum and or Swamp Gum often dominant. Typically with a Tall Tussock Grass and bracken understorey . Occasional native shrubs are present in the best remnants	
Management methods (Fuel reduction, land and vegetation management)		
Burning	?	Burning is not recommended. Any burn should be followed up with weed control. Naturally these wetter forests burnt infrequently. Burning is likely to encourage woody weeds
Slashing	?	Slashing of introduced grass understorey can be undertaken as part of fire prevention works on medium roadsides. Slashing of native grass areas or tree/shrub seedling regeneration should be avoided. No slashing on high conservation sections
Weed control	✓	Woody weed control by spot spraying is the most critical management practice on roads of this category
Grazing	✖	
Cropping	✖	
Fencing	✓	Consider fencing any fragile remnants where it becomes apparent that a lack of a physical barrier to vehicles/grazing threatens the future of the community or rare plant
Signage	✓	Signage of all high conservation roadsides is recommended to raise awareness and protect values from inadvertent damage. Markers can be used on medium roads to restrict slashing to appropriate sections
Natural regeneration	✓	Encourage natural regeneration through the removal of threats such as grazing, slashing or weed competition. Shrub regeneration is a priority to replace woody weeds and improve habitat values.
Revegetation	✓	Consider replanting local shrubs where they have been lost. A species list for all vegetation communities is in the Management Plan
Salinity	✖	Salinity is not a problem on these soils
Erosion/run-off control	✓	Road grading or management should attempt to disperse rather than concentrate water (correct road camber, run-off points, table and mitre drains). Active eroding areas should be stabilised and revegetated
Rare plant specific requirements	✓	Consult the species list for the roadside. Rare, threatened or endangered plants are noted with a code. Seek advise regarding management required to protect and enhance the species . (DNRE)
Description	Very prone to invasion by woody weeds particularly Cape Broom, Hawthorn, Briar Rose, Willow and Blackberry due to the high level of nutrients and water availability in these soils (high soil fertility). As a consequence there are few good remnants of this community type. Careful management is essential to prevent further loss from disturbance and weed invasion.	

C-compaction, L-leaching, Wa-water erosion, S-salting, Wi-wind erosion

Land Systems	Rainfall (mm)	Soil limiting processes	Major Weeds	Soils	Original Vegetation
Pvf7	>700 temperate	L/Wa/C	Cape Broom, English Broom, Gorse, Blackberry, Periwinkle, Phalaris	Red friable earths	Manna Gum, Swamp Gum/ Messmate, N/L Peppermint, Candlebark Open Forest. Native grass (Poa) understorey. Silver Wattle, Banksia, Bracken may be present.
Pvf8	>700, montane	L/Wa/C	Blackberry Cape Broom	Red friable earths	Manna gum, Swamp Gum/N/L Peppermint/Messmate, Candlebark, Blackwood Open Forest Bracken may be present

CODE ME

Name of road/category	Low conservation value roadsides on Red Volcanic coils		
Vegetation type	Previously a mixed open forest (WSF) or woodland dominated by Manna Gum and or Swamp Gum. Typically with a woody weed/introduced grass understorey. Tall Tussock Grass and bracken may be present in parts. Original Shrub understorey absent		
Management methods (Fuel reduction, land and vegetation management)			
Burning	✖		
Slashing	✓	Slash introduced grass areas prior to seeding by annual grasses and herbaceous weeds to reduce fine fuel loads. Avoid any areas of tree seedlings	
Weed control	✓	Woody weed control by spot spraying is the most critical management practice on roads of this category	
Grazing	✓	Grazing can be considered on totally degraded or modified sites without native remnants as a mechanism to control grass growth (fire risk). Control of noxious weeds must be a condition of any grazing licence	
Cropping	?	Cropping may be considered on totally degraded sites consisting of woody weeds or introduced grasses. Not appropriate where there are remnant trees	
Fencing	✖		
Signage	✖		
Natural regeneration	✓	Encourage natural regeneration through the removal of threats such as grazing, slashing or weed competition. Shrub regeneration is a priority to replace woody weeds and improve habitat values.	
Revegetation	✓	Consider replanting local shrubs where they have been lost. A species list for all vegetation communities is in the Management Plan	
Salinity	✖	Salinity is not a problem on these soils	
Erosion/run-off control	✓	Road grading or management should attempt to disperse rather than concentrate water (correct road camber, run-off points, table and mitre drains). Active eroding areas should be stabilised and revegetated	
Rare plant specific requirements	✖		
Description	Very prone to invasion by woody weeds particularly Cape Broom, Hawthorn, Briar Rose Willow and Blackberry		

C-compaction, L-leaching, Wa-water erosion, S-salting, Wi-wind erosion

Land Systems	Rainfall (mm)	Soil limiting processes	Major Weeds	Soils		Original Vegetation
Pvf7	>700 temperate	L/Wa/C	Cape Broom, English Broom, Gorse, Blackberry, Periwinkle, Phalaris	Red earths	friable	Manna Gum, Swamp Gum, Messmate, N/L Peppermint, Candlebark Open Forest. Native grass (Poa) understorey. Silver Wattle, Banksia, Bracken may be present.
Pvf8	>700, montane	L/Wa/C	Blackberry Cape Broom	Red earths	friable	Manna gum, Swamp Gum, N/L Peppermint, Messmate, Candlebark, Blackwood Open Forest Bracken may be present

CODE MF

Name of road/category	Low conservation value roadsides on Ordovician soils	
Vegetation type	Formerly mixed open forest (DSF) with a Wattle/Pea/Heath understorey now dominated by Gorse and other woody weeds	
Management methods (Fuel reduction, land and vegetation management)		
Burning	✓	Burning can be used providing follow up weed control is carried out. A mass germination of Gorse will follow burning and must be controlled
Slashing	✓	Slash introduced grass and woody weed seedlings to restrict fire risk. Care should be taken not to spread seed to other sections of the road with higher conservation values. Slashing is best carried out prior to seeding of annual grasses (by December)
Weed control	✓	Control of Gorse and other woody weeds by spot spraying is recommended as an alternative management practice to slashing or burning to reduce fire risk
Grazing	✖	Low pasture value. Grazing (e.g. by goats) can be effective in controlling woody weeds such as Gorse or Blackberry but is otherwise discouraged as it tends to spread weeds and remove desirable elements of the vegetation
Cropping	✖	Soil unsuitable for crops
Fencing	✖	
Signage	✖	
Natural regeneration	✓	Encourage natural regeneration through the removal of threats such as grazing, slashing or weed competition around any remnants
Revegetation	✓	Consider revegetation with trees and shrubs as a mechanism to cut long term management costs (i.e. remove the need for regular slashing/weed control). Direct seeding can be used on highly degraded sites by first mechanically removing the weed community and scraping off the top 100-200 mm of surface soil. Material should be carted away to an approved dump site and the area deep ripped prior to seeding.
Salinity	✓	Enlist the help of local Landcare groups to replant any saline sites with appropriate species
Erosion/run-off control	✓	Road grading or management should attempt to disperse rather than concentrate water (correct road camber, run-off points, table and mitre drains). Active eroding areas should be stabilised and revegetated
Rare plant specific requirements	✖	
Description	Roadsides with remnants of drier mixed open forest and originally with a sparse understorey of low peas and heaths with occasional native tussock grasses or sedges. Now commonly invaded by Gorse and introduced grasses.	

C-compaction, L-leaching, Wa-water erosion, S-salting, Wi-wind erosion

Land Systems	Rainfall (mm)	Soil limiting processes	Major Weeds	Soils	Original Vegetation
Gs5	500-600	Wa/C/S	Phalaris	Duplex soils	Messmate, Swamp Gum, N/L Peppermint, Candlebark, Blackwood forest
Gs6	600-700	Wa/C	Gorse	Red duplex soils, yellow duplex soils	Messmate, Manna Gum, Candlebark, N/L Peppermint, Yarra Gum, Blackwood, Black Wattle Open Forest with Native grass understorey. Prickly Tea-tree, Bracken, Banksia, Black Casuarina, R/B Mann Gum Hedge Wattle and Spear Grass may be present
Ss6	600-700	Wa/L/C	Gorse Pine	Shallow stony loams, Stony red duplex soils	Messmate, Scent Bark, Manna Gum, Swamp Gum, N/L Peppermint, Candlebark, B/L Peppermint, Blackwood, Black Wattle Open Forest

CODE MG

Name of road/category	Medium Conservation value roadsides on Ordovician soils		
Vegetation type	Mixed Eucalypt Open Forest (DSF)with a Wattle/Pea/Heath understorey and sparse ground layer. Woody weed (Gorse) and introduced grass invasion		
Management methods (Fuel reduction, land and vegetation management)			
Burning	?	Burning can be used providing follow up weed control is carried out. A mass germination of Gorse will follow burning and must be controlled	
Slashing	?	Slash areas of introduced grass or woody weed seedlings only, to restrict fire risk. Care should be taken not to spread seed to other sections of the road with higher conservation values. Slashing is best carried out prior to seeding of annual grasses (by December)	
Weed control	✓	Control of Gorse and other woody weeds by spot spraying is recommended as an alternative management practice to slashing or burning to reduce fire risk	
Grazing	✖		
Cropping	✖	Soil often unsuitable for crops	
Fencing	✖		
Signage	✖	Markers can be used to protect better quality groundlayer from slashing	
Natural regeneration	✓	Encourage natural regeneration through the removal of threats such as grazing, slashing or weed competition around any remnants	
Revegetation	✓	Consider revegetation with trees and shrubs as a mechanism to cut long term management costs (i.e. remove the need for regular slashing/weed control)	
Salinity	✓	Enlist the help of local Landcare groups to replant any saline sites with appropriate species	
Erosion/run-off control	✓	Road grading or management should attempt to disperse rather than concentrate water (correct road camber, run-off points, table and mitre drains). Active eroding areas should be stabilised and revegetated	
Rare plant specific requirements	✖		
Description	Roadsides with drier mixed open forest and a sparse understorey of low peas and heaths with occasional native tussock grasses or sedges. Now commonly invaded by Gorse and introduced grasses.		

C-compaction, L-leaching, Wa-water erosion, S-salting, Wi-wind erosion

Land Systems	Rainfall (mm)	Soil limiting processes	Major Weeds	Soils	Original Vegetation
Gs5	500-600	Wa/C/S	Phalaris	Duplex soils	Messmate, Swamp Gum, N/L Peppermint, Candlebark, Blackwood forest
Gs6	600-700	Wa/C	Gorse	Red duplex soils, yellow duplex soils	Messmate, Manna Gum, Candlebark, N/L Peppermint, Yarra Gum, Blackwood, Black Wattle Open Forest with Native grass understorey. Prickly Tea-tree, Bracken, Banksia, Black Casuarina, R/B Manna Gum Hedge Wattle and Spear Grass may be present
Ss6	600-700	Wa/L/C	Gorse Pine	Shallow stony loams, Stony red duplex soils	Messmate, Scent Bark, Manna Gum, Swamp Gum, N/L Peppermint, Candlebark, B/L Peppermint, Blackwood, Black Wattle Open Forest

CODE MH

Name of road/category	High Conservation value roadsides on Ordovician soils		
Vegetation type	Mixed Open Eucalypt Forest (DSF) with a Wattle/Pea/Heath or sparse native tussock grass/sedge understorey		
Management methods (Fuel reduction, land and vegetation management)			
Burning	?	Burning is likely to be catered for through the incidence of wildfire. A 50 year plus cycle should be sufficient to maintain diversity. Burning can be considered to encourage natural regeneration or in sections dominated by native grass. Protect seedlings, trees and shrubs by damping down	
Slashing	✖		
Weed control	✓	Control of incidental weeds such as Gorse is recommended by spot spraying or cut and paint methods	
Grazing	✖		
Cropping	✖		
Fencing	✓	Consider fencing any fragile remnants where it becomes apparent that a lack of a physical barrier to vehicles/grazing threatens the future of the community or rare plant.	
Signage	✓	Signage of all high conservation roadsides is recommended to raise awareness and protect values from inadvertent damage	
Natural regeneration	✓	Encourage through burning and removal of threats (grazing, slashing, weeds). Burning will allow regeneration of native species	
Revegetation	✖		
Salinity	✓	Planting and stabilisation of saline sites can be tackled in conjunction with the local Landcare group	
Erosion/run-off control	✓	Road grading or management should attempt to disperse rather than concentrate water (correct road camber, run-off points, table and mitre drains). Active eroding areas should be stabilised and revegetated	
Rare plant specific requirements	✓	Consult the species list for the roadside. Rare, threatened or endangered plants are noted with a code. Seek advise regarding management required to protect and enhance the species . (DNRE)	
Description	Forest Roads in the Mt Egerton, Brisbane Ranges, Garibaldi, Werribee Gorge and Ballark areas		

C-compaction, L-leaching, Wa-water erosion, S-salting, Wi-wind erosion

Land Systems	Rainfall (mm)	Soil limiting processes	Major Weeds	Soils	Original Vegetation
Gs5	500-600	Wa/C/S	Phalaris	Duplex soils	Messmate, Swamp Gum, N/L Peppermint, Candlebark, Blackwood forest
Gs6	600-700	Wa/C	Gorse	Red duplex soils, yellow duplex soils	Messmate, Manna Gum, Candlebark, N/L Peppermint, Yarra Gum, Blackwood, Black Wattle Open Forest with Native grass understorey. Prickly Tea-tree, Bracken, Banksia, Black Casuarina, R/B Manna Gum Hedge Wattle and Spear Grass may be present
Ss6	600-700	Wa/L/C	Gorse Pine	Shallow stony loams, Stony red duplex soils	Messmate, Scent Bark, Manna Gum, Swamp Gum, N/L Peppermint, Candlebark, B/L Peppermint, Blackwood, Black Wattle Open Forest

CODE MI

Name of road/category	Medium or High Conservation value roadsides on mainly Ordovician soils (in higher rainfall areas)	
Vegetation type	Mixed Open Forest (WSF) with a Wattle/Pea understorey and native grass, sedge and bracken groundlayer	
Management methods (Fuel reduction, land and vegetation management)		
Burning	?	Burning is likely to be catered for through the incidence of wildfire. A 50 year plus cycle should be sufficient to maintain diversity. Burning can be considered to encourage natural regeneration or where native grass dominates. Seedlings, shrubs and trees should be damped down before burning
Slashing	✖	
Weed control	✓	Control of incidental weeds such as Cape Broom is recommended by spot spraying, hand removal or cut and paint methods
Grazing	✖	
Cropping	✖	
Fencing	✓	Consider fencing any fragile remnants where it becomes apparent that a lack of a physical barrier to vehicles/grazing threatens the future of the community or rare plant.
Signage	✓	Signage of all high conservation roadsides is recommended to raise awareness and protect values from inadvertent damage
Natural regeneration	✓	Encourage through burning and removal of threats (grazing, slashing, weeds). Burning will allow regeneration of native species
Revegetation	✖	
Salinity	✓	Planting and stabilisation of saline sites can be tackled in conjunction with the local Landcare group
Erosion/run-off control	✓	Road grading or management should attempt to disperse rather than concentrate water (correct road camber, run-off points, table and mitre drains). Active eroding areas should be stabilised and revegetated
Rare plant specific requirements	✓	Consult the species list for the roadside. Rare, threatened or endangered plants are noted with a code. Seek advise regarding management required to protect and enhance the species . (DNRE)
Description	e.g. Wombat forest roadsides	

C-compaction, L-leaching, Wa-water erosion, S-salting, Wi-wind erosion

Land Systems	Rainfall (mm)	Soil limiting processes	Major Weeds	Soils	Original Vegetation
Gs7	>700 temperate	Wa/C/L	Cape Broom	Yellow earths, mottled duplex soils	Messmate, Manna Gum, N/L Peppermint, Swamp Gum, Candlebark, Blackwood Open Forest with a native grass/bracken understorey. Silver Wattle, Black-anther Flax-Lily, Banksia and wetter peas may be present
Gs8	>700, montane	Wa/C/L	English Broom Cape Broom	Friable earths, mottled duplex soils	Messmate, Manna Gum, N/L Peppermint, Swamp Gum, Candlebark, Blackwood Open Forest Strong shrub layer may include Elderberry Panax, Christmas Bush, Prickly Moses, Hop Bitter-pea, Silver Wattle, Tea-tree, N/L Wattle, Hop Wattle, Bracken and Poa
Ss7	>700 temperate	Wa/C/L	Blackberry, Gorse, Cape Broom	Stony earths	Messmate, Manna Gum, Swamp Gum, N/L Peppermint, Candlebark, Silver Wattle, Blackwood, Black Wattle Open Forest with Prickly Moses, Hop Wattle, N/L Wattle, Hakea, Spear Grass, Silky Tea-tree and Bracken may be locally common
Ss8	>700, montane	L/Wa/C		Shallow stony earths, friable earths	Messmate, Manna Gum, Swamp Gum, N/L Peppermint, Candlebark, Silver Wattle, Blackwood Open Forest. With B/L Peppermint, N/L Wattle, Prickly Moses, Christmas Bush, Bracken, Hop Wattle, Bursaria, heaths and Prickly Currant-bush locally common

CODE MJ

Name of road/category	Medium or High Conservation value roadsides with semi-arid vegetation on a range of soils Lower rainfall areas around Bacchus Marsh	
Vegetation type	Native grasslands or Grassy woodlands, Chenopod shrubland, Bull Mallee Woodland	
Management methods (Fuel reduction, land and vegetation management)		
Burning	?	Regular burning is not recommended. Any burning must take into account the effect on the spread of Serrated Tussock and other weeds. Follow up control is essential. Consider burning where dominated by native grasses
Slashing	?	Slashing of medium roadsides may be considered on sections dominated by introduced grasses. No slashing where Serrated Tussock occurs after seed set (slash prior to December)
Weed control	✓	The control of serrated Tussock is a high priority. Spot spray or remove any noxious weeds or inappropriate plants
Grazing	✖	
Cropping	✖	
Fencing	✓	Consider fencing any fragile remnants where it becomes apparent that a lack of a physical barrier to vehicles/grazing threatens the future of the community or rare plant.
Signage	✓	Signage of all high conservation roadsides is recommended to raise awareness and protect values from inadvertent damage
Natural regeneration	✓	Encourage regeneration through the removal of restrictions (grazing, slashing, weed competition). Concentrate on the regeneration of shrubs such as Turkey bush, Boobialla, Varnish Wattle, Gold Dust Wattle and the various Chenopods
Revegetation	✓	Consider revegetation of sites with suitable trees, shrubs and ground covers. Native grasses and chenopods can be used to replace Serrated tussock.
Salinity	✓	Planting and stabilisation of saline sites can be tackled in conjunction with the local Landcare group
Erosion/run-off control	✓	Road grading or management should attempt to disperse rather than concentrate water (correct road camber, run-off points, table and mitre drains). Active eroding areas should be stabilised and revegetated
Rare plant specific requirements	✓	A number of rare plants occur around Bacchus Marsh as isolated remnants. Consult DNRE regarding management of sites containing rare plants. Consult the species list for the roadside Rare, threatened or endangered plants are noted with a code.
Description	Bacchus Marsh roadsides	

C-compaction, L-leaching, Wa-water erosion, S-salting, Wi-wind erosion

Land Systems	Rainfall (mm)	Soil limiting processes	Major Weeds	Soils	Original Vegetation
Pvf4	400-500	C	Serrated Tussock	Red duplex soils	Grassland usually with low chenopods. May have Scattered Drooping She-oak, Buloke, Golden Wattle, Black Wattle, Varnish Wattle, Tree Violet, Lightwood, Yellow Box, Yellow Gum, Grey Box, Redgum or Tangled Lignum
Pvf5	500-600	C/S/Wg	Serrated Tussock Phalaris Gorse Pine	Yellow duplex soils, yellow clays	Grassland/Grassy woodland May have scattered Grey Box, Yellow Gum, Golden Wattle, Lightwood, Black Wattle, Blackwood, Bursaria, Hedge Wattle and Berry Saltbush
pf4	400-500	C		Brown loams	Grassy (Themeda/Spear/Wallaby /Windmill Grass) woodland Grey Box, Yellow Box, Red Box, Yellow Gum, Red Gum, Lightwood, Drooping She-oak, Black Wattle, Varnish Wattle, Hedge Wattle, Gold-dust Wattle, Tree Violet, Turkey Bush, Tangled Lignum and Chenopods
Pf55	500-600	Wa/L/C		Mottled duplex soils	Woodland , Mallee or chenopod shrubland Red Box, Grey Box, Yellow Box, Yellow Gum, Lightwood, Golden Wattle, Varnish Wattle, Gold-dust Wattle and low chenopods Or Bull Mallee, Moonah, Fragrant saltbush, Boobialla
Pf56	500-600	C/L	Ground Cherry	Brown loams	Grassland or grassy Woodland Yellow Gum, Red Gum, Grey Box, Yellow Box, Golden Wattle, Varnish Wattle, Lightwood, Gold-dust Wattle, Bursaria, Turkey Bush and low chenopods,
Gs5b	500-600	Wa/C/S	Serrated Tussock	Duplex soils	Grey Box, Red Gum, Yellow Box, Yellow Gum, Varnish Wattle, Black Wattle, Hedge Wattle, Golden Wattle Open Forest
Ss5	500-600	Wa/L/C/S	Serrated Tussock	Shallow stony loams, yellow duplex soils	Woodland Yellow Gum, Yellow Box, Grey Box, Lightwood, Golden Wattle, Varnish Wattle, Black Wattle, Fragrant Saltbush and other chenopods Occasional Drooping She-oak remnant Or Red Stringybark, Red Ironbark Open Forest
Ss6b	600-700	Wa/L/C		Shallow stony loams, Stony red duplex soils	Woodland Yellow Box, Grey Box, Yellow Gum, Varnish Wattle, Fragrant saltbush Or Red Stringybark, L/L Box, Lightwood, Golden Wattle with Chinese Scrub and heaths

CODE MK

Name of road/category	Low conservation roadsides around Bacchus Marsh on a range of soils	
Vegetation type	Semi-arid vegetation now replaced by Serrated Tussock and other weeds and introduced grasses. Occasional trees, shrubs and low chenopods may remain	
Management methods (Fuel reduction, land and vegetation management)		
Burning	?	Regular burning is not recommended. Any burning must take into account the effect on the spread of Serrated Tussock and other weeds. Follow up control is essential
Slashing	✓	Slashing of roadsides may be considered on sections dominated by introduced grasses to reduce fire risk. No slashing where Serrated Tussock occurs after seed set (slash prior to December). Do not remove cut material from site containing weed seed. Clean all equipment
Weed control	✓	The control of serrated Tussock is a high priority. Spot spray or remove any noxious weeds or inappropriate plants
Grazing	✖	Grazing is likely to contribute to the spread of Serrated Tussock
Cropping	?	Cropping could utilised on degraded roads provided sites are kept free of Serrated Tussock through regular tillage and crop competition
Fencing	✖	
Signage	✖	
Natural regeneration	✓	Encourage regeneration through the removal of restrictions (grazing, slashing, weed competition) around any existing remnants
Revegetation	✓	Consider revegetation of sites with suitable trees, shrubs and ground covers to reduce long term management. Native grasses and chenopods can be used to replace Serrated Tussock.
Salinity	✓	Planting and stabilisation of saline sites can be tackled in conjunction with the local Landcare group
Erosion/run-off control	✓	Road grading or management should attempt to disperse rather than concentrate water (correct road camber, run-off points, table and mitre drains). Active eroding areas should be stabilised and revegetated
Rare plant specific requirements	✖	
Description	Bacchus Marsh district roadsides	

C-compaction, L-leaching, Wa-water erosion, S-salting, Wi-wind erosion

Land Systems	Rainfall (mm)	Soil limiting processes	Major Weeds	Soils	Original Vegetation
Pvf4	400-500	C	Serrated Tussock	Red duplex soils	Grassland usually with low chenopods. May have Scattered Drooping She-oak, Buloke, Golden Wattle, Black Wattle, Varnish Wattle, Tree Violet, Lightwood, Yellow Box, Yellow Gum, Grey Box, Redgum or Tangled Lignum
Pvf5	500-600	C/S/Wg	Serrated Tussock Phalaris Gorse Pine	Yellow duplex soils, yellow clays	Grassland/Grassy woodland May have scattered Grey Box, Yellow Gum, Golden Wattle, Lightwood, Black Wattle, Blackwood, Bursaria, Hedge Wattle and Berry Saltbush
pf4	400-500	C		Brown loams	Grassy (Themeda/Spear/Wallaby /Windmill Grass) woodland Grey Box, Yellow Box, Red Box, Yellow Gum, Red Gum, Lightwood, Drooping She-oak, Black Wattle, Varnish Wattle, Hedge Wattle, Gold-dust Wattle, Tree Violet, Turkey Bush, Tangled Lignum and Chenopods
Pf55	500-600	Wa/L/C		Mottled duplex soils	Woodland , Mallee or chenopod shrubland Red Box, Grey Box, Yellow Box, Yellow Gum, Lightwood, Golden Wattle, Varnish Wattle, Gold-dust Wattle and low chenopods Or Bull Mallee, Moonah, Fragrant saltbush, Boobialla
Pf56	500-600	C/L	Ground Cherry	Brown loams	Grassland or grassy Woodland Yellow Gum, Red Gum, Grey Box, Yellow Box, Golden Wattle, Varnish Wattle, Lightwood, Gold-dust Wattle, Bursaria, Turkey Bush and low chenopods,
Gs5b	500-600	Wa/C/S	Serrated Tussock	Duplex soils	Grey Box, Red Gum, Yellow Box, Yellow Gum, Varnish Wattle, Black Wattle, Hedge Wattle, Golden Wattle Open Forest
Ss5	500-600	Wa/L/C/S	Serrated Tussock	Shallow stony loams, yellow duplex soils	Woodland Yellow Gum, Yellow Box, Grey Box, Lightwood, Golden Wattle, Varnish Wattle, Black Wattle, Fragrant Saltbush and other chenopods Occasional Drooping She-oak remnant Or Red Stringybark, Red Ironbark Open Forest
Ss6b	600-700	Wa/L/C		Shallow stony loams, Stony red duplex soils	Woodland Yellow Box, Grey Box, Yellow Gum, Varnish Wattle, Fragrant saltbush Or Red Stringybark, L/L Box, Lightwood, Golden Wattle with Chinese Scrub and heaths

CODE ML

Name of road/category	Road segments containing remnants of Banksia or Casuarina woodlands on various soils		
Vegetation type	Banksia woodlands Drooping She-oak woodlands Forests or woodlands containing Black Casuarina Buloke Woodlands		
Management methods (Fuel reduction, land and vegetation management)			
Burning		?	A burn may assist natural regeneration. Burning must protect existing trees. The area should not be burnt again until seedlings are well established (20 year plus cycle). It is imperative that any burning does not damage seedlings. Consider the impact of any proposed burn on the spread of weeds such as Serrated Tussock or Gorse
Slashing		✖	
Weed control		✓	Control noxious weeds and introduced grasses by spot spray, cut and paint or hand removal methods
Grazing		✖	
Cropping		✖	
Fencing		✓	Consider fencing remnants to allow natural regeneration. use rabbit proof netting
Signage		✓	Signpost all sites as a priority
Natural regeneration		✓	the encouragement of natural regeneration through the removal of threats (grazing by stock/rabbits, slashing, weed competition and inappropriate burning) is the key management task
Revegetation		✓	Consider additional planting of Casuarina and Banksia (and associated species) grown from local seed to control weeds and expand the sites
Salinity		✓	Planting and stabilisation of saline sites can be tackled in conjunction with the local Landcare group
Erosion/run-off control		✓	Road grading or management should attempt to disperse rather than concentrate water (correct road camber, run-off points, table and mitre drains). Active eroding areas should be stabilised and revegetated. Avoid directing run-off water to Banksia/Casuarina remnants or any change to the soils structure around plants
Rare plant specific requirements		✓	These plant communities are now quite rare in the region. Careful management is required. Buloke is listed as depleted in Victoria. Consult DNRE for advice regarding management of these communities
Description	These plant communities have been reduced to a number of localised remnants. Management should concentrate on the protection of existing trees and the encouragement of natural regeneration through the removal of threats (grazing by stock/rabbits, slashing, weed competition and inappropriate burning)		

CODE MM

Name of road/category	Low Conservation value roadsides on a range of sandy soils and rainfalls	
Vegetation type	Formerly mixed Eucalypt/Blackwood/Black Wattle or Silver Wattle Open Forest with a native grass/bracken/sedge groundlayer now dominated by Gorse, other woody weeds and introduced grasses	
Management methods (Fuel reduction, land and vegetation management)		
Burning	?	Burning can be used providing follow up weed control is carried out. A mass germination of Gorse will follow burning and must be controlled
Slashing	✓	Slash areas of introduced grass or woody weed seedlings only, to restrict fire risk. Care should be taken not to spread seed to other sections of the road with higher conservation values. Slashing is best carried out prior to seeding of annual grasses (by December)
Weed control	✓	Control of Gorse and other woody weeds is recommended by spot spraying as an alternative management practice to slashing or burning to reduce fire risk
Grazing	?	Grazing can be considered on totally degraded or modified sites without native remnants as a mechanism to control grass growth (fire risk). Control of noxious weeds must be a condition of any grazing licence
Cropping	?	Cropping may be considered on totally degraded sites consisting of woody weeds or introduced grasses. Not appropriate where there are remnant trees
Fencing	✖	
Signage	✖	Markers can be used to protect better quality groundlayer from slashing
Natural regeneration	✓	Encourage natural regeneration through the removal of threats such as grazing, slashing or weed competition around any remnants
Revegetation	✓	Consider revegetation with trees and shrubs as a mechanism to cut long term management costs (i.e. remove the need for regular slashing/weed control)
Salinity	✓	Enlist the help of local Landcare groups to replant any saline sites with appropriate species
Erosion/run-off control	✓	Road grading or management should attempt to disperse rather than concentrate water (correct road camber, run-off points, table and mitre drains). Active eroding areas should be stabilised and revegetated
Rare plant specific requirements	✖	
Description	Forested roads on granite sands around Lal Lal. More fertile soils along streams and valleys within Ordovician areas	

C-compaction, L-leaching, Wa-water erosion, S-salting, Wi-wind erosion

Land Systems	Rainfall (mm)	Soil limiting processes	Major Weeds	Soils	Original Vegetation
Pf55b	500-600	Wa/L/C	Phalaris	Mottled duplex soils	Manna gum Woodland with Blackwood, Black Wattle, Swamp Gum, Yarra Gum, N/L Peppermint, Candlebark, Yellow Gum and Messmate. Native grass understorey (Themeda) Rare remnants of Snow Gum, Banksia and Black She-oak
Pf63	600-700	C/Wa	Gorse	Duplex soils, grey clays	Carex/Native grassland Or Manna Gum, Swamp Gum, N/L Peppermint, Blackwood, Silver Wattle Woodland or Open Forest with Native grass understorey
Pf64	600-700	Wa/C/L	Gorse	Mottled duplex soils, yellow duplex soils	Manna Gum, Swamp Gum, N/L Peppermint, Messmate, Candlebark, Blackwood, Silver Wattle, Black Wattle Woodland or Open Forest with Native grass (Themeda) understorey
Gg7	>700 temperate	Wa/S	Gorse, Blackberry	Duplex soils	N/L Peppermint, Yarra Gum, Swamp Gum, Manna Gum, Blackwood Woodland or Open Forest with Themeda understorey or Carex/Themeda grassland

CODE MN

Name of road/category	Medium-High Conservation value roadsides on a range of sandy soils and rainfalls	
Vegetation type	Formerly mixed Eucalypt/Blackwood/Black Wattle or Silver Wattle forest with a native grass/bracken/sedge groundlayer now dominated by Gorse, other woody weeds and introduced grasses	
Management methods (Fuel reduction, land and vegetation management)		
Burning	?	Burning can be used providing follow up weed control is carried out. A mass germination of Gorse will follow burning and must be controlled
Slashing	?	Consider slashing on medium value roadsides only and limit to areas of introduced grass or woody weed seedlings to restrict fire risk. Care should be taken not to spread seed to other sections of the road with higher conservation values. Slashing is best carried out prior to seeding of annual grasses (by December)
Weed control	✓	Control of Gorse and other woody weeds by spot spraying, cut and paint or hand removal is recommended as an alternative management practice to slashing or burning to reduce fire risk
Grazing	✖	
Cropping	✖	
Fencing	✓	Consider fencing any fragile remnants where it becomes apparent that a lack of a physical barrier to vehicles/grazing threatens the future of the community or rare plant.
Signage	✓	Markers can be used to protect better quality groundlayer from slashing. Signage of all high conservation roadsides is recommended to raise awareness and protect values from inadvertent damage
Natural regeneration	✓	Encourage natural regeneration through the removal of threats such as grazing, slashing or weed competition around any remnants
Revegetation	✓	Consider revegetation with trees and shrubs as a mechanism to cut long term management costs (i.e. remove the need for regular slashing/weed control)
Salinity	✓	Enlist the help of local Landcare groups to replant any saline sites with appropriate species
Erosion/run-off control	✓	Road grading or management should attempt to disperse rather than concentrate water (correct road camber, run-off points, table and mitre drains). Active eroding areas should be stabilised and revegetated
Rare plant specific requirements	✖	
Description	Forested roads on granite sands around Lal Lal. More fertile soils along streams and valleys within Ordovician areas	

C-compaction, L-leaching, Wa-water erosion, S-salting, Wi-wind erosion

Land Systems	Rainfall (mm)	Soil limiting processes	Major Weeds	Soils	Original Vegetation
Pf55b	500-600	Wa/L/C	Phalaris	Mottled duplex soils	Manna gum Woodland with Blackwood, Black Wattle, Swamp Gum, Yarra Gum, N/L Peppermint, Candlebark, Yellow Gum and Messmate. Native grass understorey (Themeda) Rare remnants of Snow Gum, Banksia and Black She-oak
Pf63	600-700	C/Wa	Gorse	Duplex soils, grey clays	Carex/Native grassland Or Manna Gum, Swamp Gum, N/L Peppermint, Blackwood, Silver Wattle Woodland or Open Forest with Native grass understorey
Pf64	600-700	Wa/C/L	Gorse	Mottled duplex soils, yellow duplex soils	Manna Gum, Swamp Gum, N/L Peppermint, Messmate, Candlebark, Blackwood, Silver Wattle, Black Wattle Woodland or Open Forest with Native grass (Themeda) understorey
Gg7	>700 temperate	Wa/S	Gorse, Blackberry	Duplex soils	N/L Peppermint, Yarra Gum, Swamp Gum, Manna Gum, Blackwood Woodland or Open Forest with Themeda understorey or Carex/Themeda grassland

CODE MO

Name of road/category	Low Conservation value roadsides on Ordovician soils (in higher rainfall areas)	
Vegetation type	Formerly mixed Open Forest (WSF) with a Wattle/Pea understorey and native grass, sedge and bracken groundlayer now dominated by introduced grasses and woody weeds	
Management methods (Fuel reduction, land and vegetation management)		
Burning	?	Burning is likely to be catered for through the incidence of wildfire. Burning can be considered to encourage natural regeneration provided follow up weed spraying is conducted
Slashing	✓	
Weed control	✓	Control of weeds such as Cape Broom by spot spraying is recommended as the major focus of management
Grazing	✓	Consider on completely degraded sections as a means to limit management costs and control fire risk and weeds
Cropping	✓	Consider on completely degraded sections as a means to limit management costs and control fire risk and weeds
Fencing	✖	
Signage	✖	
Natural regeneration	✓	Encourage regeneration of any small patches of remnant trees and shrubs through burning and removal of threats (grazing, slashing, weeds). Burning will allow regeneration of native species
Revegetation	✖	
Salinity	✓	Planting and stabilisation of saline sites can be tackled in conjunction with the local Landcare group
Erosion/run-off control	✓	Road grading or management should attempt to disperse rather than concentrate water (correct road camber, run-off points, table and mitre drains). Active eroding areas should be stabilised and revegetated
Rare plant specific requirements	✖	
Description	e.g. Wombat forest roadsides	

C-compaction, L-leaching, Wa-water erosion, S-salting, Wi-wind erosion

Land Systems	Rainfall (mm)	Soil limiting processes	Major Weeds	Soils	Original Vegetation
Gs7	>700 temperate	Wa/C/L	Cape Broom	Yellow earths, mottled duplex soils	Messmate, Manna Gum, N/L Peppermint, Swamp Gum, Candlebark, Blackwood Open Forest with a native grass/bracken understorey. Silver Wattle, Black-anther Flax-Lily, Banksia and wetter peas may be present
Gs8	>700, montane	Wa/C/L	English Broom Cape Broom	Friable earths, mottled duplex soils	Messmate, Manna Gum, N/L Peppermint, Swamp Gum, Candlebark, Blackwood Open Forest Strong shrub layer may include Elderberry Panax, Christmas Bush, Prickly Moses, Hop Bitter-pea, Silver Wattle, Tea-tree, N/L Wattle, Hop Wattle, Bracken and Poa
Ss7	>700 temperate	Wa/C/L	Blackberry, Gorse, Cape Broom	Stony earths	Messmate, Manna Gum, Swamp Gum, N/L Peppermint, Candlebark, Silver Wattle, Blackwood, Black Wattle Open Forest with Prickly Moses, Hop Wattle, N/L Wattle, Hakea, Spear Grass, Silky Tea-tree and Bracken may be locally common
Ss8	>700, montane	L/Wa/C		Shallow stony earths, friable earths	Messmate, Manna Gum, Swamp Gum, N/L Peppermint, Candlebark, Silver Wattle, Blackwood Open Forest. With B/L Peppermint, N/L Wattle, Prickly Moses, Christmas Bush, Bracken, Hop Wattle, Bursaria, heaths and Prickly Currant-bush locally common

CODE MR1

Name of road/category	Long Forest Road and offshoots	
Vegetation type	Bull Mallee with Melaleuca and Chenopod understorey OR Red Box, Grey Box, Fragrant Saltbush, Boobialla, Varnish Wattle	
Management methods (Fuel reduction, land and vegetation management)		
Burning	✖	
Slashing	✖	Ensure there is no damage to the roadsides. Discourage slashing of frontages with high values by residents. Prosecute offenders collecting fire wood from the roadsides
Weed control	✓	Remove any weed infestations
Grazing	✖	
Cropping	✖	
Fencing	✖	
Signage	✖	Appropriate signage is in place
Natural regeneration	✓	Monitor natural regeneration. Trim vegetation for road clearance sensitively and to DNRE approval. Discuss the collection of seed from trimmed material or spreading of material to facilitate regeneration with DNRE
Revegetation	✖	
Salinity	✖	
Erosion/run-off control	✓	Ensure run-off does not significantly alter the water available to the roadside vegetation through concentration or slope alteration
Rare plant specific requirements	✓	Refer any proposed management practices to DNRE for approval. Roadside contains several rare plants Inform residents of the conservation value of remnants and encourage protection of remnants within the housing estate through the Land For Wildlife Program and other incentives such as covenanting.
Specific Requirements	✓	The Long Forest area has a very sparse ground layer and so a fuel reduction burn is not practical. The area however does have some significant fire concerns due to limited access and the flammable nature of the tree and shrub vegetation. Involvement of residents in the Community Fireguard program is strongly recommended. Protection of the community and buildings through the use of sprinkler systems, removal of hazards near homes, a communication network between residents and other practical steps are essential. The Long Forest area is a truly unique and special environment. A sensible approach to fire management is required to balance resident safety with the protection of the conservation value of the area.
Description	Unique small cluster of roads within the region containing a Bull-Mallee, Melaleuca, Chenopod community. Limit management practices to the control of weeds and roadside awareness	

Appendix 4: Analysis of Previous Roadside Data

Previous Assessment:
Nally S. (1989). *The Conservation Significance of Roadsides in the (former) Shire of Buninyong.* University of Ballarat
Further assessment was carried out in 1998 in the lead up to the production of this plan.

High Conservation Roadsides	Assessment
Ballarat-Navigators Rd (between Butlers and Ramsay Roads)	May have deteriorated in part. Nally noted weed problems and high scenic values.
Ted Lyons Rd	Identified as high in both studies.
Yendon No. 1 Road (Harts Rd to Pound Ck Road)	Identified as high in both studies. Low under powerlines.
Triggs Road (last Km)/Skeletons Rd (to Harbours Rd)	Identified as high in both studies. Nally noted absence of noxious weeds and presence of pasture grass invasion.
Spread-eagle Rd and Duggans Rd	Identified as medium/high in both studies. Nally noted significant Themeda and pasture grass invasion.
Diamonds Rd	Identified as high in both studies. Nally noted excellent regeneration, Themeda and scenic value.
"Hopwoods Track" & lower end of Hopwoods Rds	Identified as high in both studies. Nally noted pasture grass invasion on the track and firewood collection.
Pryors Rd (from Scotts Track) and Braybrook-Sandwith Rd (part to Rosenows Rd)	Identified as medium by Nally. High in recent study probably due to finer scale of recent survey.
Elaine-Bluebridge & Mt Doran Settlement Rds	Identified as high in both studies. Nally stressed improved weed and other management required such as location of gravel dumps.
Mystery Lane	Identified as high in both studies. Nally indicated road subject to threat from further housing development and fire control.
McAlisters Rd	Identified as high in both studies. Nally noted lack of regeneration possibly due to grazing.
Iron Mine Rd and Lal Lal Falls Rd (part)	Recorded as medium by Nally. Rated as high in current study possibly due to finer scale of classification of segments.
Sharrocks Lane (Sth end)	Recorded as medium by Nally. Rated as high in current study possibly due to finer scale of classification of segments.
Mount Doran-Egerton Rd and Elaine-Egerton Rd	Recorded as medium by Nally. Rated as mainly high in current study possibly due to finer scale of classification of segments. Presence of rare Casuarina/Banksia communities also influenced score.
Clarendon-Bluebridge Rd	Recorded as medium by Nally. Rated as high in current study perhaps due to significant regeneration. native grass levels may have improved.

Summary of key recommendations from *VicRoads Midland Highway Roadside Management Plan*

(Meredith-Clarendon section)

- Road is a strategic fire break
- Encourage hay cutting in low conservation areas
- Only allow indigenous plantings
- Restrict disturbance of native vegetation
- No slashing where Serrated Tussock or Chilean Needle Grass occur (NB not recorded for this section but are closer to Geelong)
- No ploughed fire breaks without a permit
- Roadside is an important area of Koala habitat
- Major weed problem is Gorse
- Yarra Gum remnants at Ballarat end (listed as an endangered plant)
- No mowing of native grasses
- Mow annual grasses and weeds prior to seeding
- No mechanical damage to trees through slashing

Appendix 5: Tender Specifications

(Prepared by the Roadside Conservation Advisory Committee)

STANDARD SPECIFICATIONS
General Conservation Management

There is both a legislative requirement (as indicated earlier in this note) for road managers to protect the environmental assets located on roadsides and an increased corporate and community expectation that these assets will be maintained.

With the increasing use of contractors to undertake works on behalf of the traditional land managers it is important that good environmental management ranks as one of an organisations key goals, and be part of economic development, the movement of freight and people, and road safety.

The Roadsides Conservation Advisory Committee can assist local government in the production of guidelines that recognise best works practices and have prepared the following standard specifications to be included as part of tender documentation. Similar clauses can be found in VicRoads documentation, however for ease of interpretation they have placed under the heading of 'General Conservation Management'. These clauses should be a minimum requirement and more detailed clauses maybe required if additional protection or management is needed for sites of specific conservation value etc.

The preparation of environmental specifications should be seen as a starting point for maintaining environmental values, as a successful project is a combination of good tender specification, the level of site supervision and the establishment and a use of QA (Quality Assurance) standards.

Approval for works	The contractor shall obtain the approval of the Superintendent prior to the removal of tree or shrub species during the period of works
Limits of Works	Disturbance of vegetation shall be limited to the road formation, typically from table drain to toe of batter, or top of fill batter
Nomination of stockpile sites and turning points	Suitable sites are to be nominated for approval by the superintendent prior to the commencement of works
Environmental damage	Rectification of environmental damage will be undertaken at Contractors expense, to the satisfaction of the superintendent, within the 12 months defects liability period
Environmental management	As part of a pre qualification process, tenders will demonstrate their capacity to implement an effective environmental management system, or have attended an appropriate environmental training program
General works principles	All works are to be performed in accordance with the principles outlined in the: • "VicRoads Roadside Management Guide" • EPA guidelines for "Environmental Guidelines for Major Construction Sites" • local Roadside Management Plan (where it exists)

Appendix 6: Article-Firebreaks and Roadside Remnant Vegetation

An article entitled "Firebreaks and Roadside Remnant Vegetation" (LFW News Vol. 1 No 9) by Stephen Platt and edited text of a talk by Steve Petris, a Country Fire Authority officer, to the RCAC on the nature of wildfire and the usefulness of firebreaks is reproduced below.

Ploughed firebreaks are often placed within roadside remnant vegetation, but is this a sensible management action? Disturbance of native vegetation is highly undesirable. It destroys understorey species, altering the ecological balance and favouring invasion by weeds and pest birds. A common invader is *Phalaris* sp., which can create many times the quantity of fine fuel (the main fire risk) originally present from native trees, shrubs or ground cover.

During intense forest fires, small firebreaks around paddocks play a secondary role to adequate protection around major assets such as the home. "The vast majority of Victoria's bushfire losses are the result of a handful of major fires that occur once or twice a decade. Experience has shown that fire breaks make no impact on these major fires. On Ash Wednesday (1983), for example, fire effortlessly jumped two and three chain roads with full-width ploughed firebreaks on either side. Similarly, no suppression force in the world is able to impede the progress of fires such as those of Ash Wednesday. Consequently, the emphasis of fire protection efforts should be on protecting lives and assets rather than on stopping fires" [under Ash Wednesday conditions] (Petris, 1992).

Petris also comments that "Research on the ability of fire-breaks to stop low intensity grassfires has shown that the presence of a handful of trees within 20 metres of a fire-break dramatically reduces its effectiveness ". However, the value of trees on farms is undisputed. So, there seems to be a dilemma. Trees are desirable but don't mix with firebreaks. The key point is that, in the farm layout, the two can occupy different areas a combination of firebreaks and other measures around the home and other assets (which may include some trees, without ground litter, to reduce wind speed, filter embers and absorb radiation) and vegetation, including trees, on other parts of the property.

If fire-breaks are constructed near roadside vegetation or shelterbelts they should be placed outside the vegetation (usually in the paddock) where competition from the trees reduces the growth of adjacent pasture or crops. The competitive effect from trees can reduce the rate of regrowth and prolong the effectiveness of the firebreak. Loss of space in a paddock is adequately compensated for by the benefits of the shelter provided to the paddock (up to 25 times the height of the trees). The role of firebreaks in providing access for firefighters and landholders must also be considered. CNR plans to develop a 'Code of Practice for Fire Prevention' providing a holistic approach to fire prevention planning. Stephen Platt Reference: Petris, S. (1992) Planting trees to enhance bushfire safety. Trees and Natural Resources,Vol.34 No.4 Dec. 1992. This issue of TNR contains many articles on fire protection and fire and native vegetation and is highly recommended. Available from NRCL, PO Box 105,Springvale, 3171. Ph. 03-546 9744.

*"*My work for the three months of the past year has concentrated on farm fire safety, which has an obvious impact on roadside conservation.

The only research on linear fire breaks has been Wilson's study in the Northern Territory. His research clearly shows that trees and fire breaks don't mix which implies that narrow meandering tracks between trees are of little use but may reduce the intensity of a fire. Fire breaks should not be located near trees to be effective. Fire intensities recorded in his study were generally less than 10 megawatts per metre (MW/m) (87%) although one fire burned at 17 MW/m. Macedon fires were between 500 KiloW/m to 60 MW/m. Some Ash Wednesday fires jumped breaks 60m wide. Our experience from all major fires suggests that fire breaks will not have any impact on the spread of fires, so it seems that for roadside firebreaks, we need to ask why are we doing it? Many fire fighters argue that a fire break is not designed to stop a major fire, but are to stop fires beginning on the roadsides, (CFA statistics are not good enough to provide any data on the frequency of occurrence of fire initiating on roadsides) or are to provide a safe place for a fire fighter to begin a back burn. It is important for people to make explicit the reasons for constructing the break.

Given that the vast majority of bushfire losses occur on the one or two bad fire days we experience every decade and given our experience of these fires shows that people can survive in their homes and then save their homes, perhaps efforts should be concentrating on asset protection rather than stopping the fire.

There is no evidence that houses actually explode; most houses ignite by sparks and embers which are not put out. This suggests that people can survive in their homes and then can be there to save the house. Radiant heat and direct flame attack were identified in one study as being the most important factor in determining whether a house survives, therefore some fuel level reduction is needed. However I'd argue that the presence of people is just as important in saving a home.

Of the 47 deaths in Ash Wednesday, 7 died in the home (of which some were over 80 and all were over 50), at Macedon 80% of houses with people present were saved. In the 20% of cases where houses did burn, the house provided protection while the fire front passed, as the fire often began in the roof or under the eaves. Of the empty houses 44% did not burn down because they were saved by neighbours or the passing fire brigade.

If the reason to construct a fire break is to stop a fire, then it needs to be recognised that it may not (cannot) stop a major fire while weather conditions are severe. Although you can survive a major fire it is nearly impossible to stop a major fire. The implication is that there is a need to adopt other holistic approaches to fire safety and asset protection.

What of the role of shelter belts? Some farmers say that while fire breaks were breached, shelter belts shielded their homes. If trees can reduce wind speeds they can reduce fire intensity and therefore be beneficial to fire suppression. Shelter belts need to be tall, impermeable and without gaps to be effective. Similarly, gaps in a shelter belt will increase wind speed and intensity. Gaps in shelter belts (and by implication, roadside vegetation) designed to stop vegetation acting as a fuse may have a negative effect on fire safety if the wind is moving across rather than along the shelter belt. The need to construct fuse breaks should be carefully considered.

Fine fuels building up in forests lead to crown fires, whereas this does not apply to open paddocks and shelter belts. While native forests are subject to huge build ups of fuel which can lead to crown fires, a shelter belt in an open paddock will not produce these huge amounts of fuel. Grass fires will generally run through the base of the shelter belt.

Farmers have a good understanding of fire as they live and work with it. However they rarely experience major fires. Many strategies are currently based on these once in a lifetime experiences. My experience of talking to farmers, while not a sound statistical sample, illustrates that not all farmers understand the principles of house survival and personal survival. More research is also needed."

Steve Petris, CFA