BIODIVERSITY CONSERVATION AND FIRE IN ROAD AND RAIL RESERVES:

MANAGEMENT GUIDELINES

GOVERNMENT OF WESTERN AUSTRALIA

FESA
Fire & Emergency Services Authority of Western Australia

Roadside Conservation Committee

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1 INTRODUCTION

Roads and railways crisscross Western Australia, forming an interlinked network. This network, which ranges from freeways to quiet country roads and from busy passenger rail lines to long haulage routes, plays an essential role in connecting people, places and produce.

The road and rail reserves also play a key role in the conservation of the State's unique flora and fauna. In many parts of the south west of Western Australia, the majority of vegetation has been cleared for agriculture. In these landscapes, the native vegetation remaining on uncleared portions of road and rail reserves provide natural habitat for flora and fauna, serve as wildlife corridors that enable fauna to move between larger patches of remnant vegetation, and provide essential habitat for Declared Rare Flora.

Road and rail reserves can also provide useful services to adjoining landholders and community by providing shade and shelter to stock and crops, maintaining water tables and reducing erosion. In cutting through the landscape, these reserves provide a cross section of the original native vegetation and the State's natural heritage, which is a useful reference for native revegetation projects. In addition, many road and rail reserves contain important Aboriginal and European cultural sites.

The majority of road and rail reserves, however, are only narrow strips of vegetation which makes them particularly vulnerable to degradation. Thus, our actions in these reserves are important, as what we choose to do will determine the longevity and function of the vegetation. These actions include how we use and manage fire in these reserves.

In Australia, some ecosystems have evolved to survive fire and some plants may even require fires to regenerate. However, fire can have both strong negative and positive impacts on natural populations of both flora and fauna, and thus careful management is required. Fire management in road and rail reserves therefore presents a challenge in balancing the risk from fire to adjoining life and property with the biodiversity values of the native vegetation.

The Roadside Conservation Committee (RCC) and the Fire and Emergency Services Authority of Western Australia (FESA) have produced these guidelines due to the important role that road and rail reserves play in both fire management and in biodiversity conservation.

1.1 Purpose of the Guidelines

These guidelines aim to promote the effective management of both the fire hazard and the conservation values in road and rail reserves. The guidelines have been prepared to aid in decision-making and help land managers make informed choices about fire in these reserves.

The purpose of these guidelines is to:

- Provide best practice guidance for fire management in road and rail reserves;
- Raise awareness of the impact of fire in narrow corridors of vegetation; and
- Promote consideration of all values at risk from both planned and unplanned fires.

These guidelines will assist with:

- Developing a fire management plan or incorporating roadside and railway vegetation into an existing plan;
- Identifying management objectives;
- Identifying and assessing management strategies; and
- Assessing the road or rail reserve and adjoining lands.

1.2 Applying these guidelines

These guidelines have been prepared for use by road and rail management authorities, and other users of road and rail reserves, who are encouraged to consider its application in planning for potential fire incidents within road and rail reserves. These guidelines can be applied in incorporating fire management of individual and networked roadsides and railways into wider roadside or railway vegetation management plans and fire management plans, or in developing a specific fire management plan for roadsides and railways.

The guidelines have been prepared principally for the wheat-sheepbelt of the south west. While most aspects of the guidelines can be applied outside of this area, it is recommended that potential users contact FESA or the RCC for further information.

For ease of writing, at times only roads and roadsides will be referred to throughout these guidelines. However, the principles and tools suggested therein are equally applicable to rail reserves.

1.3 Application of 'Road and Rail Reserves'

The term 'road and rail reserves' is a generic reference covering a number of different land types, some of which are Crown reserves which may or may not be vested in a specific managing authority.

Some local government road 'reserves' constructed within unallocated Crown land however continue to have the same responsibilities for management by the relevant local government under the Land Administration Act 1997 and the Local Government Act 1995. The use of the term 'reserve' in this document will include all of: vested road or rail reserves; unvested road or rail reserves; and other gazetted roads under the management of local government.

Vegetated roadsides often form linear corridors, linking other remnants throughout the landscape,allowing for the movement of plants and animals. (Photo MRWA)

2 LEGISLATION

There are a number of Acts and Regulations concerning environmental protection that affect the management of roadside and railway reserves. The various State and Commonwealth laws also have associated policies and guidelines and managers of road and rail reserves are advised to comply with these laws and to seek further advice from the relevant agencies where necessary.

The *Bush Fires Act 1954* is designed to reduce the dangers resulting from bush fires, and to assist in the prevention, control and extinguishment of bush fires. Local government in conjunction with FESA and DEC (on the DEC estate and fire prevention on UCL and unvested reserves out of townsites), have the prime responsibility for the management of fire on roadsides and throughout the State. Under this Act landowners and managers have a responsibility to manage their land in a way that reduces fire hazard, for example maintaining fire breaks inside their property boundary or on certain classes of land within the Crown land.

Local governments have the authorisation to create by-laws that support the Bush Fires Act, such as undertaking controlled burns and issuing firebreak notices in their area.

The *Fire and Emergency Services Authority of Western Australia Act 1998* outlines the powers and functions of FESA in relation to the management of emergency services for Western Australia. This Act binds the Crown and allows the Authority to do all things necessary in connection with the performance of its functions under the emergency services Acts. These functions include all activities associated with the prevention, control and extinguishment of fires as well as the prevention and control of other incidents. Other functions undertaken include the coordinating, managing and providing assistance to projects relating to emergency services.

Native vegetation, from the smallest reed to the largest tree, dead or alive, is protected from unlawful clearing under Part V the *Environmental Protection Act 1986*. While exemptions exist for some activities, under these laws even planned fuel reduction burning can be considered as clearing. Please ensure that you either have a permit or that your activity is exempt, as fines can be substantial.

The *Wildlife Conservation Act 1950* protects flora native to WA and all native Australian fauna. Under this Act, some flora has been Declared Rare, because the species is naturally rare, is in danger of extinction or is otherwise in need of special protection. The Act states that it is illegal to “take” Declared Rare Flora (DRF) unless a permit is granted by the Minister for Environment. To “take” means “to gather, pluck, cut, pull up, destroy, dig up, remove or injure the flora or to cause

or permit the same to be done by any means", which includes burning. The lists of State threatened species may be found at the DEC's web site at http://www.dec.wa.gov.au/content/view/852/2010/.

Threatened Ecological Communities (TEC) are not listed under State legislation, but are endorsed by the Minister for Environment. TECs and DRF are included as Environmentally Sensitive Areas under the *Environmental Protection Act 1986*, and are given extra consideration under the native vegetation clearing regulations. DEC also lists other flora, fauna and ecological communities of conservation significance which also require special management: Priority Flora, Priority Fauna and Priority Ecological Communities (PEC).

Some flora, fauna and ecological communities are also listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Any action that is likely to have a significant impact on a species or community listed under this Act should be referred to the Australian Government environment department (Department of Sustainability, Environment, Water, Population and Communities). The lists of nationally threatened species and ecological communities may be found at: http://www.environment.gov.au/biodiversity/threatened/index.html.

Relevant legislation

- *Bush Fires Act 1954*
- *Fire and Emergency Services Authority of Western Australia Act 1998*
- *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*
- *Wildlife Conservation Act 1950*
- *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)

Relevant contacts

Roadside Conservation Committee (RCC)

Fire and Emergency Services Authority (FESA)

Department of Environment and Conservation (DEC)

WA Local Government Association (WALGA)

Australian Government Department of Sustainability, Environment, Water, Population and Communities (DSEWPC)

3 FIRE & THE ENVIRONMENT

For many thousands of years fire has been a significant component of the Western Australian environment, such that, for many of the State's unique ecosystems and plants, fire has become an integral part of their life cycle. The effect of a fire is determined by the response of plants to the fire frequency, intensity and seasonality.

Every roadside contains different vegetation and other values. Understanding how these values will be impacted by, and recover from, fire is a crucial step in determining the most appropriate fire management options for that roadside. This understanding will enable better fire management that minimises the community risk and maximises the hazard reduction potential, whilst promoting biodiversity conservation.

The most common methods of post fire regeneration of plants is by seeds and resprouting. Plants that regenerate by seed are more likely to be affected by frequent fire than plants that resprout. It is also well known that chemicals contained within bushfire smoke are an important germination trigger for many native species of vegetation. However, some ecosystems like wetlands should be protected from excessive fire as many species found at these sites have a low tolerance to fire.

The Fire and Emergency Services Authority (FESA) and local Volunteer Bush Fire Brigades assist in fire management along roadside vegetation to minimize community risk and promote biodiversity conservation. (Photo FESA)

3.1 Fire Regimes

Fires are characterised by their intensity, the frequency with which they occur, the season in which they occur, and their spatial pattern or extent. Combined, these attributes describe the fire regime. Natural areas can have complex fire regimes and fire histories. Even when considered individually, aspects of the fire regime, such as frequency, can be more complex than they first appear. With the introduction of European settlement, the fire regime of natural areas has changed considerably. In some instances this may be because of too frequent fire but it may also be by fire exclusion, and both can be detrimental to natural areas. Nevertheless, the fire regime for any given area may have a major effect on the health and sustainability of a vegetation community, such as those found on roadsides.

3.1.1 Fire Frequency

The time between fires may have a significant impact on a plant community. A fire regime too frequent may cause a change in the vegetation structure or localised species extinction. For example, where a plant has grown from seed after a fire, but has not matured enough to set seeds itself before it is burnt again, the seed stocks in the soil will be depleted. Repeated fires in this pattern may remove that plant species from the community. Long periods without fire also add to fuel levels, which in turn increases the fire intensity and behaviour if and when it eventually is burnt.

3.1.2 Fire Intensity

Fire intensity is the heat produced by a fire and is directly affected by the fuel loads available. Prior to European settlement, plants evolved to cope with the fire regimes that prevailed then. However, with the change in land use and the introduction of exotic plants, fire intensity is now often far greater than was previously experienced, such that some species are unable to adapt effectively and regenerate. An example of changed fire conditions can be found in infestations of grass on roadsides where an abundance of fine aerated fuels can impact on fire intensity and the likelihood of ignition.

3.1.3 Fire Seasonality

Seasonality of fires, that is, the time of year in which a fire occurs, will influence the intensity of the fire due to the prevailing temperatures, humidity, and amount of moisture retained in the vegetation and soil. Higher moister levels enable the burning of excessive ground level litter whilst minimising scorching or burning of the overstorey. Burning in cooler seasons in the wheatbelt also allows the fire to self extinguish in the early evening due to lower temperatures and higher air moisture levels.

Seasonality also influences plant recovery post fire. For example late spring burns in the wheatbelt can subject regenerating vegetation to an extended period before the next effective rainfall, thus limiting that vegetation's ability to recover.

3.1.4 Burn distribution

The distribution of fires through an area can influence the survival of some flora and fauna. Fires that leave pockets unburnt allow vegetation sensitive to fire to recolonise burnt areas and creates a multi-aged plant community. A patchy burn also allows fauna to take refuge from the fire and enables them to survive after the fire, as unburnt vegetation offers shelter and food otherwise unavailable in completely burnt vegetation.

3.1.5 Amount and type of fuel

The amount and type of fuel available to burn has a major role in defining fire behaviour, its intensity and subsequent impact on the ecosystem. A general rule, the greater the fuel load the greater the rate of spread of the fire, and as a consequence the greater the intensity and resources needed to control it.

FESA is developing a series of Visual Fuel Load Guides for the State and these may be useful particularly for inexperienced persons in assessing fuel loadings.

3.2 Weeds and fire

Weed invasion of native vegetation is a significant issue that is often exacerbated by an inappropriate fire regime. Weeds are often disturbance opportunists and thus are often the first to colonise an area after fire. Many grasses have an annual cycle that produces a rapid increase in their biomass, which increases the amount of fuel (fuel load) in that area. Control of weeds, particularly annual grasses, will help in reducing fuel loads of an area and therefore reducing the risk of high intensity unplanned fire.

Relevant contacts

Roadside Conservation Committee (RCC)

Fire and Emergency Services Authority (FESA)

Department of Agriculture and Food WA (DAFWA)

Department of Environment and Conservation (DEC)

4 FIRE MANAGEMENT ON ROADSIDES

Narrow, linear strips of vegetation such as that found on roadsides, are very vulnerable to disturbance, including fire. However, roadsides have a role in fire management and thus it is important that road managers have clear objectives and understanding of the roadside environment when making decisions on management actions.

The next two sections provide advice on forming objectives, present a series of management strategies, and recommend information needed to make an informed decision on the management strategy to use. The process of making good decisions on roadside management is summarised in Figure 1.

FESA strongly recommends that road and rail managers write a fire management plan for land under their control or include fire in other management plans for these areas. FESA and the RCC can provide more information on how to do this.

These Guidelines are not designed to cover in detail all of the issues associated with fire management within road and rail reserves. Further detailed information can be sought from FESA, RCC, DEC and WALGA.

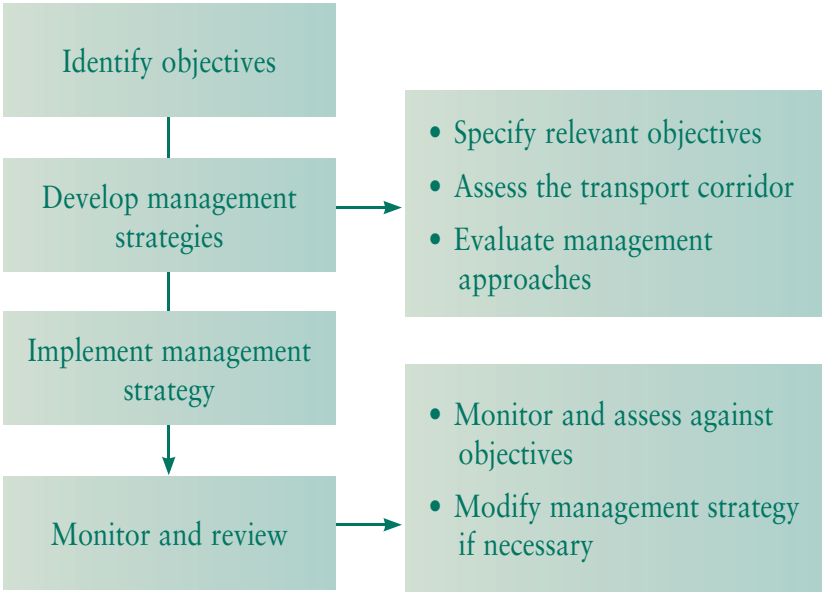
4.1 Objectives

Clearly defined and specific objectives are key for any management plan, as the objectives determine the actions undertaken. Management of a road reserve should be centred on ensuring the safety of the community and protecting and enhancing biodiversity.

The objectives of management actions should give consideration to:

- The prevention of fires along road reserves;
- The potential hazards/risk of fire;
- Biodiversity conservation;
- The containment of roadside fires; and
- Recovery from fire.

Figure 1. Developing fire management strategies for roadsides and rail reserves



Appropriate fire management along roadsides can protect the values of the native vegetation while preventing hazardous uncontrolled burns. (Photo Roadside Conservation Committee)

4.2 Management strategies

To manage fire on roadsides any one of several management strategies may be undertaken. In selecting strategies, the land manager should have a clear understanding of what the strategy is expected to achieve and the reasons the strategy has been chosen. The information collected during the *Fire and Roadside Assessment* (Part 5, Appendix 1) should be used to inform that decision. Monitoring and assessment of a management strategy's outcomes will also provide information to modify the strategy if it is not found to be effective in achieving the stated objectives.

4.2.1 Protection

In this management strategy the roadside is deemed to either be in such condition that no specific management actions are necessary or that the best management option is to undertake surveillance and protection strategies, including early bush fire suppression and weed management. This management strategy is most appropriate for areas with:

- High conservation value vegetation
- Fire vulnerable vegetation
- Declared Rare Flora (DRF), TECs or PECs, or threatened fauna
- Other environmentally sensitive areas (ESA)
- *Phytophthora* dieback risk
- Low weed density
- Lots of hollow logs and trees with hollows
- Historical or archaeological sites
- Fragile areas or vulnerable natural features
- Low fuel loads
- Low fire risk

4.2.2 Grade shoulders and drains

This management strategy is a good solution where most of the factors listed above apply but some form of fuel break is needed between the road's travelling surface and the vegetation. This strategy may not be appropriate for areas with a *Phytophthora* dieback risk, unless appropriate hygiene is implemented, i.e. vehicles and machinery are clean on entry and exit. Consult DEC if DRF, priority flora, threatened or priority fauna, TECs or PECs, and ESAs are involved to ensure that planned works will not impact these sites. Roadside markers may be installed to prevent accidental damage to these biodiversity values.

4.2.3 Slash shoulders and drains

Slashing of vegetation growing in drains and on shoulders is an effective way of reducing fuel loads and height, providing slashing occurs prior to seed head production. This is a suitable management strategy where the same situation described for grading occurs, but where there is a risk of erosion, *Phytophthora* dieback or where runoff may take herbicides into sensitive areas. Where *Phytophthora* dieback precautions are need vehicles and machinery should be clean on entry and exit of soil and plant material. Consult DEC if DRF, priority flora, threatened or priority fauna, TECs or PECs, and ESAs are involved to ensure that planned works will not impact these values.

4.2.4 Spray shoulders and drains

Herbicide spraying in drains and on shoulders can prevent vegetation, particularly annual grasses, from growing close to the road surface. Spraying, like slashing, is suitable for erosion and *Phytophthora* dieback risk areas. However, care must be taken with off-target damage, where the herbicide can kill native vegetation growing on the roadside, or where the herbicide can damage aquatic plant and animal life. Herbicide spraying can be a useful fuel prevention tool between works with the grader. DAFWA can be consulted for advice on the most appropriate herbicide. Consult DEC if DRF, priority flora, threatened or priority fauna, TECs or PECs, and ESAs are involved to ensure that planned works will not impact these values.

4.2.5 Selective fuel reduction

Keeping fuel levels low through selective weed control or removing some fuel by hand is a good method of reducing fuel loads in a way that minimises disturbance and damage to the vegetation. It can also be combined with strategies such as shoulder and drain grading or spraying.

This management strategy is most appropriate for areas with:

- High conservation value vegetation
- Fire vulnerable vegetation
- DRF or other environmentally sensitive areas
- Low weed density
- High fuel loads
- Medium to high risk to property

Spraying herbicides in native vegetation can cause off-target damage and should not be carried out near DRF, threatened fauna, TECs or PECs, without first consulting DEC. Hand removal of fuel may only be possible if there is a high degree of community involvement. Consideration should be given to the retention of dead woody material as valuable habitat for a range of fauna.

4.2.6 Fuel reduction burns

With careful consideration, fuel reduction burns can be used to reduce fuel loads and promote regeneration. This management strategy is appropriate for areas with:

- Low conservation value vegetation
- Fire regenerative vegetation
- No DRF, TECs or threatened fauna
- No environmentally sensitive areas
- No historical sites
- High weed density
- High fuel loads
- High risk to life and property

If a fuel reduction burn is the most appropriate management strategy for a roadside, FESA must be consulted for a pre-burn checklist and burn prescription and relevant Local Government's must be consulted for permits to burn. Consult DEC if DRF, priority flora, threatened or priority fauna, TECs or PECs, and ESAs are involved to ensure that the planned works will not impact these values, and to arrange permits if required.

It is important to consider the seasonality, intensity and frequency of fuel reduction burns and their relationship with the roadside vegetation, and plan accordingly (please refer to Part 3). A fuel reduction burn should result in a mosaic of burnt and unburnt patches within the roadside. This can be achieved by burning when moisture levels in soil and vegetation is appropriate. It should also be done when the vegetation is least vulnerable to fire, for example well before fire sensitive species emerge or prepare to flower. The time between fires should also be carefully considered. A rule of thumb that could be used is fire interval should be twice the length of time of mature seed production of the species which is slowest to recover after fire. Regeneration within the road reserve should be identified and protected from fire until the vegetation is mature enough to withstand the impacts of fire.

It is also recommended that only one side of the road be burnt in any one year to ensure adequate fauna habitat and that the road reserve can continue to be used as a corridor. Thus, take into consideration the other side of the road and on which side it is more suitable to conduct a fuel reduction burn.

Controlled burning of roadside vegetation should result in a mosaic of burnt and unburnt patches. (Photo FESA)

Hollow logs and trees with hollows are important fauna habitat and can easily be destroyed by fire. Protection of these hollows can be achieved by creating a mineral earth break around them before commencing a burn and burning in appropriate conditions to avoid ignition of heavy fuels and minimising fire damage. Alternatively, the tree or log can be protected from the fire by wetting the adjacent area and water spray when the fire is approaching.

Weeds are disturbance opportunists and can grow quickly and profusely after fire. If a fuel reduction burn is planned, appropriate weed control should be carried out, as post fire weed suppression is essential for maintaining good quality native vegetation. A good weed control program can even improve the condition of the vegetation that occurred before the fire. Contingency plans for weed control after unplanned fires should also be developed in areas of high conservation value. Fire could negate previous weed control efforts if post-fire management does not occur.

Linear strips of vegetation, such as those found in roadsides throughout the agricultural areas are particularly vulnerable to weed invasion and seasonal stress. Consequently there is a need for careful planning of controlled burns to ensure that they do not have an impact on the sustainability of roadside vegetation.

4.2.7 Firebreaks

Decisions on firebreak construction within the road reserve should be made on a case-by-case basis. Firebreaks on roadsides are most suitable when the roadside is particularly wide and where a firebreak is considered the best option to protect roadside vegetation and other values. Firebreaks for the protection of adjacent values or assets, such as crops, should generally be constructed within the property where the value to be protected is located. However, the values at risk if a firebreak is not constructed or adequately maintained should also be taken into account.

Should a firebreak be suggested for a road reserve, the managing authority of the road reserve must authorise the construction and maintenance of that firebreak and determine its width. Firebreaks should, where possible, be located on already cleared or low conservation value land, for example on established tracks.

There are several environmental factors that must be considered prior to establishing a firebreak. Weeds are disturbance opportunists and the disturbance of soil for the construction of a firebreak may result in weed infestation. Erosion, from both wind and water, can occur as a result of vegetation removal. *Phytophthora* dieback is spread through earth movement such as that which occurs in the construction and maintenance of a firebreak. Where a firebreak is considered

necessary, and *Phytophthora* status is unknown or dieback free, stringent hygiene practices under a dieback management plan must be followed.

Firebreaks are not recommended for narrow road reserves and DEC must be consulted if DRF, threatened fauna or TECs are involved to ensure that planned works will not impact these species.

To assist with firebreak construction, FESA has the following publication available: *Firebreak, Location, Construction and Maintenance Manual*.

Fire breaks on roadside are most suitable when the reserve is wide. Fire breaks should generally be constructed within the property where land is to be protected. (Photo Roadside Conservation Committee)

Table 1: Table of the benefits and disadvantages of different management strategies for the roadside

Management Strategy	Benefits	Disadvantages
Protection	• Vegetation is not disturbed • Weed growth is not promoted	• Fuel loads are not reduced
Grade shoulders and drains	• Limited disturbance to vegetation • Creates a fuel-free area between the road and the vegetation	• Fuel loads are not reduced in remaining reserve • Can introduce or spread weeds • Can introduce or spread dieback • Can result in erosion • Inappropriate grading can lead to vegetation clearing
Slash shoulders and drains	• Minimal disturbance to vegetation • Reduces risk of erosion • Minimal fuel area between road and the vegetation	• Fuel loads are partially reduced on shoulder and drain but are not reduced in remaining reserve • Can introduce or spread weeds
Spray shoulders and drains	• Minimal disturbance to vegetation • Reduces weed presence • Reduces risk of erosion • Minimal fuel area between road and the vegetation	• Fuel loads are not reduced in remaining reserve • Risk of damaging roadside vegetation by spray drift • Potential risk to frogs and other fauna
Selective fuel reduction	• Reduces fuel load • Maintains or increases vegetation quality • Reduces risk of spread of weeds or dieback	• Potential for damage to vegetation by spray drift • Excessive removal of branches and logs can reduce habitat quality
Fuel reduction burn	• Reduces fuel loads • Could promote recruitment of native plants	• Promotes weed growth • Could result in the loss of fire sensitive plant species • Reduces habitat for fauna • Potential for fire to escape and cause high intensity burn
Firebreak	• Fences are better protected • May improve protection of roadside vegetation	• Reduces the amount of roadside vegetation • Disturbs vegetation • Potentially introduce dieback or weeds • Reduced benefit in high fire danger conditions

4.3 Review and evaluation of management strategy

Fire management actions should be reviewed on a regular basis to gauge their impact and to capture new information, for example a new location of DRF, vegetation response or effects on weeds.

4.4 Involving stakeholders

Stakeholder consultation is a very important step to maximise the success of fire management. This can help to prevent unplanned fires occurring through a lack of community awareness and can ensure that fire occurrences are addressed in such a way to benefit the environmental or biodiversity aspects of the road reserve. The box below provides a list of potential stakeholders who may be interested in the management of the road and rail reserves.

Potential Stakeholders

- *Local government authorities may have an interest in the management of the road and rail reserve*
- *Landowners may have an interest in the management of the road and rail reserve adjacent to their land*
- *Local conservation groups may have an interest in the sustainable management of road and rail reserves*
- *Tourist and local business groups may have an interest in the visual amenity of these areas*
- *Volunteer Fire Brigades may have an interest in terms of protection of life and property*
- *Utility managers may have infrastructure contained within the road reserve (eg underground or above ground cables)*
- *DEC should be included if Declared Rare or Priority Flora, TECs or PECs, or Threatened or Priority Fauna are present on roadsides, or if the area is adjacent to DEC managed lands*

4.5 Seeking advice

Due to the variety of situations present on roadsides, it may be pertinent to seek advice on technical aspects of fire management. For example, FESA can provide advice about fire management and assessing fuel loads and other hazards, while DEC and the RCC can provide advice on vegetation type, management and assessment.

Relevant contacts

Agencies and groups that may provide assistance in your local area may include:

- RCC – interaction of fire and biodiversity
- FESA – assessing fuel loads, interaction of fire and biodiversity
- Volunteer Fire Brigades – advice and assistance with burning at the request of the managing agency
- DEC – information on fire sensitivity of vegetation, particularly in areas where TECs/PECs and Declared Rare or Priority Flora occur
- DAFWA – weed control
- Dieback Working Group and DEC – dieback issues in your area
- Department of Indigenous Affairs – Aboriginal heritage
- Heritage Council of WA – European heritage
- National Trust of Australia (WA) – European heritage
- Water Corporation – water storage and catchment information
- Utilities – location or sensitivity of utility services

5 FIRE AND ROADSIDE ASSESSMENT

An assessment of the roadside environment, surrounding values and potential fire behaviour will develop an understanding of potential impacts, hazards and risks to native vegetation and adjoining life and property of an individual roadside. A thorough assessment will provide managers with most of the information needed to make an informed decision on which of the management strategies outlined above to use.

The check sheet provided in Appendix 1 (*Fire and Roadside Assessment* sheet) presents a method of collecting the information.

It is recommended that the assessment be undertaken on the left and right sides of the road, as it is inadvisable to burn both sides in any one year. It may also be practical to break the roadside into sections, as conditions will change over its length.

5.1 Description of the area

The area surrounding the road reserve influences the processes within it. Information about the surrounding area will assist in making an informed decision about treatment choice.

- *Road information*

  Length of the roadway under assessment (by way of intersection or straight line kilometre (SLK)), road category and traffic volume.

- *Left or Right side of the road*

  It is recommended that separate assessments are done for the left and the right sides of the road.

- *Road reserve width and roadside vegetation*

  Record the width of both the road reserve and the width of the roadside vegetation.

- *Land use & assets*

  General overview of the adjacent land use and the location of assets within the area. Consider nearby assets such as residential, industrial, cultural, agricultural, plantations and other populated areas. Include details of fence construction and location of firebreaks, water sources, and access routes through the road reserve to the adjoining land.

- *Vegetation*

  Description of the type of vegetation within the road reserve (e.g. grass, trees, shrubs, or combination; native or weeds) including the presence of any environmentally sensitive areas, for left and right sides of the road.

- *Fuel loads*

  Assess the fuel loads in the road reserve and surrounding land using FESA's *Guide to assessing fuel loads*, for both the left and right sides of the road.

5.2 Identify and assess environmental values

Due to the vital role that roadside vegetation plays in the conservation of flora and fauna, it is important to consider all the values it contains and to assess the impact of management strategies on those values.

Roadside vegetation

- *Conservation Value*

  This is determined by the intactness of the vegetation on the roadside. "High conservation value" means that the native vegetation is intact, with trees, shrubs and native ground covers usually present. These areas will contain few to no weeds. "Low conservation value" means that little native vegetation remains (perhaps only some trees) and that weeds such as annual grasses dominate the understorey. Note, some vegetation does not have an obvious understorey, e.g. some salmon gum communities, and so an understanding of the natural vegetation is important. The conservation values of your Shire's roadsides may have been mapped by the RCC. Contact the RCC for more information.

- *Declared Rare Flora (DRF)*

  Road and rail managers are notified by the Department of Environment and Conservation if any DRF occurs within the lands they manage. These are recommended to be marked on the roadside with yellow "hockey stick" markers. Contact DEC if any DRF are present. A Ministerial permit will be required to burn any DRF.

- *Environmentally Sensitive Areas (ESA)*

  These areas may include any Threatened Ecological Communities (TECs), threatened fauna or DRF. They may also be marked on the roadside with yellow "hockey stick" markers. Most exemptions under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* do not apply in these areas.

- *Special requirements for flora habitat*.

  As explained in Part 3, different plants have different sensitivity to fire. Consultation with DEC or FESA's environment branch may be needed to assess this point.

- *Dieback (Phytophthora cinnamomi) precautions*

  Phytophthora dieback is spread by soil on machinery and excessive surface water flow. Precautions mean that machinery and vehicles used in the area, including for fire prevention actions, should be cleaned of any soil or plant materials on entry and exit.

- *Weed density*

  Density of weeds can be estimated from per cent cover, i.e. what per cent of the ground is covered in weeds. A visual guide to estimating per cent cover can be obtained from the RCC.

Wildlife

- *Threatened fauna*

  Some threatened fauna use vegetation in road reserves for feeding, nesting and to move through the landscape. Examples of threatened fauna include Carnaby's cockatoos and phascogales.

- *Hollow logs and tree hollows*

  Hollow logs and hollows in trees are very important habitat for wildlife and are particularly vulnerable to fire. Examples of wildlife using hollow logs include reptiles and echidnas, while many birds and other animals use tree hollows.

- *Connecting uncleared vegetation*

  Roadside vegetation often links larger patches of remnant vegetation, which allows wildlife to move through the landscape.

Small native animals often have restricted home ranges and specific habitat requirements which can be severely impact by fire. (Photo Department of Environment and Conservation)

- *Wildlife considerations*

  There may be other wildlife considerations to take into account. For example, quenda (bandicoot) shelter in dense understorey which would not exist immediately after fire.

5.3 Identify and assess other values

Road reserves often contain, or are close to, other features that should be considered in deciding on a fire management strategy. There may also be other management factors to consider in a particular road reserve.

Surrounding values

- *Aboriginal or European historical or archaeological sites*

  These sites can comprise of artefacts, trees, geological formations, buildings and other structures. Locations of such sites and information on their management can be found through the Heritage Council of WA, National Trust of Australia (WA) and the Department of Indigenous Affairs.

- *Fragile areas and natural features*

  Fragile areas and natural features include things like caves, steep slopes, creeks and wetlands. These areas can be damaged by fire and fuel reduction or fire prevention measures. For example, grading or ploughing a firebreak may cause erosion of steep slopes and smoke may mark natural features within caves.

- *Water catchments and storage*

  Ash falling on water or washing through catchments into storage areas can jeopardise drinking water quality. Fire also influences sedimentation and turbidity which reduces the quality of the water. Information can be sought from the Water Corporation or the Department of Water.

- *Aesthetics of roadsides*

  Roadsides help create a sense of place and can be important for tourism.

- *Threat to and from adjoining property*

  The threat to surrounding property might be reduced by the presence of a firebreak on the private property side of the fence.

- *Utilities and roadside furniture*

  Utilities are often contained within road reserves. Above-ground structures, such as poles, pits and elevated points, are particularly vulnerable. It is thus important to check what is present through the Dial Before You Dig service.

Current Management

- *Roadside vegetation management plan*

  A management plan may be in place to provide guidance on managing vegetation. This might provide some guidance on fire management and provide additional information.

- *Revegetation areas*

  Areas that have been revegetated can be identified through records, the vegetation management plan and local knowledge. The roadside vegetation should be inspected to ensure it has regenerated sufficiently to withstand the effects of a planned fire.

- *Weed control programs*

  Weed control programs may have been established by the road manager or local interest groups.

- *Monitoring and survey*

  Several groups, such as DEC, weed action groups and the RCC might have monitoring or survey sites on roadsides to monitor DRF, weed spread, vegetative cover, etc.

- *Interest groups*

  The above points will help to identify any groups that might have an interest in the roadside and that might influence the choice of treatment option. Liaison with these interested groups should occur prior to the implementation of any management strategy that could lead to disturbance of the roadside vegetation.

5.4 Identify and assess the fire issues

In consultation with stakeholders, identify risk areas to be assessed and consider the potential threat to life, property and the environment. Within this, a description of the area, such as the climate and topography, and an assessment of the fire issues, such as fire history and risk, need to be considered.

- *Fire history*

  Indicate when the roadside was last burnt (planned or bush fires).

- *Fuel load*

  Estimate the fuel load using FESA's *Visual Fuel Load Guide*. Areas where the fuel load is greater than 10 tonnes per hectare are considered to have a high fuel load.

- *Fuel type*

  Include a brief description of the vegetation types and quantities. *Grasses* is a covering of predominately grasses. *Shrubland* is where shrubs, which might be up to 5m, dominate the roadside. *Woodland* is a covering of trees with either some shrubs or dense shrubs underneath.

- *Likely fire behaviour*

  Fire behaviour is based on the amount and type of fuel available as well as other factors that are specific to the time and location of the fire, such as fire history, climatic conditions and hill slope. Thus, this point draws on information collected for other sections of the roadside assessment.

  Low – estimated fuel load is <5 tonnes per ha and time since fire is <5yrs, or where vegetation is sparse or mainly grass and surface fuels.

  Medium – estimated fuel load of 5-10 t/ha and time since last fire approximately 5-10 years with shrubland type vegetation which is more continuous.

  High – fuel load is >10t/ha with time since last fire >5yrs or with a continuous cover of vegetation including surface, elevated and overstorey components.

The identification and assessment of fire issues should be repeated for vegetation found on adjoining land to indicate fire behaviour if a fire was to start on the roadside and continue onto surrounding areas.

Contact FESA for more information or refer to the "Guides and Tables for bush fire management in Western Australia" produced by FESA.

Relevant contacts

Roadside Conservation Committee

FESA

Department Environment and Conservation

Department Agriculture and Food WA

Department of Indigenous Affairs

Department of Water

Heritage Council of WA

Water Corporation

6 ROADSIDE FIRE MANAGEMENT GUIDELINES

1. Roadside burning should not take place without the consent of the managing authority.
2. Local Governments should adopt local policies to manage roadside fuel loads.
3. Biodiversity conservation and the abatement of fire hazard should form the basis of all fire management decisions.
4. Only the verge on one side of a road should be burnt in any one year.
5. Firebreaks should only be considered on roadsides where the firebreak is considered necessary to protect the vegetation without lessening its conservation value.
6. The road manager shall specify the maximum width to which the break may be constructed.
7. In the case of any dispute concerning roadside fire management, FESA should be called in to arbitrate.

7 CONTACT DETAILS OF RELEVANT ORGANISATIONS

Roadside Conservation Committee
(RCC)
Locked Bag 104
Bentley Delivery Centre WA 6983
Phone: 08 9334 0423
Fax: 08 9334 0199
E-mail: rcc@dec.wa.gov.au

Fire and Emergency Services Authority of Western Australia (FESA)
FESA House
480 Hay Street, Perth
GPO Box P1174
Perth WA 6844
Phone: 08 9323 9300
Fax: 08 9323 9384
Free Call (outside Perth metro area):
1800 199 084
E-mail: environment@fesa.wa.gov.au
Web: www.fesa.wa.gov.au

FESA Bush Fire and Environmental Protection Branch
(Specialist information)
FESA House
Level 4, 480 Hay St, Perth
GPO Box P1174
Perth WA 6844
PH: 08 9323 9857
Fax: 08 9323 9495

Department of Environment and Conservation (DEC)
168 St Georges Terrace
Perth WA 6000
Locked Bag 104
Bentley Delivery Centre WA 6983
Phone: 08 6467 5000
Fax: 08 6467 5562
E-mail: info@dec.wa.gov.au
Web: www.dec.wa.gov.au

Department of Agriculture and Food (DAFWA)
(Weed science)
Locked Bag 4
Bentley Delivery Centre WA 6983
Phone: 08 9368 3333
Fax: 08 9474 2405
Email: enquiries@agric.wa.gov.au

Department of Indigenous Affairs (DIA)
Cloister's Square
PO Box 7770
Perth WA 6850
Phone: 08 9235 8000
Local office: 1300 651 077
Fax: 08 9235 8088
E-mail: info2@dia.wa.gov.au

Heritage Council
PO Box 6201
East Perth WA 6892
Phone: 08 9221 4177
Fax: 08 9221 4151
E-mail: heritage@hc.wa.gov.au

Department of Sustainability, Environment, Water, Population and Communities (DSEWPC)
GPO Box 787
Canberra ACT 2601
Phone: 02 6274 1111
Fax: 02 6274 1666
Website: www.environment.gov.au/epbc/index.html

Water Corporation
PO Box 100
Leederville WA 6902
Phone: 9420 2420
Fax: 9423 7722
Website: http://watercorporation.com.au/

Department of Water (DoW)
P O Box K822
Perth WA 6842
Phone: 6364 7600
Fax: 6364 7601
Website: http://www.water.wa.gov.au/

Dial Before you Dig
13 South Street
Canning Vale WA 6155
Phone: 1100
Fax: 9424 8122
Website: www.1100.com.au

Dieback Working Group (DWG)
80 Great Northern Highway
Middle Swan WA 6056
Midland WA 6936
Phone: 9374 3333
Fax: 9374 0685

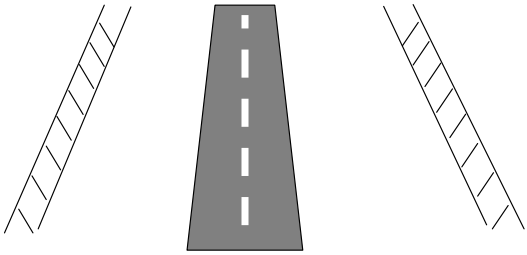
8 APPENDIX 1 Roadside Risk Assessment sheets

FIRE AND ROADSIDE ASSESSMENT

This assessment should be undertaken after reading, and in conjunction with, "Management Guidelines for Fire Use and Control in Road and Rail Reserves"

Shire	Date
Road name	Assessment No
Road Category	Assessment by
Length of road and reserve in this assessment (km)	

Description		Left Verge	Right Verge
Step 1.	Indicate land use on adjacent land		
Step 2.	Indicate width of road and roadside reserves		
Step 3.	Describe vegetation in the road reserve		
Step 4.	Indicate fuel loads in the road reserve and adjacent land		
Step 5.	Indicate proximity of property		



ADJACENT LAND | RESERVE | ROAD | RESERVE | ADJACENT LAND

Objective(s) to be Addressed (Part 4)

Environment

Roadside Vegetation (Part 5, contact DEC)	(Please circle)				
Is the vegetation in good condition (high conservation value)?	High	Medium high	Medium low	Low	Unknown
Is there any known Declared Rare Flora (DRF)?	Yes	No		SLK:	
Are there any other Environmentally Sensitive Areas (ESA)?	Yes	No		SLK:	
Are there any special requirements for flora habitat?	Yes	No		SLK:	
Are phytophthora dieback precautions needed?	Yes	No			
What is the weed burden?	High	Medium high	Medium low	Low	Type:

Wildlife (Part 5, contact DEC)	(Please circle)		
Are there any threatened fauna to consider?	Yes	No	Species:
Are hollow logs present?	Yes	No	SLK:
Are trees with hollows present?	Yes	No	SLK:
Does the roadside vegetation connect areas of uncleared vegetation?	Yes	No	
Are there any other wildlife considerations?	Yes	No	Description:

Please complete other side

FIRE AND ROADSIDE ASSESSMENT – Side 2

Surrounds

Surrounding Values (Part 5, contact DIA, WC, FESA)	(Please circle)			
Are there historical or archaeological sites (Aboriginal or European)?	Yes	No		SLK:
Are there fragile areas or natural features (eg. caves, steep slopes, granite outcrops)?	Yes	No		
Is there a gazetted water catchment or water storage boundary involved?	Yes	No		
Is the road a Flora Road, tourist drive or major road?	Yes	No		
What is the threat to surrounding property?	High	Medium	Low	

Current Management (contact DEC, local groups, RCC)	(Please circle)			
Is this road covered by a roadside vegetation management plan?	Yes	No		
Are there are any revegetated areas?	Yes	No		SLK:
Are there any weed control programs for this road?	Yes	No		
Will any monitoring or survey sites be disturbed?	Yes	No		SLK:
Do other groups have an interest in this roadside (eg. DEC, weed action group, Lions Club)?	Yes	No	Group:	

Fire

Risk of a Fire Starting (Part 5, FESA Visual Fuel Guide)	(Please circle)		
Time since the last fire (years)?	0 – 5	5 – 10	>10
What is the estimated fuel load (t/ha)?	0 – 5	5 – 10	>10
What is the fuel type?	Grasses	Shrubland	Woodland

Fire Risks (Part 5, contact FESA)	(Please circle)		
What is the likely fire behaviour along this road?	Low	Medium	High
What will the fire behaviour be if it leaves the road reserve?	Low	Medium	High
What is the extent of fire prevention works on adjoining land?	Firebreak	No firebreak	Width:

Advice will be sought from:

DEC FESA RCC Dept Ag and Food WA Main Roads Shire Local groups Other:

Treatment solution Left:

No action | Grade drains | Slash drains | Spray herbicide in drains (Contact DAF and DEC) | Selective hazard reduction | Burn (Contact FESA) | Firebreak

Treatment solution Right:

No action | Grade drains | Slash drains | Spray herbicide in drains (Contact DAF and DEC) | Selective hazard reduction | Burn (Contact FESA) | Firebreak

Rational for treatment choice:

Notes

Notes

GOVERNMENT OF WESTERN AUSTRALIA

FESA
Fire & Emergency Services Authority of Western Australia

Roadside Conservation Committee