City of Casey

Roadside Vegetation Management Plan

Part 1
Management Plan

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Responsible Department – Engineering & Environmental Services

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Preamble

In accordance with a resolution of Council on 21 June 2005 to include definitions of Council, Councillors and Council officers in all Council policy documents, the following definitions are provided:

Council – means Casey City Council, being a body corporate constituted as a municipal Council under the Local Government Act 1989

Councillors – means the individuals holding the office of a member of Casey City Council

Council officers – means the Chief Executive Officer and staff of Council appointed by the Chief Executive Officer.

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1.0 SUMMARY AND RECOMMENDATIONS

SUMMARY

The City of Casey local government area is situated in a growth corridor some 40km south east of Melbourne. It covers an area of 395 square kilometres and spans 30km from the foothills of the Dandenong Ranges to the shores of Western Port. Between these two extremes is a diverse range of landscapes and environments, both natural and developed. The City of Casey is the third fastest growing municipality in Australia (City of Casey 1999). Such growth puts immense pressure on the environment, hence resulting in the need to adequately manage the biodiversity remaining. In light of this, the City of Casey commissioned Ecology Australia to produce a Roadside Vegetation Management Plan covering all rural roads (588 km) in the City. The Plan aims to preserve, enhance and properly manage roadsides for their conservation and landscape values while maintaining their functional roles.

Road reserves are used not only for transport, but also as service corridors, in fire prevention, for recreation and, occasionally, for agriculture. Vegetation on roadsides is important for land protection, flora and fauna habitat, and landscape character. Vegetated roadsides can provide important links between larger areas of native vegetation, and where larger remnants no longer exist, roadside vegetation can provide the only functional habitat for native flora and fauna. However, the continued survival of remnant vegetation cannot be taken for granted. Strategic and site-specific management planning is needed to reconcile the functional roles and long-term protection of the conservation values of rural roadsides.

Roadsides retain a substantial proportion of the remaining native vegetation in the City, and some roadside sections are highly significant for their natural values. While not within the scope of this study, many roadsides are also likely to contain sites of high cultural heritage significance.

The Plan is presented in two parts. This first part begins with recommendations for action by the relevant authorities to implement the Plan. An outline is provided on the existing laws, plans and guidelines applicable to roadsides in the City of Casey. In particular, relevant aspects of local laws, fire prevention plans and local vegetation protection measures are summarised. Recommendations for vegetation management are provided as generic prescriptions. Ecological Vegetation Classes recorded on roadsides in the City of Casey are briefly described and their conservation significance outlined.

Part Two is an Operations Manual. Maps and site specific assessments have been included for all roadsides of medium and high conservation significance. There are management prescriptions for each medium and high value road section. There are also generic prescriptions for low conservation value roadsides, and roads with cultural landscape values. The guidelines and prescriptions are directed primarily at the agencies and their contractors who undertake works on road reserves. Additional information is provided on priority weeds, and on indigenous species for revegetation works.

The current document has been revised and updated from the existing Mornington Peninsula – Western Port Roadsides Management Plan prepared by Ecology Australia Pty Ltd and Context Pty Ltd in March 1996.

RECOMMENDATIONS

The following recommendations are made for action to implement this Plan, to monitor and to review the Plan in due course.

Action

1.0 Adoption and implementation

1.1 Refer to and utilise this Roadside Vegetation Management Plan and Operations Manual when revising the City of Casey Planning Scheme, revising the Municipal Fire Prevention Plans, and when planning road improvements or utility installations.

1.2 Establish a Roadsides Management Plan Implementation Committee with similar composition to the Steering Committee which guided the preparation of this Plan.

1.3 Allocate appropriate financial and staff resources to implement the actions specified below.

2.0 On-ground works

2.1 Erect signs on roadsides of High and Moderate conservation value to educate the public of their importance; highlight significant areas for works crews and to enforce legislation.

- Signs should allude to Significant Roadside Vegetation, but due to resources being low there is no need to differentiate between High and Moderate Conservation ratings.
- A contact number could be included on the sign to enable consultation with Council regarding site management prior to the commencement of work.

2.2 Assess roadsides for potential Cinnamon Fungus infestations. Signpost any sites, and provide guidelines regarding the prohibited activities and required hygiene measures.

2.3 Clearly mark on the ground areas that are not to be slashed or subject to other disturbances. Ensure that relevant field operators understand the marking system, and ensure that this is included in contract conditions.

2.4 Identify locations where degradation of indigenous vegetation, drainage or erosion problems are resulting from recreational use of road reserves, undertake remedial action such as fencing sensitive areas.

2.5 In areas utilised for equestrian activities, designate and signpost a network of bridle trails, avoiding high and medium conservation value roadsides and highly erodable areas where possible. Publicise this network amongst the horse-riding community.

2.6 Investigate opportunities to promote the establishment of timber woodlots on private or public land of low conservation, as an alternative source of firewood to road reserves.

2.7 Develop a priority list of sites where Aerial Bundled Cabling (ABC), relocation or undergrounding should be used to replace existing powerlines. Consider retaining plants smaller than 4m (regardless of their mature size) growing under existing powerlines when sites have been proposed for installation or conversion to ABC. Decisions regarding the appropriate pruning techniques can be made after ABC has been installed.

2.8 Review road maintenance practices and adjust where necessary to implement the Roadside Management Guidelines and prescriptions in the Operations Manual.

2.9 Manage stockpile or dump sites to prevent growth and/or dispersal of pest plants. Provide all statutory authorities and contractors undertaking roadworks with a list and location map of designated stockpile, dump and parking sites.

3.0 Vegetation management

3.1 Establish and maintain a register of rare, threatened or significant fauna, flora or plant communities occurring on road reserves in the municipality, based on those identified in this Roadside Vegetation Management Plan, the Biodiversity Management Plan and previous roadside assessment undertaken in the Municipality. Update as information is provided from NRE Flora and Fauna divisions and local field naturalists, and incorporate into prescriptions in the Operations Manual.

3.2 If necessary (and appropriate) indicate the location of rare, significant or threatened flora or fauna, significant habitats and wetlands by:

- on-site markers (e.g. small wooden stakes tipped with orange paint or other markers)
- fencing off the area.

Maintain a list of sites marked. Ensure that numbers on markers correspond with management prescriptions for each site in the Operations Manual. Note that it may be inappropriate to mark some rare species as obvious signage may result in illegal removal of species such as native orchids.

3.3 Nominate a contact person in the municipality to be responsible for:

- the marking of rare, threatened or significant vegetation
- maintenance of a register
- communicating with nominated contacts in service authorities
- organising salvage of significant species prior to works

These activities may be the responsibility of a Council Environment Officer or Environmental Planner.

3.4 Seek specialist advice from NRE, local naturalists or other expert botanist/biologist/zoologists about the management of particular rare or significant species or vegetation types. Where possible, develop management plans for particular species, vegetation types or sites of significance not covered by Flora and Fauna Guarantee Action Statements.

3.5 Identify existing areas of regeneration, and potential sites for regeneration. Fence regenerating vegetation and potential sites, when appropriate, to protect against grazing, slashing or accidental destruction. Mark regenerating vegetation on site with appropriate Environmental Markers.

3.6 Encourage local landholders and community groups to manage and protect remnant vegetation and undertake revegetation on roadsides and adjoining private property. Consider introducing incentives e.g. rate rebates, grants, with priority given to roads identified as being of high conservation value, or potential/proposed habitat links.

3.7 Prepare a rural Roadside Revegetation and Planting Program with reference to the Plant Species Guidelines for Revegetation in Appendix 3 of the RVMP Part 2: Operations Manual, and in consultation with relevant authorities, landholders and interest groups. Give particular attention to implementing the prescriptions or revegetation on priority roadsides, including potential habitat links, and to regeneration and habitat restoration. Ensure that adequate funding is allocated, and specify ongoing vegetation management tasks and responsibilities to the planted areas.

3.8 Review and update a Weed Control Strategy and Action Plan for roadsides, with reference to the Priority Weeds table in **Appendix 3** of RVMP Part 2: Operations Manual. This should be done in consultation with landowners, Department of Natural Resources and Environment, Country Fire Authority, Victorian Farmers Federation and the general community and interest groups. Allocate resources for implementation.

3.9 Undertake an assessment of windbreak stands of planted exotic trees (both within and beyond road reserves) in terms of:

- cultural significance
- ecological effects
- effects on adjacent landholders
- aboricultural issues (including lifespan, health)

Develop a policy and use the results of the assessment to:

- guide a management strategy for these stands, including removal and replacement of trees that are senescent, hazardous or a significant threat to indigenous vegetation, and
- ensure current Planning Schemes will protect significant treelines.

3.10 Undertake a staged program of removal of all wilding (i.e. self-sown) pine trees from road reserves, and replacement with suitable indigenous plantings. Give priority for removal of pines and subsequent suitable indigenous plantings. Give priority for removal of pines that are of a seed-bearing age, and within 100m of indigenous vegetation remnants. Consider establishing a yearly task force to remove young invasive pines from indigenous remnants.

3.11 Introduce incentives (including the offer of replacement plants) for private landholders to remove invasive species, including pines and introduced wattles, adjacent to roadsides, especially those contributing to weed establishment in remnant vegetation.

3.12 Consider applying for *Land For Wildlife* status for sections of roadsides being managed to incorporate habitat values.

4.0 Training

4.1 Organise a training program, or support attendance at courses organised by other bodies (e.g. Greening Australia), for all relevant field staff in Council, utility authorities and contractors to encourage understanding of:

- indigenous plants and major weed identification and recognition;
- methods to minimise disturbance to soils and native vegetation (e.g. removing trees by (i) use of chainsaws rather than bulldozers; (ii) cutting stumps to ground and painting with herbicide);
- methods to minimise the spread of weeds and soil pathogens;
- correct pruning techniques to maintain healthy trees;
- removal of noxious and environmental weeds;
- anticipated tree growth rates and mature heights (to minimise pruning);
- rehabilitation techniques;
- recognition and reporting of possible sites of cultural heritage value, particularly Aboriginal sites.

Training should have both theoretical and on-site, practical components.

5.0 Information and education

5.1 Ensure that copies of the Operations Manual are widely distributed to operations staff, all utility authorities, contractors and others undertaking works on road reserves. This should include a map highlighting roadside management categories.

5.2 Liaise with local groups, service authorities and NRE to prepare a list of indigenous plant species suitable for establishment under or near services, to replace existing weed species.

5.3 Disseminate information to rural landholders (with rates notices, in Council publications, or in the local press) about:

- roadside vegetation conservation values
- the importance of protecting roadside remnant vegetation, including understorey plants, and encouraging regeneration
- fire prevention requirements on roadsides
- weed identification and control, including target species of Regionally Controlled weeds and invasive environmental weeds that should not be planted on private or public land
- statutory responsibilities of landholders for weed control on adjoining road reserves (except Declared Roads), under the Catchment and Land Protection Act
- revegetation with indigenous species on roadsides and adjoining land
- environmental and economic costs of weed control from escaped garden or other exotic plantings.

5.4 To encourage targeted weed control, ensure all spraying and slashing contractors and council operations staff recognise the most invasive and damaging weeds of roadsides. This may be achieved through the production and provision of a weeds identification kit, containing an illustrated description of these weeds as well as information on the most appropriate control methods for each species.

5.5 Provide ratepayers (with rates notices or Council publications) with:

- information on the habitat value of dead wood and the threat to wildlife posed by removal of fallen timber;
- alternative sources for firewood, and encouraging the use of plantation-grown firewood;
- NRE and Council firewood collection regulations.

5.6 Ensure that all nurseries, Council outlets and appropriate Council offices operating within the region are aware of obligations under the *Catchment and Land Protection Act* 1994 regarding the:

- selling of mulch containing weeds or weed seed
- selling of environmental weeds.

5.7 Where appropriate inform service authorities and adjacent landholders of the presence of sites (or markers) of rare, threatened or significant flora or fauna, and the need to avoid any disturbance when undertaking works in their proximity.

6.0 Conflict resolution

6.1 Follow the steps outlined in the Roadsides Management Process (Section 6, below) for coordination, planning and consultation relating to works to roadsides.

6.2 Develop a vision statement, through widespread community consultation, describing the desired future rural landscape character of the region, including the roles of indigenous and non-indigenous vegetation.

6.3 Establish a clear process for information and consultation with all interested parties before works are undertaken with potential substantial effects on conservation values of road reserves.

6.4 Include considerations from the Roadside Management Plan in any review of the Municipal Fire Prevention Plan. Consider the need to establish a consultative committee for management of Significant Treelines, of which many are on roadsides. This committee could consist of interested parties such as the National Trust, conservation, tourism, land management and Council representatives. The role of this committee would be to prioritise and debate issues, and act as a prior consultative panel before any actions are taken, especially where pine trees are involved.

6.5 Liaise with appropriate groups (Pony Clubs, trail ride operators, etc.) to develop further guidelines to manage horse riding on roadsides.

7.0 Controls and regulations

7.1 Prohibit the collection of firewood on road reserves by investigating comparative advantages of enacting a local law, erecting signs or modifying the City of Casey Planning Scheme Controls.

7.2 Ensure that moderate and high conservation roadsides are protected from grazing of livestock.

7.3 Enact a local law to prohibit cropping or haymaking on roadsides, except under permit on roadsides of low conservation value without native grasses.

7.4 Investigate the introduction of amendments to the local section of the planning schemes in the study area to implement this Roadsides Management Plan, and in particular to protect the identified conservation values on roadsides.

7.5 Investigate and if feasible, introduce a system of certification to ensure soil and gravel merchants and plant nurseries maintain suitable hygiene standards to prevent the spread of pathogens and weeds.

8.0 Monitoring

8.1 Convene meetings of the Roadside Management Plan Implementation Committee as required to report on and discuss progress in implementation of the RMP.

8.2 Consult between the CFA and NRE or a fire ecologist to monitor and evaluate fire prevention works annually in order to determine the effectiveness of works on both the conservation values and fire management. Specifically, monitoring is required of representative slashed and non-slashed sites of High quality indigenous vegetation to evaluate the ecological effects of slashing regimes.

8.3 Monitor the impacts of horse riding on areas of high and medium conservation values, and in locations where drainage and/or erosion problems occur.

8.4 Monitor sites containing rare or threatened significant species or vegetation types, documenting management regimes accordingly (in consultation with specialist expertise).

9.0 Review

9.1 To ensure adequate implementation of the Roadside Management Plan, undertake a review and revision of this document and the Operations Manual, after three years with annual review of an action plan.

2.0 INTRODUCTION

2.1 THE IMPORTANCE OF ROADSIDES

Road reserves were initially established, and their primary function remains, to provide for property access and the movement of people and goods. Today they are not only used for transport by motor vehicle, bicycle, horse and on foot, but also as service corridors for gas, electricity, water supply, sewerage, telecommunications and drainage. They have an important role in fire prevention and suppression. Rural road reserves are used for the movement of livestock, and for grazing, particularly in times of drought.

Because roadsides tend to have suffered fewer disturbances than other land, they may contain sites of archaeological significance such as scar trees and Aboriginal middens. They may also contain historical sites or monuments, such as the routes of early explorers and settlers, avenues of honour, or bridges.

The significance of the vegetation on roadsides is now widely recognised. Roadside vegetation, whether native or not, makes a major contribution to landscape character and aesthetic quality. It can act as a valuable windbreak or shelterbelt for adjoining farmland. In many parts of Victoria, including the City of Casey, roadsides contain a substantial proportion of remaining indigenous vegetation in a largely cleared countryside. Some of the reasons for conserving this native vegetation include:

- preventing land degradation due to soil erosion and salinity
- providing habitat for native fauna and flora, including rare or threatened species
- providing corridors for the movement of wildlife between areas of native vegetation
- conserving genetic variation of plants and animals for their potential economic and scientific value, and long-term viability
- enhancing the aesthetic value of roadsides and the broader landscape
- providing scientific evidence for the distribution of former vegetation communities
- improving public awareness of nature conservation and providing opportunities for education in botany and ecology
- assisting fire control, through slowing wind speed and rate of spread of fire.

2.2 CONSERVING INDIGENOUS VEGETATION REMNANTS

Remnant vegetation on roadsides is important as it:

- is often the only remnant over a large area and may be habitat for rare or endangered plant or animal species
- is an intrinsic part of the land system which sustains soils and biodiversity
- provides shade and shelter for farms
- contributes to the natural beauty of an area and defines the natural landscape character
- contributes to the prevention and control of land degradation (e.g. erosion, salinity)
- reflects headlight beams along the edge of the road and defines the extent of a curve.

Roadside vegetation can be affected by a wide range of degrading pressures or processes. Degradation may occur because of:

- lack of awareness of the effect of disturbance resulting from road construction, fire prevention, service installation and maintenance activities
- inappropriate public activities (e.g. littering and refuse dumping, firewood collecting)
- agricultural activities (e.g. ploughing, grazing, cropping)
- disturbances to soil levels or soil conditions (e.g. changes to water, salinity, nutrient or soil oxygen levels) which can result in die-back and death of vegetation
- pest and disease invasion.

Regeneration is a naturally occurring process where plant species re-establish following disturbance either by seed germination or when roots, suckers, bulbs, or rhizomes etc. sprout. A number of ecological conditions, (e.g. light, soil water or nutrient status, fire, flood) allow species to flourish and grow, and ensure that a vegetation community perpetuates itself. Changes in site conditions affect a plant's ability to regenerate. Competition for space, water, light, and nutrients by weeds may also inhibit regeneration. Altered soil moisture levels and salinity will influence the ability of different plant species to recolonise a site.

Grazing by livestock or rabbits and slashing can destroy young regenerating plants. Conversely, roadside management regimes can be designed to promote some regeneration. In general, the widespread lack of regeneration is a major issue for roadsides conservation.

2.3 WILDLIFE HABITAT AND HABITAT LINKS

Wildlife habitat, in its broadest definition, includes any vegetation, or other physical structure that meets an animal's needs for food and/or shelter. Habitat provided by indigenous vegetation and naturally occurring structures (e.g. in the case of wetlands) usually provide the best habitat, as they are richest in diversity and, hence, resources for indigenous fauna, and, in undisturbed, or relatively little disturbed states, are self-sustaining.

A 'habitat type', e.g. Open Forest, or Saltmarsh, contains a multitude of microhabitats and habitat features, that provide a variety of resources, such that a wide range of fauna species' needs for food and shelter are met.

The vegetation in an Open Forest habitat, for example, provides a number of structural levels of habitat, including the tree canopy, a mid-storey of saplings, medium-sized tree species and large shrubs, a lower shrub layer, and a groundcover of small shrubs, grasses, and herbs. Different food and shelter resources occur in all of these 'layers' of habitat, that may satisfy the varied needs of one particular species, or, more often, the different needs of a number of different species. Other habitat components, providing shelter, are provided by dead trees and other vegetation, bark, cracks and hollows in trees, fallen timber, rocks, and leaf and twig litter on the ground.

When roadsides are disturbed, or 'tidied up', some of these components may be removed, reducing the overall quality of the habitat. Any disturbance places additional competition or pressure on available resources. Ultimately, with loss or degradation of habitat, the overall area of habitat available is reduced, hence population sizes of fauna are reduced, and long-term viability of a species or a number of species, is reduced.

Aside from the intrinsic habitat that indigenous vegetation on roadsides can provide, any remnant vegetation on roadsides which links larger areas of natural vegetation has an important role to play in the conservation of wildlife. Habitat links can facilitate the movement of fauna from one area to another for the purposes of feeding, breeding, roosting, nesting, or denning. By providing relatively undisturbed areas of natural vegetation, roadside corridors can provide habitat for certain species in areas where much of the habitat is otherwise missing.

2.4 THE NEED FOR MANAGEMENT PLANNING

Given the diversity of roles and values that exist on road reserves, it is inevitable that conflicts occur, and some functions have taken precedence over others. In particular, the continued survival of the remnant native vegetation cannot be taken for granted. If both the functional roles and conservation values are to be protected for the future, there is an urgent need to develop a strategic approach to Roadside Vegetation Management which recognises all relevant values.

Benefits of preparing a Roadside Vegetation Management plan include:

- improved knowledge and understanding of the full range of values, interests and responsibilities to be considered when planning works projects on road reserves
- savings in time and cost by not having to seek permits for every works project on roadsides
- avoidance of site-specific conflicts and/or processes put in place for efficient resolution of conflicts

- possible efficiency gains from having a strategic approach to road clearance practices for fire purposes
- tourism and amenity benefits from the recognition and protection of heritage assets
- improved communication and co-ordination between the various stakeholders involved in roadsides.

2.5 PREPARING THIS ROADSIDE VEGETATION MANAGEMENT PLAN

In July 2001, the City of Casey commissioned an assessment of all roadside vegetation on rural roads, to upgrade and digitise data captured in the previous Mornington Peninsula – Western Port Roadside Management Plan (1996). The current project required the driving of all rural roads within the City of Casey (Figure 1) to rapidly assess vegetation quality, habitat quality and vegetation conservation value by applying fixed criteria to each remnant. While some significant species on roadsides were noted, further intensive assessments of high and moderate conservation value roadsides are recommended and are likely to yield further records of significant species that were otherwise overlooked during this study.

2.6 A GUIDE TO THIS ROADSIDE VEGETATION MANAGEMENT PLAN

The Roadside Vegetation Management Plan is presented in two parts. The first part begins with recommendations for action by the relevant authorities to implement the plan. A summary is provided of the existing laws, plans and guidelines applicable to roadsides in the region. The Ecological Vegetation Classes found on the roadsides are listed, together with their conservation values. Roadside Vegetation Management issues in the region are outlined and a set of management guidelines is presented to deal with functional, cultural and recreational, landcare and conservation issues in planning and undertaking works and other activities on roadsides.

Part Two is an Operations Manual. It includes maps of the study area showing conservation value assessment of all rural roadsides supporting high and moderate conservation value vegetation. There is a prescription for every high and moderate value road section, which provides specific management requirements. There are also generic prescriptions for low conservation value roads and roads with cultural landscape values. The prescriptions are directed primarily at the agencies and their contractors who undertake works on road reserves. Additional information is provided on priority weeds, and on indigenous species for revegetation projects.

2.7 SCOPE OF THIS ROADSIDE VEGETATION MANAGEMENT PLAN

The study area for this plan covers the entire City of Casey local government area. The project deals with rural roads, geographically defined in Figure 1, that are managed by the City of Casey. Some major VicRoads funded roads and highways containing substantial sections of vegetation have been included as a means of providing Council with a holistic overview of the regions' vegetation cover and distribution on road reserves.

Figure 1: Study area for the City of Casey Roadside Vegetation Management Plan.

3.0 EXISTING LAWS, PLANS AND GUIDELINES

A wide range of legislation, policies, strategies, plans and guidelines relate to roadsides, enabling the management of road verges for the conservation of remnant vegetation while maintaining the functional role of these reserves. Outlined below are the provisions relevant to roadside vegetation management from documents applicable to the study area.

3.1 COMMONWEALTH LEGISLATION

The key Commonwealth legislation is the *EPBC Act (1999)*. A summary of the major implications is presented below.

Title of Act	Roadside Vegetation Management implications
Environment Protection and Biodiversity Conservation Act 1999 (replaces *Endangered Species Protection Act 1992, Environment Protection (Impact of Proposals) Act 1974, National Parks and Wildlife Conservation Act 1975, World Heritage Properties Conservation Act 1983).*	Establishes a Commonwealth process for assessment of proposed actions that are likely to have a significant impact on matters of national environmental significance or on Commonwealth land (this includes listed threatened species and ecological communities, and listed migratory species).

3.2 VICTORIAN LEGISLATION

Many Acts of State Parliament have an impact on roadside management. A summary of their major implications is presented below.

Title of Act	Roadside Vegetation Management implications
Archaeological and Aboriginal Relics Preservation Act 1972	Aboriginal and archaeological sites protected.
Catchment and Land Protection Act 1994	Designates who is responsible for weed and vermin control on all roadsides. Currently under review.
Country Fire Authority Act 1958	Allows fire prevention works to be carried out on roadsides as described in the MFPS.
Crown Land (Reserves) Act 1978	Gives Crown ownership rights over all vegetation on roadsides.
Drainage Areas Act 1958	Requires construction of works to ensure that proper drainage takes place and to ensure that drainage areas are not adversely affected by other works.
Environment Effects Act 1978	Requires statutory bodies to prepare an Environment Effects Statement if proposed works are considered to have "significant impact".

Environment Protection Act 1970	Provides for the control of polluted runoff from disturbed roads.
Flora and Fauna Guarantee Act 1988	Public authorities must have regard to flora and fauna conservation and management objectives (see below).
Forests Act 1958	Gives local municipalities responsibility for managing vegetation on most 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 local government responsibility for management of undeclared roads. Gives Councils power to create certain Local Laws relating to roadsides.
Planning and Environment Act 1987	Statutory basis for planning controls, including State-wide control over removal of native vegetation from roadsides under the Native Vegetation Retention Controls.
Transport Act 1983	VicRoads responsible for the management of "declared roads" (Freeways, Highways, Tourist Roads). Also cover main roads with management delegated to Councils but VicRoads standards apply.
Wildlife Act 1975	On both public and private land, this Act protects all wildlife that is indigenous to Australia. It also protects any invertebrate animal that is listed under the Flora and Fauna Guarantee Act 1988.
Line Clearing Code of Practice (Vegetation Dec. 1999)	Provides guidelines for the appropriate clearance of vegetation below overhead transmission lines.
Servicing Acts	Permits servicing authorities to locate assets on roadsides and gives them rights of access for maintenance works. Many servicing bodies have some forms of guidelines to aid field staff, and may be formalised in a Code of Practice.
Victoria's Biodiversity Strategy (1997)	Comprises three documents which fulfil the requirements of the *FFG Act (1988)* for the preparation of a strategy that includes proposals for guaranteeing the survival, abundance and development in the wild of all taxa and communities of flora and fauna in Victoria. It also provides for the proper management of potentially threatening processes, providing an education programme, and improving people's ability to meet flora and fauna conservation objectives.

3.2.1 FLORA AND FAUNA GUARANTEE

A desktop study revealed that two species listed under the *Flora and Fauna Guarantee Act 1988* have been recorded within the City of Casey: Metallic Sun-orchid (*Thelymitra epipactoides)* and Gilgai Blown-grass (*Agrostis billardierei* var. *filifolia).* These species have not been recorded on rural roadsides within the study area.

3.3 FIRE PREVENTION PLANS

City of Casey Municipal Fire Prevention Plan. January 1999 (MFPS)

Under the *Country Fire Authority Act 1958*, municipalities are responsible for managing roadside vegetation to reduce the fire threat to life and property. A municipality documents the fire prevention works it believes are necessary to meet its fire prevention responsibilities in its Municipal Fire Prevention Plan (MFPP), which is produced by the Municipal Fire Prevention Committee.

A highly significant element of each Fire Prevention Plan for roadside vegetation management are the Strategic and Tactical (Secondary) Firebreaks. A firebreak is any strip of land where vegetation has been removed or substantially reduced, and may be constructed by cultivation, burning, slashing or mowing, grazing or by planting crops.

'Strategic Firebreaks' are constructed for broad scale fire prevention purposes such as protection of a township, containing wildfire to known high hazard areas or subdivision of an otherwise large, unbroken area of fuel. They are usually main roads, from fence line to fence line. 'Secondary firebreaks' are generally smaller and used for localised protection of individual properties or as control lines by brigades. They are usually located in roadways but not necessarily main roads.

The Country Fire Authority has produced *Roadside Management Guidelines for Fire Prevention Planners* (1994) to assist Municipal Fire Prevention Committees and brigades to both achieve fire prevention objectives and have regard to native vegetation values.

The City of Casey MFPS does not list any roadsides as Strategic Fire management Roads. The Strategy does, however, have in place objectives to reduce the likelihood and effect of wildfire, on property and environment. If in the future this results in the identification of some roads as strategic firebreaks, it is likely that the objectives of the firebreaks may conflict with existing vegetation retention and protection policies of council, where the roads support remnant vegetation.

VicRoads is responsible for fire prevention on State Highways, Freeways, Tourist and Forest Roads, except where the last two are maintained by Councils. It has a Code of Practice for Fire Prevention on Declared Road Reserves in Rural Areas. One of the principles is that "as far as possible, damage to trees, shrubs, grasses and natural features of the landscape be avoided to preserve the appearance of the roadside and prevent erosion. The value of the roadside as a habitat area for wildlife is also considered".

The Department of Natural Resources and Environment has responsibilities for fire prevention on public land such as National Parks, State Forests and Crown land reserves. Fire management plans for large reserves are usually incorporated into the relevant Municipal Fire Prevention Plan. Committees of Management for public land reserves also undertake fire prevention works, which occasionally affects adjoining road reserves.

3.4 CURRENT ENVIRONMENT MANAGEMENT STRATEGIES

Environment Management Strategies have been prepared jointly by Council and the local community in many municipalities in Victoria, to provide a policy and action framework for integrating conservation and development at the local level. They deal with a wide range of issues relating to nature, natural resources, and environmental quality. In rural and urban fringe areas, Environment Management Strategies commonly refer to roadsides because of their conservation values.

3.5 PLANNING SCHEME CONTROLS

The extracts below are taken from the City of Casey Planning Scheme 2000, and are relevant to management of vegetation along rural roadsides.

3.5.1 VEGETATION PROTECTION OVERLAY (VPO)

Purpose

- To implement the State Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.
- To protect areas of significant vegetation.
- To ensure that development is done in a way which minimises loss of vegetation.
- To preserve existing trees and other vegetation.
- To recognise vegetation protection areas as locations of special significance, natural beauty, interest and importance.
- To maintain and enhance habitat and habitat corridors for indigenous fauna.
- To encourage the regeneration of native vegetation.

42.02-2 Permit Requirement

"A permit is required to remove, destroy or lop any vegetation specified in a schedule to this overlay (with exceptions)."

Schedule 1 to VPO (VPO1): Brookland Greens – Native vegetation

3.5.2 ENVIRONMENTAL SIGNIFICANCE OVERLAY (ESO)

Purpose

- To implement the State Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.
- To identify areas where the development of land may be affected by environmental constraints.
- To ensure that development is compatible with identified environmental values.

42.01-2 Permit requirement

“A permit is required to remove, lop or destroy any vegetation" (with exceptions).

Schedule 1 to ESO (ESO1): Coastal Environs

Schedule 3 (ESO3): Royal Botanic Gardens, Cranbourne Environs

Schedule 4 (ESO4): Cranbourne South Conservation Area

3.5.3 SIGNIFICANT LANDSCAPE OVERLAY (SLO)

Purpose

- To implement the State Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.
- To identify significant landscapes.
- To conserve and enhance the character of significant landscapes.

42.03-2 Permit requirement

“A permit is required to remove, lop or destroy any vegetation specified in a schedule to this overlay" (with exceptions).

Schedule 1 to SLO (SLO1): Casey Foothills

Schedule 2 to SLO (SLO2): Western Port Coast

3.6 REGIONAL LANDCARE PLAN

Regional Landcare plans have been prepared by the Department of Natural Resources and Environment in consultation with the Landcare Regional Reference Group.

The aim of a Regional Landcare Plan is to set guidelines for landcare programs to address natural resource management issues in the related catchments. Priority recommendations for 'Management of Roads and other Utilities' are reproduced below.

- 'Encourage the preparation of management strategies for utility sites and corridors. These strategies should be prepared with community involvement and should include consideration of all Landcare principles and incorporate management solutions for:
  - protection of flora and fauna
  - weed and pest animal problems
  - soil erosion and sedimentation arising from roads and other site works
  - fire protection.
- Establish and maintain liaison arrangements with major utilities, transport and fire prevention organisations so that Landcare practices are included in works programs.

- Encourage the Country Fire Authority to continue and further develop community consultation arrangements so that both conservation and fire protection needs can be incorporated into planned fire protection works on sites such as roads and rail lines.

3.7 ROADWORKS

VicRoads has published a *Roadside Management Guide* (1990) which presents principles and Guidelines for management of roadsides in the context of road construction and maintenance.

Each municipal council has an annual works program which includes roadworks. VicRoads also plans road improvements, on the roads for which it is responsible (Freeways, Highways and Tourist Roads).

3.8 CODE OF PRACTICE FOR CLEARANCE OF TREES FROM POWER LINES

This Code, published in the Victorian Government Gazette in November, 1999, specifies the standards and practices to be adopted in tree pruning or clearing in the vicinity of electric lines. Clearing is undertaken to minimise the risk of fires caused by contact between trees and overhead electric lines, and to reduce interruptions to supply caused by trees. Special consideration is to be paid to botanically important vegetation, significant trees, vegetation of outstanding aesthetic or ecological significance, or the habitat of rare or endangered species. An area of Particular Significance is one in which special arrangements are made to vary the normal applications of the Code. The Minister must determine such areas, and they are recorded on a register. An effective alternative management plan must be agreed for these areas, which will not result in any appreciable increase in the risk of fire ignition in the area.

The power company is normally responsible for clearing in rural areas, while the Road Authority is normally responsible for clearing on road reserves in Declared Urban Areas.

4.0 ROADSIDE VEGETATION CONSERVATION VALUES

4.1 VEGETATION OF THE STUDY AREA

The natural vegetation of the City of Casey has been reduced to a fraction of its original cover since European settlement. The complex pattern of vegetation distribution has been highly simplified and all vegetation types have been depleted and highly modified. Many of the original vegetation communities still occur in the study area to some extent, with their distribution reflecting strong geological, hydrological and coastal influences. Most of these vegetation communities also occur in road reserves, though some are highly restricted. However, comparing the results of this and the 1996 study there is no doubt that the roadside vegetation is in a state of decline.

4.2 VEGETATION COMMUNITIES ON ROADSIDES

The present study has outlined all naturally occurring vegetation types occurring on road reserves within the study area. These have been documented and mapped for all sections of roadsides deemed to be of High and Moderate conservation value and presented in the Roadside Operations Manual (Part 2 of this study).

The eight Ecological Vegetation Classes (EVC's) or plant communities occurring in road reserves are:

Ecological Vegetation Class
Coastal Saltmarsh
Riparian Forest
Herb-rich Foothill Forest
Valley Grassy Forest
Heathy Woodland
Swampy Woodland Complex
Grassy Forest
Grassy Woodland

Refer to Page 24 for EVC descriptions and conservation status.

For some of these communities, roadside remnants are not significant in their overall conservation - the proportion occurring in roadsides is negligible (e.g. Saltmarsh). In most cases however, roadsides are of considerable value in conserving remnants of depleted vegetation types (e.g. Grassy Woodland), in some cases playing a vital role. With only limited conservation reserves in the region, many of which are small, and much of the remnant vegetation present being on private land, the role of roadside vegetation remnants in local and regional conservation cannot be overstated. Proper management of such roadsides is vital.

4.3 SIGNIFICANCE OF VEGETATION IN ROADSIDES

4.3.1 Definition

Significance in the biological context has a similar meaning as in general use, *significant* being defined as 'noteworthy, of considerable importance (Oxford Dictionary). Sites of botanical significance are areas where features of the vegetation meet defined botanical criteria. These assessments are independent of land-use classifications (e.g. biological reserves) or land ownership (e.g. public or private), instead being an assessment of the qualities of the remnant indigenous vegetation in the context of its current distribution, conservation status and integrity.

Significance has two components - scale and degree. The assessment of *degree* of significance (e.g. high or moderate) is based on the values of the site in relation to the overall distribution, condition or importance of sites possessing these values - within the range delineated by the *scale* of reference, i.e. national, state, regional or local. In general usage, scale and degree are often combined into levels of significance denoted by scale alone. In the context of the present study the following areas apply to the scale of significance:

Local:	City of Casey
Regional:	Gippsland Plain Bioregion and Highlands – Southern Fall Bioregion
State:	Victoria
National:	Australia

It should be noted that all remnant indigenous vegetation and populations of indigenous plant species in the study area have at least *local conservation significance* given the considerable depletion and poor conservation status of vegetation in the region.

4.3.2 Indigenous plant species

The assessment of significance of plant species recorded from the study area during this study is based on the application of one or more of the following criteria:

- Naturally uncommon or rare in the region or Victoria;
- Formerly widespread in the region or Victoria but now depleted through habitat destruction or degradation;
- Remnant population(s) with important information content on floristics of the regional vegetation;
- Species which are taxonomically or biogeographically interesting;
- Potentially valuable source of propagation material for revegetation or species-enrichment plantings.

Species which are of National Significance if they are either rare, threatened or endangered on an Australia-wide basis. Many of these taxa are listed as Rare or Threatened Australian Plant Species (ROTAPS) by Briggs and Leigh (1995), ANZECC (1999), NRE (2000a), or listed on the EPBC Act 1999; listings are updated on the basis of new data.

Species which are rare, threatened or endangered in Victoria are listed on the FFG Act 1988 and/or DNRE (2000), although additional species may be similarly categorised as further information comes to hand. All such species are considered to be of at least State Significance.

Table 1 has been compiled from FIS records for the City of Casey. These records show seven National, 21 State Significant including four EPBC and two FFG listed taxa are extant. However, only two of these are known from roadsides and the vast majority (75%) are presumed extinct. This judgment is based on the known ecology of these species and the requisite habitat available on City of Casey roadsides.

4.3.3 VEGETATION COMMUNITIES

The significance of vegetation types is primarily a function of the following attributes:

- Rarity: Distribution and abundance in the Region, the State and Nationally. And level of depletion;
- Landscape Context: patch size, degree of isolation/continuity, linkage role; and
- Vegetation Condition: the level of anthropogenic disturbance e.g. physical modification and weed invasion.

The JANIS criteria (JANIS 1997) were developed as a nation wide system for assessing the conservation status of forested vegetation types. The criteria focus largely on rarity and landscape context, and are currently the most appropriate criteria for assessment at the community level.

JANIS Criteria used to assess the conservation status of Vegetation Types/Ecological Vegetation Classes (EVC)

Status of EVC		Criteria
Depleted	D1	30-50% pre-European extent remains
	D2	>50% remains but moderately degraded over a majority of this area
Rare	R1	Total range generally less than 10 000 ha
	R2	Total are generally less than 1 000 ha
	R3	Patch sizes generally less than 100 ha
Vulnerable	V1	Approaching greater than 70% lost (depletion)
	V2	Includes EVC's where threatening processes have caused: • Significant changes in species composition • Loss or significant decline in species that play a major role within the ecosystem, or • Significant alteration to ecosystem processes
	V3	Subject to continuing threatening processes
Endangered	E1	Distribution has contracted to less than 10% of original range
	E2	Less than 10% of original area remaining
	E3	90% of area is in small patches subjected to threatening processes

Table 1: Significant flora species confirmed to occur, or potentially found, on road reserves in the City of Casey

Species	Name	Conservation status	FFG	VROT	EPBC	AROT	Likelihood of occurrence on City of Casey roadsides
Amphibromus fluitans	River Swamp Wallaby-grass	National	-	k	Vulnerable	V	Presumed Extinct
Burnettia cuneata	Lizard Orchid	National	-	r	-	R	Presumed Extinct
Dianella amoena	Matted Flax-lily	National	-	e	Endangered	E	Low
Eucalyptus yarraensis	Yarra Gum	National	-	k	-	R	Moderate
Prasophyllum frenchii	Maroon Leek Orchid	National	-	e	Endangered	E	Presumed Extinct
Tetratheca stenocarpa	Long Pink-bells	National	-	r	-	R	Presumed Extinct
Thelymitra epipactoides	Metallic Sun-orchid	National	L	e	Endangered	E	Presumed Extinct
Agrostis avenacea var. perennis	Wetland Blown-grass	State	-	k	-	-	Presumed Extinct
Agrostis billardierei var. filifolia	Gilgai Blown-grass	State	L	v	-	-	Presumed Extinct
Amphibromus fluitans	River Swamp Wallaby-grass	State	-	k	-	V	Presumed Extinct
Atriplex australasica	Native Orache	State	-	k	-	-	Presumed Extinct
Atriplex paludosa ssp. paludosa	Marsh Saltbush	State	-	k	-	-	Moderate
Austrodanthonia sp. (syn. Danthonia procera)	Tall Wallaby-grass	State	-	k	-	-	Presumed Extinct
Avicennia marina ssp. australasica	White Mangrove	State	-	r	-	-	Recorded on the South Gippsland Hwy at the eastern boundary of the Study area.
Caladenia dilatata s.s.	Green-comb Spider-orchid	State	-	k	-	-	Presumed Extinct
Caladenia flavovirens	Summer Spider-orchid	State	-	r	-	-	Presumed Extinct
Cardamine tenuifolia	Slender Bitter-cress	State	-	k	-	-	Presumed Extinct
Corybas aconitiflorus	Spurred Helmet-orchid	State	-	r	-	-	Presumed Extinct

Species	Name	Conservation status	FFG	VROT	EPBC	AROT	Likelihood of occurrence on City of Casey roadsides
Craspedia canens	Grey Billy-buttons	State	-	e	-	-	Presumed Extinct
Craspedia paludicola	Swamp Billy-buttons	State	-	v	-	-	Presumed Extinct
Entolasia stricta	Upright Panic	State	-	k	-	-	Presumed Extinct
Eucalyptus fulgens	Green Scentbark	State	-	v	-	-	Recorded in the southern section of the study area.
Helichrysum aff. *rutidolepis* (Lowland Swamps)	Pale Swamp Everlasting	State	-	v	-	-	Presumed Extinct
Juncus revolutus	Creeping Rush	State	-	r	-	-	Low
Limonium australe	Yellow Sea-lavender	State	-	r	-	-	Moderate
Pomaderris vacciniifolia	Round-leaf Pomaderris	State	-	v	-	-	Presumed Extinct
Prasophyllum pyriforme s.s.	Silurian Leek-orchid	State	-	k	-	-	Presumed Extinct
Thelymitra circumsepta	Naked Sun-orchid	State	-	v	-	-	Presumed Extinct

EPBC Act
Refers to threatened species which are formally listed under national legislation, i.e. on the Threatened Species and Communities category of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. E = endangered, V = vulnerable.

FFG Act
Species listed on Schedule 2 of the Victorian *Flora and Fauna Guarantee Act 1988*. L = listed, N = nominated for listing.

AROT (Australian Rare or Threatened species)
Categories of rare or threatened Plants in Victoria (adapted from Gullan et al., 1990; Briggs & Leigh, 1996 and Cameron et al., 1999)
V = Vulnerable in Australia, E = Endangered in Australia, R = Rare in Australia, K = Poorly know in Australia, X = Presumed extinct in Australia:

VROT (Victorian Rare or Threatened species)
v = Vulnerable in Victoria, e = Endangered in Victoria, r = Rare in Victoria, k = Poorly known in Victoria, x = Presumed extinct in Victoria

The above-listed records of significant species are those records predominantly found on **High or Moderate (of higher quality) Conservation Significance** roadsides. Due to the Rapid Assessment style of this current study, no sites were intensively surveyed and significant flora species may be overlooked. Occasional records of significant flora species may also occur on some **Low** quality roadsides.

4.4 VEGETATION DESCRIPTIONS AND CONSERVATION STATUS

The following descriptions are brief overviews of each Ecological Vegetation Class recorded from roadsides in the City of Casey. Location of these EVC's are recorded in the Assessment Sheets included in the Roadside Vegetation Management Plan Part 2: Operations Manual.

Coastal Saltmarsh

Generally dominated by glassworts (*Sclerostegia*, *Sarcocornia* and *Halosarcia* species); other significant species populations also present include Chaffy Saw-sedge (*Gahnia filu*m), Sea Rush (*Juncus krausii*) and Blue Tussock-grass (*Poa poiformis*) and Marsh Saltbush *(Atriplex paludosa*). This EVC occurs in the Gippsland Plain Bioregion and is listed as **vulnerable** in this bioregion (DNRE 2000) and is considered to be of **State Significance** (Carr, White and McMillan 2001). Coastal Saltmarsh was recorded on only one road reserve (Adeneys Rd) in the study area.

Riparian Forest

Riparian Forest is a tall forest which occurs along the banks and lower terraces of Cardinia Creek. It is dominated by Manna Gum (*Eucalyptus viminalis*), with Silver Wattle (*Acacia dealbata*), Blackwood (*Acacia melanoxylon*), Hazel Pomaderris *(Pomaderris aspera)* and Prickly Coprosma *(Coprosma quadrifida)*.

Generally, a partially intact understorey persists with a wide variety of terrestrial species as well as a suite of semi-aquatic plants on the creek margins. Usually present are Fishbone Water-fern (*Blechnum nudum*), Tall Sedge (*Carex appressa*), Mother Shield-fern (*Polystichum proliferum*), Swamp Club-sedge (*Isolepis inundata*), Small-leaf Bramble (*Rubus parvifolius*) and Rough Tree-fern (*Cyathea australis*).

Environmental weeds are a common component of Riparian Forest. This is due to a variety of factors, including the natural pattern of disturbance through flooding, the amenable environment, and the history of human activity along rivers.

Riparian Forest was formerly along all major streams in southern lowland Victoria, but is now significantly depleted and is regarded as Endangered across its range. This vegetation class only occurs on one road reserve in the study area (Chadwick Rd).

Herb-rich Foothill Forest

Herb-rich Foothill Forest occurs on relatively sheltered south and east-facing slopes of the north-east area of the City of Casey. The canopy is composed of Manna gum (*Eucalyptus viminalis)* and Swamp Gum (*Eucalyptus ovata)*. Usually the ground layer is dense and species rich. The following species are frequently present: Kidney-weed (*Dichondra repens*), Weeping Grass (*Microlaena stipoides*), Common Lagenifera (*Lagenifera stipitata*), Bidgee-widgee (*Acaena novae-zelandiae*), Cinquefoil (*Geranium potentilloides*), Ivy-leaf Violet (*Viola hederacea*) and Common Tussock-grass (*Poa labillardieri).*

This EVC occurs in the Highlands – Southern Fall Bioregion, but was only recorded on one road reserve in the study area (Rowallan Ave). It is listed as **least concern** in Victoria (DNRE 2000), however, it is considered to be of **Regional Significance** (Yugovic and Organ 2000) as it is subject to local depletion for agriculture and urban development.

Valley Grassy Forest

Valley Grassy Forest has a restricted occurrence in the northern area of the City of Casey. It is characterised by a dominance of Yellow Box (*Eucalyptus melliodora*), Long-leaf Box (*Eucalyptus goniocalyx*) and Narrow-leaf Peppermint *(Eucalyptus radiata).* In low lying sites, often adjacent to seasonally inundated areas, Swamp Gum (*Eucalyptus ovata*) may be present.

The shrub layer tends to be rather sparse, often comprising a scattering of Burgan (*Kunzea ericoides*), Cherry Ballart (*Exocarpos cupressiformis*), Black Wattle (*Acacia mearnsii*), Sweet Bursaria (*Bursaria spinosa*) and Common Cassinia (*Cassinia aculeata).* A rich array of native grasses and herbs occur in the low ground layer. Weeping Grass (*Microlaena stipoides*), Kangaroo Grass (*Themeda triandra*), Grey Tussock-grass (*Poa sieberiana*), and Silver-top Wallaby-grass (*Chionochloa pallida*) are common, in association with Kidney-weed (*Dichondra repens*), Common Maidenhair (*Adiantum aethiopicum*) and Ivy-leaf Violet (*Viola hederacea*).

Sweet Pittosporum (*Pittosporum undulatum)* and Monterey Pine (*Pinus radiata*) are serious environmental weeds in this community.

State Significant Valley Grassy Forest is listed as **endangered** in the Highlands – Southern fall Bioregion (DNRE 2000). Very little of this EVC now occurs on road reserves in the study area.

Heathy Woodland

Heathy Woodland occurs from the gentle slopes near the northern boundary of the City of Casey south to the coast.

In the north, Heathy Woodland consists of Narrow-leaf Peppermint (*Eucalyptus radiata)*, Mealy Stringybark (*Eucalyptus cephalocarpa)* and/or Yertchuk (*Eucalyptus consideniana*) over a shrub layer of Hakea (*Hakea* sp.), Prickly Tea-tree (*Leptospermum continentale)* and Common Heath (*Epacris impressa)*. The ground layer includes Kangaroo Grass (*Themeda triandra)*, Milkmaids (*Burchardia umbellata)*, Thatch saw-sedge (*Gahnia radula)*, Common Raspwort (*Gonocarpus tetragynus)*, Small Grass-tree (*Xanthorrhoea minor)* and Wattle Mat-lily (*Lomandra filiformis)*. Heathy Woodland within the northern section of the study area occurs in the Highlands – Southern Fall Bioregion where it is listed as **depleted** (DNRE 2000) and has **Regional Significance**.

Heathy Woodland in the southern section of the study area is similarly depleted and often degraded. It is characterised by a canopy of Coast Manna Gum (*Eucalyptus viminalis* ssp. *pryoriana)* or Narrow-leaf peppermint (*Eucalyptus radiata)* over a suite of low shrubs, tussock-grasses and sedges. This EVC occurs in the Gippsland Plain Bioregion where it is listed as **depleted** (DNRE 2000).

Swampy Woodland Complex

Swampy Riparian Complex has been recorded on road reserves throughout the study area, it consists of woodland or scrub that was dominated by Swamp Gum (*Eucalyptus ovata)* and/or Swamp Paperbark (*Melaleuca ericifolia).* Prior to modification, major associated species would have included Common Tussock Grass (*Poa labillardieri)*, Black Wattle (*Acacia mearnsii)* and Rushes (*Juncus* spp.), with a range of wet site species variously present such as Lanky Goodenia (*Goodenia elongata)*, Centella (*Centella cordifolia)*, Creeping Brooklime (*Gratiola peruviana)* and Common Reed (*Phragmites australis*).

Swampy Riparian Complex would have occurred along many major streams in southern lowland Victoria, but is now significantly depleted (Yugovic and Organ 2000) and hence of **Regional Significance**. It is listed as **endangered** in the Highlands – Southern Fall Bioregion (DNRE 2000).

Grassy Forest

Grassy Forest is characterised by a dominance of Messmate Stringybark (*Eucalyptus obliqua)* and Narrow-leaf Peppermint (*Eucalyptus radiata)* formerly with a grass and forb dominated understorey. Associated canopy species include Swamp Gum (*Eucalyptus ovata)* and Manna Gum (*Eucalyptus viminalis)* around gullies or seepage areas. Much of this vegetation consists of dominants over a weedy understorey and thus are considered of only Moderate Conservation Value.

In some areas, Grassy Forest persists with a relatively intact understorey including Veined Spear-grass (*Austrostipa rudis*), Variable Sword-sedge (*Lepidosperma laterale)*, Kangaroo Grass (*Themeda triandra)*, Thatch Saw-sedge (*Gahnia radula*) and Vanilla Lily (*Arthropodium* sp.).

Grassy Forest occurs in the Highlands – Southern Fall Bioregion and occurs on relatively fertile soils of the Harkaway area. This EVC is of **State Significance** (Yugovic and Organ 2000) and is listed as **endangered** in the Highlands – Southern Fall Bioregion (DNRE 2000).

Grassy Woodland

Former Grassy Woodland remnants are represented in the southern to central section of the study area. This floristic community is defined by a dominance of Coast Manna Gum (*Eucalyptus viminalis* ssp. *pryoriana)* and Drooping Sheoak (*Allocasuarina verticillata)* over a grassy ground flora with robust dicot herbs such as Mat-rushes and Flax-lilies. Remnants in the study area now consist of scattered trees over an exotic grassy understorey.

This EVC occurs in the Gippsland Plain Bioregion where it is listed as **presumed extinct**.

Limited Grassy Woodland remnants were recorded in the northern section of the study area where it occurs in the Highlands – Southern Fall Bioregion. In this location Grassy Woodland has **State significance** (Yugovic and Organ 2000) and is listed as **vulnerable** (DNRE 2000).

4.5 FAUNA ON ROADSIDES

Habitats

Eight terrestrial vertebrate fauna habitats occur on the roadsides within the City of Casey, as follows:

- Open Forest
- Open Drain
- Riparian Forest
- Saltmarsh
- Scattered Indigenous Trees
- Swamp Scrub
- Exotic grassland/Open country
- Garden/Plantation

Open Forest

This habitat type includes all of the EVC's with a eucalypt overstorey other than the riparian vegetation types. Usually, due to clearance of the original vegetation in adjacent land, this habitat forms narrow strips within the road reserve. Exceptions to this are where it occurs adjacent to Churchill National Park, along Chadwick Road, and in places at Blind Bight. The overstorey commonly consists of moderate to large stringybark and peppermint eucalypts. The mid-storey varies from sparse to dense, including species such as Blackwood, Burgan, Hakea and Silver Banksia. The habitat quality varies from moderate to good.

Open Drain

Open drains occur in a number of areas on roadsides within the City of Casey. They are usually long and narrow, and vegetated with a mix of indigenous and exotic plant species, including grasses, and rushes. Overall, they would provide quite extensive breeding habitat for common frog species such as Common Eastern Froglet, and consequently for predators of frogs, such as snakes and large wading waterbirds, such as herons and egrets. Although they possess some attributes of wetlands, they lack some significant features, such as larger size, and greater depth of water.

Riparian Forest

Riparian Forest habitat corresponds to Riparian Forest EVC, and occurs only along Cardinia Creek. It occurs alongside more permanent waterways, adjoining the Open Forest habitat that occurs upslope from the gullies. It contains a similar complement of fauna, although, occurring on more fertile soils, usually possesses a denser mid-storey and shrub layer, and is generally richer in foraging and shelter sites.

Saltmarsh

This habitat type corresponds to Coastal Saltmarsh EVC, and occurs on the roadside in one location within the City of Casey (i.e. Adeneys Road). The saltmarsh habitat within the road reserve is narrow, however, it adjoins saltmarsh habitat in adjacent private property. The Saltmarsh provides foraging habitat for wading birds, and may provide habitat for the State significant Swamp Skink.

Scattered Indigenous Trees

Scattered indigenous trees occur in many areas within roadsides. These are remnants of Open Forest habitat that has been cleared. Most of the trees are of moderate to large size. Their scattered and relatively isolated occurrence reduces their value as fauna habitat. However, they provide perching, feeding, and, to a lesser extent, roosting locations for common resident bird species, as well as general habitat for common reptile species. They are considered separately from the planted non-indigenous trees because they form a natural habitat for the local area, and because of this are usually of greater habitat value, and considered to be more significant.

Swamp Scrub

This habitat type corresponds to Swampy Woodland Complex EVC, and occurs in more poorly-drained sites. Nearly all examples of this habitat type within roadsides is presently in poor condition. Mostly it consists of narrow strips of relatively young regrowth, consisting largely or solely of dense Swamp Paperbark. Its present habitat value is mainly for small insectivorous birds, such as thornbills, and Superb Fairy-wrens.

Exotic grassland/Open country

This habitat occurs wherever the former tree and/or shrub cover has been removed, and is the predominant habitat type on roadsides in the City of Casey. It consists mainly of a dense cover of entirely exotic grass and herb species. This habitat type provides habitat largely for a range of common open country birds such as Australian Magpie, Little Raven, Magpie-lark, and Welcome Swallow.

Garden/Plantation

This habitat occurs in a number of locations, most often in the suburban/rural fringe. It consists of planted tree and shrub species, both non-indigenous native plants and exotic species. This habitat type provides habitat mainly for bird species, including White-plumed Honeyeater, Red Wattlebird, and Little Wattlebird.

Species

A total of 12 frog species (all native), 21 reptile species (all native), 198 bird species (187 native), and 35 mammal species (27 native) have been recorded within the City of Casey. All of these species are listed in Appendix 1. Many of these species would not occur within roadsides within the City of Casey, due to a lack of suitable habitat.

A total of three frog species (all native), 47 bird species (40 native), and two mammals (one native) was recorded along, or within the vicinity of, the road reserves during the current field inspection. The species recorded during the current study are listed in Appendix 1

Significant species

A total of one frog species, two reptile species, 60 bird species, and three mammal species recorded within the City of Casey are regarded as having conservation significance at the National or State level.

Of these, 33 bird species are listed under the EPBC Act solely due to their listing under one or more international migratory treaties or conventions to which Australia is a signatory. These treaties and conventions are: Japan Australia Migratory Bird Agreement (JAMBA), China Australia Migratory Bird Agreement (CAMBA), and the Bonn Convention.

Only those species regarded as threatened or near-threatened are listed here. Species listed under the EPBC Act solely due to their listing on an international migratory treaty or convention are either not threatened within Australia or Victoria, or there is no habitat or substantial habitat for them within the roadsides in the City of Casey. These latter species are not discussed further. Those species threatened or near-threatened at a National or State level are listed in Table 2.

Table 2. Species threatened or near-threatened at the National and State level recorded within the City of Casey

Common Name	Scientific Name	National		State	
		EPBC Act	Other	FFG Act	NRE (2000)
Frogs					
Southern Bell Frog	*Litoria raniformis*	V		L	v
Reptiles					
Glossy Grass Skink	*Pseudemoia rawlinsoni*				lr-nt
Swamp Skink	*Egernia coventryi*				v
Birds					
Brown Quail	*Coturnix australis*				dd
Australasian Shoveler	*Anas rhynchotis*				v
Blue-billed Duck	*Oxyura australis*			L	v
Hardhead	*Aythya australis*				v
Musk Duck	*Biziura lobata*				v
Magpie Goose	*Anseranas semipalmata*				e
Great Egret	*Ardea alba*			L	e
Intermediate Egret	*Ardea intermedia*			L	ce
Little Egret	*Egretta garzetta*			L	ce
Nankeen Night Heron	*Nycticorax caledonicus*				v
Caspian Tern	*Sterna caspia*			L	v
Gull-billed Tern	*Sterna nilotica*			L	e
Grey Goshawk	*Accipiter novaehollandiae*				lr-nt
White-bellied Sea-Eagle	*Haliaeetus leucogaster*			L	e
Pied Cormorant	*Phalacrocorax varius*				lr-nt

Table 1 (cont'd).

Common Name	Scientific Name	National		State	
		EPBC Act	Other	FFG Act	NRE (2000)
Birds (cont'd)					
Lewin's Rail	*Rallus pectoralis*				e
Eastern Curlew	*Numenius madagascariensis*				lr-nt
Glossy Ibis	*Plegadis falcinellus*				v
Royal Spoonbill	*Platalea regia*				v
Powerful Owl	*Ninox strenua*			L	e
Sooty Owl	*Tyto tenebricosa*			L	v
Superb Parrot	*Polytelis swainsonii*	V	V	L	e
Swift Parrot	*Lathamus discolor*	E	V	L	e
Hooded Robin	*Melanodryas cucullata*			L	
Helmeted Honeyeater	*Lichenostomus melanops cassidix*	E	E	L	e
Painted Honeyeater	*Grantiella picta*			L	v
Grey-crowned Babbler	*Pomatostomus temporalis*			L	e
Mammals					
Dingo/Dog (feral)	*Canis lupus dingo*				dd
New Holland Mouse	*Pseudomys novaehollandiae*			L	ce
Southern Brown Bandicoot	*Isoodon obesulus*	E			

Key

Refer to Appendix 1

Habitat within roadsides within the City of Casey does not provide habitat for most of the species listed above, and does not provide substantial habitat for any of the species.

The Southern Bell Frog breeds within permanent or near-permanent wetlands in Spring and Summer, and spends Autumn and Winter in terrestrial habitats within dense vegetation, under rocks, logs, etc. Any terrestrial habitat within the vicinity of their breeding habitat may provide Autumn and Winter refuge sites for this species. No breeding habitat was identified within roadsides, however, if breeding habitat occurs near roadsides, individuals may utilise terrestrial roadside habitats as refuge during the non-breeding period.

The Saltmarsh habitat within the roadside may provide some habitat for the Swamp Skink. The extent and condition of the remaining Swamp Scrub habitat renders it unlikely habitat for the Swamp Skink.

Due to the absence of large bodies of water within the roadsides there is no habitat, or substantial habitat, for most of the waterbird species, including the White-bellied Sea-Eagle. Some sub-optimal foraging habitat may be provided for the egrets, Nankeen Night-Heron, Lewin's Rail, Eastern Curlew, and Glossy Ibis in the Open Drain and Saltmarsh habitats.

The Grey Goshawk may occur occasionally in the better areas of Open Forest and Riparian Forest habitats.

The Powerful Owl and Sooty Owl may occur in the forested habitats, particularly areas of Riparian Forest.

The Swift Parrot may be an occasional visitor to the forested habitats.

The Superb Parrot no longer occurs in southern Victoria, and the Grey-crowned Babbler's 'population' south-east of Melbourne is now reduced to less than half a dozen individuals, none of which now occur within the City of Casey.

The Hooded Robin is uncommon in southern Victoria. Occurrences within the City of Casey are likely to be rare, at best. They prefer open forested habitats, with open areas containing leaf litter.

The Painted Honeyeater is a summer migrant to Victoria from further north in Australia, and their occurrence in Victoria is very largely north of the Great Dividing Range. At best, they would be a very rare visitor to forest habitats within the City of Casey.

There is potential habitat for the Southern Brown Bandicoot in areas of intact or semi-intact vegetation in roadsides that adjoin Royal Botanic Gardens (Cranbourne), Churchill National Park, and Lysterfield State Park.

4.6 CULTURAL HERITAGE VALUES

Cultural heritage significance relates to the historic, aesthetic, social and research value of a place. It is not unusual for sites of cultural and heritage value to be found on roadsides. Examples include:

- sites of significance to Aboriginal people
- sites of historical and/or archaeological significance
- avenues of honour
- historic bridges or monuments
- routes used by Aboriginal people or by early explorers
- stone fences
- scenic roads
- landscapes Classified by the National Trust.

These features can contribute to the conservation significance of many roadsides. A major difficulty is that the existence of many sites (particularly Aboriginal sites) is unknown, and they may only be revealed, or simply destroyed, in the process of works on road reserves.

4.7 VISUAL AMENITY AND LANDSCAPE VALUES

Vegetation on roadsides plays an important role in contributing to landscape values:

- vegetation helps to define the local landscape character of the area e.g. coastal, forest - an important tourism feature
- remaining indigenous vegetation provides a glimpse of the pre-settlement land conditions and therefore gives an insight into the development of a region
- vegetation contributes to the natural beauty of an area
- roadside vegetation can frame vistas across the broader landscape:

- it can be a tourist attraction in itself e.g. wildflower drives, tall forest drives, autumn colour provided by amenity plantings.
- it provides points of visual interest to help maintain driver alertness.
- it provides visual cues for motorists to slow down, e.g. amenity plantings at town entrances.
- it can serve as landmarks.
- it can provide pleasant rest areas for motorists.

Upgrading, maintaining and retaining the visual amenity and landscape value of roadsides is an important aspect of roadside management. Inappropriate landscape treatments can all contribute to the visual degradation of the roadside e.g. amenity plantings not in harmony with the surrounding environment, poorly maintained or weed infested vegetation; inappropriate stockpile sites at sensitive locations such as township entrances or on tourist roads.

5.0 ROADSIDE VEGETATION MANAGEMENT ISSUES AND GUIDELINES

The issues described below, which relate to values, uses and problems on roadsides, have been identified as being significant in the study area. Guidelines to address these issues by management action are presented below each management issue, and the prescriptions in Volume 2 also address some of these issues.

5.1 FIREWOOD COLLECTION

Issues

Trees, whether living or dead, with hollows or not, are an important habitat component. The removal of fallen timber and standing trees (dead or alive) from roadsides for firewood therefore reduces habitat values. Roadsides in areas associated with popular camping areas are particularly subject to removal of firewood by visitors.

While dead vegetation is exempt from the Native Vegetation Retention Controls, local or regional section planning controls can identify and protect significant dead vegetation, and landholders should be encouraged to protect significant dead vegetation. At present, the City of Casey has environmentally significant overlays for some more sensitive zones of the municipality. The adequacy of these planning controls needs to be investigated. An alternative approach is the use of local laws which should be researched to determine on the best means of protection for all identified conservation roadside sections.

Section 190, Land Act 1958 provides a penalty for the unauthorised cutting or removal of live or dead timber from roads. A permit is therefore required from NRE for firewood removal. Timber on roadsides is the property of the Crown, and royalties may be payable on any timber taken from roadsides.

It is recommended that the collection of firewood from road reserves be prohibited within the City of Casey.

Guidelines:

Prohibit the collection of firewood from any important habitat areas by either enacting a local law, erecting signs or modifying the City of Casey Planning Scheme Controls.

Monitor the illegal removal of firewood from roadsides.

Provide penalties for breaches of any implemented controls.

5.2 FIRE MANAGEMENT

Issues

Roads and roadsides have longed played a contributory role towards fire prevention in rural areas. Road authorities (local government, VicRoads and NRE) are charged with the dual responsibility of managing roadside vegetation to reduce the fire threat to life and property and for the conservation of flora and fauna. The most widespread conflict between these two goals occurs with the removal or substantial reduction of vegetation to create Strategic Firebreaks and Fuse Breaks on roadsides. Roadside firebreaks help protect people using the roads during a fire: they can stop, or restrict, a fire that begins on a roadside from spreading to adjacent land, or they may stop fires that are spreading across country, or assist suppression forces in stopping

these fires. A major disadvantage of firebreaks is that they are usually colonised by massive weed growth over the autumn/winter/spring period and require high levels of maintenance to keep them in a low fire risk state.

The most common means of fuel reduction on firebreaks in the region is by slashing. There is considerable circumstantial evidence that annual slashing can maintain an indigenous ground flora in areas which would otherwise be smothered by weeds. The downside is that it restricts recruitment, particularly of shrubs and trees. However, slashing can, over time, degrade native vegetation (i.e. result in reduction in cover and replacement by weeds), if:

- it is carried out at a time when native plants are flowering and setting seed.
- the slasher blades are set so low that they disturb soil, tear out plants or destroy the reproductive capability of small shrubs species (100 mm is often too low).
- the soil is too wet, leaving wheel ruts and churned up ground prone to erosion and colonisation by weeds.
- if hygiene practices are not observed during slashing.

Fire may in some instances be used as a tool for regeneration or other ecological management.

Guidelines:

Undertake all fire prevention works on roadsides in accordance with the Municipal Fire Prevention Plan.

Record on the Municipal Fire Prevention Plan the conservation values of roadsides, proposed habitat corridors and sites of rare, threatened or significant flora or fauna, especially for those designated as strategic or tactical firebreaks.

Landholders, when undertaking fire prevention works on roadsides which adjoin their properties should consult with the Municipal Fire Prevention Officer to ensure all works are in accordance with the Municipal Fire Prevention Plan and the Roadside Vegetation Management Plan. Municipalities should inform land holders of options and strategies to reduce fire risk on roadsides adjoining their properties.

Carry out fuel reduction works to ensure minimal damage or disturbance to indigenous vegetation and fauna:

- whenever possible locate strategic and tactical firebreaks on roadsides or private property with a high proportion of areas of low conservation value
- in high conservation areas slashing should be restricted to fuse breaks and the immediate road verge unless specified as part of the vegetation management, i.e. a 3 metre width on Declared Roads, IL-2 metres width on other roadsides
- slashing in Moderate (<0.20 Habitat Rating Score) or Low conservation areas is generally not detrimental providing the above guidelines are followed
- in the high likelihood that some remnant ground flora exists in Moderate (<0.20 Habitat Rating Score) vegetation slashing should be in the range of 150 - 200 mm above the surface. It is most important that slashing does not disturb the soil surface and uproot plants
- in Moderate (>0.20 Habitat Rating Score) vegetation, the frequency of slashing should be modified in some areas to allow for regeneration. An experimental approach is required, and representative sites chosen for monitoring. Suggested slash frequency is once every 3-4 years to allow regeneration to achieve an observable height, so that it is easily avoided during subsequent slashing

Guidelines (cont.):

- consider burning as an alternative to slashing and mowing (unless site conditions indicate otherwise) as in most circumstances burning results in less damage to indigenous vegetation
- prior to any fire prevention works on roadsides designated as strategic or tactical firebreaks, identify and ensure adequate protection is given to rare, threatened and significant flora and fauna species (refer to prescriptions in this volume)

Consult between the CFA and NRE or an approved fire ecologist to monitor and evaluate fire prevention works annually in order to determine the effectiveness of works on both the conservation values and fire management.

Identify the location of weeds, which may produce higher fuel loads. Take steps to remove and prevent their spread. Monitor the spread of weeds that may result from fire prevention works, especially weeds known to vigorously colonise remnant vegetation or produce higher fuel loads. If necessary, follow up burns with a spot-spraying program, undertaken by a practitioner skilled in plant identification.

Encourage slashing operators to slash the woody weed species, by providing illustrations of these species to assist recognition.

Where fuel reduction burning has been an existing practice, seek scientific advice before continuing the practice unless scientific research indicates otherwise.

Fire prevention programs should employ burning in a manner that achieves both fire prevention and conservation objectives. Planned ecological fuel reduction burns provide valuable opportunities for CFA brigade members to train in back burning and fire fighting techniques.

Consult with NRE or a fire ecologist for advice when:

- proposing to burn a site for the first time;
- using frequent or annual fuel reduction burning (this is not always advisable unless It is known to favour a desirable species or plant community);
- proposing to use burning in the vicinity of rare, threatened or significant flora or fauna sites.

Design slashing programs to begin with clean machinery in high conservation value areas and work towards the more degraded sites. This will assist in the prevention of further spread of weeds.

Identify areas of regenerating indigenous vegetation and leave unmown.

Ploughing, cultivating and grading roadsides to create firebreaks disturbs soil, encourages the spread of weed species and soil-borne pathogens, and destroys remnant vegetation. If no other technique is appropriate, grading is preferred over ploughing and cultivation. Ploughing, cultivating or grading should be applied only as an ancillary measure on strategic or tactical firebreaks to fuel reduction burning (a maximum width of 2 metres is sufficient for this purpose). These works should be subject to the approval of the Municipal Fire Prevention Officer and in accordance with the Municipal Fire Prevention Plan.

Avoid the general application use of herbicides on roadsides. Consider burning or slashing and removal of woody weeds to reduce fuel loads and maintain weed free firebreaks. Limit the use of herbicides to spraying:

Guidelines (cont.):

- around road furniture;
- for selective control of particular weeds where it is the most appropriate means of control;
- to control growth of potentially serious weeds on firebreaks (subject to the approval of the Municipal Fire Prevention Officer);
- when weather conditions will minimise the likelihood of spray drift affecting non-target plants.

5.3 INSTALLATION AND MAINTENANCE OF UTILITY SERVICES

Issues

The road reserve has traditionally provided a readily accessible site for the location of utility services (e.g. electricity, telecommunications, water, sewerage and gas). Locating new services on either high or medium conservation value roadsides usually requires substantial clearing of vegetation for construction and ongoing costs are required to maintain vegetation clear zones to enable services to be maintained and operate efficiently. These clearing and construction operations may result in:

- introduction of weeds or soil pathogens (e.g. Cinnamon Fungus) particularly if hygiene practices are not observed when moving from an infected area to a clean area
- erosion
- opening up the vegetation canopy (making it more vulnerable to damage from storms etc.)
- destruction of the natural shape and form of trees, resulting in a loss of their amenity and aesthetic value.

Overhead power lines require regular maintenance, particularly the reduction of fire hazard by the removal of vegetation from the vicinity of wires. The requirement for line clearance works has (at times) resulted in much controversy and public debate. A 'Code of Practice for Tree Clearing' has been designed to provide guidelines and limits for clearance operations (related to a tree species structure and rate of growth).

Guidelines:

Consider the following when planning routes:

- state or municipality policies or agreements;
- significant flora and fauna information;
- sites of cultural heritage significance;
- the Roadside Management Plan and Operations Manual;
- location of underground assets in the vicinity (via local service providers)
- Codes of Practice of relevant agencies.

Locate services (when practicable) on cleared land adjacent to roadsides or on low conservation value roadsides.

Guidelines (cont.):

Consider all options to minimise vegetation loss when vegetation removal is proposed on high or medium conservation roads.

Service authorities should notify and discuss all proposed new works on roadsides with the municipality to ascertain permit requirements. If required, permit applications are made to the municipal Council, and referred to NRE. (A permit is not required for vegetation removal necessary to maintain public utility services).

When planning for new works, incorporate the costs of:

- tree removal/pruning/root pruning
- measures to protect and minimise damage or stress to remaining vegetation
- any rehabilitation works required, including weed control and plant replacement for 1-2 years after completion of the works.

Arrange an on-site inspection by all parties if proposed tree removals (occurring during installation works) may result in conflict. Consult with affected landholders, local residents and others with specialist knowledge.

Notify adjacent landholders if proposed works are likely to have an impact on their land.

Ensure (with penalty clauses in contracts) that contractors and staff from service authorities involved in the installation or maintenance of services (particularly on high conservation value roadsides) are trained in and apply:

- methods to minimise disturbance to soils and native vegetation (e.g. removing trees by (i) use of chain saws rather than bulldozers (ii) cutting stumps to ground level and painting with herbicide)
- methods to minimise the spread of weeds
- hygiene measures for Cinnamon Fungus (*Phytophthora*) control
- correct pruning techniques to maintain healthy trees
- removal of noxious (including environmental) weeds (e.g. those which could be removed altogether or cut to ground level and treated with herbicide)
- anticipated tree growth rates and mature heights (to minimise pruning)
- rehabilitation techniques.

Where existing indigenous vegetation is disturbed, rehabilitate the site to (as close as practical) the condition prior to commencement of works. Use tubestock of robust indigenous ground cover species rather than exotic grass seed (Refer to Appendix 4 for plant species guidelines for revegetation). Provide replacement indigenous plants to compensate for any trees removed during installation works. Monitor site rehabilitation and vegetation re-establishment, control weeds and replace any lost planted stock for 12 months after completion of works, as part of the contract.

During trenching works, the topsoil should be salvaged, stored and then respread to match the original soil profile. Stabilise with indigenous tubestock or sterile cereal rye grass.

Rather than severely pruning trees (e.g. cut to near ground level) growing directly under any power lines, encourage removal of the tree and replacement with an indigenous species that do not require such drastic pruning.

5.4 ROAD CONSTRUCTION AND ROAD WIDENING

Issues

Road construction and road widening works are undertaken as traffic volumes increase, and to improve safety in hazardous locations. The need for such works is widespread and ongoing within the study area, as the population increases. These activities can have substantial impacts on roadside vegetation, depending on the scale of works, but these impacts can be mitigated through design and route alignment. Apart from direct removal, road works can destroy vegetation through changes in soil levels, compaction of soil, and altered drainage resulting in waterlogging.

Guidelines:

An Environmental Effects Statement or similar may be required if works are likely to have significant impact on the environment (usually major road projects).

Consult with relevant government departments, community organisations and specialists prior to preparation of detailed designs to determine the likely effects of works from erosion, water, weeds, etc. on vegetation. Arrange on-site meetings of all interested parties to plan for ways to minimise disturbance or loss of remnant vegetation. Consider modifying the design to reduce vegetation loss (e.g. different alignments, pavement and shoulder widths, use of kerb and channel).

Plan the construction phase to occur at the optimum time of year to minimise impacts (e.g. erosion, spread of *Phytophthora*) To minimise erosion, undertake (where appropriate) construction works in stages so as to expose the smallest work area for the shortest time.

Locate any borrow pits where native vegetation will not be disturbed.

Take materials for construction works from disease and weed free sites.

Apply to the local municipality for a planning permit when proposed works involve the removal of native vegetation.

Design drainage systems and batters to:

- minimise sedimentation of water courses
- minimise discharge into disease-susceptible plant communities
- control erosion.

Plan for temporary or permanent erosion mitigation measures to be used during works.

Where construction will have a significant impact on flora or fauna, organise a public display of plans of the proposed works, and provide an appropriate level of publicity.

Consult adjacent land holders and interest groups and (where necessary) invite to on-site meeting.

Train workers and contractors in erosion control, vegetation removal and vegetation protection measures prior to commencement of works.

Identify (both on a plan and on the ground)

- vegetation to be retained
- areas to be rehabilitated

Guidelines (cont.):

- the location of stockpile and dump sites
- washdown sites
- material storage sites (avoid placing at the base of trees)
- access roads
- measures to minimise erosion and control sedimentation.

Prior to commencement of works:

- consider testing for *Phytophthora cinnamomi* in areas of, or adjacent to areas of conservation significance
- use fencing, barricades or other markers to delineate boundaries
- inform all workers and contractors of permit conditions.

Locate protection barriers at a reasonable distance beyond the drip lines of major trees and shrubs to minimise root damage and soil compaction.

Confine vehicles and machinery to access tracks or existing (or proposed) road alignments.

Select machinery of a type and size that will minimise soil disturbance and impacts on vegetation and ground surface.

Use methods indicated under the guidelines in 'Vegetation Removal'.

Remove any topsoil (where necessary) prior to works and store in a designated area. At completion of construction works, reduce erosion of disturbed area by:

- covering with topsoil from the disturbed site
- sowing with sterile cereal rye grass or native grass seed
- using mulch, ideally chipped from indigenous vegetation from the works site.

Begin rehabilitation as soon as works are completed.

When construction works are completed, do not spread excess soil over undisturbed roadside vegetation. Cart away excess soil to designated disposal or stockpile sites.

5.5 ROAD MAINTENANCE

Issues

The level of maintenance required for a road to be managed in a good safe condition is dependent upon traffic volumes, road geometry, type of road surface, accident history, road marking, speed zones, drainage and roadside vegetation. Minor roads with small traffic volumes usually require less maintenance than a main road or highway.

Inappropriate road maintenance practices can have an adverse effect on the conservation of roadside vegetation, particularly through the inadvertent clearing of vegetation and the spread of weeds. Conversely, improved practices will result in a reduction in ongoing maintenance costs.

Native Vegetation Retention controls require a permit to lop, prune remove or destroy native vegetation (subject to a range of exemptions designed to facilitate normal domestic and rural practices). Maintaining *existing* clearances or removing vegetation which presents an immediate threat of personal injury or damage to property would not require a permit. Removing overhanging limbs and branches or trimming back vegetation to *establish* clearer roads requires a permit. Refer to Appendix 4 for an Example of Standard Conditions for Planning Permits for Roadsides.

Most maintenance works have the potential to spread pest plants. Road maintenance crews have an important role in maintaining clean machinery and implementing work practices that will monitor and prevent the spread of noxious and environmental weeds.

Silt, gravel and weeds accumulate in table drains and cut-aways. Rotary drain cleaners remove this material, however spoil may be deposited in a manner which may smother vegetation and contribute to the spread of pest plants.

The presence of litter and rubbish on roadsides seems to invite people to dump more rubbish. Larger items of rubbish (e.g. tyres, car bodies) can shelter vermin or encourage anti-social activities (e.g. fires and other acts of vandalism). A quick response to cleaning up litter and rubbish can prevent an increase of the litter problem and keep the bush and roadsides looking attractive.

Guidelines:

Minimise weed and disease spread by programming works to begin with clean machinery in high conservation areas and working toward degraded sites.

Designate dump and stockpile sites prior to commencement of works.

Identify and mark out the full extent of work zones.

When working on narrow roads of high or medium conservation value, identify machinery turn-around points (i.e. where native vegetation will not be damaged).

Obtain materials required for road works from disease and weed free sites.

In drain cleaning and grading, confine machinery operation (where possible) to the formed road surface.

Construct and maintain table drains to:

- follow natural drainage lines
- to reduce water velocity and run-off
- to prevent water from flooding the road and roadside (except during times of flash downpours).

Consider grassed road shoulders on gravel roads and on less used bitumen roads, as a means of reducing silt run-off.

Minimise disturbance to vegetation growing outside the functional part of a table drain.

Avoid the use of rotary drain cleaners on roadsides of high or medium conservation value, as this equipment throws spoil back over the vegetation, causing disturbance and providing opportunities for spread and establishment of weeds.

Avoid heaping graded material into windrows or surrounding vegetation on high conservation value roadsides by:

- grading drain spoil onto the road for reuse in resurfacing operations (gravel roads only)

Guidelines (cont.):

- removing excess weedy spoil to a designated dump site
- removing excess spoil where constructing run-off drains from gravel roads
- making spoil available for use (e.g. as fill) on adjacent land.

Use rock structures to minimise erosion of drainage lines.

Stockpile materials used on a daily basis on the road formations or, if this is not suitable, on cleared land or roadsides of low conservation value.

Avoid damage to roots, bark and limbs during grading and drain cleaning operations.

Avoid working inside the drip line of trees, or disturbing roots of trees and shrubs.

Use saws to remove any unwanted trees or other woody vegetation growing on batters. Alternatively, use selective herbicide to kill trees and shrubs but maintain grass.

Remove any vegetation in accordance with the guidelines in 'Section 5.15 Vegetation Removal'.

Where practical, mow batter slopes with a flail mower.

Avoid vegetation disturbance on top of batters.

Maintain clearance zones for road safety according to the function or hierarchy of the road. Take into account the nature of the hazard, conservation values, traffic and road characteristics and accident record before selectively clearing any existing vegetation.

5.6 BICYCLE AND PEDESTRIAN TRAILS

Issues

Walking on rural roadsides is popular in the region, particularly in the more scenic areas. Heavy pedestrian use of roadsides depletes native vegetation by trampling.

Recreational cycling is increasing in popularity. Bicycle strategies for the former municipalities in the region gave preference to sealing the road shoulder for cyclists as a relatively low-cost option, but for safety reasons the demand for off-road cycle tracks is likely to increase in future. Construction of trails through remnant vegetation will cut a permanent swathe that fosters weed invasion and requires ongoing maintenance.

Guidelines:

Avoid areas of high or moderate conservation value vegetation when designating a trail alignment.

Construct trails to appropriate standards to minimise drainage and erosion problems.

Where usage level and safety issues justify an off-road bicycle trail, construct shared footway standards (2.0-2.5m wide, sealed surface, appropriate gradients and sight distances).

Avoid/prevent the joint use of trails by bicycles and horses, as conflicts are likely.

Consider elevated trails (boardwalks) over drainage lines in high conservation value areas.

5.7 HORSE RIDING

Issues

Recreational horse riding is a popular pursuit in some parts of the City of Casey. Horses, like other livestock, can be very damaging to roadsides:

- remnant vegetation is trampled and destroyed on heavily used paths creating opportunities for weeds to invade
- soil is often left exposed leading to erosion of trails
- weed seeds, soil borne fungal pathogens and diseases may be spread via horse hooves or manure
- horses graze selectively, and can eliminate palatable plant species
- water courses become pugged degrading water quality.

These types of impacts are intensified where there is heavy riding pressure, such as regular use by commercial trail rides or riding schools.

Conflicts can occur when equestrians and cyclists use the same trail, particularly when horses take fright at the sudden appearance of fast-moving bicycles.

Guidelines:

Monitor the impacts of horse riding on areas of high and medium conservation value, and in locations where drainage and/or erosion problems occur.

Signpost and fence areas of high conservation value, where threatened by horse riding.

Designate a network of bridle trails, avoiding high and medium conservation value roadsides and highly erodible areas. Publicise this network amongst horse riders.

Avoid/prevent joint use of trails by horses and cyclists.

Require commercial trail ride operators to obtain Council approval to use a road reserve. An application for approval should be accompanied by payment of a bond. Specify, in the permit, the routes to be used and any trail maintenance to be undertaken.

Where heavy use by riding schools or commercial trail ride occurs, reduce impacts by providing mulched or tanbark trails, away from high speed traffic. Construct pine rail or other fencing to restrict horses to the trail where necessary for safety reasons or to protect indigenous vegetation. Implement measures to control impacts of drainage runoff, if necessary.

Liaise with appropriate groups (Pony Clubs, trail ride operators, etc.) to develop further guidelines to manage horse riding on roadsides.

5.8 PINE TREES

Issues

Pines, in particular Monterey Pine *(Pinus radiata),* often have conflicting roles in the landscape and biodiversity of the region. The mature avenues of Pines are often seen as a significant landscape feature. On the other hand, the generations of Pines which have arisen from these plantings (known as wildings), are of legitimate concern to others fostering the conservation of indigenous vegetation and fauna habitat. Pines are a serious environmental weed in the region, as they are throughout their range in Victoria and Tasmania.

The main issue arises where Pines have been planted near (within 100-200m) or adjoining remnant vegetation. In this situation annual seed rain from mature planted individuals reaches the indigenous vegetation and wildings establish. Once these reach reproductive maturity (about 8-12 years) the sources of seed are diversified and the rate of invasion increases proportionately. The consequences of Pine invasion are at first incremental, but over time lead to a substantial loss in flora and fauna values, i.e. greatly reduced biodiversity.

Guidelines:

Assess cultural significance, ecological effects, lifespan and health of planted trees (Monterey Pine Pinus radiata, and Cluster Pine Pinus pinaster) in road reserves, as the basis for management decisions. To move and replace pine trees that are senescent, hazardous or a significant threat to indigenous vegetation. Replace with suitable (preferably indigenous) species.

Undertake a staged program of removal of all wilding (i.e. self sown) pine trees from road reserves, and replacement with indigenous plantings. Prioritise for removal those pine trees that are:

- of seed bearing age, and
- in or close to (within 100m) indigenous vegetation remnants, especially remnants of high conservation value.

Provide incentives (including replacement plants) for private landholders to remove pines adjacent to roadsides, especially those contributing to wildings in remnant vegetation.

Develop and disseminate an information leaflet/s for landholders (and others) on the environmental and economic costs of pine wildings, with advice on removal and replacement plantings.

5.9 PLANT PATHOGENS

Issues

Cinnamon Fungus ***(Phytophthora cinnamomi***) is a serious fungal pathogen causing the destruction of many species of indigenous and exotic vegetation. The fungus is soil-borne and encysting (dormant) spores can be readily transported in soil adhered to vehicles - particularly earth moving machinery.

A typical symptom of Cinnamon Fungus is one of dieback of the upper branches reflecting moisture stress as roots are destroyed by the pathogen. However, there are a number of factors causing dieback in the City of Casey, hence expert opinion would need to be sought.

There is a high potential to spread Cinnamon Fungus either as a soil-borne contaminant, on machinery, vehicles, or horses hooves for example, or by changing the hydrological conditions in a contaminated area. The fungus disperses in soil-water and increasing the wetness of a site generally favours its spread.

Prevention is essential as there is no cure.

Guidelines:

Monitor roadside vegetation for potential outbreaks of Cinnamon Fungus.

Undertake isolation procedures of infected areas.

Guidelines (cont.):

Restrict access to infected sites by members of the public.

If vehicular activity is necessary in infected areas, ensure all equipment and work boots are cleaned and sterilised using an appropriate fungicide prior to leaving the infected area.

5.10 CROPPING, HAYMAKING AND GRAZING

Issues

Landowners sometimes graze livestock on the roadsides adjacent to their properties. This usually occurs when:

- there is a need to reduce fuel loads
- drought or floods have meant sufficient feed is not available on the private land.

Grazing low conservation value roadsides which consist mostly of exotic pasture grass is an effective means of reducing fuel loads, however during times of drought etc. care must be taken to ensure that high conservation roadsides or areas of rare, threatened or significant vegetation are protected from damage by grazing stock. In general, grazing of low conservation value roadsides may be problematic due to the scattered distribution of many remnants. Individual stands of trees and shrubs are very susceptible to ringbarking by certain stock. Grazing of roadsides is prohibited under the City of Casey Local Law Number 2, Part 3.22.

Cropping on road reserves destroys remnant indigenous vegetation either directly or indirectly by:

- physical removal of plant species
- run-off from fertilisers and pesticides that alter the nutrient status of the soil
- leaving fallowed soil which may be more vulnerable to weed invasion and erosion
- potentially spreading pest plants.

Baling exotic grasses on low conservation value roadsides may provide a fire prevention function. However, haymaking in areas of native grassland may result in their destruction.

Guidelines:

Discourage use of roadsides for grazing of domestic stock and for haymaking. Install appropriate signage on significant roadsides to deter these practices.

Monitor the use of ploughing to form firebreaks and for cropping on roadsides. Consider fines to discourage offenders.

5.11 DRAINAGE AND MANAGEMENT OF RUNOFF

Road construction and upgrading inevitably alter stormwater runoff patterns, and this can result in erosion, sedimentation, waterlogging, spread of pathogens (e.g. Cinnamon Fungus) and pest plants, or reduction in soil moisture levels on the road reserve or adjoining land. Similarly, runoff from worn or constructed trails (used by walkers, cyclists or horses) can cause land degradation. Inadequate or inappropriate cut off drains contribute to degradation problems. Spraying of drainage lines with ' non-selective herbicides can leave areas prone to erosion and infestation by undesirable species. Well-designed drainage is essential to protect a formed road and for safety, but drains should be designed to minimise vegetation loss and erosion, and to comply with the Drainage Act.

Guidelines:

Run-off points from graded road surfaces should be restricted to low value sections of roadsides.

Where run-off drains are required on moderate or high value roadsides, consider the installation of silt traps or small settling ponds to prevent siltation and weed influx.

Monitor water flow and erosion along recreational trails. Undertake appropriate repairs as required.

5.12 PEST PLANTS (NOXIOUS AND ENVIRONMENTAL WEEDS)

Issues

Roadsides are particularly vulnerable to weed invasion as they often experience a build-up in nutrients over time, and they have a large perimeter (or 'edge') in proportion to their overall area. The roadside 'edges' are subject to disturbance and the spread of weeds is aided by:

- machinery and vehicles
- the movement of water in drains
- the movement and dumping of spoil / rubbish / garden waste
- grading of road shoulders
- maintenance and installation of utilities.

Weed invasion is also encouraged by burning, clearing, grazing, ploughing of firebreaks, and service installation that may occur within roadside reserves. Any of these disturbances may create conditions suitable for the spread and growth of weeds.

It is possible to categorise pest plants according to the areas they colonise and the type of threat they pose. *Noxious Weeds* are plants which are considered to be (or have the potential to become) a serious threat to primary production, Crown Land, the environment or community health. *Environmental weeds* are plants capable of colonising indigenous vegetation and are a major threat to the conservation of remnant vegetation. Environmental weeds may be exotic plants or native plants outside their geographic range. Some desirable agricultural species (e.g. *Phalaris aquatica)* are considered environmental weeds on roadsides.

Under the *Catchment and Land Protection Act 1994*, weeds may be declared under the following categories:

State Prohibited Weeds: These either do not occur in Victoria, or if they do occur it is reasonable to expect that they can be eradicated from the State.

Regionally Prohibited Weeds: These are not widely distributed throughout the region. They are capable of spreading further in the region, and it is reasonable to expect that they can be eradicated from the region.

Regionally Controlled Weeds: They often occur widely in the region. They are capable of spreading further and should be prevented from doing so. To prevent their spread, continuing control measures are required.

Restricted Weeds: These are a serious threat to primary production, Crown Land, the environment or community health in another state or Territory. They have the potential to spread into and within Victoria. If sold or traded in Victoria there would be an unacceptable risk of them spreading within Victoria and to other States or Territories.

Responsibility for controlling weeds under the Catchment and Land Protection Act is as follows:

- *Landowners* must take all reasonable steps to prevent the spread of *regionally controlled weeds* on roadsides adjoining their property. This does not apply if the roadside is part of a declared road (under the meaning of the *Transport Act 1983*, i.e. a Freeway; Highway, Tourist Road, or Main Road), or is under a 'Special Area Plan' agreement. VicRoads are responsible for weed control on Freeways, Highways and Tourist Roads. Councils are responsible for weed control on Main Roads. Landowners must take all reasonable steps to eradicate regionally prohibited weeds and to prevent the growth and spread of *regionally controlled weeds* located on their own land.
- *NRE* must take all reasonable steps to eradicate *State prohibited weeds* from all land within the State and eradicate *regionally prohibited weeds* on Crown land, that is including roadsides (except Crown land held under lease or licence).
- *Public Authorities* (i.e. the land owner, manager or lessee of Crown land) must take all reasonable steps to prevent the spread of *regionally controlled weeds* on roadsides adjacent to that land.

Under Section 71 of the Act, a person must not:

- remove machinery, implements or other equipment from land on to a road without first taking reasonable precautions to ensure that the equipment is free from the seeds of any noxious weeds and any other part of a noxious weed which is capable of growing.
- without a permit from NRE remove or cause to be removed or sell soil, sand, gravel or stone which contains or is likely to contain any part of a noxious weed, or which comes from land on which noxious weeds grow.
- without a permit from NRE deposit on land a noxious weed or the seeds of a noxious weed that are apparently capable of germinating.

Given the limited resources and scale of the problem it is important that co-ordinated educational and weed control programs be developed by everyone undertaking works on roadsides. Weeds can also be spread by people dumping garden refuse and many retail nurseries unknowingly sell environmental weeds. It is important to include these groups in any strategy aimed at controlling the spread and distribution of weed species.

Guidelines:
Monitor outbreaks of declared noxious and regionally controlled weeds.
Produce a strategy to eradicate such outbreaks.
Monitor outbreaks of other weed species, particularly with reference to the potential threats that such species place on indigenous vegetation.
Ensure weed control is undertaken intensively on Council-maintained roadsides (Refer to Appendix 2 of the RVMP Part 2: Operations Manual).
Develop community awareness programs to ensure landholders understand their responsibilities regarding weed control on roadsides.
Encourage landholders to remove weeds from roadsides.
Encourage and support Landcare and other local environment groups to undertake long-term weed control on roadsides.

5.13 PEST ANIMALS

Issues

Under the *Catchment and Land Protection Act* 1994 an animal may be declared as a pest animal if it:

- did not occur naturally in the wild before European settlement
- is a serious threat to, or has potential to threaten, primary production, Crown land, the environment or community health.

Rabbits, foxes, dogs, cats and introduced birds (e.g. Common Myna, Common Starling) are the main pest animals on roadsides in the region. Landowners have a legislative requirement to control 'established' pest animals (including rabbits and foxes) on undeclared roadsides adjoining their property (note: the term landowner includes the occupier, lessee, or manager of Crown land). NRE is the agency responsible for enforcing the legislation.

The range of pest animals create numerous problems for indigenous flora and fauna, including: predation, competition for food and nest sites, and grazing of vegetation. As a group, exotic fauna and flora have a substantial impact on biodiversity.

Guidelines:

Monitor outbreaks of noxious fauna such as rabbits.

Develop a community awareness program to encourage landholders to undertake active control of introduced fauna.

Development policies on cat curfew, particularly in areas of high conservation significance.

Undertake Council-initiated rabbit, fox and cat control in reserves and on roadsides.

5.14 STOCKPILE AND DUMPSITE MANAGEMENT

Issues

Within the City of Casey, there are a number of locations on roadsides that are designated for use as stockpile sites, where gravel, soil or road-works refuse may be retained for later use or removal.

Stockpiling, when well contained, should have little impact on nearby remnant vegetation. However, when stockpile sites are located within high value remnants, the risk of vegetation damage due to heavy vehicle activity is increased particularly if care is not taken to keep vehicles within the designated area. Currently there is only one designated stockpile site located near a High Value remnant of indigenous vegetation, this is at Churchill Park Drive.

Stockpile sites often become extensively invaded by exotic flora and naturalised indigenous species. When road materials (gravel, soil) are then transported to other areas, new infestations are likely to establish.

Stockpile sites are often unsightly, and may encourage the dumping of domestic waste, or the use of the site for non-designated recreational activities such as four-wheel-driving. Thus, these sites can be further degraded through inappropriate uses and activities.

Guidelines:

Designate a set number of stockpile or dump sites at strategic locations (selected and approved by the relevant Council officer for:

- storing road work materials (e.g. Road metal, topsoil, gravel, mulch)
- storing excess material from road construction or maintenance operations from the roadside

Guidelines (cont.):

- disposal of pest plants and other materials.

Avoid using wayside rest areas as stockpile or dump sites.

Relocate the stockpile site at Churchill Park Drive to another area.

When selecting new stockpile or dump sites consider locating them:

- on roadsides or public land of low conservation value
- in areas which have previously been cleared of vegetation
- away from drainage lines, flood ways and culverts
- in areas which can be screened from view.

Restore former stockpile or dump sites using appropriate indigenous vegetation.

Provide all statutory authorities and contractors undertaking roadworks with a list and location map of designated stockpile and dump sites.

Define the extent of stockpile or dump sites with a 20m wide buffer zone.

Mark the boundaries of stockpile sites clearly and (when practical) fence, barricade or screen (using appropriate indigenous plantings) from the roadside.

Control any weed species prior to stockpiling materials on a new site.

Nominate an officer responsible for:

- ensuring materials are dumped only at designated sites
- allocating new locations (as required)
- controlling weed growth and monitoring pathogens at stockpile and dump sites
- organising phase out and rehabilitation of old sites

Discourage use of stockpile sites by local community and visitors to the area.

Enforce local laws on littering and inappropriate land uses.

5.15 VEGETATION REMOVAL

Issues

Vegetation removal from roadsides is prohibited unless under the conditions of a planning permit, for the installation of a new driveway and services or to remove vegetation (usually trees) that are considered dangerous.

Removal of vegetation from some roadsides may be required for the purposes of road widening or maintenance, for fire management, or for the installation of services and utilities.

The impacts of vegetation removal include:

- immediate loss of vegetation cover
- fragmentation of vegetation / habitat corridor
- loss of biodiversity
- increased site and soil disturbance
- potential for weed invasion

Guidelines:

Plan activities and works to result in minimal vegetation removal. Consider:

- alternative sites (e.g. sides of road, private land)
- options for services (e.g. underground, aerial bundled cable, zigzagging, shared easements)
- clearance requirements on individual roads (e.g. bus routes require more clearance)
- options to keep works vehicles on the formed road pavement.

Under the State section of all Planning Schemes, a planning permit is required to lop or destroy any native vegetation along any roadside (apart from works specifically exempted). Applications are to be made to the municipal Council and may be referred to NRE for advice on approval and conditions.

Inspect, identify and mark all vegetation to be removed before starting any works.

Select machinery which will suit the size/type of the task and result in minimal impact on surrounding earth and vegetation.

Remove only the least amount of vegetation necessary to do the works.

Use personnel with appropriate horticultural training when removing the vegetation.

Wherever possible, vehicles used during removal works are to remain on the road formation (if this is not practical, consider gaining permission to use cleared private land adjacent to roadside).

Unless posing a safety hazard or conflict with the Municipal Fire Prevention Plan, retain dead trees and fallen limbs. Similarly, retain larger felled vegetation containing hollows on site or relocate to another area to provide additional wildlife habitat.

Fell vegetation in a direction that minimises damage to surrounding vegetation (preferably onto the road formation or a cleared area).

When disposing of felled vegetation (e.g. by sawing, splitting or chipping) minimise disturbance to the understorey. Consider recycling felled material by:

- chipping and returning to site (Note: do not stockpile mulch around tree bases as this encourages collar-rot; do not apply a layer of mulch to indigenous ground flora that will result in smothering of vegetation)
- making left over material available for fence posts
- stockpiling in a cleared area and making available for firewood.

If felled material cannot be recycled, burn or dispose of the excess material at a designated tip site.

Rehabilitate and facilitate regeneration of indigenous vegetation in any areas beyond the works zone which have been accidentally disturbed during removal of vegetation.

5.16 VEHICLE AND MACHINERY ACTIVITY

Issues

Many roadside verges are inappropriately utilised for parking of domestic and road-construction/maintenance vehicles.

Indigenous vegetation may be destroyed or highly-disturbed by these activities, often resulting in soil disturbance and the potential for weed invasion.

Weed invasion is most likely to occur due to poor hygiene of service or maintenance machinery, whereby road grading, for example, can transport weed seed from an infested site into a clean area. Transport of plant pathogens will similarly occur (refer to section **5.8 Plant Pathogens**)

Tree illness and/or death may also occur due to root damage or soil compaction with prolonged site use by heavy machinery (including domestic vehicles).

Guidelines:

Schedule the works program to move from areas of least weed infestation to areas of greatest weed infestation.

Select machinery on the basis of minimum size or capacity required to complete the job.

Begin the day's work with clean machinery.

Turn vehicles or machinery on low conservation value roadsides or sites which have minimal indigenous vegetation (such as a driveway, wayside stop etc.).

Where possible operate all vehicles and machinery from:

- the road formation;
- a cleared area, or
- cleared private land.

When manoeuvring machinery, take care to avoid disturbing plant roots, nicking bark or breaking limbs.

Park vehicles or machinery left overnight or for an extended period:

- clear of traffic
- on a cleared area
- in a designated wayside stop, or
- on private land of low conservation value.

Only service vehicles on the roadside in an emergency.

If works have occurred on sites of weed or pathogen infestation, scrape, wash or air clean vehicles and machinery of all soil and plant debris before moving to a new location.

6.0 GOALS, OBJECTIVES, POLICIES AND PROCESSES FOR ROADSIDE VEGETATION MANAGEMENT

6.1 GOAL

To preserve, enhance and properly manage roadsides for their conservation and landscape values while maintaining their functional roles.

6.2 OBJECTIVES

- To protect and re-establish indigenous vegetation on roadsides
- To control the spread of weeds and soil-borne pathogens on roadsides and eradicate serious weeds if possible
- To identify and protect significant species and communities of flora and fauna on roadsides
- To maintain, enhance and extend wildlife corridors and fauna habitat on roadsides
- To complement and assist in the conservation of reserves and private bushland by the provision of corridor linkages and buffer zones
- To ensure the safe function of roads and protection of the road formation
- To identify and conserve cultural heritage assets on roadsides
- To maintain and enhance landscape quality and visual amenity of roads
- To reduce fire hazards and assist fire suppression in order to protect community and environmental assets
- To minimise land and water degradation due to works on road reserves
- To enhance the travelling experience and provide for the needs of tourism and recreation
- To involve all interested parties in planning processes for roadsides
- To prevent and/or resolve conflicts that arise on roadsides.

6.3 POLICIES

The policies below target management issues which frequently arise on roadsides, and which can give rise to conflicts with the conservation of natural values.

ISSUE/ACTION	RECOMMENDATIONS
A. Road construction e.g. widening passing lines	• avoidance or minimal impact to High Conservation areas; fence these areas if construction is close by. • wherever possible locate works in Low Conservation areas. • in Medium Conservation areas, take account of variability in distribution of remnants, and locate

	works in low impact zones. • undertake plant rescue operation if significant species cannot be avoided.
B. Installation and maintenance of utility services	• utilise Low Conservation areas, existing easements or private property wherever possible (depending on the type of utility service). • avoid High Conservation areas. • wherever possible (depending on the type of utility service), minimise impact on Moderate Conservation areas by meandering through remnants, i.e. maximise the use of degraded areas. • choose access points for machinery and construction techniques (e.g. underground tunnelling/boring) to minimise adverse impacts on vegetation. • revegetate with local species. • use combined or shared easements. • minimise access points, avoid tracks along easements unless dual purpose e.g. pedestrian path.
C. Fire prevention	• consider other options for primary firebreaks if current breaks coincide with large contiguous High value areas. • in High Conservation areas avoid slashing of vegetation, providing firebreaks installed at intervals which should not generally exceed 500m, and a weed control strategy is implemented concurrently. • utilise existing clearings or driveways as firebreaks, consider more conservation-orientated fuel reduction practices such as low intensity burning and (particularly) woody weed removal in High Conservation areas. • review the strategy of slashing along fencelines particularly in High Conservation areas. • encourage and cooperate with land owners in fire prevention to reduce the emphasis on roadsides particularly in High and Medium Conservation areas. • continue 4m x 4m box-clearance for emergency vehicle access, using methods that are sensitive to environmental aspects of some roadsides e.g. avoiding heavy vehicle activity of roadside vegetation etc.

D. Exotic plantings / Boulevards	• undertake a staged removal of non-indigenous plantings on road reserves, to be replaced with site-specific indigenous species. • Determine threats imposed by non-indigenous plantings, prioritise for weed removal program. • Monitor establishment of exotic species from adjoining private and public land into remnant roadside vegetation.
E. Revegetation	• Revegetation should be undertaken using species which occupy or formerly occupied the site (Refer to Appendix 3 of the RVMP Part 2: Operations Manual). • Unless on-going management can be assured, revegetation should focus on the woody component (trees and shrubs) of the vegetation. • Expert advice should be gained on suitable species, sources of propagation and revegetation treatments. • Investigate, and implement, the use of burning of sites for weed control and to encourage natural regeneration. • Species should be propagated from local provenance stock
F. Horseriding	• Wherever possible horse trails should be placed in Low Conservation areas. • in areas of moderate value, horse trails should be carefully planned and maximise the use of degraded areas. • Horseriding should not generally be permitted in High Conservation areas. In circumstances where some riding is unavoidable, the use should be kept to a minimum, and the situation monitored. This applies particularly to the condition of the track, potential damage to vegetation and weed invasions. • Ideally, horseriding should be completely contained within or excluded from sites infected with Cinnamon Fungus.
G. Firewood removal	• Collection and removal of firewood from road reserves is discouraged because of its effects on flora and fauna habitat values, visual amenity and land protection. This includes fallen timber, unless it creates a safety or fire hazard. • Where timber has been felled as part of works on roadsides, this timber should be cut into firewood lengths and left in an accessible location for collection by the public. Use of large diameter logs for furniture making and craft use should be encouraged.

6.4 ROADSIDE VEGETATION MANAGEMENT PROCESS

The steps outlined below are designed to put into practice the goals and objectives of this Plan, and to prevent or mediate conflicts that may arise.

A. CO-ORDINATION

1. Nominate, in each authority involved in this Plan, a contact officer/position who will have a co-ordinating role in implementation of the Plan within their organisation.
2. Publicise the Roadside Vegetation Management Plan and Operations Manual within Council, other roadsides managers, and the community.
3. Establish and inform all relevant parties about the notification, referral and consultation process for works planning affecting roadsides.
4. Compile and regularly update a register of interested parties for notification and consultation about roadsides works.
5. Encourage a multi-disciplinary team approach and/or use of specialist advice in planning of works on roads.
6. Organise regular co-ordination meetings of the regional Roadside Management Plan Implementation Committee.
7. Initiate/support and monitor the implementation of the action recommendations for the Roadside Vegetation Management Plan, including on-ground works, training, vegetation management, information and controls.
8. Advise and assist community groups and landholders in roadside management projects (e.g. weed control, fuel reduction, rubbish removal, revegetation).

B. PLANNING / DESIGN STAGE (for road works, utilities installation, fire prevention)

1. Enlist appropriate specialist skills, e.g. in land and vegetation management, landscape design, etc. to assist in plan preparation.
2. Notify road authority about intention to undertake works affecting roadsides.
3. Check the Roadside Vegetation Management Plan maps for the status of road/s under consideration, and the implications of this for the proposed works (see Roadside Management Categories, below). Check the Operations Manual for conservation values, relevant guidelines and prescriptions.
4. If the project will involve excavation, contact local service providers for information on underground assets in the vicinity.
5. For major works projects, contact Aboriginal Affairs Victoria for information on known Aboriginal sites, and Heritage Victoria for information on other cultural heritage sites. Commission a survey by qualified archaeologists if necessary.
6. Prepare draft plans, incorporating measures to protect conservation values and existing assets.
7. Undertake notifications and consultation as required, including on-site meetings if necessary.
8. Obtain any permits that may be required, e.g. a planning permit for clearance of native vegetation.

9. Finalise plans. Prepare contract specifications with reference to the checklist below. Include requirements for compliance with the Roadside Vegetation Management Plan and penalties for breaches.

C. WORKS STAGE

1. Ensure that works crews are properly trained in appropriate roadside management techniques.
2. Contact Melbourne One Call Service at least 2 working days before excavation for up-to-date information on underground assets.
3. Supervise works and enforce penalties if necessary.
4. If conflicts occur with community or other organisations during works, project manager to arrange discussions (preferably on site) with all interested parties, including road authority.
5. Check works on completion, and ensure that site rehabilitation is completed and maintained.

6.5 ROADSIDE MANAGEMENT CATEGORIES

These categories indicate the overall conservation management priorities for roadside sections. Some general guidelines for management action and appropriate uses in each category are presented below.

MANAGEMENT CATEGORY A (HIGH CONSERVATION VALUE ROADSIDES)

These are 'priority' road sections for which individual prescriptions have been prepared (see Vol. 2, Operations Manual, for the prescriptions). They may include roadsides containing substantial remnants of high quality native vegetation and significant fauna habitat.

The remnants of high quality vegetation generally have moderate to high faunal values and often significant species present. The overriding priority in these areas is to preserve and protect existing indigenous vegetation.

- Protect, manage and monitor remnant indigenous vegetation as a priority.
- Avoid slashing unless recommended as part of vegetation management.
- Avoid utilisation as strategic/tactical fire breaks. Limit firebreaks to 500 m apart and utilise pre-existing breaks (e.g. driveways) where possible.
- Minimise user activities. No stock grazing. In general, no horse trails, bicycle trails, etc.
- Provide sensitive stormwater runoff dispersal.
- No utilities if possible - place on opposite side of road or other route. If necessary, then minimise impacts through use of innovative, site-specific techniques with skilled supervision and planning, construction and best practice and revegetation and management if necessary.
- Keep roadworks/road widening away from remnant vegetation.
- Provide signage at strategic points and educative material if appropriate.
- Consult/coordinate with adjacent landowners. Encourage sympathetic revegetation and/or coordinated management of vegetation remnants, and the possibility of utilising lower conservation value areas on private property for utility easements. Information about vegetation management could be provided with rates notices.

- Ensure any proposed habitat links are thoroughly planned with respect to current and future uses of the roads involved to minimise potential conflict between major revegetation projects and other activities.
- Install utilities underground and prior to any revegetation.
- Ensure species selected are compatible with road uses, utility easements, etc.
- Revegetate areas as necessary (low and moderate value sections) using local indigenous trees and shrubs. On very busy roads seek zoological advice prior to species selection to minimise potential roadkills.
- Permit limited use of habitat links by horse riders, except in areas of high conservation value where they should be excluded.

MANAGEMENT CATEGORY B (MEDIUM CONSERVATION VALUE ROADSIDES)

This category includes extensive areas of moderately degraded indigenous vegetation, highly degraded but relatively continuous remnants, or a mosaic which may include some small, high quality remnants in otherwise degraded stretches. For this reason, generalisations are more problematic (cf. categories A & C) and in many situations a site specific approach will be required.

- Protect and manage any small, high quality remnants, important habitat trees, or populations of significant species. Where constraints allow, actively manage Category B vegetation; this will include upgrading plantings using local indigenous plant species.
- Carefully plan utility alignments avoiding, where possible, higher quality vegetation and large remnant trees.
- Remove or rationalise aerial powerlines where this is a major constraint on roadside conservation values (where possible).
- If possible, avoid utilisation as strategic/tactical firebreaks.
- Allow equestrian, bicycle and foot trails, but plan carefully so as to minimise impacts on remnant vegetation.
- Keep roadworks/road widening away from any higher quality vegetation remnants and populations of significant species. Avoid the need for tree removal.
- Provide sensitive stormwater, etc. dispersal.
- Involve local landowners and other interested parties in revegetation and weed control plans.

MANAGEMENT CATEGORY C (LOW CONSERVATION VALUE ROADSIDES)

These are predominantly cleared roadsides which often contain scattered remnant trees. While opportunities exist to upgrade these areas through revegetation, it should be remembered that these roadsides are also (by default) important for a range of activities that are generally incompatible with flora and fauna conservation (e.g. utility services, firebreaks, road widening). In some cases these low conservation value roadsides serve to take the pressure off some of the higher value roadsides, given the range of conflicting demands present.

- Avoid removal of remnant trees and shrubs.
- Prioritise these roadsides for a range of uses including utility services, firebreaks, active recreation trails and roadworks / road widening (including location of stockpiles, etc.).
- Control the most serious environmental weeds that may be threatening nearby high quality remnant vegetation.
- Revegetate with woody species where appropriate.

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Appendix 1 Terrestrial vertebrate fauna species recorded within the City of Casey (up to September 1999: Atlas of Victorian Wildlife CD-Rom)

Common Name	*Scientific Name*	National			State	
		EPBC Act	Other	Migratory	FFG Act	NRE (2000)
Frogs						
Southern Brown Tree Frog	*Litoria ewingii*					
Verreaux's Tree Frog	*Litoria verreauxii*					
Southern Bell Frog	*Litoria raniformis*	V			L	v
Whistling Tree Frog	*Litoria verreauxii verreauxii*					
Common Froglet	*Crinia signifera*					
Common Spadefoot Toad	*Neobatrachus sudelli*					
Haswell's Froglet	*Paracrinia haswelli*					
Southern Bullfrog	*Limnodynastes dumerilii*					
Southern Toadlet	*Pseudophryne semimarmorata*					
Spotted Marsh Frog	*Limnodynastes tasmaniensis*					
Striped Marsh Frog	*Limnodynastes peronii*					
Victorian Smooth Froglet	*Geocrinia victoriana*					
Reptiles						
Tree Dragon	*Amphibolurus muricatus*					
Common Long-necked Tortoise	*Chelodina longicollis*					
Eastern Small-eyed Snake	*Rhinoplocephalus nigrescens*					
Lowland Copperhead	*Austrelaps superbus*					
Tiger Snake	*Notechis scutatus*					
White-lipped Snake	*Drysdalia coronoides*					
Black Rock Skink	*Egernia saxatilis intermedia*					
Blotched Blue-tongued Lizard	*Tiliqua nigrolutea*					
Bougainville's Skink	*Lerista bougainvillii*					
Common Blue-tongued Lizard	*Tiliqua scincoides*					
Cunningham's Skink	*Egernia cunninghami*					
Delicate Skink	*Lampropholis delicata*					
Eastern Three-lined Skink	*Bassiana duperreyi*					
Garden Skink	*Lampropholis guichenoti*					
Glossy Grass Skink	*Pseudemoia rawlinsoni*					lr-nt
McCoy's Skink	*Nannoscincus maccoyi*					
Metallic Skink	*Niveoscincus metallicus*					
Southern Water Skink	*Eulamprus tympanum*					
Swamp Skink	*Egernia coventryi*					v
Weasel Skink	*Saproscincus mustelinus*					
White's Skink	*Egernia whitii*					

Common Name	*Scientific Name*	National			State	
		EPBC Act	Other	Migratory	FFG Act	NRE (2000)
Birds						
Black-shouldered Kite	*Elanus axillaris*			+		
Brown Goshawk	*Accipiter fasciatus*			+		
Collared Sparrowhawk	*Accipiter cirrhocephalus*			+		
Grey Goshawk	*Accipiter novaehollandiae*			+		lr-nt
Little Eagle	*Hieraaetus morphnoides*			+		
Spotted Harrier	*Circus assimilis*			+		
Swamp Harrier	*Circus approximans*			+		
Wedge-tailed Eagle	*Aquila audax*			+		
Whistling Kite	*Haliastur sphenurus*			+		
White-bellied Sea-Eagle	*Haliaeetus leucogaster*			+	L	e
Australian Owlet-nightjar	*Aegotheles cristatus*					
Singing Bushlark	*Mirafra javanica*					
Eurasian Skylark*	*Alauda arvensis*					
Australasian Shoveler	*Anas rhynchotis*			+		v
Australian Shelduck	*Tadorna tadornoides*			+		
Australian Wood Duck	*Chenonetta jubata*			+		
Black Swan	*Cygnus atratus*			+		
Blue-billed Duck	*Oxyura australis*			+	L	v
Chestnut Teal	*Anas castanea*			+		
Grey Teal	*Anas gracilis*			+		
Hardhead	*Aythya australis*			+		v
Musk Duck	*Biziura lobata*			+		v
Pacific Black Duck	*Anas superciliosa*			+		
Darter	*Anhinga melanogaster*					
Magpie Goose	*Anseranas semipalmata*					e
Fork-tailed Swift	*Apus pacificus*			+		
White-throated Needletail	*Hirundapus caudacutus*			+		
Cattle Egret	*Ardea ibis*					
Great Egret	*Ardea alba*			+	L	e
Intermediate Egret	*Ardea intermedia*				L	ce
Little Egret	*Egretta garzetta*				L	ce

Common Name	*Scientific Name*	National			State	
		EPBC Act	Other	Migratory	FFG Act	NRE (2000)
Birds (cont'd)						
Nankeen Night Heron	*Nycticorax caledonicus*					v
White-faced Heron	*Egretta novaehollandiae*					
White-necked Heron	*Ardea pacifica*					
Australian Magpie	*Gymnorhina tibicen*					
Dusky Woodswallow	*Artamus cyanopterus*					
Grey Butcherbird	*Cracticus torquatus*					
Grey Currawong	*Strepera versicolor*					
Pied Currawong	*Strepera graculina*					
White-browed Woodswallow	*Artamus superciliosus*					
Galah	*Cacatua roseicapilla*					
Gang-gang Cockatoo	*Callocephalon fimbriatum*					
Little Corella	*Cacatua sanguinea*					
Long-billed Corella	*Cacatua tenuirostris*					
Sulphur-crested Cockatoo	*Cacatua galerita*					
Yellow-tailed Black-Cockatoo	*Calyptorhynchus funereus*					
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*					
Black-fronted Dotterel	*Elseyornis melanops*			+		
Double-banded Plover	*Charadrius bicinctus*			+		
Grey Plover	*Pluvialis squatarola*			+		
Masked Lapwing	*Vanellus miles*			+		
Pacific Golden Plover	*Pluvialis fulva*					
Eastern Whipbird	*Psophodes olivaceus*					
Red-browed Treecreeper	*Climacteris erythrops*					
White-throated Treecreeper	*Cormobates leucophaeus*					
Brush Bronzewing	*Phaps elegans*					
Common Bronzewing	*Phaps chalcoptera*					
Crested Pigeon	*Ocyphaps lophotes*					
Rock Dove*	*Columba livia*					
Spotted Turtle-Dove*	*Streptopelia chinensis*					
Australian Raven	*Corvus coronoides*					
Little Raven	*Corvus mellori*					

Common Name	*Scientific Name*	National			State	
		EPBC Act	Other	Migratory	FFG Act	NRE (2000)
Birds (cont'd)						
Brush Cuckoo	*Cacomantis variolosus*					
Fan-tailed Cuckoo	*Cacomantis flabelliformis*					
Horsfield's Bronze-Cuckoo	*Chrysococcyx basalis*					
Pallid Cuckoo	*Cuculus pallidus*					
Shining Bronze-Cuckoo	*Chrysococcyx lucidus*					
Mistletoebird	*Dicaeum hirundinaceum*					
Grey Fantail	*Rhipidura fuliginosa*					
Leaden Flycatcher	*Myiagra rubecula*					
Magpie-lark	*Grallina cyanoleuca*					
Restless Flycatcher	*Myiagra inquieta*					
Rufous Fantail	*Rhipidura rufifrons*					
Satin Flycatcher	*Myiagra cyanoleuca*					
Willie Wagtail	*Rhipidura leucophrys*					
Australian Hobby	*Falco longipennis*			+		
Brown Falcon	*Falco berigora*			+		
Nankeen Kestrel	*Falco cenchroides*			+		
Peregrine Falcon	*Falco peregrinus*			+		
European Goldfinch*	*Carduelis carduelis*					
European Greenfinch*	*Carduelis chloris*					
Pied Oystercatcher	*Haematopus longirostris*					
Laughing Kookaburra	*Dacelo novaeguineae*					
Sacred Kingfisher	*Todiramphus sanctus*					
Fairy Martin	*Hirundo ariel*					
Tree Martin	*Hirundo nigricans*					
Welcome Swallow	*Hirundo neoxena*					
Caspian Tern	*Sterna caspia*				L	v
Crested Tern	*Sterna bergii*					lr-nt
Gull-billed Tern	*Sterna nilotica*				L	e
Pacific Gull	*Larus pacificus*					lr-nt
Silver Gull	*Larus novaehollandiae*					
Whiskered Tern	*Chlidonias hybridus*					lr-nt

Common Name	*Scientific Name*	National			State	
		EPBC Act	Other	Migratory	FFG Act	NRE (2000)
Birds (cont'd)						
Southern Emu-wren	*Stipiturus malachurus*					
Superb Fairy-wren	*Malurus cyaneus*					
Bell Miner	*Manorina melanophrys*					
Brown-headed Honeyeater	*Melithreptus brevirostris*					
Eastern Spinebill	*Acanthorhynchus tenuirostris*					
Helmeted Honeyeater	*Lichenostomus melanops cassidix*	E	E		L	e
Little Wattlebird	*Anthochaera chrysoptera*					
New Holland Honeyeater	*Phylidonyris novaehollandiae*					
Noisy Miner	*Manorina melanocephala*					
Painted Honeyeater	*Grantiella picta*				L	v
Red Wattlebird	*Anthochaera carunculata*					
Singing Honeyeater	*Lichenostomus virescens*					
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*					
White-eared Honeyeater	*Lichenostomus leucotis*					
White-fronted Chat	*Epthianura albifrons*					
White-naped Honeyeater	*Melithreptus lunatus*					
White-plumed Honeyeater	*Lichenostomus penicillatus*					
Yellow-faced Honeyeater	*Lichenostomus chrysops*					
Yellow-tufted Honeyeater	*Lichenostomus melanops*					
Australian Pipit	*Anthus australise*					
Bassian Thrush	*Zoothera lunulata*			+		
Eurasian Blackbird*	*Turdus merula*			+		
Song Thrush*	*Turdus philomelos*			+		
Varied Sittella	*Daphoenositta chrysoptera*					
Figbird	*Sphecotheres viridis*					
Olive-backed Oriole	*Oriolus sagittatus*					
Eastern Shrike-tit	*Falcunculus frontatus*					
Golden Whistler	*Pachycephala pectoralis*					
Grey Shrike-thrush	*Colluricincla harmonica*					
Olive Whistler	*Pachycephala olivacea*					
Rufous Whistler	*Pachycephala rufiventris*					

Common Name	*Scientific Name*	National			State	
		EPBC Act	Other	Migratory	FFG Act	NRE (2000)
Birds (cont'd)						
Brown Thornbill	*Acanthiza pusilla*					
Buff-rumped Thornbill	*Acanthiza reguloides*					
Spotted Pardalote	*Pardalotus punctatus*					
Striated Pardalote	*Pardalotus striatus*					
Striated Thornbill	*Acanthiza lineata*					
White-browed Scrubwren	*Sericornis frontalis*					
Yellow Thornbill	*Acanthiza nana*					
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*					
Beautiful Firetail	*Stagonopleura bella*					
Eurasian Tree Sparrow*	*Passer montanus*					
House Sparrow*	*Passer domesticus*					
Red-browed Finch	*Neochmia temporalis*					
Zebra Finch	*Taeniopygia guttata*					
Australian Pelican	*Pelecanus conspicillatus*					
Eastern Yellow Robin	*Eopsaltria australis*					
Flame Robin	*Petroica phoenicea*					
Hooded Robin	*Melanodryas cucullata*				L	
Jacky Winter	*Microeca fascinans*					
Pink Robin	*Petroica rodinogaster*					
Rose Robin	*Petroica rosea*					
Scarlet Robin	*Petroica multicolor*					
Great Cormorant	*Phalacrocorax carbo*					
Little Black Cormorant	*Phalacrocorax sulcirostris*					
Little Pied Cormorant	*Phalacrocorax melanoleucos*					
Pied Cormorant	*Phalacrocorax varius*					lr-nt
Brown Quail	*Coturnix australis*					dd
Stubble Quail	*Coturnix pectoralis*					
Tawny Frogmouth	*Podargus strigoides*					
Australasian Grebe	*Tachybaptus novaehollandiae*					
Great Crested Grebe	*Podiceps cristatus*					
Hoary-headed Grebe	*Poliocephalus poliocephalus*					

Common Name	*Scientific Name*	National			State	
		EPBC Act	Other	Migratory	FFG Act	NRE (2000)
Birds (cont'd)						
Grey-crowned Babbler	*Pomatostomus temporalis*				L	e
Australian King-Parrot	*Alisterus scapularis*					
Blue-winged Parrot	*Neophema chrysostoma*					
Crimson Rosella	*Platycercus elegans*					
Eastern Rosella	*Platycercus eximius*					
Musk Lorikeet	*Glossopsitta concinna*					
Rainbow Lorikeet	*Trichoglossus haematodus*					
Red-rumped Parrot	*Psephotus haematonotus*					
Superb Parrot	*Polytelis swainsonii*	V	V		L	e
Swift Parrot	*Lathamus discolor*	E	V		L	e
Australian Spotted Crake	*Porzana fluminea*					
Black-tailed Native-hen	*Gallinula ventralis*					
Buff-banded Rail	*Gallirallus philippensis*					
Dusky Moorhen	*Gallinula tenebrosa*					
Eurasian Coot	*Fulica atra*					
Lewin's Rail	*Rallus pectoralis*					e
Purple Swamphen	*Porphyrio porphyrio*					
Spotless Crake	*Porzana tabuensis*					
Black-winged Stilt	*Himantopus himantopus*			+		
Common Greenshank	*Tringa nebularia*			+		
Curlew Sandpiper	*Calidris ferruginea*			+		
Eastern Curlew	*Numenius madagascariensis*			+		lr-nt
Latham's Snipe	*Gallinago hardwickii*			+		
Red-necked Stint	*Calidris ruficollis*			+		
Sharp-tailed Sandpiper	*Calidris acuminata*			+		
Powerful Owl	*Ninox strenua*				L	e
Southern Boobook	*Ninox novaeseelandiae*					
Common Myna*	*Acridotheres tristis*					
Common Starling*	*Sturnus vulgaris*					
Brown Songlark	*Cincloramphus cruralis*					
Australian Reed Warbler	*Acrocephalus australis*					

Common Name	*Scientific Name*	National			State	
		EPBC Act	Other	Migratory	FFG Act	NRE (2000)
Birds (cont'd)						
Golden-headed Cisticola	*Cisticola exilis*					
Little Grassbird	*Megalurus gramineus*					
Rufous Songlark	*Cincloramphus mathewsi*					
Australian White Ibis	*Threskiornis molucca*					
Glossy Ibis	*Plegadis falcinellus*					v
Royal Spoonbill	*Platalea regia*					v
Straw-necked Ibis	*Threskiornis spinicollis*					
Yellow-billed Spoonbill	*Platalea flavipes*					
Painted Button-quail	*Turnix varia*					
Barn Owl	*Tyto alba*					
Sooty Owl	*Tyto tenebricosa*				L	v
Silvereye	*Zosterops lateralis*					
Mammals						
Goat (feral)*	*Capra hircus*					
Dingo	*Canis familiaris dingo*					dd
Dingo/Dog (feral)	*Canis familiaris*					
Dog*	*Canis familiaris familiaris*					
Fox*	*Canis vulpes*					
Agile Antechinus	*Antechinus agilis*					
Dusky Antechinus	*Antechinus swainsonii*					
Cat (feral)*	*Felis catus*					
Brown Hare*	*Lepus capensis*					
Rabbit*	*Oryctolagus cuniculus*					
Black Wallaby	*Wallabia bicolor*					
Eastern Grey Kangaroo	*Macropus giganteus*					
White-striped Freetail Bat	*Tadarida australis*					
Black Rat*	*Rattus rattus*					
Bush Rat	*Rattus fuscipes*					
House Mouse*	*Mus musculus*					
New Holland Mouse	*Pseudomys novaehollandiae*				L	ce
Swamp Rat	*Rattus lutreolus*					
Water-rat	*Hydromys chrysogaster*					
Platypus	*Ornithorhynchus anatinus*					
New Zealand Fur Seal	*Arctocephalus forsteri*					

Common Name	*Scientific Name*	National			State	
		EPBC Act	Other	Migratory	FFG Act	NRE (2000)
Mammals (cont'd)						
Southern Brown Bandicoot	*Isoodon obesulus*	E				
Sugar Glider	*Petaurus breviceps*					
Yellow-bellied Glider	*Petaurus australis*					
Common Brushtail Possum	*Trichosurus vulpecula*					
Koala	*Phascolarctos cinereus*					
Common Ringtail Possum	*Pseudocheirus peregrinus*					
Short-beaked Echidna	*Tachyglossus aculeatus*					
Chocolate Wattled Bat	*Chalinolobus morio*					
Gould's Wattled Bat	*Chalinolobus gouldii*					
Large Forest Bat	*Vespadelus darlingtoni*					
Lesser Long-eared Bat	*Nyctophilus geoffroyi*					
Little Forest Bat	*Vespadelus vulturnus*					
Southern Forest Bat	*Vespadelus regulus*					
Common Wombat	*Vombatus ursinus*					

Key

The status of vertebrate fauna is here considered at three levels: National, and State conservation significance. Note: all indigenous fauna species are considered to be at least of local conservation significance. National conservation significance is accorded to those species which occur on Schedule 1 of the (Commonwealth) EPBC Act, and/or are listed as threatened on a (National) Action Plan, i.e. Cogger et al. (1993), Garnett and Crowley (2000), Lee (1995), Tyler (1997), Maxwell et al. (1996), Wager and Jackson (1993) (see references). State conservation significance is accorded to those species which are listed as threatened on 'Threatened Vertebrate Fauna in Victoria – 2000' (NRE 2000), or are listed on Schedule 2 of the (Victorian) FFG Act.

Common Name

***** = introduced species

EPBC Act

Refers to threatened species which are formally listed under national legislation, i.e. on the Threatened Species and Communities category of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. E = endangered, V = vulnerable.

Other

V(I) = listed within the IUCN Red List of Threatened Animals (Baillie and Groombridge 1996), or on ANZECC (1999) ('E' or 'V'), or in Garnett and Crowley (2000) (NT = near threatened; LC = least concern).

Migratory

Species listed under the Migratory Species category of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Such species are not necessarily threatened in Victoria or Australia. J = JAMBA, C = CAMBA, B = Bonn Convention.

FFG Act

Species listed on Schedule 2 of the Victorian *Flora and Fauna Guarantee Act 1988*. L = listed, N = nominated for listing.

NRE (2000)

Refers to species which are not listed under Victorian legislation, but which have been identified by NRE (2000) as vulnerable or potentially vulnerable. X = extinct, Cr = critically endangered, E = endangered, V = vulnerable, , LR = lower risk – near threatened, DD = data deficient.

Appendix 2 Fauna species recorded within roadsides, City of Casey, Victoria, 17-19 October 2001

Common Name	Scientific Name
Frogs	
Common Eastern Froglet	*Crinia signifera*
Brown-striped Frog	*Limnodynastes peronii*
Spotted Grass Frog	*Limnodynastes tasmaniensis*
Birds	
Australian Wood Duck	*Chenonetta jubata*
Pacific Black Duck	*Anas superciliosa*
White-necked Heron	*Ardea pacifica*
Dusky Moorhen	*Gallinula tenebrosa*
Eurasian Coot	*Fulica atra*
Masked Lapwing	*Vanellus miles*
Spotted Turtle-Dove*	*Streptopelia chinensis*
Common Bronzewing	*Phaps chalcoptera*
Long-billed Corella	*Cacatua tenuirostris*
Sulphur-crested Cockatoo	*Cacatua galerita*
Eastern Rosella	*Platycercus eximius*
Pallid Cuckoo	*Cuculus pallidus*
Fan-tailed Cuckoo	*Cacomantis flabelliformis*
Horsfield's Bronze-Cuckoo	*Chalcites basalis*
Laughing Kookaburra	*Dacelo novaeguineae*
Superb Fairy-wren	*Malurus cyaneus*
Spotted Pardalote	*Pardalotus punctatus*
Striated Pardalote	*Pardalotus striatus*
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*
Yellow-faced Honeyeater	*Lichenostomus chrysops*
White-eared Honeyeater	*Lichenostomus leucotis*
White-plumed Honeyeater	*Lichenostomus penicillatus*
Bell Miner	*Manorina melanophrys*
Noisy Miner	*Manorina melanocephala*
White-naped Honeyeater	*Melithreptus lunatus*
Red Wattlebird	*Anthochaera carunculata*
New Holland Honeyeater	*Phylidonyris novaehollandiae*
Eastern Yellow Robin	*Eopsaltria australis*
Rufous Whistler	*Pachycephala rufiventris*
Grey Fantail	*Rhipidura albiscapa*
Willie Wagtail	*Rhipidura leucophrys*

Common Name	Scientific Name
Magpie-lark	*Grallina cyanoleuca*
Grey Butcherbird	*Cracticus torquatus*
Australian Magpie	*Gymnorhina tibicen*
Dusky Woodswallow	*Artamus cyanopterus*
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*
Little Raven	*Corvus mellori*
Eurasian Blackbird*	*Turdus merula*
Common Starling*	*Sturnus vulgaris*
Common Myna*	*Acridotheres tristis*
Welcome Swallow	*Hirundo neoxena*
Tree Martin	*Petrochelidon nigricans*
Australian Reed-Warbler	*Acrocephalus australis*
Golden-headed Cisticola	*Cisticola exilis*
Eurasian Skylark*	*Alauda arvensis*
House Sparrow*	*Passer domesticus*
European Goldfinch*	*Carduelis carduelis*
Mammals	
Common Brushtail Possum	*Trichosurus vulpecula*
Rabbit*	*Oryctolagus cuniculus*

- denotes introduced species

Appendix 3 Regionally prohibited and regionally controlled weeds in the Port Phillip East Catchment and Land Protection Region (Schedule 2 - *Catchment and Land Protection Act* 1994)

Common Name	Scientific Name	Port Phillip East Catchment and Land Protection Region
African Daisy	*Senecio pierophorus*	C
Angled Onion	*Allium triquetum*	C
Apple of Sodom	*Solanum linnaeanum*	C
Artichoke Thistle	*Cynara cardunculus*	C
Bathurst Thistle	*Xanthium spinosum*	P
Blackberry	*Rubus fruticosus* spp. agg.	C
Boneseed	*Chrysanthemoides monilifera*	C
Boxthorn	*Lycium ferocissimum*	C
Perennial Thistle	*Cirsium arvense*	C
Montpellier Broom	*Genista monspessulana*	C
Two-leaf Cape Tulip	*Homeria miniata*	P
One-leaf Cape Tulip	*Homeria flaccida*	P
English Broom	*Cytisus scoparius*	C
Fennel	*Foeniculum vulgare*	C
Flax-leaved Broom	*Genista linifolia*	C
Gorse	*Ulex europaeus*	C
Golden Thistle	*Scolymus hispanicus*	C
Hawthorn	*Cretaegus monogyna*	C
Hemlock	*Conium maculatum*	C
Hoary Cress	*Cardaria draba*	C
Horehound	*Marrubium vulgare*	P
Paterson's Curse	*Echium plantagineum*	C
Prairies Ground Cherry	*Physalis viscosa*	C
Ragwort	*Senecio jacobaea*	C
Saffron Thistle	*Carthamus lanatus*	C
Sand Rocket	*Diplotaxis tenuifolia*	C
Scotch Thistle	*Onopordum acanthium*	P`
Serrated Tussock	*Nassella trichotoma*	C

Silverleaf Nightshade	*Solanum elaeagnifolium*	P
Skeleton Weed	*Chondrilla juncea*	P
Slender/Shore Thistle	*Carduus tenuiflorus*	C
Spear Thistle	*Cirsium vulgare*	C
Spiny Broom	*Calicotome spinosa*	C
Spiny Rush	*Juncus acutus*	C
St John's Wort	*Hypericum perforatum*	C
St Peter's Wort	*Hypericum tetrapterum*	P
Stinkwort	*Dittrichia graveolens*	C
Sweet Briar	*Rosa rubiginosa*	C
Common Thorn Apple	*Datura stramorium*	C
Long-spine Thorn Apple	*Datura ferax*	C
Recurved Thorn Apple	*Datura innoxia*	C
Topped Lavender	*Lavandula stoechas*	C
Tree of Heaven	*Ailanthus altissima*	C
Tutsan	*Hypericum androsaemum*	C
Variegated Thistle	*Silybum marianum*	C

Key:

P = Regionally Prohibited Weed

C = Regionally Controlled Weed

Appendix 4 Example of Standard Conditions for Planning Permits for Roadsides as recommended by Victoria's Draft Native Vegetation Management Framework (2000).

1. **Design and Works Plans**. The alignment of the upgrading road works should be in accordance with Planning Permit Application No. _____ and Design Plant No._____ referred to NRE on the Date ____.

2. **Vegetation Removal and Identification.** To assist the Plant Operator in identifying the trees to be felled, all trees approved for removal during the site inspection should be marked with a painted coloured "X" and shall be felled within the prescribed works area to avoid damaging remaining standing vegetation. Trees approved for branch trimming should be marked with a painted coloured "T".

3. **All felled trees and stumps shall be removed from the site.** To prevent scorching of remaining trees, no felled trees, tree stumps or lopped branches shall be burned or left under or against remaining vegetation. Lopped branches and small trees should be chipped and reused on the site for rehabilitation purposes. To reduce waste of a valuable timber resource every effort should be made to utilise the wood from the felled trees.

4. **Tree Trimming.** Tree trimming operations shall be undertaken using the three cut method as described in VicRoads Road Management Guide.

5. **Tree and Understorey Replacement.** Any felled trees which have been approved for felling shall be replaced with similar local indigenous species including understorey species at a ratio of ____ with a minimum 75% survival rate at five years. These trees shall be placed with 12 months from the date of removal and should be planted as close as practical to where they are removed. Tree guards shall be used and the revegetated area maintained. Care should be taken not to plant tress in natural native grassland areas.

6. **Staying Within the Works Target Area.** To prevent damage to remaining roadside vegetation no machinery or associated road-making equipment, including tip trucks or lowloaders, shall be permitted on the road reserve o any adjoining Crown Land outside the prescribed works area. The exception is within NRE approved machinery and truck turning areas, parking areas and temporary stacksites where damage to native vegetation species will be minimal. Every effort should be made to establish these turning areas on adjoining cleared freehold land.

7. **Topsoil Management.** All top soil, including low growing vegetation, shall be windrowed or stockpiled immediately prior to primary earth works being undertaken (including the establishment of, NRE approved, turning areas, parking areas and temporary stacksites). On completion of each section of the road works, all disturbed ground, including machinery turning areas, parking areas and temporary stacksites shall be shallow ripped and covered with a layer of topsoil originally removed from the site. To achieve the best results from the viable seed in the topsoil every effort should be made to undertake rehabilitation of the disturbed areas as soon as possible, in stages if necessary, and not left until the end of the project.

8. **Weed Hygiene and Disease Pathogen Prevention.** To prevent the spread of weeds and pathogens, all earth moving equipment and associated machinery including tip trucks and low loaders, shall be made free of soil, seed and plant material before being taken to the works site and again before being taken from the works site on completion of the project. To further prevent the spread of weeds, all road-making material required for the project shall come from an area free of weeds. Excavated material, including topsoil, taken from the works site to be returned later will be stored on a clean site free of weeds.

9. **Soil Management and Erosion Control.** Off-cut drains should be constructed on the roadside in such a manner as to avoid the further removal of trees. To avoid damage to roadside vegetation, waterways and adjoining freehold land, silt from batters, off-cut drains, table drains and the road works shall be retained on the works site during and after the construction stage of the project. This should be achieved be establishing workable sediment traps. Table drains and off-cut drains should be designed and constructed in such a manner to reduce water velocity and subsequent soil erosion. "V" cross section drains should be avoided. Off-cut drains shall be constructed on the roadside along the contour. Batter steeper than 3:1 (horizontal: vertical) should be avoided. Topsoil should be spread over batters 70 to 100 millimetres thick. Steeper batters should be treated in accordance with Environmental Protection Authority recommendations detailed in the "Construction Techniques for Sediment Pollution Control No. 275, May 1991".

10. **Reducing the Risks of Pollution.** To protect nearby waterways, no works office, toilet and service facility is to be established within 100 metres of any creek, channel or drainage line. Oils, greases, used grease cartridges, used oil filters and air filters and other road construction refuse will be properly disposed of according to EPA requirements.

11. **Informing the Workers at the Coalface about Environment.** Works engineers, design engineers, surveyors, works crews, contractors and particularly plant operators shall be properly briefed on all the Planning Permit conditions of the project, prior to its commencement. A copy of the Planning Permit should be made available to all employees working on the project.

12. **Contact NRE.** NRE Contact Officer to be advised about the commencement date of the project at least five working days before the works begin.

City of Casey

Roadside Vegetation Management Plan

Part 2
Operations Manual

June 2002

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1.0 INTRODUCTION

In July 2001, the City of Casey commissioned an assessment of all rural roadside vegetation, to upgrade and digitise data captured in the previous Mornington Peninsula – Westernport Roadside Management Plan (1996). The Roadside Management Plan covers rural roads (588km), geographically defined in Figure 1, that are managed by the City of Casey and has involved extensive field survey. Some major VicRoads funded roads and highways containing substantial sections of vegetation have been included as a means of providing Council with a holistic overview of the regions' vegetation cover and distribution on roadsides. The Plan aims to preserve, enhance and properly manage roadsides for their conservation and landscape values while maintaining their functional role.

The Plan is presented in two parts. Part 1 is the overview roadside conservation strategy, providing recommendations for action by the relevant authorities to implement the Plan. Part 1 also includes an outline of existing laws, plans and guidelines applicable to roadsides in the region. In particular, relevant aspects of local (Municipal) laws, local conservation strategies and planning schemes are considered. Eight Ecological Vegetation Classes found on the roadsides are listed, and their significance is discussed. Other conservation values relate to fauna, cultural heritage, visual amenity and landscape. Roadside management issues in the region are reviewed. Goals, objectives, policies and processes for roadsides management are proposed, and several major management categories of roadside are identified. Management guidelines to deal with functional, cultural and recreational, landcare and conservation issues are also presented in the first volume.

Part 2 is an Operations Manual. It includes a set of maps of conservation value assessments of all rural roads in the study area that support vegetation of High and Moderate Conservation Value, i.e. sections of high and moderate quality vegetation and sites supporting significant species. There are also generic prescriptions for low conservation value roads and roads with cultural landscape values. There is a management prescription for every road with sections identified as 'High or Moderate Conservation Value'. The guidelines and prescriptions are directed primarily at the agencies and their contractors who undertake works on road reserves. Additional information is provided on priority weeds.

In Part 2, Section 2.0 lists previous studies of roadside flora for the Municipality. The criteria under which roadsides were assessed during the current study have been defined.

Section 3.0 provides generic management prescriptions for roadsides that have not been assessed in detail e.g. Section 3.1 discusses management of culturally significant roadsides, Section 3.2 covers management options for Low Conservation Value Roadsides.

Section 4.0 provides more detailed site assessments for all roadside sections supporting vegetation of High and Moderate Conservation Value, with an explanation of data collection methods and assessment sheet format.

Figure 1. Study area for the City of Casey Roadside vegetation management Plan

2.0 CONSERVATION ASSESSMENTS OF ROAD RESERVES

2.1 Previous studies

Several studies of roadside conservation significance have been undertaken in the City of Casey. These reports are:

- Mornington Peninsula Westernport Roadside Management Plan Volume 1., 1996
- Mornington Peninsula Westernport Roadside Management Plan Volume 2., 1996
- Mornington Peninsula Westernport Roadside Management Plan Stage 1., 1995
- City of Berwick Roadside Vegetation Assessment, 1992

2.2 Field assessments

For the current study, conservation values were assessed primarily on vegetation quality ('intactness') and rarity, which was based on the ARI Flora Research – Vegetation Condition Field Assessment criteria.

The vegetation quality of the roadside was based on the overall score of this assessment and could be divided in to three main categories:

Low: Score 0-0.15. Very scattered remnants of dominant species only (e.g. isolated eucalypts) to cleared exotic vegetation. Also included in this category are very small isolated patches of remnant vegetation too small to map (i.e. insignificant over a 100m section of road).

Medium: Score 0.15-0.4. Partially intact remnant with understorey less than 50% indigenous, to remnants of dominant species only providing moderate to dense cover over a 100m section of the road. This frequently includes more or less continuous stands of remnant eucalypts with no indigenous understorey (or some indigenous understorey), and indigenous grassy swards as remnants of grassy woodlands.

High: Score 0.4-1.0. Substantially intact remnants with vegetation dominants present and understorey at least 50% indigenous **or**, if only moderate quality, represents remnants of regionally rare vegetation communities (e.g. significant Ecological Vegetation Classes (EVC's)).

In addition, the assessment required consideration of the original elements of the vegetation association deemed to have occurred on a particular site, and to what extent the present vegetation is an artefact of clearance and/or other ecological disturbance. Other major considerations included faunal habitat value, width of the road reserve and the importance of linking remnants (where known).

Planted roadside vegetation was not recorded as these stands were of low conservation value. Such plantings are generally of Australian native plants but not indigenous. However, such plants often provide the only shelter for some faunal species, and usually support totally exotic ground flora.

3.0 GENERIC PRESCRIPTIONS

3.1 Cultural landscapes

Applicability: Road sections of cultural heritage significance, e.g. of aesthetic or historical value. Most commonly, these are planted Monterey Pine *Pinus radiata* windbreaks, with some Monterey Cypress or Sugar Gum windbreaks. (Self-sown trees are excluded, unless they are specifically identified as being of cultural heritage significance). Aboriginal sites, and roadsides that are part of broader landscapes Classified or Recorded by the National Trust should also included.

Significant Features: The mature lines of windbreak trees and dense roadside shrub plantings are major landscape features in some parts of the study area, and are characteristic of the historical rural development of the region. Nature conservation values of these plantings are generally limited, and many species are likely to act as seed sources for invasion and degradation of native vegetation communities.

Aboriginal sites may include scarred trees, stone scatters, or middens. They may be of cultural significance to Aboriginal people, and/or of scientific significance to archaeologists. Many sites have not be identified, and may only be revealed with disturbance of the surface. All sites are legally protected, and may not be disturbed without permission.

Conservation objectives: Identify and protect places of cultural heritage significance, within and adjoining road reserves. Take a strategic approach to dealing with ecological threats posed by invasive tree and shrub species, and maintenance and replacement of senescing trees.

The following table provides general prescriptions for the management of culturally significant roadsides reserves and lists the authorities responsible for that aspect of roadside management:

Management Requirements:		**Responsibility**
Assessment:	• Assess windbreaks for cultural significance, ecological impacts and arboricultural status. • Undertake survey for Aboriginal and historical sites before works which may impact on sites.	Council
Fire:	• Undertake fire prevention works according to Municipal Fire Prevention Plan, with consideration for potential impacts on places of cultural heritage significance.	Municipal Fire Protection Officer and Road authority
Tree management:	• Develop a strategy and program for management, protection, replacement of significant trees, based on assessment. Develop guidelines with an arborist for tree canopy and root protection. Minimise stress, e.g. from one-sided pruning, soil compaction or root disturbance. Selection of species to replace trees that die or are removed should consider significance of the place, site conditions, remaining trees, ecological issues, and future management requirements. Establish guidelines for responding to requests for removal of trees.	Council
Utilities:	• Minimise impacts on cultural sites when installing and maintaining utility services. Observe guidelines for protection of significant treelines.	Utility authority

3.2 Low Conservation Value Roadsides

Significant features

Low conservation roadsides constitute approximately 86% of all roadsides within the study area. Some of these contain scattered remnants, notably eucalypts and wattles and grassy species including Kangaroo Grass, Wallaby grasses and Spear grasses. These remnants need to be protected. In some cases low conservation roadsides fall within otherwise medium and/or high value sites and require upgrading, particularly to strengthen habitat continuity.

In a non-biological context low conservation value roadsides present a viable option for incompatible uses of medium and high value areas e.g. installation of services such as telecommunications cables.

Conservation objective

Strategically plan the use of low conservation areas in the short and long term. In a framework of protecting extant vegetation, roads with a predominance of low values should be considered for such activities as strategic fire breaks and the provision of services. In situations where low values punctuate a landscape of otherwise high and/or medium values, the low value areas should be managed within the context of conservation objectives for the associated higher value vegetation, including reduced slashing to allow natural regeneration, encouraging the formation of habitat links, or the control of noxious and other invasive exotic plants.

The following table provides general prescriptions for the management of low conservation value roadsides reserves and lists the authorities responsible for that aspect of roadside management:

Management requirements		Responsibilities
Strategic planning	• Prioritise low conservation areas for utilities, fire protection, road upgrading and rehabilitation. • Investigate whether existing and/or potentially conflicting uses of medium and high value areas can be transferred to low conservation areas.	Council
Weeds	• Control serious weed species (Appendix 2) with priority given to those areas adjoining high conservation sites.	Road authority / landowners
Slashing	• Slashing should avoid remnant indigenous plant populations. This applies mostly to trees and shrubs, but known populations of significant species should be identified and the slashing program modified accordingly. Slashing otherwise is unlikely to be detrimental.	Road authority
Revegetation	• Low conservation areas which form part of major habitat links should be revegetated with appropriate local species. These should be based on the original vegetation of the site.	Approval – Road authority Undertake – Road authority / community groups / landowners

4.0 HIGH AND MODERATE CONSERVATION ROADSIDES: MANAGEMENT PRESCRIPTIONS

The following section provides management prescriptions for priority roads. These have been defined as roads containing remnant vegetation of High and Moderate Conservation Value. A total of 159 assessments are presented, representing about 14% of all roadsides in the study area. Of the 588km of rural roads in the City of Casey 13% have been classified as Moderate Conservation Value, while only 1% are of High Conservation Value.

Each road section containing High and/or Moderate Conservation Value roadside vegetation has a prescription sheet or is included with other high and/or medium value sections on a sheet covering the entire road. Each prescription sheet has an accompanying map detailing the distribution and conservation status of the vegetation. Maps were produced from the GIS layer created from the assessment data collected during this study. The information presented is as follows:

Assessment sheet

- **Description** of the road section.
- **Vegetation communities** present, and range of occurrence in metres from the named road (e.g. 500-1600m).
- **Vegetation quality/condition** based on the total score obtained during field assessment with the ARI Flora Research – Vegetation Condition Field Assessment criteria, which required ascertaining the degree to which the road reserve met nine criteria, which includes:
  - Number of trees per hectare
  - Percentage of tree cover
  - Amount of disturbance to the understorey
  - Percentage cover of weeds
  - Evidence of regeneration
  - Percentage cover of expected litter
  - Percentage cover of expected logs
  - Area of the site being assessed
  - Degree of connectivity/isolation
- **Conservation value** based on the following scale (see also Section 2):

  High: containing healthy populations of rare or significant species; and/or supporting rare of significant EVC's; and/or supporting high quality vegetation and fauna habitat.

  Medium: containing occasional rare or significant species; and/or supporting fragments of significant EVC's; or supporting moderate quality vegetation or fauna habitat.

  Low: not containing rare or significant species; or occasional indigenous species only; or entirely exotic and degraded.
- **Comments:** General comments about the vegetation and fauna habitat.

- **Conservation objective:**
- **Management requirements**, comprising a set of prescriptions.

Map sheet

- Road section delineated by intersections.
- Ecological Vegetation Classes and distribution.
- Conservation value (Low, Moderate or High).
- Map sheet scale indicated by a scale bar of which the total length is 400m.
- All maps are orientated with north to the top of the page.
- Maps are generated using JPEG image captures of the GIS layer produced from the data collected during this study.

Weed control

- Appendix 2 lists the major environmental weeds requiring control in the study area and suitable control methods.

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Appendix 1: Assessment Sheets

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Appendix 2: Major Environmental Weeds on Roadsides

Appendix 2: Major environmental weed species requiring control on roadsides of the City of Casey study area, Victoria, November 2001.

Note: Only woody species (trees and shrubs) and a few of the most serious herbaceous species have been included on this list. A large suite of annual and perennial dicot and monocot herbs (particularly grasses) are not listed even though they may have devastating impacts on indigenous flora and fauna; for these species control in many situations is not practicable.

There are 11 species of Regionally Controlled and Prohibited Weeds, listed under the Catchment and Land Protection Act 1994, as occurring within the Western Port Phillip and Corangamite Catchment and Land Protection Regions. While many of these species were not recorded in the rapid assessments during this current study, it is likely that many do occur on roadside verges within the City of Casey.

	NAME	SPECIES	CONTROL METHODS
C	Angled Onion	*Allium triquetrum*	1
C	Boneseed	*Chrysanthemoides monolifera* ssp. *monolifera*	1,2,5,7
C	Hawthorn	*Crataegis monogyna*	1,2,6,8
C	Flax-leaf Broom	*Genista linifolia*	1,2,5,7
C	Montpellier Broom	*Genista monspessulana*	1,2,5,7
	Coast Tea-tree	*Leptospermum laevigatum*	4,7
	Bridal Creeper	*Asparagus asparagoides*	1
	Pines	*Pinus* species	3,4,5
	Sweet Pittosporum	*Pittosporum undulatum*	2,5,6,7
	Myrtle-leaf Milkwort	*Polygala myrtifolia*	1,2,5,7
	Italian Buckthorn	*Rhamnus alternus*	1,2,6,8
C	Blackberry	*Rubus fruiticosus* spp. agg.	1,8
	Wandering Jew	*Tradescantia albiflora*	1
C	Gorse / Furze	*Ulex europaeus*	1,8
	Blue Periwinkle	*Vinca major*	1
	Bulbil Watsonia	*Watsonia meriana* var. *bulbillifera"*	1
	Agapanthus	*Agapanthus praecox* ssp. *orientalis*	1,5
C	Spear Thistle	*Cirsium vulgare*	1
	Mirror Bush	*Coprosma repens*	1,2,5,6
	Pampas Grass	*Cortaderia jubata/selloana*	1,5,8
	Cotoneaster	*Cotoneaster* species	1,2,8
	Tree Lucerne	*Cytisus palmensis*	1,2,5,6,7
	Ivy Groundsel	*Delairea odorata*	1,8

	NAME	SPECIES	CONTROL METHODS
	Common Dipogon	*Dipogon lignosus*	1,5,7
	Paterson's Curse	*Echium plantagineum*	1,5
	Spanish Heath	*Erica lusitanica*	1,8
	Garden Broom	*Genista* (garden hybrid)	1,2,5,7,
	Gladiolus	*Gladiolus* species	1
	Sweet Hakea	*Hakea suaveolens*	4,5,7
	English Ivy	*Hedera helix*	1,2,5
	Morning Glory	*Impomea indica*	1,7
	Japanese Honeysuckle	*Lonicera japonica*	1,7
C	African Boxthorn	*Lycium ferocissimum*	2,8
P	Horehound	*Marrubium vulgare*	1
	Giant Honey-myrtle	*Melaleuca armillaris*	4,7
	Cape Wattle	*Paraserianthus lophantha*	1,4,7
	Toowomba Canary-grass	*Phalaris aquatica*	1,8
C	Sweet Briar	*Rosa rubiginosa*	1,2,8
	White Arum Lily	*Zantedeschia aethiopica*	1

Shaded species are the most abundant on roadsides.

C Denotes Regionally controlled weeds under the *Catchment and Land Protection Act* 1994

P Denotes Regionally prohibited weeds under the *Catchment and Land Protection Act* 1994

Control Methods (see text):

1 Herbicide applied to foliage with spray, wick applicator, etc.

2 Cut down and concentrated herbicide immediately applied to stump or stems, or bark "frilled" and herbicide applied.

3 Ring-barking.

4 Cut off at ground level (Species without basal buds from which to resprout: sometimes applies to older plants only).

5 Physical removal – most plants can be physically removed by hand-weeding or with tools when small or where populations are small and/or isolated, but soil disturbance must be kept to a minimum. Disturbed sites should be mulched with chipped vegetation or leaf litter.

6 Stem drilled and injected with concentrated herbicide.

7 Stands burnt (fire-sensitive species); regeneration from soil-stored seeds may follow burning. In the case of succulents (e.g. cacti) dry fuel may need to be heaped around or over plants.

8 Plants burnt or cut back to ground level and young regrowth then sprayed with herbicide.

NOTE: Mowing or slashing of roadsides is a major means of dispersal of a few species, especially of Bulbil Watsonia (*Watsonia meriana* var. *bulbillifera*). This species should **never be slashed after bulbils have been formed on the flowering stem** (its only means of spread). Slashing should only be done while the plant is in the **very early flowering stage**.

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Appendix 3: Plant species guidelines for revegetation

Appendix 3: Plant species guidelines for revegetation of the major vegetation types identified on roadsides in the City of Casey.

List is not comprehensive.

BOTANIC NAME	COMMON NAME	Coastal Saltmarsh	Riparian Forest	Herb-rich Foothill Forest	Valley Grassy Forest	Heathy Woodland	Swampy Woodland Complex	Grassy Forest	Grassy Woodland
Trees: Medium to Large									
Eucalyptus camaldulensis	Red Gum								
Eucalyptus cephalocarpa	Mealy Stringybark					A			
Eucalyptus fulgens	Green Scentbark					C		C	
Eucalyptus goniocalyx	Long-leaf Box				A				
Eucalyptus melliodora	Yellow Box				A				
Eucalyptus obliqua	Messmate			B				A	
Eucalyptus ovata var. *ovata*	Swamp Gum		A	A	B		A		B
Eucalyptus pauciflora	Snow Gum								B
Eucalyptus viminalis ssp. *pryoriana*	Coast Manna Gum								A
Eucalyptus radiata	Narrow-leaf Peppermint		B	B	A		C	A	B
Eucalyptus viminalis	Manna gum		A	A				D	

Tree: Small									
Acacia dealbata	Silver Wattle		B	D	D		D	C	
Acacia mearnsii	Black Wattle		C	D	C		D		B
Acacia melanoxylon	Blackwood		B	D	D		C	C	C
Allocasuarina littoralis	Black Sheoak								C
Allocasuarina verticillata	Drooping Sheoak								C
Shrubs: Medium to large (2-4m)									
Acacia paradoxa	Hedge Wattle				D	C			B
Acacia pycnantha	Golden Wattle							C	D
Acacia stricta	Hop Wattle			D				C	D
Acacia verniciflua	Varnish Wattle							C	
Acacia verticillata var. *verticillata*	Prickly Moses		B				C		
Allocasuarina paludosa	Swamp Sheoak					C			
Banksia marginata	Silver Banksia				D	C		C	D
Bursaria spinosa var. *macrophylla*	Sweet Bursaria								C
Bursaria spinosa var. *spinosa*	Sweet Bursaria		B						C

Cassinia aculeata	Common Cassinia		C	D	C	C		C	C
Coprosma quadrifida	Prickly Currant-bush		C	D			C	C	
Daviesia latifolia	Hop Bitter-pea							C	
Hakea nodosa	Yellow Hakea								
Hakea sericea	Bushy Hakea				D			C	D
Hakea ulcina	Furze Hakea					C		C	
Kunzea ericoides	Burgan		C		C		C		
Leptospermum continentale	Prickly Tea-tree		C	D	D	B	C		C
Leptospermum lanigerum	Woolly Tea-tree								
Leptospermum myrsinoides	Heath Tea-tree					C			
Melaleuca ericifolia	Swamp Paperbark					C	B		
Olearia lirata	Snow Daisy-bush		C					C	
Ozothamnus ferrugineus	Tree Everlasting		B		D		B		
Pomaderris aspera	Hazel Pomaderris		B						
Prostanthera lasianthos	Victorian Christmas-bush		C						
Viminaria juncea	Golden Spray		D				C		

Dicot Herbs									
Disphyma crassifolium	Rounded Noon-flower	C							
Samolus repens	Creeping Brookweed	B							
Sarcocornia quinqueflora	Beaded Glasswort	A							
Sellaria radicans	Shiny Swamp-mat	B							
Suaeda australis	Seablite	B							

Indicative Planting densities

A dominant in the particular vegetation stratum; of major structural importance.

B co-dominant in vegetation stratum, or frequent occurrence.

C localised structural significance, or scattered with moderate frequency.

D of minor structural significance, plants infrequent or uncommon.

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