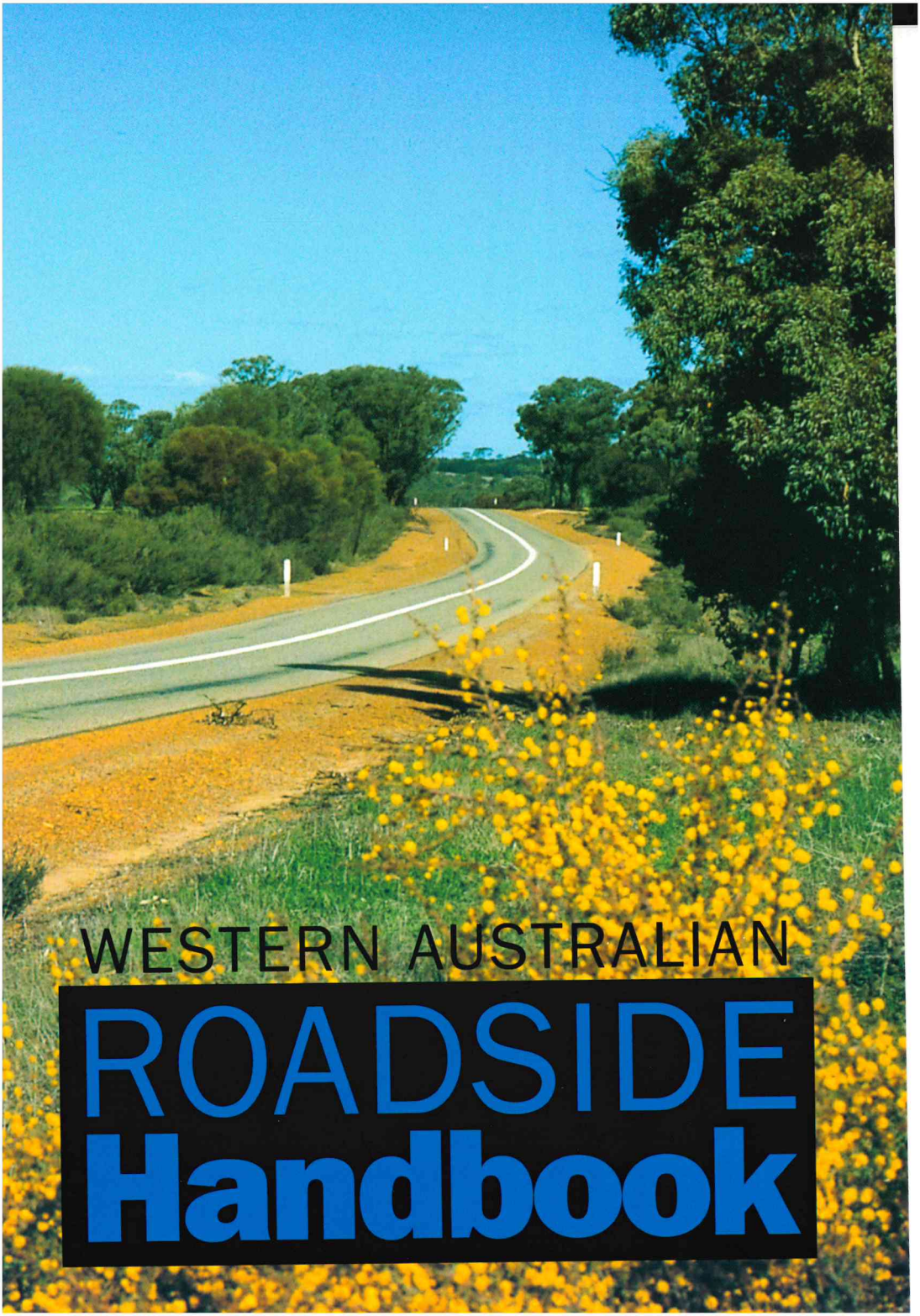
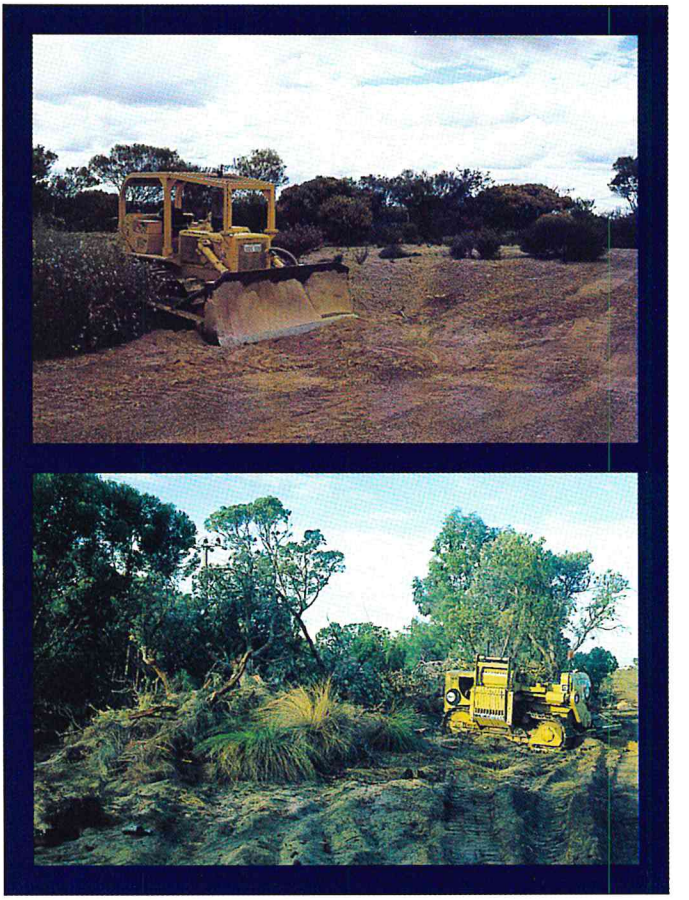

WESTERN AUSTRALIAN
ROADSIDE
Handbook

Environmental guidelines for road construction and maintenance workers



Published by the Western Australian
Roadside Conservation Committee, April 1998

Roadside Conservation Committee

The Western Australian Roadside Conservation Committee (RCC) was re-formed in 1985 in response to concern expressed by local communities, the tourism industry and the conservation movement over the deterioration of roadside vegetation.

Terms of Reference

The RCC's Terms of Reference are to co-ordinate and promote the conservation and effective management of rail and roadside vegetation for the benefit of the environment and the people of Western Australia.

Membership

Department of Conservation and Land Management
Main Roads Western Australia
Westrail
Agriculture Western Australia
Water Corporation
Alinta Gas
Bush Fires Service
Private conservation interests
Greening Western Australia
Western Australian Municipal Association (3 representatives)
Western Power

Acknowledgments

The Roadside Conservation Committee acknowledges with thanks the financial support of the Local Government Supervisors Association.

RCC also acknowledges with thanks the kind permission of Graeme Stone, VICROADS, for use of material from the VICROADS Roadside Handbook, which has been rewritten to accommodate the Western Australian environment. It complements the RCC Roadside Manual, which should be referred to for specific details.

Compiled and rewritten by David Lamont

Edited by Jan Knight
Design and layout by Dot Hewgill
Cartoons by David Lumsden
Line drawings by Stephen Wallbrink
Cover photo by David Lamont

Part 1 General Environmental Guidelines

Part 2 Construction Guidelines

Part 3 Maintenance Guidelines

Part 4 Protection and Rehabilitation Guidelines

Foreword

Local Government Authorities have the task of managing more than 120,000 km of roads and associated reserved land in Western Australia. This reserved land often contains remnant native vegetation that has an important role in regional flora conservation, as well as providing more general land and water conservation benefits. For many travellers, roadside vegetation is their link to the natural heritage of this State, and for the local community it provides their 'sense of place'. For some rare flora, it is their only habitat!

The sustainability of roadside remnants depends on the ability of the managing Authority to maintain their road reserves in a manner that is sensitive to the roadside vegetation, especially with regards to clearing or drainage, and also to address an array of threatening processes or events, such as fire, weeds and disease. The challenge is to maintain viable roadside vegetation, while still managing a safe and effective road transport network.

In the present climate of diminishing resources, it is tempting for road managers to take the simple option of managing the road in isolation, and disregarding the roadside vegetation because it appears cheaper at the time to do so. In the longer term, this is not the case for the local community. The landcare movement has demonstrated the value of retaining regional vegetation for controlling watertables, and providing protection from soil erosion and wind effects. Roadside vegetation can be a significant regional contribution to this.

In a time of rapid change where the demands placed on the natural world are many, it is vital that there is a co-ordinated management of lands across all tenures to ensure the sustainability and integrity of the natural biota and processes, agricultural lands and service infrastructure. It is somewhat ironic that the reserves established to cater for a transport system in a modern world are now so integral to this co-ordinated management. We must be vigilant to ensure that these areas are not degraded by careless management and that the people charged with their management receive adequate funding and training to ensure that roadside reserves persist for subsequent generations of Australians.

Roadsides are a vital link and a priceless community asset. I believe that the information in this booklet will provide road construction and maintenance workers with a basic understanding of roadside conservation practices. It will enable Local Governments to be sound corporate citizens aware of their environmental responsibilities, as well as provide a safe transport network throughout their districts. Through knowledge and planning, this can be achieved in a cost effective manner.

I urge all involved in the management and maintenance of roadsides to be familiar with the contents of this booklet.

Dr Ken Atkins, Chairman
Roadside Conservation Committee, April 1998

PART 1

General Environmental Guidelines

The value of roadside vegetation

Roadsides are valuable because they:

- often are the only remaining example of original vegetation within cleared areas;
- are easier to maintain and generally less fire prone than introduced vegetation;
- provide habitat for many native species of plants, mammals, reptiles, amphibians and invertebrates;
- provide wildlife corridors linking other areas of native vegetation;
- often contain rare and endangered plants and animals;
- provide the basis for our important wildflower tourism industry;
- often contain sites of historical or cultural significance;
- provide a benchmark for the study of soil change during agricultural development;
- provide windbreaks and stock shelter areas for adjoining farmland; and
- are a vital source of local seed for revegetation projects (CALM permit required).

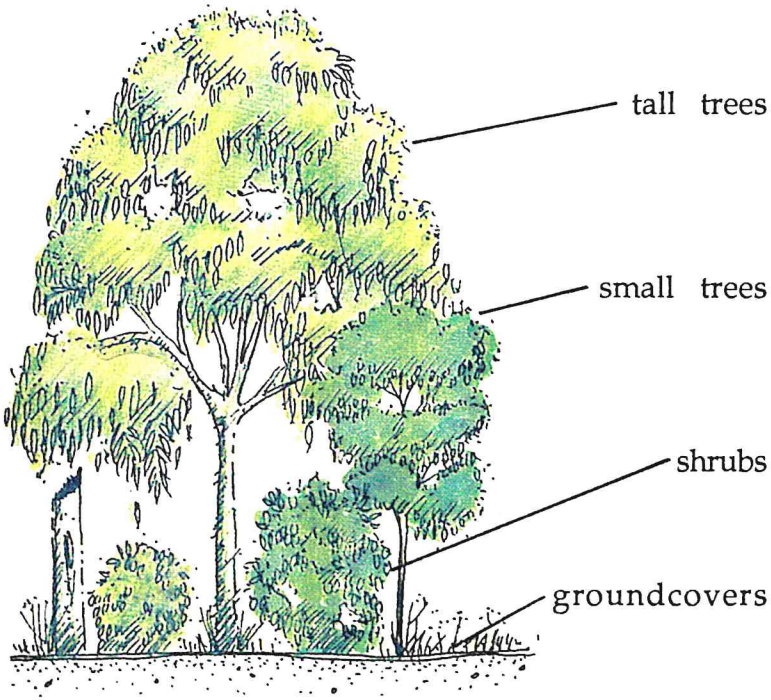
Roadside vegetation is often the only original native vegetation left in an area. (Photo by Main Roads WA)

Trees are good – bush is better

Remnant native vegetation includes more than just trees. Trees, shrubs and ground covers (creepers, grasses and herbs) combine to provide valuable food and shelter for different types of wildlife.

Existing native vegetation will require less maintenance if left undisturbed.

Protect native vegetation by minimising disturbance.



Undisturbed bushland on roadsides is valuable.

Only do what you have to do

Only disturb what you have to disturb.

Disturbing the soil and healthy native vegetation:

- encourages weeds which compete with native plants and increase maintenance costs and the fire risk of roadsides;
- can prevent the natural regeneration of native plants; and
- increases the risk of soil erosion.

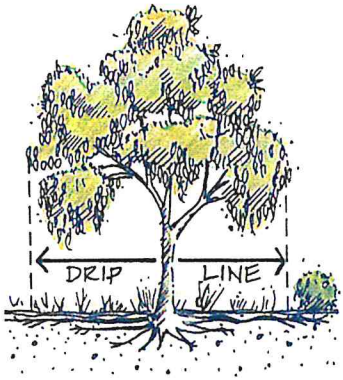
Disturbing the soil unnecessarily may encourage weeds and destroy native plants. (Photo by Penny Hussey)

Protect vegetation

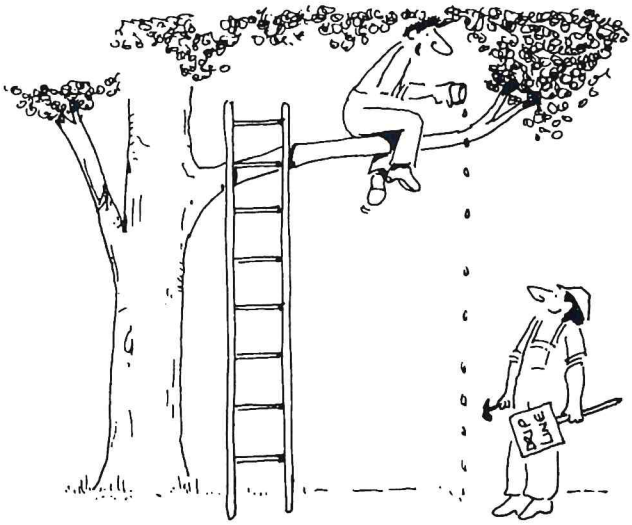
Healthy vegetation is an asset. It is cheaper and easier to protect existing trees, shrubs and ground covers than it is to replant them.

- Avoid working within the drip line of a tree, to reduce damage to the roots, trunk and limbs.

  Remember – the fine feeder roots occur in the top 30 cm of soil and larger, deeper roots act as 'anchors'.



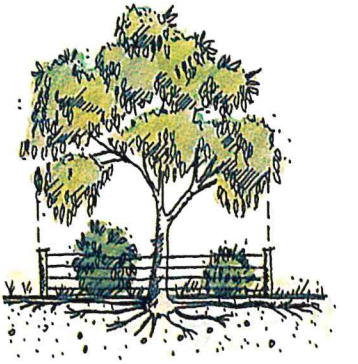
The drip line of a tree



- Avoid storing materials and equipment under trees. Don't drive vehicles under trees or over other native plants, such as native herbs and grasses.

  These practices damage vegetation and compact the soil, stopping air from reaching the roots.

  Fence off areas where these problems may occur. Woven mesh barrier, wire fencing or large logs can be used.

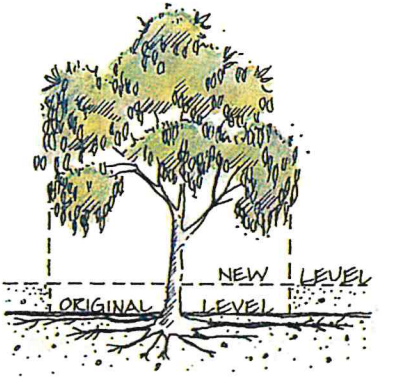


Control vehicular access and stockpiling.

- Keep fill material clear of the drip line of trees or shrubs.

  Fill material prevents water and air from reaching the roots, causing root death. It may also cause trunk rot.

  Where fill is unavoidable, try to retain the fill beyond the drip line.

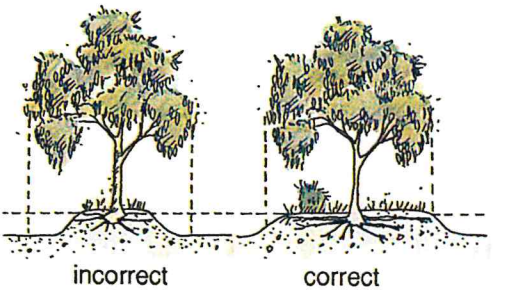


Do not place fill around the trunk.

- Avoid cutting within the drip line of a tree.

  This damages the essential fine 'feeder roots' of the tree. Damage to roots can also make the tree unstable.

  When root removal cannot be avoided, leave a clean-cut edge to the root.



Avoid root removal.

Be aware of weeds in your area

Declared and environmental weeds can be spread during road construction and maintenance.

Declared weeds are plants which are a serious threat to agriculture and the environment and there is a legal requirement to control them.

Environmental weeds are non-local plants, which invade and replace the local native vegetation. They may be native plants, which did not originally grow in the area, or non-Australian plants. The Minister for the Environment has endorsed a list of roadside environmental weeds.

CHECK: Ask your supervisor for a list of the major declared and environmental weeds in your area.

Bridal Creeper – Get to know the problem weeds in your area. (Photo by David Lamont)

Control soil erosion

Erosion removes valuable topsoil and produces sediment, which silts drains, creeks and rivers.

Adopting the following principles can reduce erosion:

- Protect and encourage as much vegetation as possible. Vegetation protects the ground surface and slows down water run off.
- Disturb the soil as little as possible. Limit machinery access and earthworks to construction areas only and schedule works to expose the smallest possible area for the shortest possible time.

- Vigorous pasture grasses should not be used in natural areas. Mulch chipped from the site may be an alternative cover.
- Ripping along the contour on bare areas helps reduce erosion and promote growth of vegetation.

Construction and maintenance sites cannot be left without protection from erosion. (Top photo by David Lamont, bottom photo by Main Roads WA)

Notice of Intent

Any new road construction or removal of more than one hectare of native vegetation from any roadside (outside the existing road formation) requires a Notice of Intent (NOI) to be submitted to the Commissioner of Soil and Land Conservation. Soil and Land Conservation Act Regulations empower the Commissioner of Soil and Land Conservation to object within 90 days to any proposal to clear more than one hectare of native vegetation. The Commissioner of Soil and Land Conservation must approve of any NOI to clear native vegetation before works commence.

A Notice of Intent (NOI) is required if clearing of vegetation exceeds one hectare. (Photo by Main Roads WA)

Other legislation

Many of the operations carried out within the road reserve are influenced by prevailing legislation. Road managers and all those who work in the roadside environment should be familiar with the requirements of this legislation.

Local Government Act - local government responsibilities

Wildlife Conservation Act - protection of flora and fauna

Environmental Protection Act - protection of environment

Bush Fire Act - fire prevention and control

Agriculture and Related Resources Act - control of declared species (weeds and vermin)

This list is only an indication of legislation relating to roadsides; the RCC Roadside Manual gives more detail.

Roadside Management Plans

Roadside Management Plans aim to develop the best way to manage and maintain roadsides. Proposals for fire protection, electricity and water supply and the ideas of interested local people can be included in these plans.

The Roadside Conservation Committee is available to provide assistance in surveying roadsides.

CHECK: Are you aware of any vegetation survey or Roadside Management Plan for your section of road?

A Roadside Management Plan can direct roadside maintenance and location of services to avoid damage to vegetation. (Photo by David Lamont)

PART 2

Construction Guidelines

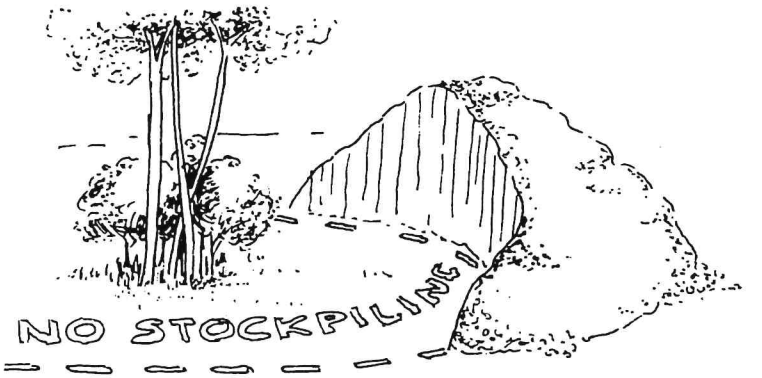
Environmental Code of Practice for construction workers

1. Clearly mark the limits of stripping and all other construction zones.
2. Always stay within the construction zone.
3. Plan vegetation removal.
4. Strip and stockpile topsoil from areas of good native vegetation. Re-use as soon as possible.
5. Control erosion in the following ways:
   - minimise vegetation removal and encourage the growth of vegetation on batters;
   - leave batters rough so as to hold the topsoil;
   - limit access and earthworks to the area required for construction; and
   - establish adequate drainage systems.
6. Avoid 'tidying up' roadside vegetation after construction.
7. Clean down machinery before moving to another site.
8. Keep machinery and stockpiles on cleared land.
9. Only use the appropriate type and minimum size of machine for the job. (See page 28.)
10. If there is no alternative to burning, do not burn under or near desirable vegetation.
11. Chip light material left over from tree removal into mulch to spread the local seed.

Walk the route

'Walking the route' involves inspecting the construction alignment before construction begins to confirm and mark the limits of all construction activities (the construction zone). This could involve the Construction Engineer, Overseer and an officer from any relevant agency that may have an interest in resources associated with the project. To minimise the impact of construction on vegetation, they should identify:

- the limits of stripping and where all vegetation removal should start. Use paint or tape to mark trees to be removed and to show the direction of felling;
- rare or priority flora, or significant vegetation and sensitive areas which are to be protected from disturbance;
- the exact location of stockpiles, plant compounds and access roads; and
- the presence of any cultural sites.

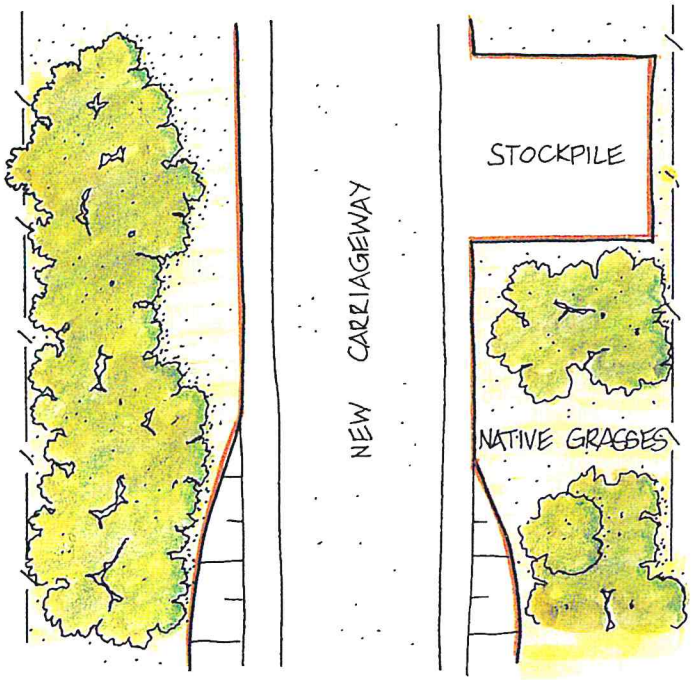


Stay within the construction zone

The construction zone is the area marked out with pegs where all construction activities take place (such as the area stripped for road construction, stockpile areas, compounds etc.).

Disturbance by one machine can do a lot of damage to large areas of native vegetation. Stay within the marked construction zone during construction and confine machinery to well-defined access tracks.

Choose equipment to reduce damage to roadside plants. For example, a backhoe can minimise disturbance to vegetation by remaining on the road shoulder, whereas a bulldozer is more destructive since it must manoeuvre within the vegetation.



The 'construction zone'

Keep machinery and stockpiles on cleared land

Stockpiles and construction compounds should be located on land already cleared of native trees, shrubs and ground-cover. This may be permitted on nearby private land.

Do not store materials and machinery under trees as this compacts the soil and could kill trees and small native plants.

Mark stockpile areas with a fence or large logs to prevent the stockpile area from spreading. Do not push stockpiles into surrounding vegetation.

Poor location of stockpiles (Photo by David Lamont)

Plan vegetation removal

Clear only the minimum amount of vegetation required for road construction (marked vegetation within the construction zone) and that required for safety and sight distances. Trees should be felled into the construction zone, not into undisturbed vegetation.

- Remove all millable timber first.
- The remaining wood, light branches and local native shrubs can be chipped for mulch and spread on exposed areas to encourage the local seed.
- If material must be burnt, keep the fire clear of existing native vegetation.

Strip and stockpile topsoil

Stockpiling topsoil from areas of native vegetation is important, since topsoil contains organic matter and the seeds of local native plants. Make sure that weedy topsoil is not imported from another site into good native vegetation.

- Strip the top 100 to 200 mm of topsoil before starting any major works. Make sure that topsoil is not mixed with poor subsoil.
- Locate soil stockpiles in cleared areas, away from existing drainage lines, trees, shrubs and native grasses. Remove any weeds before stockpiling by spraying or scalping.
- Topsoil should ideally be stockpiled for less than 12 months to make sure that the seed in the soil remains viable.

Minimise disturbance to vegetation

Disturbing the soil and healthy vegetation:

- makes construction more expensive when disturbed areas have to be replanted;
- encourages weeds, which compete with regenerating native trees and shrubs and increases future maintenance costs and the fire risk of roadsides;
- increases the risk of soil erosion; and
- increases the risk of the spread of soil-borne pathogens.

Young regenerating trees and shrubs may not be obvious. Marking them with stakes or using a star picket and strand wire fence can protect them.

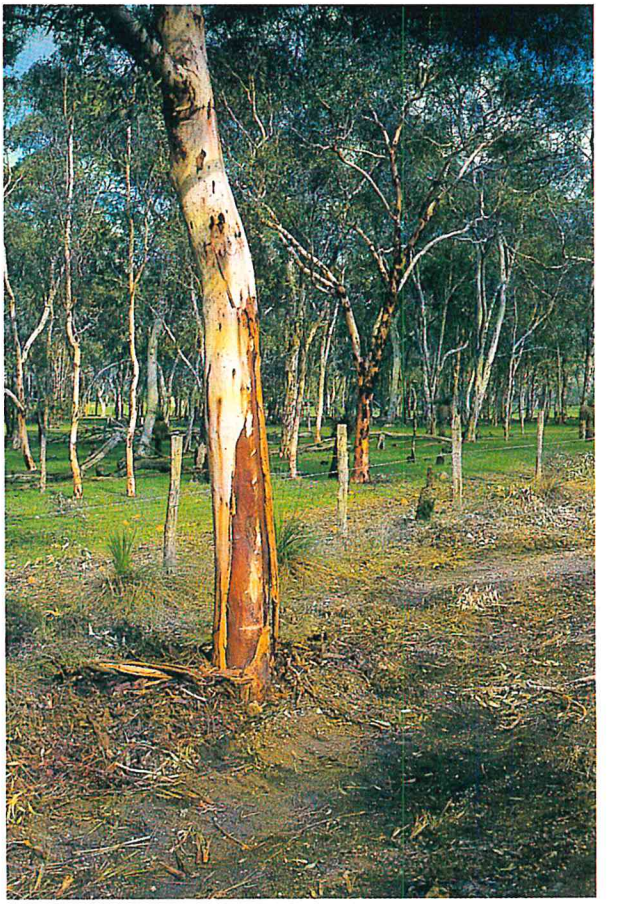
Do not disturb healthy vegetation outside the construction zone. (Photo by David Lamont)

Avoid 'tidying up' vegetation

Grading the roadside, spreading topsoil into vegetation and thinning out plants causes unnecessary disturbance to the soil and vegetation and spreads weeds.

Leaving vegetation undisturbed wherever possible during construction means there is less need for costly remedial works.

Shrubs, logs, old or dead trees and small native plants are valuable for wildlife and should be retained wherever possible unless they are a threat to safety or services.



'Tidying up' removes shrubs and ground covers and damages the trunks of trees. (Photo by David Lamont)

Clean down machinery

Dirty machinery can spread weeds and soil borne diseases. Before transporting any earth moving machinery and vehicles to a new site, remove all seed and soil from machinery by:

- scraping and brushing off soil; and
- washing down with high-pressure water using as little water as possible.

Wash down machinery well away from creeks and preferably on already degraded areas.

Cleaning down vehicles and machinery ensures that weeds and diseases are not spread. (Photo by CALM)

PART 3

Maintenance Guidelines

Environmental Code of Practice for maintenance workers

1. Protect natural regeneration.
2. Avoid mowing in native vegetation.
3. Mow only up to the back of the table drain in most situations.
4. Avoid 'tidying up' vegetation. Retain stumps, dead trees and understorey wherever possible. (See page 19.)
5. Locate firebreaks on cleared land. Firebreaks should be on private land.
6. Remove drain spoil and dispose in a designated dump site.
7. Locate stockpiles on land already cleared.
8. Remove or prune trees using the target pruning method.
9. Only use the appropriate type and minimum size of machine for the job at hand.
10. Only use soil or gravel from a weed- or dieback-free site.
11. Control erosion in the following ways:
    - remove as little vegetation as possible and encourage the growth of vegetation on batters;
    - maintain drainage systems; and
    - minimise disturbance to the soil.
12. Clean down machinery before moving to another site.

Avoid mowing in native vegetation

Avoid native vegetation when mowing. Regular mowing removes young plants. When young trees and shrubs become established, they will shade out grasses and reduce the need for mowing.

- Mow only what is necessary for road and fire safety.
- Use stakes to protect groups of young trees and shrubs where mowing is essential.

Native grasses and wildflowers can be mown, but should be left until after seeding or flowering. In most cases, this is in autumn.

CHECK: Is there a Roadside Management Plan describing mowing requirements for your section of road?

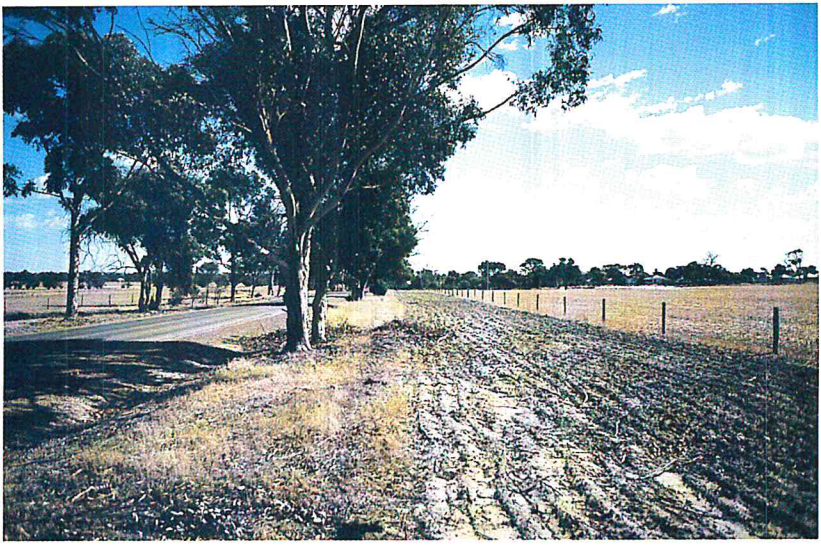
Avoid mowing in native vegetation. (Photo by Main Roads WA)

Locate firebreaks on cleared land

Firebreaks are a form of disturbance that provides sites for weed growth. Firebreaks should not be permitted on narrow road reserves. Firebreaks on roadsides can destroy ground plants, introduce weeds, disrupt drainage and cause soil erosion. This may increase long-term maintenance costs.

On wider road reserves where the width of the roadside vegetation is greater than 20 metres and in the opinion of the road manager, a firebreak is necessary for the protection of the roadside vegetation, then one could be authorised.

Identify and avoid any rare or significant plants before starting firebreak construction.



Firebreaks should not be permitted on narrow road reserves. (Photo by Penny Hussey)

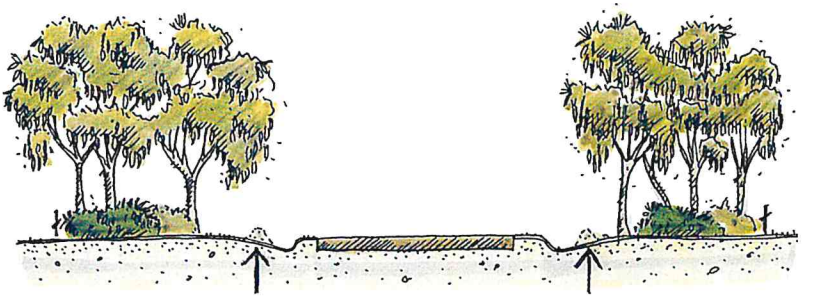
Remove drain spoil

Avoid extra reshaping of table drains and windrowing drain material into roadside vegetation.

Exposed earth and drain spoil is ideal for weed establishment.

- Direct the spoil from drains towards the road pavement (for collection).
- Remove spoil and dispose in an area that will not cause a weed problem.

CHECK: Is there a Roadside Management Plan listing drain spoil disposal sites for your section of road?



Avoid windrowing drain material into vegetation.

Locate stockpiles on land already cleared

- Stockpiles should ideally be located on land which is already cleared of trees, shrubs and native grasses. Sites intended for stockpiling should be weed-free.
- Weed-infested material (for example, drain spoil containing pasture grasses) should not be stockpiled on, or next to, land which has native vegetation.
- Prevent uncontrolled access and disturbance to surrounding vegetation by marking out the stockpile area with a fence or large logs.

CHECK: Is there a Roadside Management Plan listing stockpile sites for your section of road?

Remove or prune trees carefully

Trees and other plants on roadsides should be preserved wherever possible. Careful pruning of overhanging branches can often reduce the need for tree removal. Use the target pruning method below.

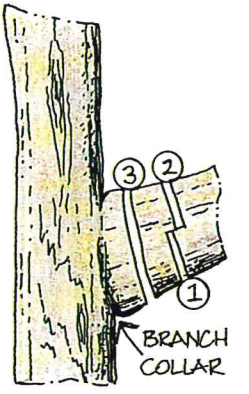
Consider the following points before any action is taken.

- Safety of staff, property and road users.
- The effect of the tree removal on the appearance of the roadside.
- The historical significance of the tree (check with your supervisor).

Minimise the burning or dumping of wood. Retain stumps and logs for animal shelters wherever possible. Light material can be chipped for mulch.

To avoid bark injury below the cut, use the target pruning method on all but the smallest branches.

1. The under cut.
2. The upper cut (to remove the branch).
3. The final trim cut. Cut close to, but not flush with the main trunk or limb. Always cut on the outside of the branch collar – this assists the tree in wound healing (callusing) and provides a protective barrier against decay.



The target pruning method

Only use machinery best suited to the job

Minimise disturbance to vegetation by using the appropriate type and minimum size of machine for the job. Overuse of machinery encourages weeds, destroys useful native plants, compacts the soil and damages the roots of trees.

- Consider using a backhoe from the shoulder of the road rather than a bulldozer within the roadside vegetation.
- Tracked vehicles are more destructive to vegetation and soil structure than rubber-tyred vehicles. Minimise their use.
- Do not 'tidy up' after works by grading the roadside.

PART 4

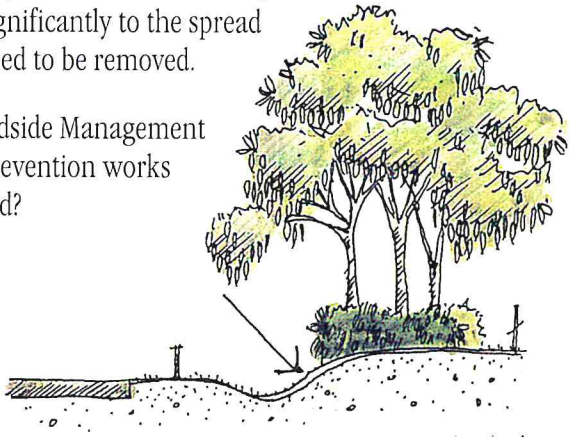
Protection and Rehabilitation Guidelines

Fire prevention

Strategic firebreaks or fire prevention methods are the most effective way of protecting the countryside. Not all roadsides need to be cleared, cleaned up or mown to provide reasonable fire precautions.

Removing fine grass, leaf litter and twigs to form strategic firebreaks may be warranted; however, material greater than the diameter of a pencil (such as stumps, dead trees and shrubs) does not contribute significantly to the spread of fire and may not need to be removed.

CHECK: Is there a Roadside Management Plan describing fire prevention works for your section of road?



Mow only up to the back of the table drain in most situations.

Dieback disease

In Western Australia, the term 'dieback' is used for a plant disease caused by an introduced microscopic fungus called *Phytophthora*. The fungus lives on or in the roots of its hosts. It grows up the roots of susceptible hosts and kills them by girdling the collar. It can also destroy enough of the host's root system to restrict the plant's ability to take up water and nutrients, eventually causing death.

About one third of the native flora of the South West of the State is susceptible to dieback disease. This disease is very serious as it causes dramatic changes in our vegetation, threatening our rare flora and the fauna which depend on them.

Dieback disease (cont.)

Jarrah dieback, a threat to our native flora (Photo by CALM)

Although you can't see the actual fungus, you can see its presence in the symptoms of plant disease. Infected plants often look as though they are dying of drought.

Anything that moves infected plants or soil from one place to another will spread the fungus. Vehicles, especially road-making plant, can carry infected soil and plant material on their tyres or under-body and so spread the disease. Infected gravel used for roadworks in uninfected areas will also spread the disease. Once established, the disease will spread very quickly downhill with water movement and progressively move upslope through the roots of host plants.

There is no way to eradicate the fungus once it is introduced into an area. The only effective action we can take is to manage our projects to ensure that we do not aid the fungus by moving it into dieback-free areas.

Don't let your roadworks spread dieback disease.

- Learn to identify dieback-free areas that can be protected.
- Become familiar with dieback hygiene methods if operating in dieback-free areas.
- Inspect and clean any machine before transport to a new area.
- Identify dieback-free road building materials.
- Learn to recognise dieback indicator species.
- Program earthworks in dieback-free areas for the dry months.
- Plan haul routes from pit to job to avoid crossing dieback-infected sites.
- Ensure that dieback hygiene specifications are written into contracts and strictly adhered to.

Your local CALM office can provide you with further information about dieback identification and dieback hygiene methods.

CHECK: The best way to prevent dieback is to stop it spreading by observing dieback hygiene procedures.

Weed control

Weed control is a critical component for the successful regeneration of roadside vegetation. Failure to successfully control weeds invariably results in poor regeneration.

Successful weed control means:

- controlling existing weeds; and
- preventing re-invasion.

Weeds are most prolific where native vegetation is weakest and are favoured by disturbance.

Disturbance means:

- removing native plant cover;
- disrupting the soil surface; and/or
- adding nutrients.

All three forms of disturbance produce conditions which enable weeds to out-compete native vegetation. Generally, the greater the disturbance, the greater the weed problem.

Weed control needs to be effective before and during regeneration and to continue until plants have formed a dense cover and are able to suppress the weeds.

The choice of weed control will be dependent on:

- site characteristics;
- types of weeds present;
- the season;
- the stage of the weeds' life cycle;
- the resources available; and
- the choice of the roadside manager.

Special Environmental Areas

Special Environmental Areas are sections of roadside which have such significance that they require special protection. Reasons for establishing Special Environmental Areas can include:

- protection of rare or threatened species of native plants;
- protection of sites that have other high conservation, scientific or aesthetic values; and
- protection of Aboriginal or European cultural sites.

Special Environmental Areas can be delineated by the use of site markers. Workers who come across a Special Environmental Area marker in the field should not disturb the area between the markers unless specifically instructed. If in doubt, contact your supervisor.

Figures 15.1 and 15.3 of the RCC Roadside Manual give examples. Western Power and Westrail also have systems for marking sites near power or rail lines.

Reasons for establishing Special Environmental Areas include the protection of rare flora or historical sites. (Top photo by Penny Hussey, bottom photo by David Lamont)

Banksia cuneata

Historic school site

Environmental markers

Environmental markers identify special areas of vegetation for roadside workers only. Do not start work between the markers without seeking the approval of the local Department of Conservation and Land Management, Main Roads WA, Region or Shire. Westrail and Western Power have also developed 'Special Environmental Area' signs to advise workers of significant sites within areas under their control.

Environmental markers help roadside workers to identify high-value areas. (Photo by Dr Ken Atkins)

Flora Roads

Flora roads have special conservation value because of the high conservation value of the native vegetation within the road reserve.

A managing authority may decide to declare a Flora Road on the recommendation of:

- the Roadside Conservation Committee's survey of conservation value;
- a consultant's report; or
- the recommendation of a local community group.

Attractive Flora Roads are an important feature of the wildflower tourism industry, and they can be highlighted with specific signs.

Flora Roads have special conservation value.
(Photo by David Lamont)

Timber harvesting from roadsides

Trees, both living and dead, are an important habitat component. Fallen timber and the removal of standing trees (dead or alive) are issues on roadsides.

Timber collection for firewood from roadsides should be discouraged as there is an increasing demand for firewood and a growing recognition of the conservation value of standing and fallen timber on roadsides.

Timber trees on roadsides, like all naturally occurring native plants on crown land are 'protected flora' under the Wildlife Conservation Act, which is administered by the Department of Conservation and Land Management.

In all cases, the permission of the managing authority and CALM should be sought before any timber is removed from roadsides.

Fence setbacks

In agricultural areas where there has been extensive clearing of native vegetation all native roadside vegetation has an increased value. Road managers should encourage landowners to set their fences back to avoid damaging existing roadside vegetation and, with regeneration, provide a wider strip of native vegetation.

Wider road verges will:

- provide greater protection to stock and crops on adjoining land;
- reduce the effect of wind erosion;
- assist in the control of salinity;
- assist in the drainage of the road;
- provide useful habitat for fauna (especially birds); and
- enhance the aesthetic values.

The aim of creating a network of wide bush corridors should be encouraged as they are vital for the sustainability of local and regional agricultural and conservation values.

Revegetation methods

There are three basic methods of revegetation:

- natural regeneration;
- planting seedlings; and
- direct seeding.

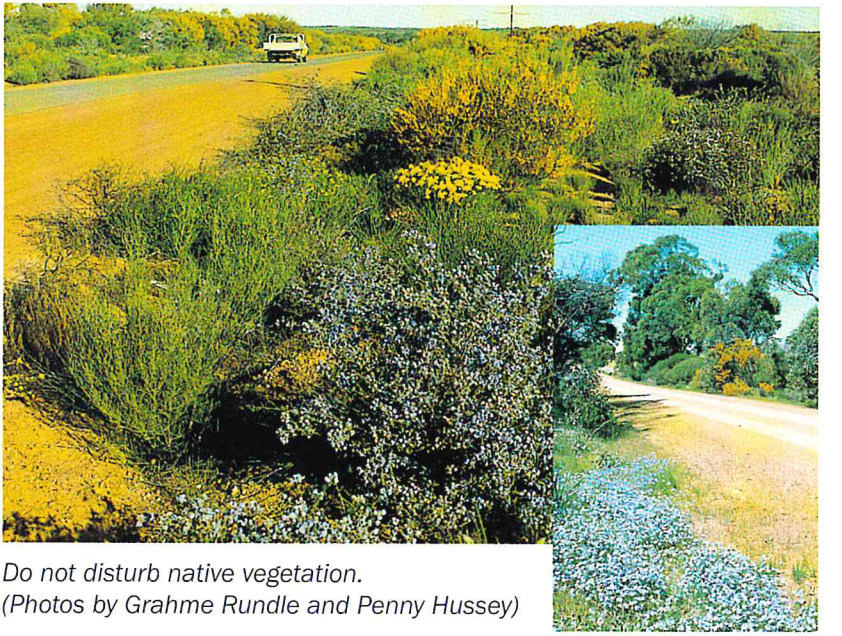
Each method has its own advantages and disadvantages and none are suitable for all situations. Combining two or more methods can often achieve effective results and in some instances may be the only practical way.

Protect natural regeneration

Natural regeneration is the natural establishment of native plants from topsoil replacement, seed-fall or suckering. It costs little and ensures that the local roadside vegetation will continue to survive by being replaced over time by the young plants.

- Do not disturb native vegetation. Disturbance encourages weed growth, which competes with young plants.
- Regenerating areas may not be obvious. Identify these areas with stakes where mowing or other activities are likely.

Natural regeneration on road verge (Photo by Main Roads WA)



Do not disturb native vegetation.
(Photos by Grahme Rundle and Penny Hussey)

Tree and shrub planting

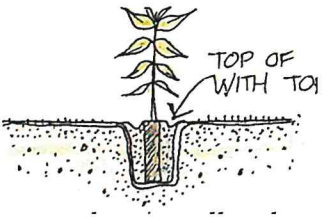
Ground preparation

The site should be slashed and actively-growing weeds sprayed with glyphosate, then ripped to between 300 mm and 500 mm deep in random, irregular lines.

Planting procedure

Generally, the planting season is between May and September. May planting is usually preferable. The soil should be damp but not wet.

- Water plants thoroughly before planting.
- In soil that has been previously ripped, dig a hole as deep as the plant container.



Tree planting, Coolgardie–Esperance Road (Photo by Main Roads WA)

Planting procedure (continued)

- Remove plant from the tube or pot, taking care not to break the soil around the plant, and plant so as to leave a shallow depression.
- Water plant as soon as possible after planting.
- Mulch around the plant to a depth of 100 mm. Do not build up the mulch against the stem of the plant.
- Place a rabbit guard around the plant in rabbit-infested areas.

Indigenous plants

Indigenous plants are the original native plants of an area. Main Roads WA prefers to plant indigenous plants on rural roadsides because they have adapted to the conditions of the site and reinforce the local character and conservation value of the road. An experienced person can collect seed from vegetation on or near the site and grow seedlings for planting.

Seed collection

Collecting seed rather than purchasing it removes uncertainties of unknown origin and freshness.

If you are going to collect seed from any crown land (roadsides are crown land), you will need the permission of the managing authority and a CALM licence.

Worked-out gravel pits often are suitable for establishing seed orchards for future rehabilitation of degraded areas. This provides a future seed source and rehabilitates a degraded site. Greening Western Australia can provide assistance in establishing seed orchards.

Direct seeding

Direct seeding involves sowing a mixture of native seeds directly into the site where they are to grow.

Advantages

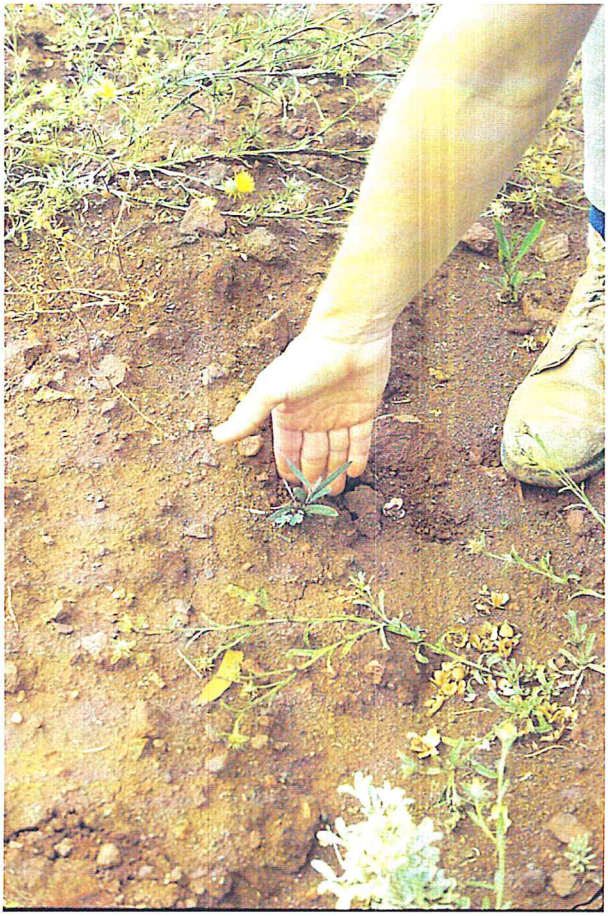
- Large areas can be treated quickly and cheaply.
- A mixture of trees, shrubs and ground covers can be used to recreate more natural communities.
- The seed mix can be altered to cater for different soil types and topographical positions
- When grown, the plants have a more natural appearance.

Disadvantages

- This technique is more restricted to areas of reliable, moderate to high rainfall.
- Good weed control is necessary before seeding.
- Seedlings are prone to damage by rabbits.
- Some species require pre-treatment before sowing.
- Some species do not germinate readily or are difficult to collect.

Some species may dominate at the expense of others and it may be necessary to manage pioneer species, such as acacias, to ensure the desired result.

More information about direct seeding can be obtained from Main Roads WA.



Seedlings resulting from direct seeding (Photo by Main Roads WA)

Further information

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Further reading

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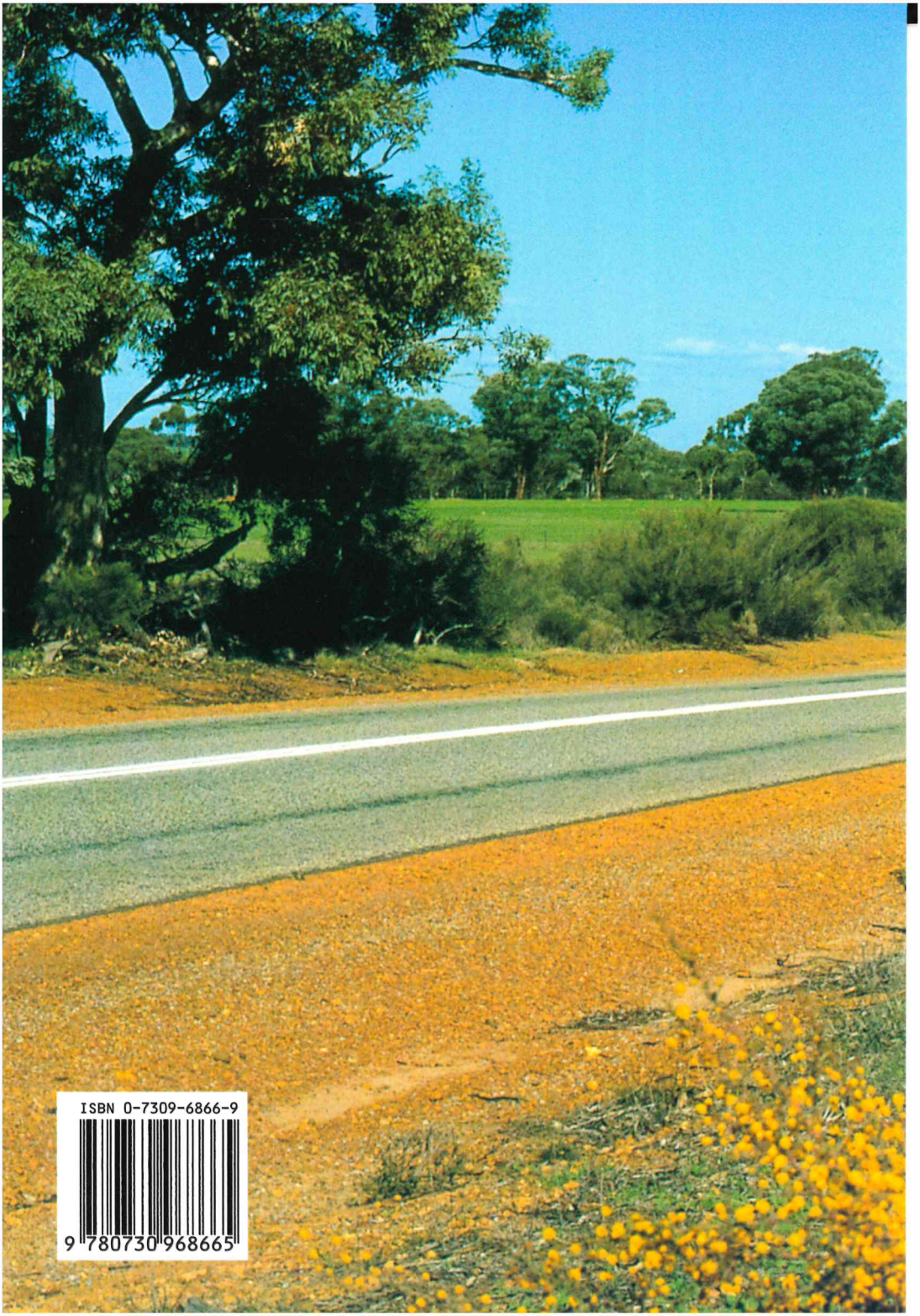
ISBN NUMBER 0-7309-6866-9

Colour separations by ColourboxDigital Pty Ltd.
Printed in Western Australia by Picton Press.


ISBN 0-7309-6866-9
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