

Manawatu District Council

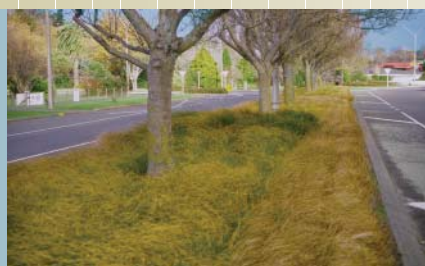
August 2003



Manawatu District

Road Planting Policy and Guidelines

The management of road berms and verges for road safety, amenity and environmental health.



PREPARED BY



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Introduction

There are approximately 1,428 kilometres of legal road in the Manawatu District. If we assume that road land has an average width of 20 metres, this gives a total road area of 2,900 hectares. Not only do roads occupy a significant amount of the district's land but, perhaps more importantly, they are one of the most visible and frequently seen parts of the landscape. It is through road corridors that we travel on a daily basis and from which we see the landscape of the district. For these reasons, the management of road vegetation has a significant effect on the environment of the district. The purpose of the policies and guidelines is to combine the interests of road operation and safety with those of the environment. This document represents a step towards a broader role for roads in the landscape and a positive environmental use of road berms.

The policies and guidelines in this document apply to public roads that are managed by the District Council and may be used as a basis for consultation with Transit New Zealand regarding the management of vegetation on roads of state highways. The policies and guidelines will assist the relevant Council departments, in particular Roading and Parks and Reserves, in their operations and forward planning. They are also intended to assist Community Committees, local environmental groups and other members of the community who are interested in the road environment. They will be of relevance to private landowners with land adjacent to roads, and developers and businesses with road frontages. The policies and guidelines will help in the provision of well-designed roads in new subdivisions and contribute to improvements to existing rural roads and urban streets.

The process of developing the policies and guidelines included a search of the existing information and literature, consultation with council officers, site investigations and consultation with stakeholders and the community.



About this Document

1. About this document

The policies and guidelines in this document are intended to be used at an operational level. They are recommended best practice in the planning, design and implementation of all new sections of roading in the Manawatu District, in all improvement work to existing roading, and in community projects within the road corridors.

It is also envisaged that they will be used by those who have property adjacent to road berms and verges to guide the choice of plants on these properties and their management and maintenance. The objective is to enhance road safety, particularly at intersections and bends to ensure visibility, enhance amenity and environmental health and protect overhead and underground utilities that may be present in roadsides and that may be damaged by trees planted on or adjacent to roadsides (refer figures 1 and 2 on the facing page).

1.1 GUIDE TO USING THIS DOCUMENT

There are a number of stages in developing a proposal to carry out work on roadsides or plant in places which may affect road safety and underground and overhead utility services (refer figure 3 p.10). These include planting on properties adjacent to roads or where the property owner may wish to contribute to the amenity and environmental health of roadsides.

It is recommended that landscape and planting plans be developed prior to planting, particularly in areas that have high visual and environmental amenity values and are in highly visible areas such as urban roads, town entrances, rest areas and roundabouts.

The development of site specific planting management plans is also recommended to ensure appropriate and efficient management and maintenance of planting.

If community or environmental groups or an individual proposes to plant adjacent to roadsides they are advised to discuss their proposal with the Council's Roding Manager to check whether the proposal will impact on road safety and utility services. After developing the plans, groups or individuals should forward their plans to the Council's Roding Manager for signed approval of their proposal.

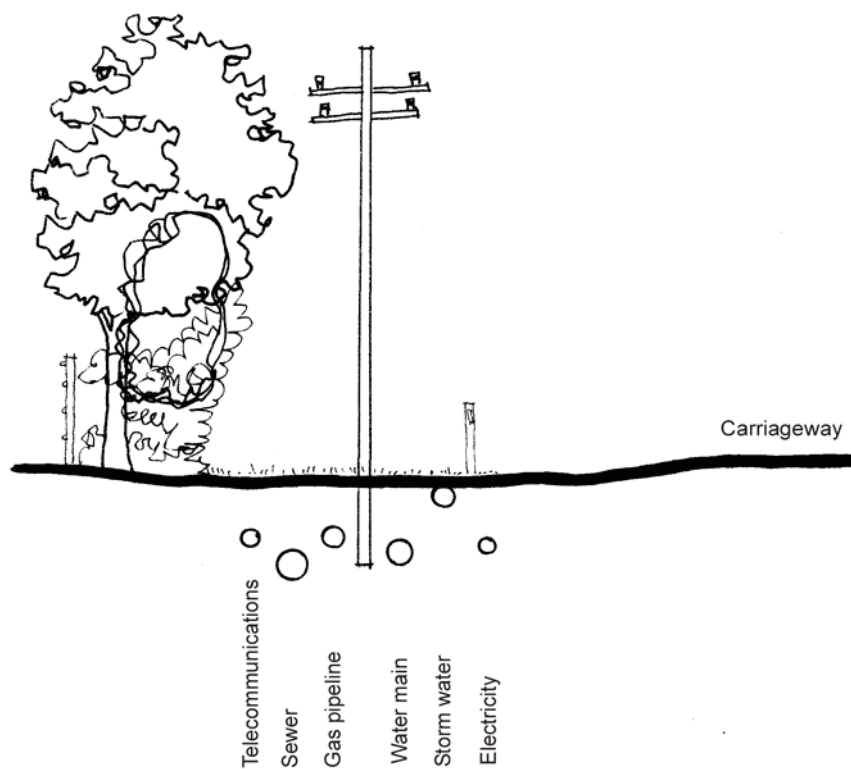


Figure 1 Possible overhead and underground utilities present in roadsides

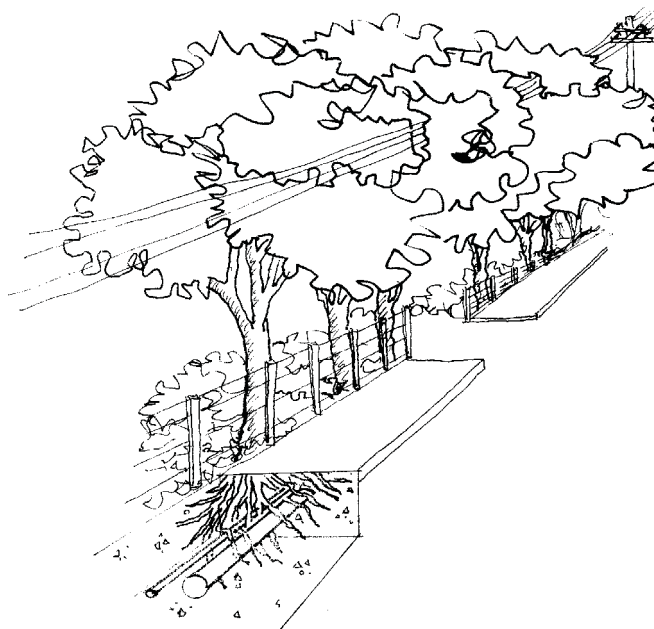


Figure 2 Trees growing on properties adjacent to roadsides have the potential to damage overhead or underground utilities

Figure 3 Stages in developing a proposal to carry out planting



1.2 OVERVIEW OF LEGISLATION RELEVANT TO THE MANAGEMENT OF VEGETATION ON ROADS

1.2.1 Legal definition of road

Transit New Zealand, Wellington Region, advise that the generally accepted definition of a road is ‘from boundary fence to boundary fence and comprises the actual road itself (sealed area), grass verges and footpaths’.

The legal description of a road is contained in section 43 of the *Transit New Zealand Act 1989* (refer Appendix 2). A legal definition is also set out in section 315 of the *Local Government Act 1974* (refer Appendix 2). Both these Acts and the *Land Transport Act 1998* provide for road safety, maintenance, planting etc of roads. For instance, under section 55 of the Transit New Zealand Act, a local authority has the power to require overhanging trees etc, where they impact on a road, to be removed by the offending landowner (refer section 55 Appendix 2). Under section 334A, the Local Government Act also provides for the Council to carry out work on Maori roadways.

Note: The Local Government Act 1974 was replaced with the Local Government Act 2002. This was enacted during the preparation of these policies and guidelines and while not directly affecting them the new Act when fully implemented may result in some administrative changes.

The District Plan sets out the rules for the provision and management of roads in the different zones in the district e.g. Rule B3 Rural Zones sets out the rules for roading impacts (3.3.1H), visibility at railway crossings (3.3.1P), access to roads (3.3.1P), and farm loading ramps (3.3.1R) all of which may impact on the management of roads, including the type of vegetation planted.

1.2.2 Distinction between public and roads not owned by the Council

‘Private roads and private ways’ are defined under section 315 of the Local Government Act 1974 (refer Appendix 2). Private roads are generally constructed on private land, but are intended for public use. Private ways are also on private land but intended for private or limited use only. Neither private roads nor private ways are of importance for the present policies and guidelines. Note: Private roads are not found in the Manawatu District.

1.2.3 Definition of terms road berm and road verge as used in this document

There appears to be no official definition of the terms ‘road berm’ and ‘road verge’. The dictionary definition of berm is a ‘ledge’, often set between or above sloping ground, however, the term berm will be used here in its local, colloquial sense of the area between the edge of the road carriageway and the legal road boundary. The term verge will be used to refer in particular to rural berms that are more or less covered in vegetation.

1.2.4 Responsibilities and opportunities of territorial authorities regarding roads

The responsibilities and opportunities of the council regarding roads relate primarily to their use for the movement of vehicular and pedestrian traffic. The Local Government Act 1974 also allows councils to carry out other works that include growing plants provided that this planting will not unduly impede vehicular traffic (refer Appendix 2).

1.2.5 Legislation and policy relevant to environmental amenity and roads

The roads constitute a significant part of the Council’s physical land assets and the environment of the district and can help to fulfil district and regional environmental objectives. The Proposed Manawatu District Plan (District Plan) and the Regional Policy Statement (RPS) contain a range of provisions aimed at protecting and improving the environment and amenity of the district and the region. These recognise the importance of environmental quality and the economic and social benefits that come from an attractive and healthy landscape.

1.2.6 The District Plan

The District Plan has the role of assisting the Council to achieve the purposes of the Resource Management Act 1991 (RMA). In this respect, it is concerned with the effects on the environment of various activities, including transport and road management, and with the means by which any adverse effects can be avoided, remedied or mitigated. (section 5, RMA, quoted in the District Plan, p. iii).

The District Plan is also concerned with the effects of development, including tree planting, on the safety of roads. LU 27 p.56 seeks to ensure satisfactory sight lines (LU 27 a) ii)) and prevent vegetation from obscuring official signs (LU 27) a) v)) and that new vegetation plantings are managed to maintain adequate visibility and to minimize icing of roads (LU 27 a) vii)).

1.2.7 Amenity values and environmental quality

Under section 7 of the RMA, the District Council's responsibilities include having regard to the maintenance and enhancement of amenity values and environmental quality (section 7, RMA, quoted in the District Plan, p.2). These are basic values that underpin the authority's approach to the physical environment of the district and apply to all its activities. The roading network offers a range of important opportunities to enhance the amenity and environmental quality, whilst protecting the existing values from the adverse effects of road development and management.

1.2.8 Significant issues

The District Plan identifies as one of the significant issues that faces the district the major loss of ecosystems that has occurred particularly in lowland areas, and the need to restore ecosystem values and enhance biodiversity (District Plan p. 4 section 2.2 paragraph 3). It also mentions the importance of visual appearance and the need to prevent problems of "eyesores" (District Plan p.4 section 2.2 5) i)). Screening from the public road may be able to assist with this.

1.2.9 Significant places

There are a number of regionally significant and outstanding landscapes in the district, including the Pohangina and upper Oroua Rivers and their valleys. Although these areas have not suffered the same extent of ecosystem loss as the more intensive production areas on the plains and downs, they are particularly sensitive to visual and ecological change including the impact of roads, road management and forestry practices. The protection and, "where appropriate" enhancement of the distinctive physical elements of these landscapes is an important objective (LU9, District Plan, p.20-20A).

Management of roads must also consider any heritage places and sites with heritage value that may be affected. These include wetlands, indigenous vegetation, archaeological areas and trees with heritage value.

1.2.10 Managing the effects of land use in the different zones

Finally, the District Plan sets environmental objectives in general and for the various zones of the district. General Objective LU 1) to 5) deals with potential adverse effects and maintaining

and enhancing amenity (District Plan, p.13). Specific policies include tree planting on selected “spare” areas of rural road reserve, such as “where the verges are very wide”, and where planting “may improve the amenities of the countryside” (District Plan, p.18-19). General objectives relevant to roads include:

District Plan Objective LU 4) – “to maintain and enhance the amenity values that make the district a pleasant place to live in and visit” – this sets an overall aim towards which the landscape of roads can make a significant contribution

District Plan Policy and Objective LU 7 (a) – “safeguarding soil quality”

Objective LU 8 – “maintaining and enhancing rural character and amenity”

Objective LU 9 – “protecting the quality of the district’s outstanding landscapes”

The plan also notes the value of distinguishing the character of different areas and zones, such as maintaining a clear distinction between the character of urban and rural landscapes.

Specific objectives include “a green, well treed appearance... wherever possible on streets and public areas” in the Residential Zone and the Village Zone (Objective LU12 iii), p.39). Even in industrial areas, the District Plan notes that “Streetscape values (particularly on main roads) are enhanced by having landscaped areas” and implies the desirability of screening unsightly aspects of industrial zones (Objective LU19 i) and iii), p.46).

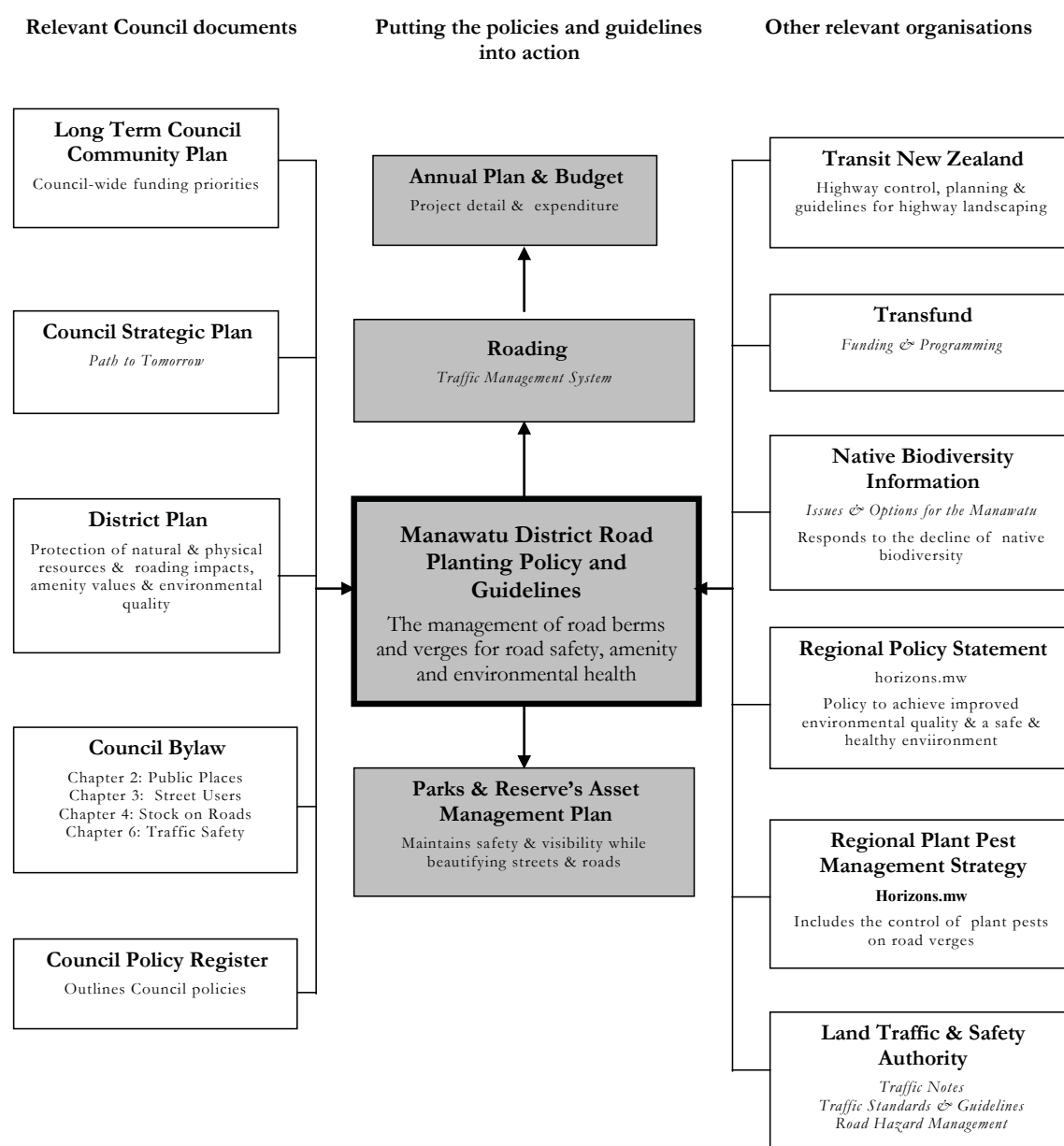
1.2.11 Regional Policy Statement (horizons.mw)

The Regional Policy Statement (RPS) includes issues and policies for the regional land transport network. It recognises the same basic environmental values and concerns as the District Plan, including the adverse effects that can arise from the transport systems on the natural and physical environment (RPS, Issue T1. p.242), especially in urban areas. These effects include noise and air pollution and effects on amenity and cultural values. The RPS also identifies the potential for promoting “walking and cycling as appropriate transport modes” (RPS, p.243). The accompanying policy is “To promote a land transport system which minimises any adverse effects on amenity values and outstanding landscapes and features”

1.2.12 Relationship of this document with other plans and documents

The policies and guidelines sit within a wide range of district, regional and national plans and documents as illustrated below. Putting the policies and guidelines into action (refer figure 4 on the following page) shows Council's process when implementing capital works related to these policies and guidelines.

Figure 4 Relationship with other plans and documents





Objectives

2. Objectives

There are two major objectives for these policies and guidelines:

1. The safe, efficient operation of the district's roads and associated utilities
2. The environmental health of the district

The aims are to balance the needs of these two objectives, and in doing this, to make a positive contribution to the environmental amenity and ecological health of the district's urban and rural landscapes. This project is based on the premise that roads can have multiple uses and functions; that they can, in addition to their transport function, also provide for environmental functions and make a significant contribution to the amenity of the landscape in which we live. Roads can be a valuable contributor to the physical and cultural landscape.

2.1 THE SAFE AND EFFICIENT OPERATION OF THE DISTRICT'S ROADS

The vegetation of road berms and verges affects road safety and the ease and economy of road reserve management in a number of ways. The primary concerns of road management are:

2.1.1 Visibility

Visibility for drivers, cyclists, pedestrians and other users is sometimes obstructed by the growth of roadside trees and shrubs. The guidelines show how new planting can avoid interference with visibility. Figure 5 (p.18) illustrates some of the typical locations where visibility distances affect safety.

2.1.2 Planting for road safety

Well positioned planting can help drivers to 'read' the road ahead and focus their attention on changes in the road environment. This reduces the chance of sudden changes taking the driver unawares and allows them to adjust driving behaviour to suit the character of the road. Planting can be used to indicate hazardous sites such as junctions and showing the alignment of roads. Planting that enhances visible interest without providing distractions helps to keep drivers alert. can help to reduce distractions by screening dangerous background messages such as misleading road alignments and distracting views. Planting can also help reduce distractions by screening dangerous background messages such as misleading road alignments and distracting views.

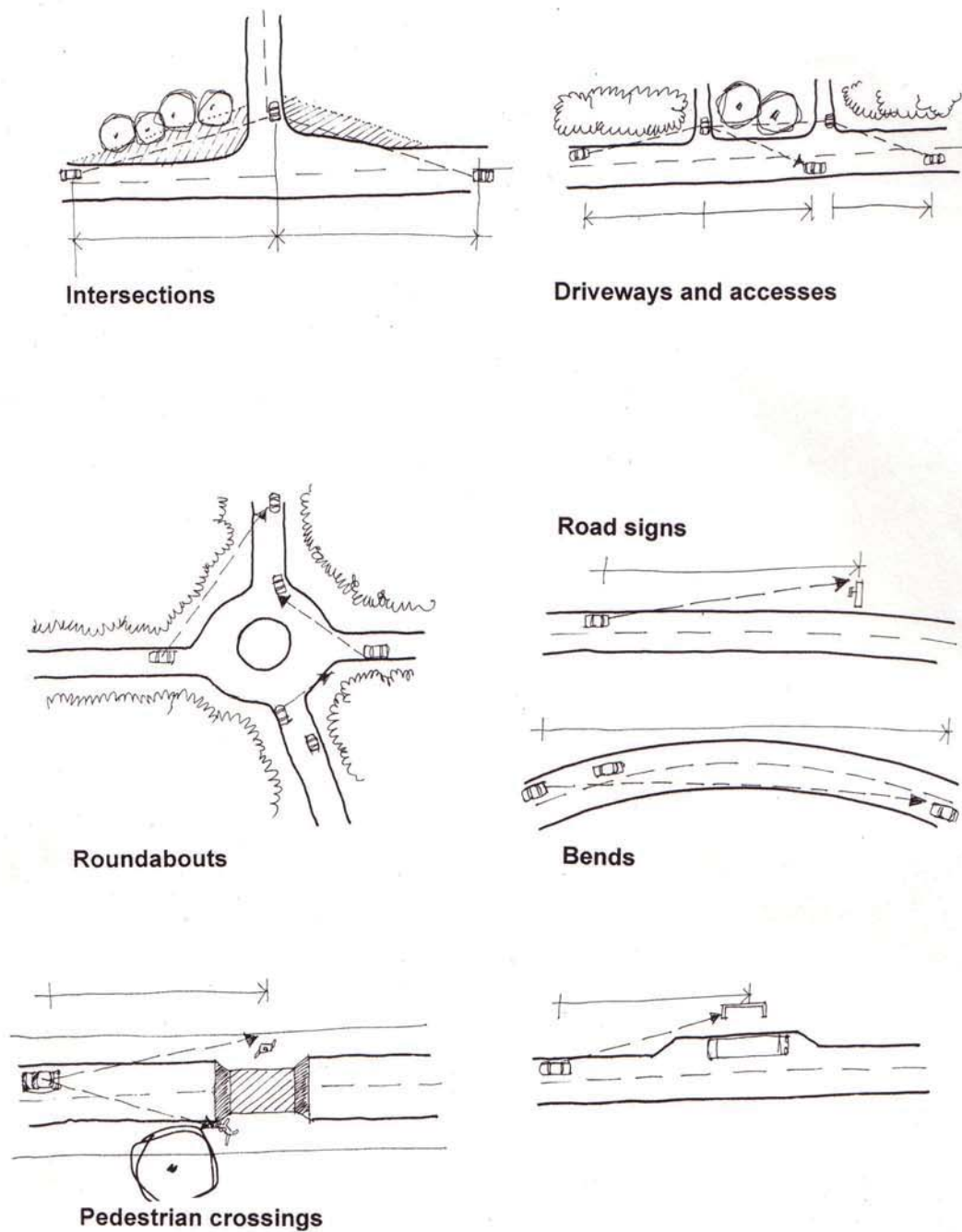


Figure 5 Typical locations where visibility distances affect safety

(Redrawn from Traffic Authority of New South Wales May 1987)
 Note these plans are not to scale and the sight lines are indicative only

2.1.3 Physical obstruction

Trees and shrubs that have been planted too close to the road or footpath encroach upon it and can cause obstructions. They then need to be cut back to allow proper use of the road by pedestrians and vehicles. It is common for plants in private land, including farmland and gardens, to grow over the road reserve. In some cases this causes serious obstruction. The pruning of this vegetation is the responsibility of the owner of the vegetation. The guidelines include methods for ensuring that new planting does not result in this problem.

2.1.4 Collision with trees in run off road accidents

Collision with objects can cause serious accidents and damage to vehicles that have lost control and left the road. Structures such as lighting columns, signs and so on, installed on the road berms are frangible, that is, they give way upon severe impact. If trees with substantial trunks are present on the road reserve they can be struck by vehicles that have lost control and left the road. This danger is greatest on bends but is also present on straight stretches. The guidelines recommend types and arrangements of planting that has properties of frangibility. Figure 6 (p.21) illustrates some of the typical locations where run off road accidents occur.

2.1.5 Shading

Shading of the road surface can prolong frost on the road on winter mornings and a wet surface at other times of the year. This can be hazardous, especially if drivers do not anticipate a sudden change to slippery road conditions. This kind of shading results from trees and large shrubs that cast shadow on the road during the morning. It will occur if dense, tall vegetation is growing to the north east of the road. The guidelines describe how planting can be designed to avoid shading where it may cause dangerous road conditions.

2.1.6 Weed control

The seasonal growth of grasses and other herbaceous roadside vegetation demands extensive maintenance where they obstruct visibility and where they interfere with the working of roadside drains by causing silting. The total area sprayed with herbicide twice each year is considerable and this study explores ways of reducing the extent of spraying necessary and the visual and environmental impact of roadside herbicides.

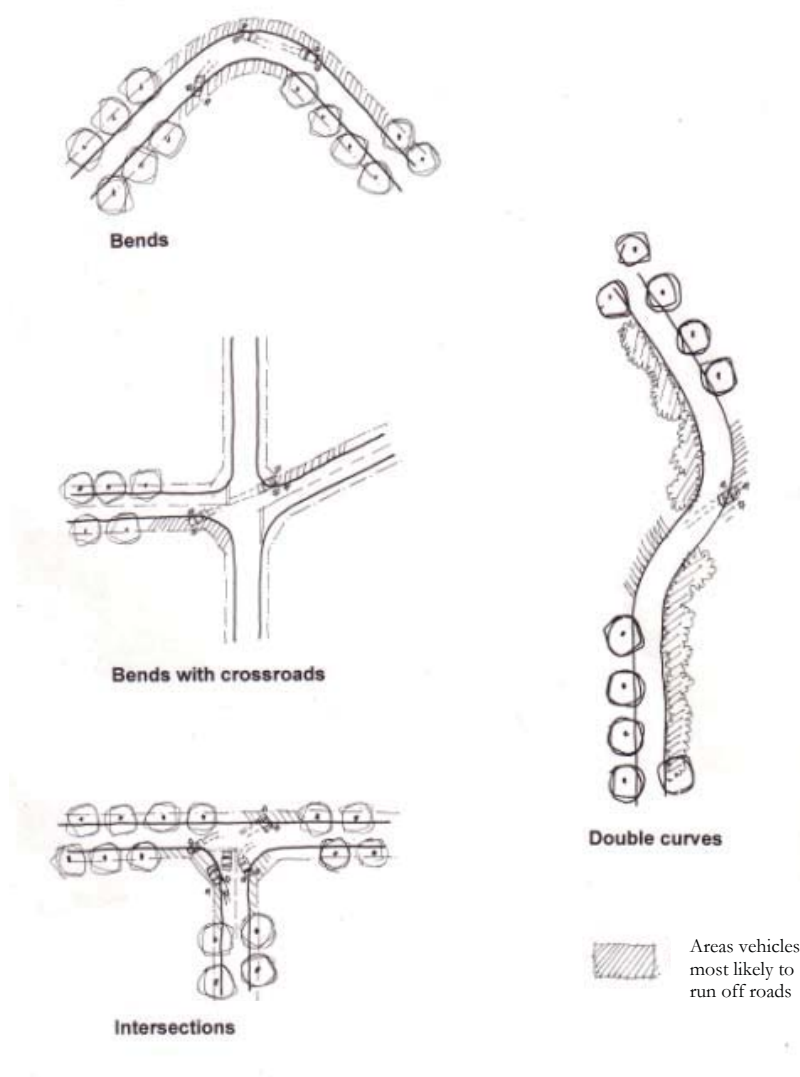


Figure 6 Common locations for run-off-road accidents

(Redrawn from Traffic Authority New South Wales May 1987)
 Note these plans are not to scale and are indicative only

2.1.7 Interference with street lighting

The canopy growth of trees can interfere with the effectiveness of street lighting, power supply poles and wires or auxiliary equipment. The guidelines describe tree selections and management techniques that avoid or reduce likely interference.

2.1.8 Drain maintenance

Roadside drainage is essential for the protection of the road structure and for maintaining safe driving conditions. The growth of vegetation can interfere with their operation and is controlled by herbicide application and mechanical clearance. The areas of spraying are extensive and detract from the appearance of the roadside landscape. The guidelines describe ways in which drains might be designed to allow more visually acceptable maintenance.

2.1.9 Road alignment

The ease with which drivers can read the alignment of the road ahead makes an important contribution to road safety. If a bend is situated on the top of a rise or if, on flat land, the road has been built up on fill to achieve the required camber at a sharp bend, it may be difficult to anticipate the change in direction especially at night. In some cases on rural roads the main route turns or bends while a minor route or driveway continues ahead. These alignments can be particularly hard to read after dark. The guidelines propose planting that helps the driver to read the road ahead.

2.1.10 Physical damage

Trees can, in some cases, cause direct physical damage to footpaths, kerbs, road structure, and underground or overhead services. This usually occurs when trees have been planted close to the structure concerned and are vigorous species. It should be noted that some tree species that are not particularly large growing may have very vigorous root systems that extend close to the ground surface and can cause this kind of damage. Cherry trees are a good example of small trees that are sometimes planted in unsuitable locations because their rooting habit is not understood. The guidelines describe planting design and tree management that avoids or reduces this damage.

2.1.11 Plant selection and planting locations

In many cases problems result from the combination of unsuitable plant species and poor

planting locations. The costs of removal or pruning the trees and shrubs that cause these problems are a direct result of the planting without enough regard for the effects on the operation of the road. Many of the guidelines in this document will focus on species choice, planting design locations and establishment techniques that are appropriate on and adjacent to roads. In addition to planted vegetation, self-sown trees and shrubs can cause problems, but these represent the minority of cases. Guidance for the management of self-sown, woody vegetation is given. Policies seek the integration of planting with road alignment, road berm drainage, ground form, lighting and signage and utility services.

2.1.12 Fire mitigation

Planting design must consider the potential role of vegetation in the reduction or promotion of fire risk in the case of road accidents.

2.2 THE ENVIRONMENTAL AMENITY OF THE DISTRICT'S ROADS

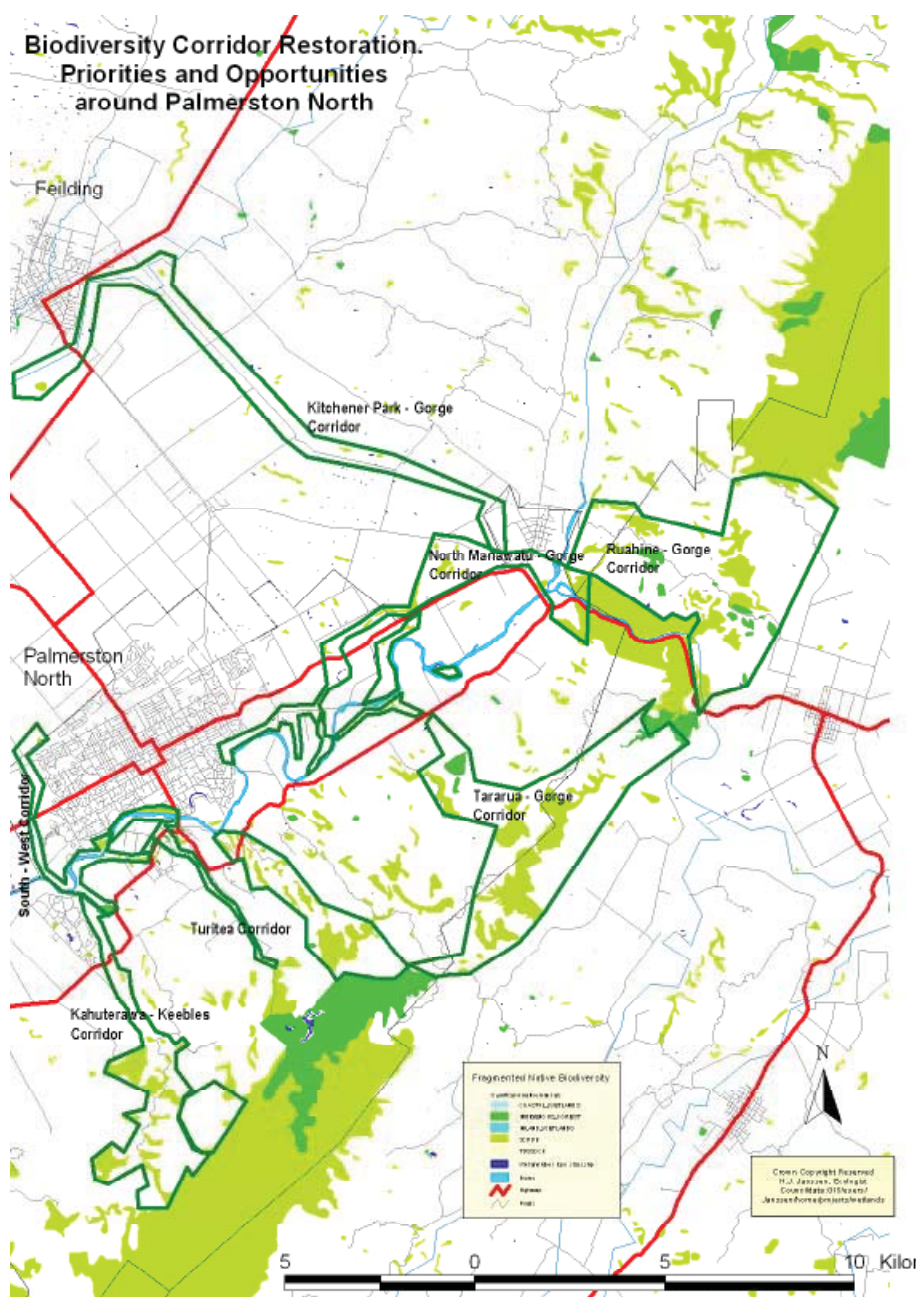
Investigations of existing practice and literature indicate that there are three main areas where planting can contribute to the quality of the roadside environment. These are bioengineering, ecology/wildlife management, and visual/cultural amenity. The contributions can be summarised as follows:

2.2.1 Bioengineering

The main roles of bioengineering on roadsides are improved drainage performance and reducing erosion and instability. Ground water quality can be protected by the use of bio-filtering methods such as 'reed beds' and filter drains, provided that the required run off rates can be accommodated. Sediment and pollutants can be removed from run off. Planting of cuttings, banks and other steep grades can help with stability and so minimise soil erosion, dust and silting.

2.2.2 Managing for ecology and wildlife

Although roads consist of mostly narrow strips of land their total size is significant, and their linear nature allows them to play a vital linking role in habitat development. They can assist regional bio-diversity by developing corridors to link larger habitats and provide seed sources in areas where there may be little other native vegetation. A good example of this is provided



Location of the proposed Kitchener Park – Manawatu Gorge Biodiversity Corridor

by the biodiversity corridors currently proposed by the Regional Council. These include the Kitchener Park-Manawatu Gorge Corridor that follows the Reid Line E Road and is intended to provide a link between the forests of the Ruahine ranges and the remnant plains forest found in Kitchener Park.

Roads that follow river courses often provide good opportunity to reinforce habitat corridors because river courses are likely to already provide a higher frequency of habitat sites and these

can be strengthened and linked by planting on road berms, rest areas and lay-bys. In other areas roads can provide a small but valuable refuge for indigenous flora and fauna within a productive landscape. In some cases these can be special habitats such as road cuts or steep banks which can sometimes support rare or unusual species.

On the negative side, roads can also provide corridors for the spread of noxious weeds, but good weed management and preventative care can help to avoid or reduce this. Roads give the opportunity to establish protective native edges to bush remnants and indigenous forest and thereby to reduce infestation of those remnants by weeds.

Road construction materials and machinery involved in road repair projects and road berm maintenance have the potential to disperse weed seeds. Establishing methods of preventative care by checking materials for contamination, using locally sourced materials during roading operations and cleaning equipment during road and road berm maintenance will reduce the risk of weed dispersal.

2.2.3 Visual, cultural and microclimatic amenity

Visual amenity is often the primary reason for roadside planting. It may aim to ‘beautify’ a residential or urban street, an important route, or to form part of a larger scale town or village upgrade project. As well as this, street and roadside trees are planted for the shelter they give and summer shade, and for historical, commemorative and community reasons.

The Council already recognises a number of ‘Heritage Trees’ in the District Plan. Further recognition could be given to the amenity, social and cultural importance of established trees on road berms to provide for their continued protection.



The Road Landscapes of the Manawatu District

3. The road landscapes of the Manawatu District

What follows is a brief description of the district's road network and its distinctive rural and urban landscape types, sufficient to show that different approaches to road reserve planting are beneficial in different parts of the district. The landscape types will be described first so that the road types can be discussed in the context of the landscapes through which they pass.

3.1 LANDSCAPE CHARACTER TYPES

The district has a number of distinct landscape character types including urban and village settlements, agricultural landscapes, significant areas of indigenous vegetation and areas of special or outstanding landscape quality. At the regional scale, horizons.mw identifies five main 'landform suites' in the Manawatu – Wanganui Region (refer the map in horizons. mw, RPS, p. 72, a detail of which is reproduced on the facing page). All of these are represented to a greater or lesser extent in the Manawatu District. These are based on the geomorphology and soils of the areas and this is reflected in topography, vegetation, land use and landscape character. The five 'landform suites' are:

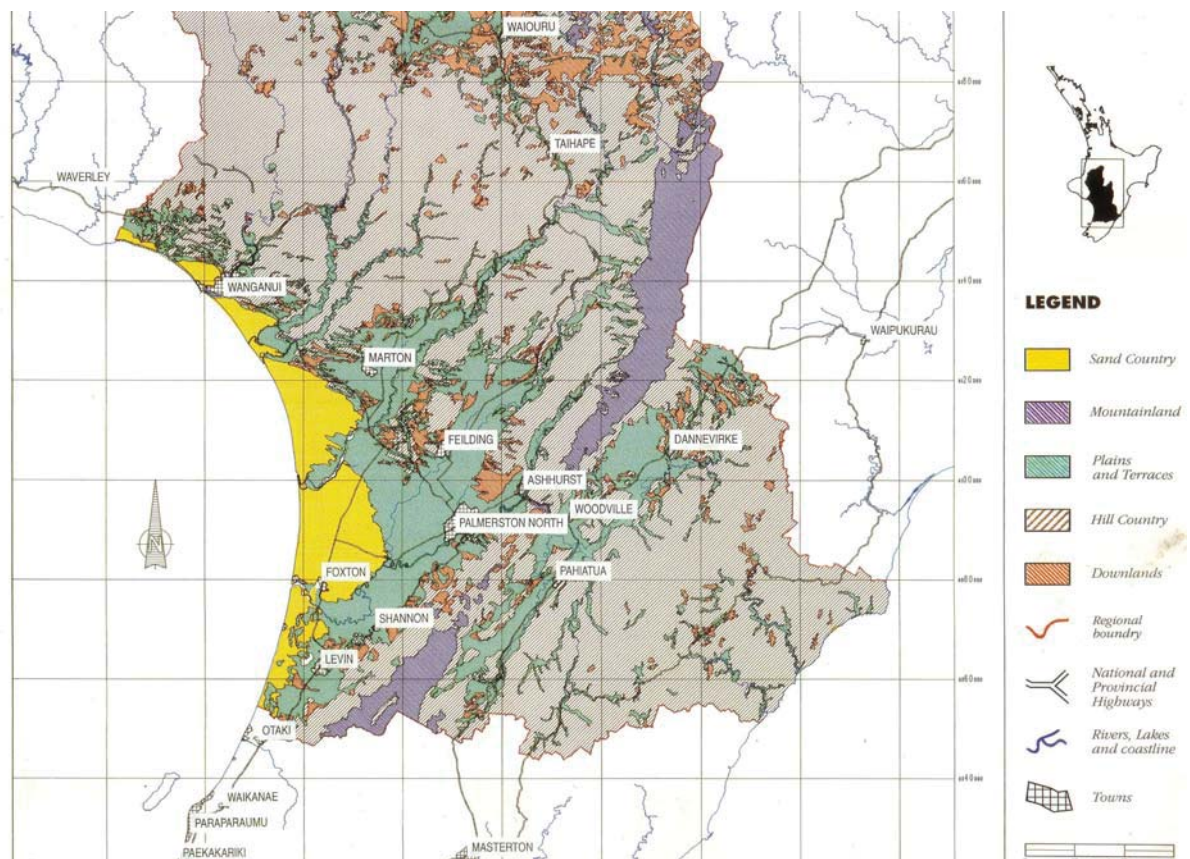
Sand Country. This includes: fore dunes, stable and unstable dune systems, and sand plains.

Mountainland. This comprises the mountain ranges and does not generally have public road access. They do, however, provide the backdrop to many important views throughout the eastern parts of the district.

Plains and terraces. These are generally clay and other alluvial lands of less than 3% slope, and are the most productive and versatile land in the district.

Hill Country. Hill country, defined as land with slopes greater than 15%, characterises a large proportion of the district.

Downland. This is rolling or strongly rolling land with slopes up to 15% which supports pastoral activities and some cropping.



‘Landform suites’ in the Manawatu District, from horizons. Mw, RPS, p.72

Landscape character types are based on the ‘landform suites’ and the visual and ecological character of the landscape. They are a product of geology, climate, land use, buildings and transport elements. The landscape character types of the Manawatu District are:

3.1.1 Coastal sand country

This includes the dune lands and small areas of the sand plain where it comes within the immediate direct influence of the sea. The dune lands (mainly tertiary dune formations) are typified by flat areas and slacks interspersed with steep sided dunes that are commonly planted in exotic forestry. Much of the land between the dunes is typically in small scale production or ‘lifestyle’ smallholdings. This landscape is dominated by farm forestry with exotic species, especially *Pinus radiata* (Monterey pine) and small to medium scale fenced fields containing stock and smallholding activities. Views from the road are generally restricted to short and medium range. Very little remains of the original native vegetation.

The role of shelter belts in helping to control wind erosion is important and the road land may provide further opportunities for linear shelterbelt planting. This would be especially valuable if planting were to consist of predominantly native trees and shrubs.

3.1.2 Plains landscape

This includes both the sand plains and the alluvial plains. The sand plain is, as the name suggests, predominantly flat. It is intensively farmed with extensive crop fields providing a distinctive feature and is characterised by a windswept medium to large scale landscape, subdivided here and there by shelter belts of Monterey pine, *Cupressus macrocarpa* (Monterey cypress), poplar species and willow species. Planting or native colonisation of the roadsides is very rare and, where it does occur, is confined to very small areas. To the casual observer travelling by road there is very little indication of the underlying natural character of the sand plain.

The western alluvial plain is contiguous with the sand plain and is also typified by intensive grazing and some crop production. They include highly productive class I and class II agricultural land (as classified in the Land Resource Inventory). In the Western part of the district the general visual character of this land form type is similar to the sand plain country, though the native vegetation on the sand plain would have included more coastal forest species such as kohekohe.

Agricultural shelter trees and occasional specimens and groups of species such as plane trees, Monterey cypress, Monterey pine and eucalypts dominate roadside vegetation. In one or two locations natives have been planted in place of exotics to form field boundary shelter hedges. Totara, for example, has been used in this way, mixed with shrubby species including taupata, karo and houhere. In a small number of other locations the local community or adjacent landowner has carried out diverse planting of pioneer native trees and shrubs on the road reserve. These plantings have established and spread to give a semi-natural appearance.

Like the coastal sand country, the plains landscape benefits greatly from whatever shelter can be provided. The sandy soils in particular are vulnerable to wind erosion. To establish linear shelter belts of predominantly native species on road berms in this area would contribute a great deal to the environment and microclimates of the plains.



View of plains landscape from road

3.1.3 Downlands

Downlands are a feature of the district's landscape with their steeply rounded forms highlighted by uniform grass cover and general openness although confined to a smaller area than the plains and hill country. The view from the road is commonly attractive due to the variety and distinctive character provided by the topography. There are occasional remnants of native vegetation including lines of totara which follow some of the stream courses. Planting or colonisation of the roadsides is uncommon and confined mainly to cuttings and very small areas where native scrub may persist.



General view of downland landscape

3.1.4 Hill country

This coincides with the hill country landform suite. Hill country is extensive in the north of the district and supports a diversity of use and vegetation including pasture, production forestry, exotic shrubland, secondary native scrub and native forest remnants. The role of native vegetation is similar to that in the valleys; native scrub and young forest has colonised steep slopes by the side of the road and at a distance visible from the road and forms a characteristic part of this landscape.



View of steep roadside in hill country with native vegetation

Species that are common in these steep roadside areas include: manuka (*Leptospermum scoparium*), karamu (*Coprosma robusta*), ti kouka (*Cordyline australis*), koromiko (*Hebe stricta*), tutu (*Coriaria arborea*) (poisonous), kotukutuku (*Fuchsia excorticata*), mahoe (*Melicytus ramiflorus*), mamaku (*Cyathea medullaris*), kohuhu (*Pittosporum tenuifolium*) and the naturalized shrubs and trees: gorse (*Ulex europaeus*), broom (*Cytisus scoparius*), buddleia (*Buddleia* species), barberry (*Berberis* species) and Monterey pine (*Pinus radiata*). The mix of species present depends on the aspect and moisture content of the site. Native ferns, especially *Blechnum*, are common around the edges of scrub on the moist banks. Exotic shrublands dominated by gorse and broom are also common in views from the road.

3.1.5 Terraced valley landscapes

There is a distinction between the general extent of hill country and the landscape of the terraced river valleys that lie within the hill country. These are a composite of types (mainly alluvial terraces and hill country) but they are experienced as integral landscape units. They include the Pohangina, Oroua and Rangitikei Valleys and some of the smaller valleys in the north west of the district.

The close integration with the river course, terraces and cliff faces and the steep hill country of the valley sides mark this landscape. It is a smaller scale landscape than the plains in the lowland areas nearer the coast. The variety of land form and vegetation cover is greater. Secondary native scrub and young forest is common on the steep slopes by the side of the road and at a distance visible from the road. It forms a characteristic part of this valley landscape.

The Pohangina Valley, Rangitikei Valley and the Upper Oroua Valley are recognised in the Regional Policy Statement as three of the region's outstanding landscapes. These valleys are noted for the diversity of their landscapes, combining ordered cultivation of the land with areas of wilder character and native forest that provide a link with the valley's past (refer Pohangina Valley Landscape Assessment by Promised Land LTD. 1996 for a fuller description of the visual landscapes typical of this and other settled valleys).



View of terraced valley landscape in the Pohangina Valley

3.1.6 Mountainlands

These coincide with the Mountainland landform suite. They are of high conservation value but not directly relevant to the present study because they do not include public roads.

3.1.7 Urban areas

These are distributed through the land form suites but are commonest on the plains and terraces type. They include Feilding and the other smaller settlements of the district. The visual landscape of these urban areas is characterised by wide streets with generous verges of mown grass. Vegetation consists of mixed shrubs and small trees of private gardens plus street trees that are commonly exotic deciduous species.

In Feilding, oak, ash, and plane trees are the most common street trees of any stature; smaller street trees include virgilians, kowhai and camellias.

Some towns have developed characteristic planting themes that reflect the climate, soils and history of the town. For example, Apiti in the Oroua Valley is planted with chestnuts and magnolias, Kimbolton provides good conditions for rhododendrons and other ericaceous trees and shrubs, the Pohangina Valley is famous for autumn colour particularly of its sweet gum and ginkgo. At Himatangi Beach Norfolk Island pines provide a feature. There are fine oak trees in the road berm at Halcombe, and recent planting of cherries has been successful in Rongotea.

Many of these street trees in the various urban areas are assets that make a significant contribution to environmental amenity, provide visual cohesion and strengthen the individual character of towns. They should be formally recognised and protected to ensure that they are not unnecessarily lost or damaged.



View of street trees in an urban environment

3.2 DESCRIPTION OF THE TYPICAL LANDSCAPE OF THE ROAD NETWORK

The district's road hierarchy consists of the following categories. These are shown on the maps in figure 7 (pages 37-38).

3.2.1 National routes

State Highways 1 and 3 are administered by Transit New Zealand, form part of the national strategic network and carry the majority of the through traffic. Within the Manawatu District the national routes are confined almost exclusively to sand and alluvial plains. The roads are wider than local roads and include long stretches of broad grass verges between the shoulder drain and boundary fence. These wide verges are usually on one side of the road and more than ten metres wide. The national routes also include rest areas, some of which include extensive areas of mown lawn (for example the Mount Stewart Memorial Rest Area). The entries to some towns are marked by threshold treatments such as kerb extensions that create planting areas for low ground cover plants (for example, Sanson).

The functional aspect of road engineering and management dominates the visual environment of the national routes. Signs, reflectors, areas of herbicide treatment, lighting, power poles, guardrails and farm fences make up the driver's roadside view and frame the landscape through which the traveller is passing. There is very little, if any, planting or spontaneous native tree and shrub vegetation. What planting and other amenity works do exist are to be found almost entirely within rest areas. Overall, the road berms have the character of a 'wasteland' that is being kept in check in order to maintain the functioning of the highway and other utilities occupying the route. The approach is similar to that employed alongside railways. In general, highway routes do not reflect the character of the country through which they pass.

3.2.2 Regional arterial routes

These also carry through traffic, in this case between districts and regions. They are State Highways 54, 56 and 57 administered by Transit New Zealand, plus the Saddle Road–Ashhurst–Halcombe route between Manawatu gorge and Wanganui. These roads have some of the features of the national routes but are generally smaller in scale. In some cases there are extensive areas of roadside land such as the wide grass verge alongside State Highway 54 between Feilding and Cheltenham. This is over twenty metres wide for a distance of

approximately ten kilometres. Other roads such as Halcombe Road include berms of varying width and gradient. Some of these areas are extensive and are being colonised by bracken and native scrub. Others are rest areas, informal ‘pull-ins’ and lay-bys with little or no existing planting. The visual and ecological character of the road berms is similar to the national routes.

The Wellington–Auckland railway follows close to the regional arterial routes as it passes through the district. There is often railway land between the road and the rail tracks and this is commonly covered by rough grassland or weedy exotic scrub in rural areas, and mown grass with scattered specimen trees in urban areas.

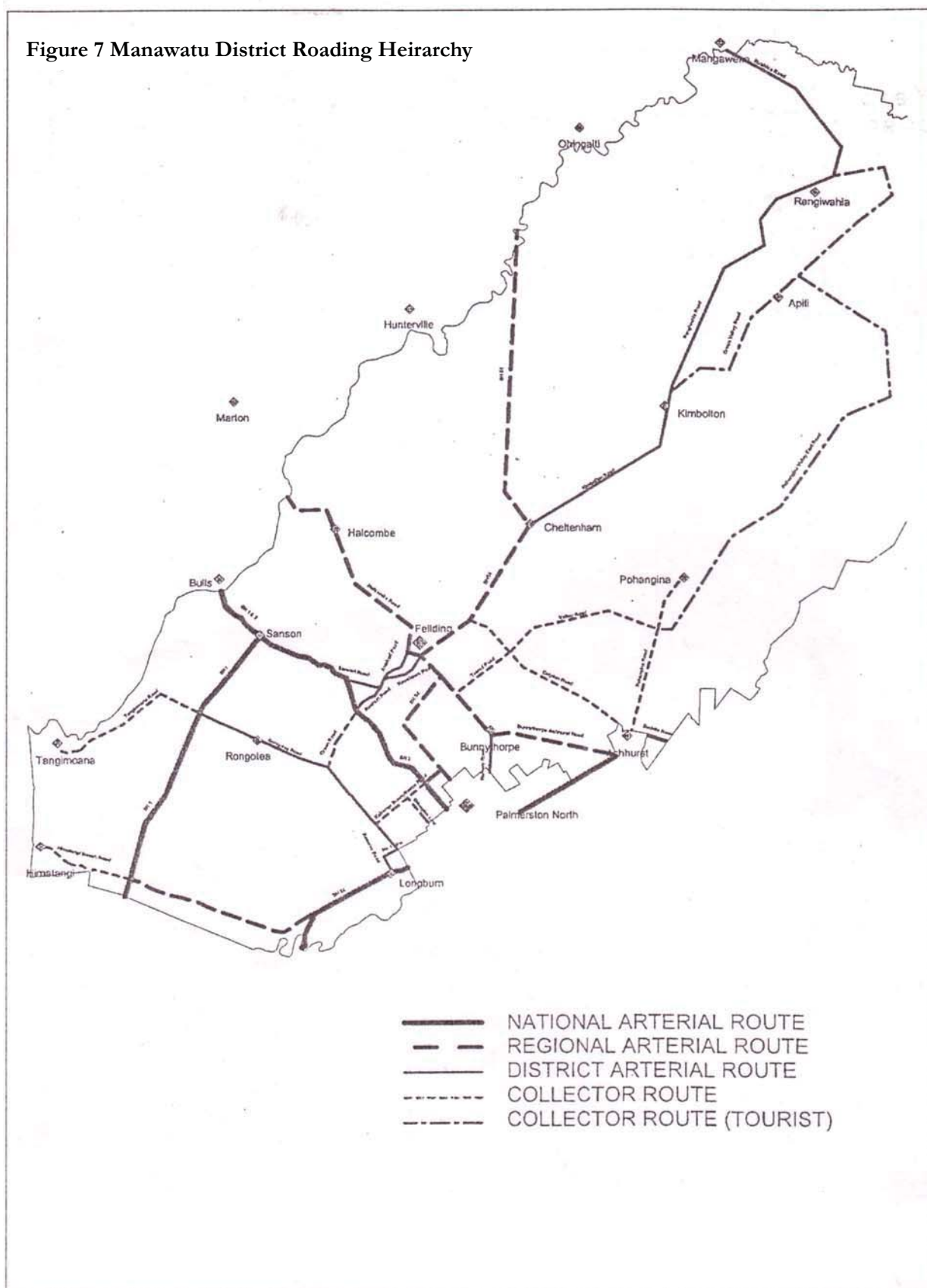


Lay-by on regional arterial route

3.2.3 District Arterial routes

These are strategic routes within or between districts and cross plains and hill country. Examples include the Rongotea–Longburn and Cheltenham–Mangaweka links. Berm widths tend to be less than on the regional routes though can be substantial in places. The largest areas of open grass and weed swards are found where the road has been re-aligned, and at corners, bends and junctions. In some cases ‘T’ junctions are split leaving a triangle of land within the three roads at the junction. These can be substantial in size and in some cases are fenced. All are mown regularly and fence lines are sprayed with herbicide. Herbicide treatment dominates the view at certain times of the year, and in the hill country and valleys sprayed weedy vegetation can contrast disturbingly with native vegetation on or adjacent to the road reserve.

Figure 7 Manawatu District Roding Heirarchy







Rest area on regional arterial route

3.2.4 Collector routes

These are local routes between population centres and activities. They include property access in many areas and routes to the beaches and tourist routes such as the Apiti-Rangiwahia route. Collector routes share many features with district arterial routes. Some are used regularly by tourists and pass through and within sight of varied and attractive country, including some of the ‘outstanding landscapes’ such as the upper river valleys. In these hill country areas there is more colonisation of native trees and shrubs on berms particularly where these are steep or include exposed rocks, and are close to native seed sources. Such patches of native scrub are characteristic of the roads in these districts. The roadside visual character of collector routes is similar to district arterial routes.

3.2.5 Local roads

These roads primarily serve local properties and provide farm access for stock and machinery. They are very similar in landscape to collector routes and are dominated in their character by the kind of landscape through which they pass. In the lowland plains and downs landscapes, berms are typically covered with a coarse grass-weed sward and only very occasionally planted in shrubs or tree species seen. In hill country berms have a similar character to the other hill country routes with native scrub common on banks and cuttings, farm plantings of willow, poplar and conifers, and some larger specimen exotic deciduous trees also forming part of the roadside landscape.

3.2.6 Unformed roads

There are extensive lengths of unformed road in the Manawatu District. These are commonly found in hill country associated with the river esplanades and may also be found on flat land. Unformed roads are typically twenty metres wide and can be straight. At present much of this area is used for grazing and is not necessarily fenced off from adjoining land.

The opportunity may arise for the Council to carry out planting along these unformed roads at some time in the future. If this proves to be the case, care should be taken to ensure that any planting carried out is in keeping with the best aspects of the character of the local landscape and the Landscape Character Type in which it is located (refer 5.1). The use of extensive linear strips of constant width to establish commercially managed exotic forestry would be conspicuous if the landscape in which it is set is predominantly open and characterised by the small scale of most of the forestry operations at present. Council forestry operations may be more appropriate in landscapes which are already typified by such planting and which are of low visual sensitivity.

3.2.7 Common features of rural roads

The portion of the road reserve between the edge of the road surface and the drainage ditch or swale is generally a clear zone that is devoted to signage, reflectors and drainage provisions. This area is commonly covered with a combination of road metal and grass-dominated sward. Much of the sward is treated with herbicide at regular intervals and is thus patchy or dead. The remainder is kept short by mowing. Large areas around signs of various heights are commonly also treated with herbicide.

The maintenance of roadside surface drains is carried out to prevent silting. The growth of herbaceous vegetation in the drain channel is regularly sprayed with herbicide. The channel is physically cleared out and re-graded when necessary. The kind of growth in a drain channel depends upon the amount and persistence of water and the depth of the channel. In many cases it consists simply of the general mix of coarse grasses and weed that covers most rural road verges on agricultural areas. In some places, where spraying has not eliminated them, specific wetland species such as raupo are present. But most of the drains contain dead vegetation for much of the year.

The part of the verge between the drainage ditch and the boundary fence is mown less frequently or not at all. This area can be steep, roughly undulating and include banks and

cuttings. This is the part of the reserve that most often contains self sown or planted trees and shrubs. It may also include harakeke (New Zealand flax), native bracken, raupo and toetoe. However, it is common for this part of the road reserve to be colonised by invasive exotics such as pampas grass, blackberry, buddleia and gorse.

Tree planting close to the boundary in adjacent fields can have a large influence on both the functioning and the appearance of the road in rural areas. This planting commonly consists of row planting of vigorous willows, poplars, macrocarpa and radiata pine. In addition oaks and plane trees are a familiar component of field corners close to the road and property entrances.

3.2.8 Common features of urban roads

The urban road environment has different demands to that of the rural road. Where the various road types pass through urban areas the vegetation management issues and the objectives are different.

The District Council's Parks and Reserves service maintain urban road berms and a substantial amount of tree planting has been carried out at various times in the past. The environmental benefits of this are now being appreciated as avenues reach mature size and other street trees also grow to be in scale with the urban streetscape. Street trees are found in many of the district's towns and villages, but parts of Feilding are particularly well endowed with street plantings. Mature avenues of claret ash, oak and plane are characteristic of a number of the main routes into and around the town, including South Street, the south end of Kimbolton Road, and North Street. These are valuable for the scale, continuity and seasonal attractions they bring to the urban scene.

In urban areas with grass berms such as residential areas, herbicide treatment is carried out where the adjacent owner does not maintain the grass edge and these brown strips are an unattractive feature of the streetscape, especially in the period after application. This raises the question of whether the treatment is essential for the safeguarding of the road and channel drainage or whether it is carried out to meet a public expectation of tidiness.



Policies

4. Policies

The following policies will be employed to meet the objectives outlined in section 2. Guidelines for the implementation of these policies are found in section 5.

4.1 APPROPRIATE PLANTING

Vegetation management and new planting will take place so that they do not conflict with road safety and utility services.

4.2 CONTRIBUTIONS TO ENVIRONMENTAL VALUES

The existing vegetation of roads will be managed and new planting carried out so that it advances the ecological, visual, cultural and microclimatic values of the road environment.

4.3 REDUCING THE ADVERSE EFFECTS OF ROADS

Planting and other vegetation will be used where it can help alleviate or avoid adverse effects caused by roads in the urban and the rural environments. In particular vegetation will be used for the following purposes:

4.3.1 Bioengineering

Vegetation management and Bioengineering planting will be used to assist with ground stability on steep slopes, to reduce surface run off and wind erosion of soils, and to reduce the need for the use of herbicides.

4.3.2 Plant and animal habitat

Vegetation management and planting will be used to reconstruct lost habitat, improve existing habitats, create new roadside wildlife habitats, and to contribute to habitat links and wildlife corridors through agricultural and urban land.

4.3.3 Visual amenity

Vegetation management and planting will be used to improve views from the road and of the road, and to reduce some of the visual effects of traffic, signage, utilities and engineering structures, road management practices such as herbicide use, and of the road itself. Sites will be assessed relative to their particular location.

4.3.4 Other environmental benefits

Vegetation management and planting will also be used to improve amelioration of noise pollution, carbon dioxide pollution and to filter dust and airborne chemical pollutants such as heavy metals and road and farm run off.

4.4 REFLECTING LANDSCAPE CHARACTER AREAS OF THE DISTRICT

Road berm planting will aim to reflect, reinforce and enhance the distinctive, positive, environmental qualities of the landscape character areas of the district including urban areas. Visual, ecological, cultural and historical criteria will be established for species selection and management practices in the identified character areas (refer 5.1).

4.5 PLANT BIODIVERSITY

To maximise biodiversity locally sourced native plant material will be used where possible.

4.6 REINFORCING BIODIVERSITY CORRIDORS

Roads that lie within the biodiversity corridors such as those proposed by the Regional Council will be planted with selected tree and shrub species that will assist in connecting habitats along biodiversity corridors.

4.7 PRIORITIES AND LOCATIONS FOR PLANTING

The following types of planting and sites will be given priority when resources become available to carry out new planting. These are:

- Planting to improve legibility of road alignment and hazards (refer 5.7)
- Planting of rest areas and lay-bys
- Planting of thresholds and other traffic calming elements in urban areas (refer 5.8)

In addition planting will be carried out in the following locations to enhance the rural environment when the opportunity arises:

- Planting of wide berms or verges including areas at junctions
- Using selected spare road berms for environmental tree planting
- Planting on the berm between the drainage ditch or swale and the road boundary where this does not conflict with the function of the road or utility.

4.8 INTRODUCING SHELTER AND NATIVE VEGETATION TO THE COASTAL SAND COUNTRY AND PLAINS LANDSCAPES

The introduction of local indigenous planting will be given a high priority in the coastal sand country and the plains landscapes. The scale and character of attractive existing views will be maintained whilst developing a greater diversity in scale and visual interest.

Linear shelter planting of native trees and shrubs along road corridors will be carried out where the opportunity arises.

4.9 PLANTING FOR TIMBER PRODUCTION

Any forestry established by the Council for timber production or other forms of economic return will be planted and managed so as to combine the objectives of high visual amenity and ecological improvements with those of financial return. Care will be taken to avoid the adverse effects of extensive linear belts of regularly spaced exotic timber trees in an open landscape. Any forestry established would be of mixed species and multiple use, and accessible to the public for passive recreational enjoyment where practicable. The margins of any production forestry would be planted with native trees and shrubs as listed in 5.1.

4.10 RECOGNITION OF IMPORTANT EXISTING ROAD BERM TREES

Existing established trees that make a significant contribution to the environmental amenity of urban areas will be recognised and protected from unnecessary damage or removal during

engineering or construction works. Particular care will be taken when carrying out works to utilities and services in the road berms.

4.11 PLANTING IN URBAN STREET AND ROAD UPGRADES

Appropriate planting will be included in improvement works carried out to streets in urban areas.

4.12 COMMUNITY PLANTING INITIATIVES

Initiatives by local residents, neighbourhood groups and other community and environmental groups to carry out road berm planting will be supported, provided that the planting conforms to the guidelines and objectives in this policy. Special guidance will be provided on the implementation, management and maintenance of planting by community members and groups (refer to figure 3 p.10 for stages in developing a planting proposal). Memorial and donated plantings may require special procedures for approval.

In particular the Council will support initiatives by the local community to establish amenity planting on areas of grass road berm where space allows within rural settlements.

4.13 CONSULTATION WITH THE COMMUNITY ABOUT MANAGEMENT AND PLANTING ON ROADS

The Council will consult with the local community as part of the process of planning road berm planting and management. Consultation will include informing the local community about the Council's aims for the roads.

Local residents and businesses will be informed about major tree management work and proposed planting that is intended in their neighbourhood.

4.14 WEED CONTROL METHODS

Chemical herbicide application will continue to be used mainly for economic reasons. However, ways of reducing herbicide use will be tried and their effectiveness assessed.

Chemical herbicide application will be avoided adjacent to organically certified sites.

4.15 PREVENTING WEED SPECIES SPREAD

Road construction materials will be monitored for weed dispersal, and where the spread of weeds is likely to have an adverse effect on the ecological health of an area steps will be taken to eradicate the weed to prevent its spread.

Road machinery, when operating in an area with a known weed source that has an adverse effect on the ecological health of the district, should be cleaned to remove the potential weed source prior to operating elsewhere.

Roadsides will be monitored for the dumping of garden waste and offenders will be asked to remove rubbish if they can be identified. Should the dumping of garden waste on roadsides prove to be a significant issue an education programme will be instigated.

4.16 MANAGING PLANT PESTS

Plant pests growing in the road berm that pose a threat to high value indigenous vegetation will be monitored and controlled and where practicable will be eradicated.

An inventory of nuisance weeds associated with road berms and verges will be maintained and their impacts monitored.

4.17 ROADSIDE UTILITY SERVICES

Proposed planting will need to take account of the potential effects to existing utility services and maintain recommended clearances.

4.18 PLANTING AND MAINTENANCE OF PLANTING ON PRIVATE LAND ADJACENT TO ROADS

Plant species and planting positions on land adjacent to roads will not conflict with the needs of road safety and utility services.

The Council will work with landowners to enhance road safety opportunities and encourage appropriate planting where there is potential to compromise road safety. This is particularly important at intersections and bends where planting may reduce visibility or obstruct road or footpath safety (refer 5.2 and 5.3).

Such sites are opportunities to plant with frangible plants to reduce damage caused by vehicles leaving the road (refer 5.5) and to use planting to improve legibility of road alignment and hazards (refer 5.7) and Sensitive Sites

Sensitive sites will be protected, new sensitive sites identified and a database kept. The database will include sensitive sites identified on land adjacent to roadsides.



Guidelines

5. Guidelines

5.1 SUITABLE TREES AND SHRUBS FOR PLANTING

5.1.1 Purpose

To ensure that new planting of trees and shrubs carried out on or near road berms is successful, effective and is in keeping with the distinctive landscape character types of the Manawatu District. New planting should enhance the positive aspects of the existing landscape character and improve the sense of local identity.

5.1.2 Guidance

Lists of tree and shrub species are provided below for each landscape character area, and planting should be confined to these unless there is a strong reason for using others. This will ensure that new planting is both in character with the rest of the local area and is unlikely to cause problems to the operation and maintenance of the district's roads.

5.1.3 Typical solutions

Tree and shrub selections for road berms and verges and associated areas such as rest-areas are to be made from the following tables. Separate tables are given for each of the landscape character areas. Many species are common to various landscape character areas; others provide the distinctive elements of the vegetation in a particular area. Note that many of the slower growing, tall native forest trees, such as some of the podocarps and broadleaved species are not included on the lists. This is because they are best established at a second stage once conditions of shade and shelter have been established.

The trees and shrubs listed in the following tables represent a selection of species that are suitable for planting in this area. The choice for particular locations would need careful analysis of the detailed site ground and microclimatic conditions and it is recommended that expert advice is employed for detailed plant selection.

If locally sourced species are not available on the market, local seed collection will need to be carried out well ahead of planting projects. A period of 18 months is recommended to allow the growing on of plants in preparation for planting.

Coastal Sand Country

Table 5.1.1 Trees and shrubs for Coastal Sand Country Rural Roads

Shrubs/herbaceous Scientific name	Common name	Trees Scientific name	Common name
NATIVE SHRUBS (f)		NATIVE TREES	
<i>Cassinia leptophylla</i>	tauhinu, cottonwood	<i>Cordyline australis</i> (w)	ti kouka cabbage tree
<i>Coprosma repens</i>	taupata mirror plant	<i>Corynocarpus laevigatus</i>	karaka
<i>Coprosma robusta</i>	karamu	<i>Dodonea viscosa</i> (s)	akeake
<i>Coprosma lucida</i>	shining karamu		
<i>Cortaderia toetoe</i> (s) (w)	toe toe	<i>Griselinia littoralis</i> (s)	papaumu broadleaf
<i>Leptospermum scoparium</i> (s) (w)	Manuka	<i>Knightia excelsa</i>	rewarewa
<i>Lophomyrtus bullatus</i>	ramarama	<i>Kunzea ericoides</i> (f) (s)	kanuka
<i>Lophomyrtus obcordatus</i>	rohutu	<i>Melicope ramiflora</i> (m) (s)	mahoe
<i>Myrsine australis</i> (m)	red matipou	<i>Myoporum laetum</i> (s)	ngaio
<i>Olearia solandri</i>			
<i>Phormium tenax</i> (w) (s)	harakeke, flax	EXOTIC TREE	
<i>Pittosporum crassifolium</i> (s)	karo	<i>Chamaecytisus palmensis</i>	tree lucerne

In the tables, the species marked (m) are suitable for moist sites with a high water table

Species marked (w) are suitable for wet, swampy sites with standing water from time to time, as well as for moist sites

Species marked (f) are most likely to be frangible and all plants in the shrubs column are generally frangible

Species marked (s) are good for shelter planting in severe exposure

Table 5.1.2 Trees and shrubs for Coastal Sand Country Urban Roads

Shrubs/herbaceous Scientific name	Common name	Trees Scientific name	Common name
NATIVE SHRUBS (f)		NATIVE TREES	
<i>Cassinia leptophylla</i>	tauhinu/ cottonwood	<i>Alectryon excelsus</i>	Titoki
<i>Coprosma repens</i>	taupata, mirror plant	<i>Cordyline australis</i> (w)	ti kouka cabbage tree
<i>Coprosma robusta</i>	karamu	<i>Corynocarpus laevigatus</i>	karaka
<i>Cortaderia toetoe</i> (w) (s)	toe toe	<i>Dodonea viscosa</i> (s)	akeake
<i>Hebe elliptica</i> (s)	kokomuka coastal hebe	<i>Griselinia littoralis</i> (s)	papaumu broadleaf
<i>Hebe speciosa</i>	napuka	<i>Knightia excelsa</i>	rewarewa
<i>Leptospermum scoparium</i> (w) (s)	manuka	<i>Melicytus ramiflorus</i> (m) (s)	mahoe
<i>Lophomyrtus bullatus</i>	ramarama	<i>Myoporum laetum</i> (s)	ngaio
<i>Lophomyrtus obcordatus</i>	rohutu		
<i>Myrsine australis</i> (m)	red matipou		
<i>Olearia solandri</i>			
<i>Phormium tenax</i> (w) (s)	harakeke, flax		
<i>Pittosporum crassifolium</i> (s)	karo		
LOW GROUND COVER		EXOTIC TREES	
<i>Arctotis</i> cultivars		<i>Araucaria excelsa</i>	Norfolk Island pine
<i>Carex</i> species (m)	tussock sedges	<i>Erythrina crista-gali</i> (d)	Coral tree
<i>Coprosma</i> 'Hawera'		<i>Encalyptus ficifolia</i>	Red flowered gum
<i>Coprosma acerosa</i>	Sand coprosma		
<i>Coprosma</i> x <i>kirkii</i>			
<i>Gazania</i> cultivars			
<i>Muehlenbeckia complexa</i>	coastal pohuehue		
<i>Osteospermum</i> cultivars			

Species marked (m) are suitable for moist sites with a high water table

Species marked (w) are suitable for wet, swampy sites with standing water from time to time, as well as for moist sites

Species marked (f) are most likely to be frangible and all plants in the shrubs column are generally frangible

Species marked (d) are deciduous and may also be used at locations subject to winter shading

Species marked (s) are good for shelter planting in severe exposure

Plains Landscape

Table 5.1.3 Trees and Shrubs for Plains Landscape Rural Roads

Shrubs/herbaceous Scientific name	Common name	Trees Scientific name	Common name
NATIVE SHRUBS (f)		NATIVE TREES	
<i>Brachyglottis repanda</i> (m)	rangiora	<i>Alectryon excelsus</i> (m)	titoki
<i>Coprosma grandifolia</i> (m)	kanono	<i>Aristotelia serrata</i> (m) (s)	makomako
<i>Coprosma lucida</i>	shining karamu	<i>Cordyline australis</i> (w)	ti kouka, cabbage tree
<i>Coprosma parviflora</i> (w)		<i>Dacrycarpus dacrydioides</i> (w)	kahikatea
<i>Coprosma propinqua</i> (w)	mingimingi	<i>Griselinia littoralis</i> (s)	papaumu broadleaf
<i>Coprosma rhamnoides</i>		<i>Hoheria sexstylosa</i> (m) (s)	houhere, lacebark
<i>Coprosma robusta</i> (m) (s)	karamu	<i>Knightia excelsa</i>	rewarewa
<i>Coprosma rotundifolia</i> (m)		<i>Kunzea ericoides</i> (f) (s)	kanuka
<i>Cortaderia toetoe</i> (w) (s)	toe toe	<i>Melicope ramiflora</i> (m) (s)	mahoe
<i>Hebe stricta</i> (m)	koromiko	<i>Pennantia corymbosa</i>	kaikomako
<i>Leptospermum scoparium</i> (w) (s)	manuka	<i>Pittosporum eugenioides</i> (m) (s)	tarata
<i>Lophomyrtus bullata</i>	ramarama	<i>Pittosporum tenuifolium</i> (s)	kohuhu
<i>Lophomyrtus obcordatus</i>	rohutu	<i>Plagianthus regius</i> (m)	ribbonwood
<i>Myrsine australis</i> (m)	red matipou, mapou	<i>Pseudopanax crassifolius</i>	lancewood, horoeka
<i>Olearia virgata</i> (w)		EXOTIC TREE	
<i>Phormium tenax</i> (w) (s)	harakeke, flax	<i>Chamaecytisus palmensis</i>	tree lucerne

Species marked (m) are suitable for moist sites with a high water table

Species marked (w) are suitable for wet, swampy sites with standing water from time to time, as well as for moist sites

Species marked (f) are most likely to be frangible and all plants in the shrubs column are generally frangible

Species marked (d) are deciduous and may also be used at rural locations subject to winter shading

Species marked (s) are good for shelter planting in severe exposure

Table 5.1.4 Trees and ground covers for Plains Landscape Urban Roads

Shrubs/herbaceous Scientific name	Common name	Trees Scientific name	Common name
		NATIVE TREES	
		<i>Alectryon excelsus</i> (m)	Titoki
		<i>Cordyline australis</i> (w)	ti kouka, cabbage tree
		<i>Melicytus ramiflorus</i> (m) (s)	mahoe
		<i>Pennantia corymbosa</i>	kaikomako
		<i>Pittosporum eugenioides</i> (m) (s)	tarata
		<i>Pittosporum tenuifolium</i> (s)	kohuhu
		<i>Plagianthus regius</i> (m)(d)	ribbonwood
		<i>Pseudopanax crassifolius</i>	lancewood, horoecka
		EXOTIC TREES	
<i>Agapanthus</i> species and cultivars	agapanthus	<i>Fraxinus oxycarpa</i> 'Raywood' (d)	claret ash
<i>Carex</i> species	tussock sedges	<i>Liquidambar styraciflua</i> (d)	sweet gum
<i>Convolvulus sabatius</i>	blue bindweed	<i>Liriodendron tulipifera</i> (d)	Tulip tree
<i>Coprosma</i> 'Hawera'		<i>Nyssa sylvatica</i> (d)(m)	black tupelo
<i>Coprosma</i> 'Mangatangi'	hedgehog coprosma	<i>Quercus palustris</i> (d)(m)	pin oak
<i>Coprosma</i> 'Taiko'	coprosma	<i>Quercus robur</i> (d)	English oak
<i>Grevillea</i> species and cultivars	grevillea	<i>Sophora microphylla</i> (m), <i>Sophora tetraptera</i> (m).	Small and large leaved kowhai
<i>Juniperus horizontalis</i> and other species	prostrate juniper	<i>Taxodium distichum</i> (d)(w)	swamp cypress
<i>Muehlenbeckia axillaris</i>	pohuehue		
<i>Phormium</i> - dwarf cultivars such as <i>P.</i> 'Jack Sprat'	dwarf flax		
<i>Rosmarinus officinalis</i> Prostratus group			

Species marked (m) are suitable for moist sites with a high water table

Species marked (w) are suitable for wet, swampy sites with standing water from time to time, as well as for moist sites

Species marked (d) are deciduous and may also be used at locations subject to winter shading

Species marked (s) are good for shelter planting in severe exposure

Downlands

Table 5.1.5 Trees and shrubs for Downlands Rural Roads

Shrubs/herbaceous Scientific name	Common name	Trees Scientific name	Common name
NATIVE SHRUBS (f)		NATIVE TREES	
		<i>Cordyline australis</i> (w)	ti kouka, cabbage tree
<i>Coprosma lucida</i>	shining karamu	<i>Fuchsia excorticata</i> (d)	kotukutuku
<i>Coprosma robusta</i>	karamu	<i>Hobertia sexstylosa</i> (m)	houhere, lacebark
<i>Coriaria arborea</i> (poisonous)	tutu (poisonous)	<i>Kunzea ericoides</i> (f)	kanuka
<i>Cortaderia toetoe</i> (w)	toe toe	<i>Melicytus ramiflorus</i> (m)	mahoe
<i>Hebe stricta</i> (m)	koromiko	<i>Myoporum laetum</i>	ngaio
<i>Leptospermum scoparium</i> (w)	manuka	<i>Pittosporum eugenoides</i> (m)	tarata
<i>Lophomyrtus bullatus</i>	ramarama	<i>Pittosporum tenuifolium</i>	kohuhu
<i>Lophomyrtus obcordatus</i>	rohutu	<i>Podocarpus totara</i>	totara
<i>Myrsine australis</i> (m)	red matipou, mapou	<i>Pseudopanax arboreus</i>	Five finger, whauwhaupaku
<i>Olearia solandri</i>		<i>Pseudopanax crassifolius</i>	lancewood, horoeka
<i>Phormium tenax</i> (w)	harakeke, flax	<i>Sophora microphylla</i> (m)	kowhai
		EXOTIC TREE	
		<i>Chamaecytisus palmensis</i>	tree lucerne

Species marked (m) are suitable for moist sites with a high water table

Species marked (w) are suitable for wet, swampy sites with standing water from time to time, as well as for moist sites

Species marked (f) are most likely to be frangible and all plants in the shrubs column are generally frangible

Species marked (d) are deciduous and may also be used at locations subject to winter shading

NB *Coriaria arborea* (tutu) should not be planted near areas grazed by stock because it is poisonous

Table 5.1.6 Trees and ground covers for Downlands Urban Roads

Shrubs/herbaceous Scientific name	Common name	Trees Scientific name	Common name
		NATIVE TREES	
		<i>Cordyline australis</i> (w)	ti kouka/cabbage tree
		<i>Fuchsia excorticata</i> (d)	kotukutuku
		<i>Hoheria sexstylosa</i> (m)	houhere, lacebark
		<i>Aristotelia serrata</i> (m)	makomako
		<i>Melicactus ramiflorus</i> (m)	mahoe
		<i>Myoporum laetum</i>	ngaio
		<i>Pittosporum eugenoides</i> (m)	tarata
		<i>Pittosporum tenuifolium</i>	kohuhu
		<i>Podocarpus totara</i>	totara
		<i>Pseudopanax arboreus</i>	five finger, whauwhaupaku
		<i>Pseudopanax crassifolius</i>	lancewood, horoeke
		<i>Sophora tetraptera</i> (m) <i>S. microphylla</i> (m)	small and large leaved kowhai
LOW GROUND COVER		EXOTIC TREES	
<i>Carex</i> species	tussock sedges	<i>Olea europaea</i>	Olive
<i>Coprosma</i> 'Hawera'		<i>Eucalyptus leucocylon</i> 'Rosea'	
Dwarf <i>Phormium</i> cultivars such as <i>P.</i> 'Jack Sprat'	dwarf flax	<i>Ginkgo biloba</i> (d)	ginkgo
<i>Coprosma</i> 'Mangatangi'	hedgehog coprosma	<i>Gleditsia triacanthos</i> (d)	honey locust
<i>Coprosma</i> 'Taiko'		<i>Magnolia grandiflora</i>	laurel magnolia
		<i>Nyssa sylvatica</i> (d)(m)	black tupelo
		<i>Paulownia tomentosa</i> (d)	princess tree
		<i>Quercus palustris</i> (d)(m)	pin oak
		<i>Quercus robur</i> (d)	English oak

Species marked (m) are suitable for moist sites with a high water table

Species marked (w) are suitable for wet, swampy sites with standing water from time to time, as well as for moist sites

Species marked (d) are deciduous and may also be used at locations subject to winter shading

Hill Country

Table 5.1.7 Trees and shrubs for Hill Country Rural Roads

Shrubs/herbaceous Scientific name	Common name	Trees Scientific name	Common name
NATIVE SHRUBS (f)		NATIVE TREES	
<i>Brachyglottis repanda</i> (m)	rangiora	<i>Carpodetus serratus</i>	putaputaweta
<i>Coprosma lucida</i>	shining karamu	<i>Cordyline australis</i> (w)	ti kouka, cabbage tree
<i>Coprosma robusta</i> (m)	karamu	<i>Fuchsia excorticata</i> (d)	kotukutuku
<i>Coriaria arborea</i> (poisonous)	tutu (poisonous)	<i>Hoheria sexstylosa</i> (m)	houhere, lacebark
<i>Cortaderia toetoe</i> (w)	toe toe	<i>Kunzea ericoides</i> (f)	kanuka
<i>Hebe stricta</i> (m)	koromiko	<i>Melicytus ramiflorus</i> (m)	mahoe
<i>Leptospermum scoparium</i> (w)	manuka	<i>Pennantia corymbosa</i>	kaikomako
<i>Lophomyrtus bullatus</i>	ramarama	<i>Pittosporum eugenioides</i> (m)	tarata
<i>Lophomyrtus obcordatus</i>	rohutu	<i>Pittosporum tenuifolium</i>	kohuhu
<i>Macropiper excelsa</i> (m)	kawakawa	<i>Podocarpus totara</i>	totara
<i>Myrsine australis</i> (m)	red matipou, mapou	<i>Pseudopanax arboreus</i>	Five finger, whauwhaupaku
		<i>Pseudopanax crassifolius</i> (f)	lancewood, horoeka
		<i>Sophora microphylla</i> (m)	small leaved kowhai
		EXOTIC TREE	
		<i>Chamaecytisus palmensis</i>	tree lucerne

Species marked (m) are suitable for moist sites with a high water table

Species marked (w) are suitable for wet, swampy sites with standing water from time to time, as well as for moist sites

Species marked (f) are most likely to be frangible and all plants in the shrubs column are generally frangible

Species marked (d) are deciduous and may also be used at rural locations subject to winter shading

NB *Coriaria arborea* (tutu) should not be planted near areas grazed by stock because it is poisonous

Terraced Valley Landscapes

Table 5.1.8 Trees and shrubs for Terraced Valley Rural Roads

Shrubs/herbaceous Scientific name	Common name	Trees Scientific name	Common name
NATIVE SHRUBS		NATIVE TREES	
<i>Coprosma lucida</i>	shining karamu	<i>Cordyline australis</i> (w)	ti kouka, cabbage tree
<i>Coprosma robusta</i> (m)	karamu	<i>Fuchsia excorticata</i> (d)	kotukutuku
<i>Coriaria arborea</i> (poisonous)	tutu (poisonous)	<i>Hobertia sexstylosa</i> (m)	houhere, lacebark
<i>Cortaderia toetoe</i> (w)	toe toe	<i>Kunzea ericoides</i> (f)	kanuka
<i>Hebe stricta</i> (m)	koromiko	<i>Melicactus ramiflorus</i> (m)	mahoe
<i>Leptospermum scoparium</i> (w)	manuka		
<i>Lophomyrtus bullatus</i>	ramarama	<i>Pittosporum eugenoides</i> (m)	tarata
<i>Lophomyrtus obcordatus</i>	rohutu	<i>Pittosporum tenuifolium</i>	kohuhu
<i>Macropiper excelsa</i> (m)	kawakawa	<i>Podocarpus totara</i>	totara
<i>Myrsine australis</i> (m)	red matipou, mapou	<i>Pseudopanax arboreus</i>	Five finger, whauwhaupaku
		<i>Pseudopanax crassifolius</i> (m)	lancewood, horoeka
		<i>Sophora microphylla</i> (m)	kowhai
		EXOTIC TREES	
		<i>Chamaecytisus palmensis</i>	tree lucerne

Species marked (m) are suitable for moist sites with a high water table

Species marked (w) are suitable for wet, swampy sites with standing water from time to time, as well as for moist sites

Species marked (f) are most likely to be frangible and all plants in the shrubs column are generally frangible

Species marked (d) are deciduous and may also be used at rural locations subject to winter shading

NB *Coriaria arborea* (tutu) should not be planted near areas grazed by stock because it is poisonous

Table 5.1.9 Trees for Terraced Valley Urban Roads

Shrubs/herbaceous Scientific name	Common name	Trees Scientific name	Common name
		NATIVE TREES	Common name
		<i>Cordyline australis</i> (w)	ti kouka, cabbage tree
		<i>Fuchsia excorticata</i> (d)	kotukutuku
		<i>Hobertia sexstylosa</i> (m)	houhere, lacebark
		<i>Aristotelia serrata</i> (m)	makomako
		<i>Melictyus ramiflorus</i> (m)	mahoe
		<i>Pittosporum eugenioides</i> (m)	tarata
		<i>Pittosporum tenuifolium</i>	kohuhu
		<i>Podocarpus totara</i>	totara
		<i>Pseudopanax arboreus</i>	five finger, whauwhaupaku
		<i>Pseudopanax crassifolius</i> (m)	lancewood, horoeke
		<i>Sophora tetraptera</i> (m) and <i>microphylla</i> (m)	Small and large leaved kowhai
		EXOTIC TREES	Common name
		<i>Eucalyptus leucoxylon</i> 'Rosea'	
		<i>Ginkgo biloba</i> (d)	ginkgo
		<i>Gleditsia triacanthos</i> (d)	honey locust
		<i>Liquidambar styraciflua</i> (d)	Sweet gum
		<i>Liriodendron tulipifera</i> (d)	Tulip tree
		<i>Nyssa sylvatica</i> (d) (w)	black tupelo
		<i>Quercus coccinea</i> (d)	scarlet oak
		<i>Quercus palustris</i> (d) (m)	pin oak
		<i>Quercus rubra</i> (d)	red oak

Species marked (m) are suitable for moist sites with a high water table

Species marked (w) are suitable for wet, swampy sites with standing water from time to time, as well as for moist sites

Species marked (d) are deciduous and may also be used at locations subject to winter shading

5.1.4 Exceptions

There may, on occasion, be good reason for planting shrubs and trees other than those included in the lists above. In these cases guidance should be sought from the Council's manager of Parks and Reserves to ensure that the species chosen are suitable and in character.

5.2 VISIBILITY

5.2.1 Purpose

To ensure adequate visibility for drivers, cyclists, pedestrians and other road corridor users, and reduce the need for cutting back trees that obstruct visibility.

5.2.2 Guidance

All new planting should avoid locations where the trees or shrubs will interfere with visibility or existing utilities, both at the time of planting and in the future. Visibility can be obstructed by the spread of trees and shrubs that have been planted on neighbouring land, as well as those sited on the road berm itself. Recommendations for the layout and species for planting on land adjacent to roads are shown in the typical solutions.

5.2.3 Typical solutions

Planting locations in relation to sight lines are illustrated in (refer figure 8 p.65 & figure 9 p.66). In all cases the sight distances given in the Manawatu District Plan must be maintained and for state highways the sight distances given in the State Highway Geometric Design Manual must be observed. These distances are used as the basis for the examples of layout given in this guideline.

Locations that are advisable for planting on private land adjacent to the road are illustrated in figure 10 (p.66).

Planting locations in relation to highway hazards such as narrow bridges, intersections, bends are illustrated in figure 11 (p.67-70).

The incorporation of planting in berms, next to footpaths, and in kerb extensions is illustrated in figures 12 and 13 (p. 71).

5.2.4 Exceptions

There may be instances when the planting of trees or shrubs that require regular maintenance would be justified by the overall benefit that will be gained. The timing, frequency and method of operations can make a great difference to the effectiveness and efficiency of arboricultural maintenance and a management plan for the planting should be prepared with the design before planting.

5.3 PHYSICAL OBSTRUCTION

5.3.1 Purpose

To reduce the amount of encroachment by trees planted on the road berm and on adjacent land. The growth of plants from private land including farmland and private gardens over the footpath is common and difficult to avoid. The pruning of vegetation that obstructs the road or footpath is the responsibility of the owner of the vegetation.

5.3.2 Guidance

Avoid planting in locations from where trees or shrubs might encroach on the roadway or footpath (refer figure 9 p.66). When planting close to the road or utility services avoid species that are vigorous in their spread such as poplars, willows, cypress, pine and eucalypts. The extreme vigour and resilience that makes these trees a popular choice and gives quick effect, also creates onerous maintenance requirements. In addition, many of these generally spread easily by means of suckers and branch fragments and can propagate themselves in locations where they may cause a nuisance.

For roadside planting the species listed in the tables in 5.1 should be used because they are of low or moderate vigour in their lateral spread. In addition, any planting within four metres of the legal road boundary should, when possible, also be restricted to the species on the lists in 5.1.

5.3.3 Typical solutions

Refer to figure 10 (p.66) for planting opportunities close to the legal road boundary.

5.3.4 Exceptions

Exceptions to the guidance given are:

- When a formal clipped hedge is required on or adjacent to the road berm and provision has been made for its continuing maintenance
- When trees to be planted in front of the 5 metre set back will be trained to form a raised crown. The branches of the crown must be above a clear trunk so that they do not cause obstruction. Provision is to be made before planting for the necessary, continuing arboricultural management

5.4 SHADING

5.4.1 Purpose

To avoid shading of the road surface where it could become worse or prolong slippery conditions and to take particular care to keep the road near intersections and sharp bends free from shading.

5.4.2 Guidance

Avoid tree planting in locations that are orientated between east and north of the road surface near a bend or a junction. Shrubs may be planted in these locations provided that they are far enough from the road to avoid morning shading.

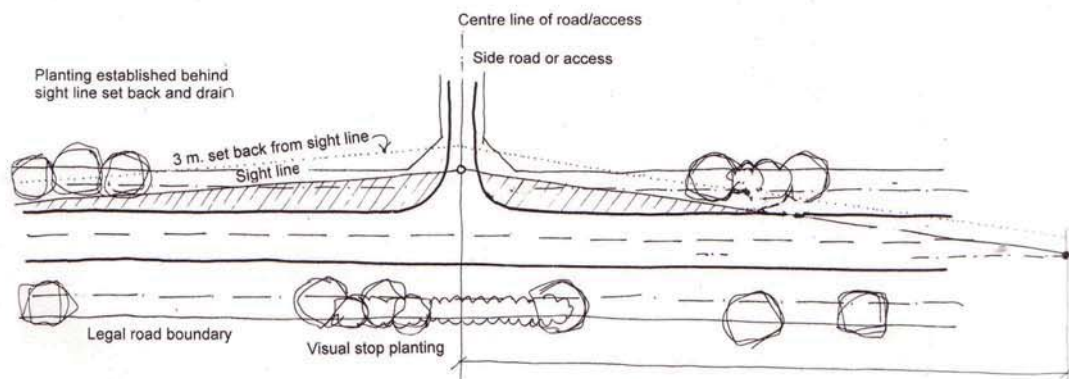
In general areas any new planting situated at an orientation that lies between east and north of the road should be well spaced and consist of trees that are deciduous and that form a raised canopy. Use the deciduous trees listed for urban areas at junctions and bends subject to winter shading. This will create a feature at these places and may help to distinguish these locations.

5.4.3 Typical solutions

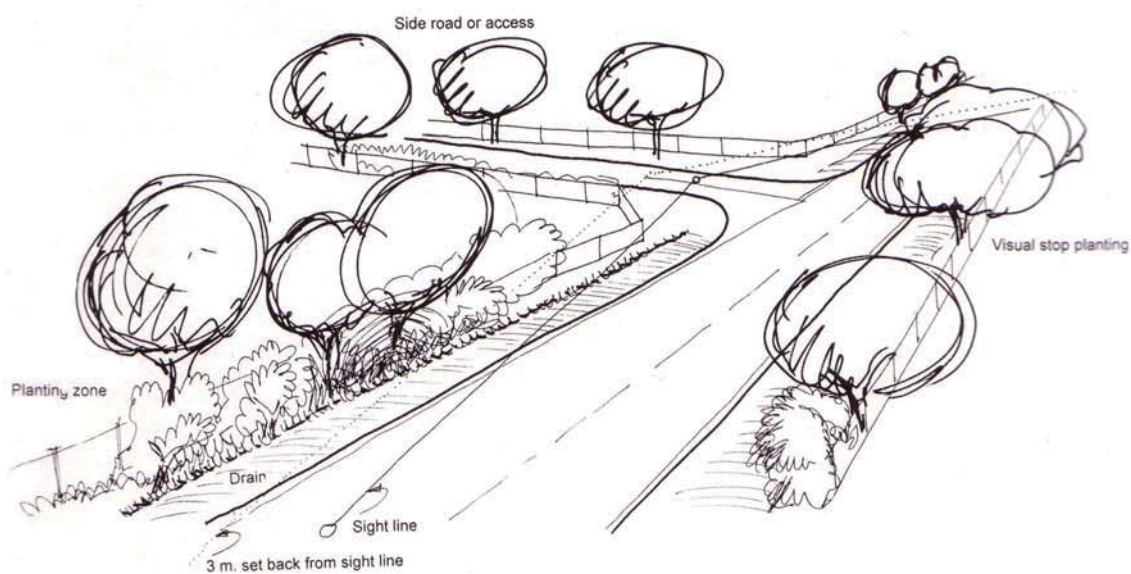
Refer figure 14 (p.72) for planting opportunities in areas subject to slippery road conditions that could be caused by shading.

5.4.4 Exceptions

- None



Plan view



Sketch view

Note that some of the planting opportunities shown may not be possible due to the presence underground or overhead services.]

Figure 8 Typical intersection planting opportunities

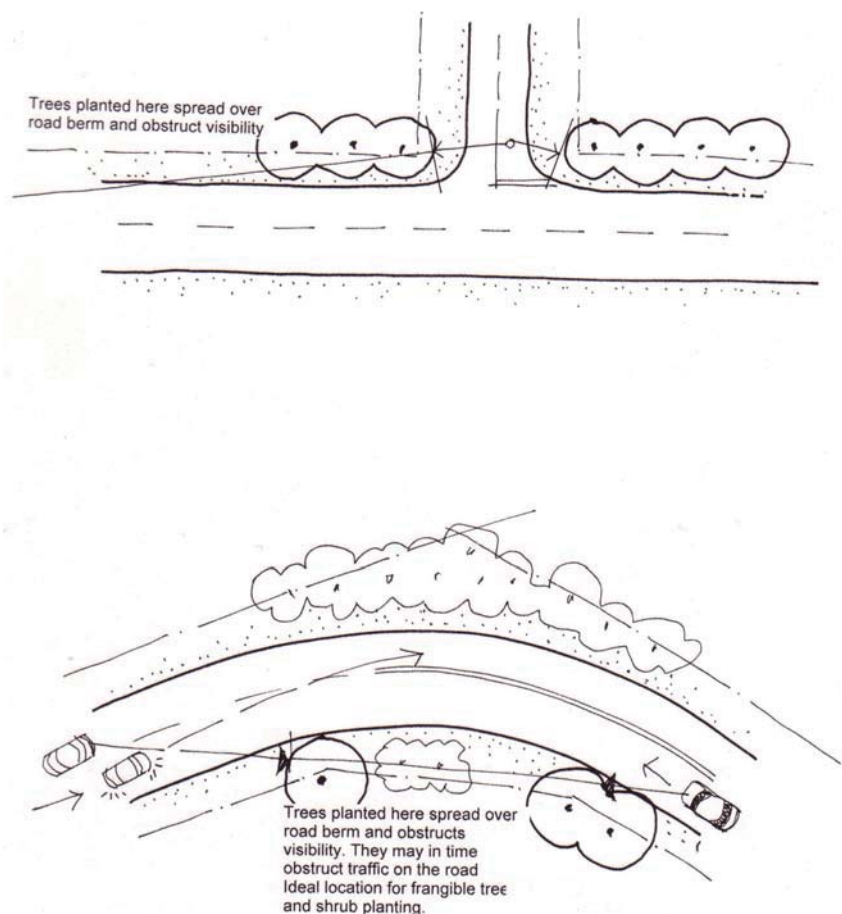


Figure 9 Typical encroachment and obstruction caused by planting close to road boundaries

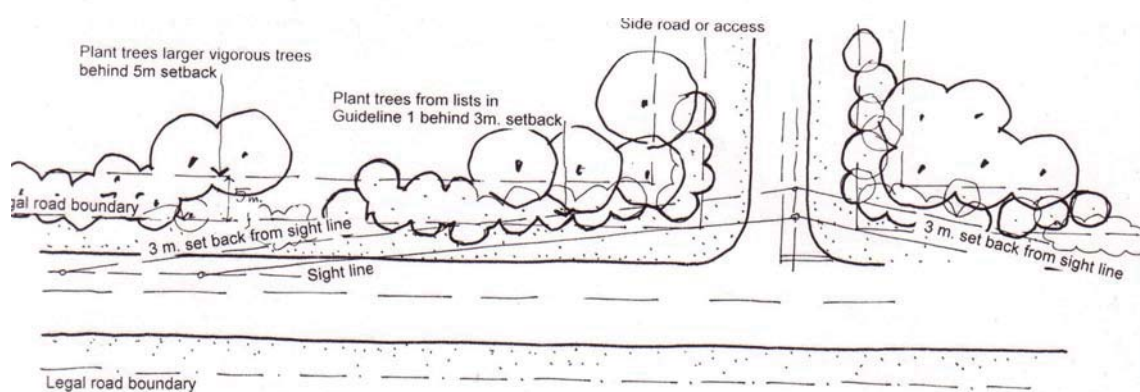


Figure 10 Typical planting opportunities on adjacent land

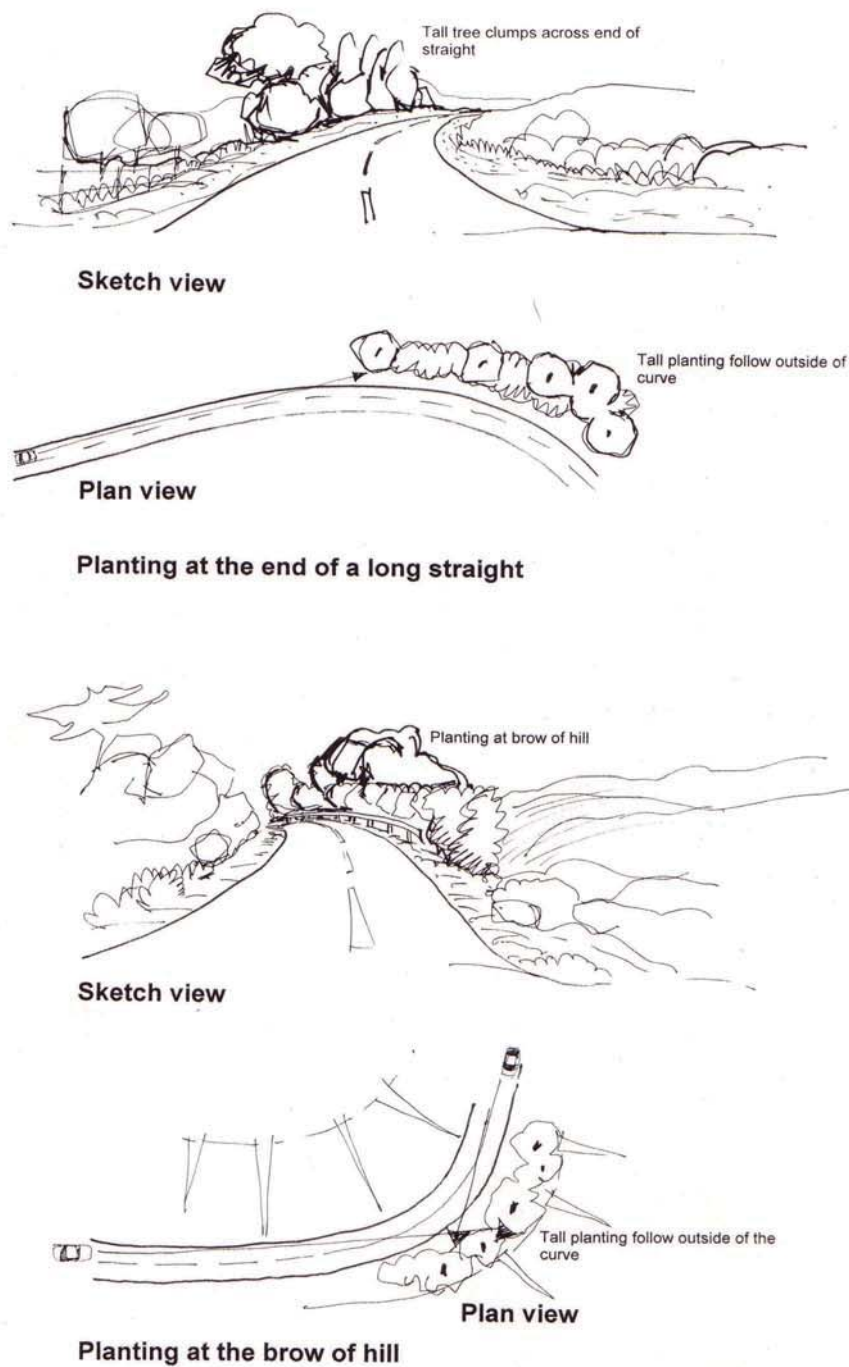
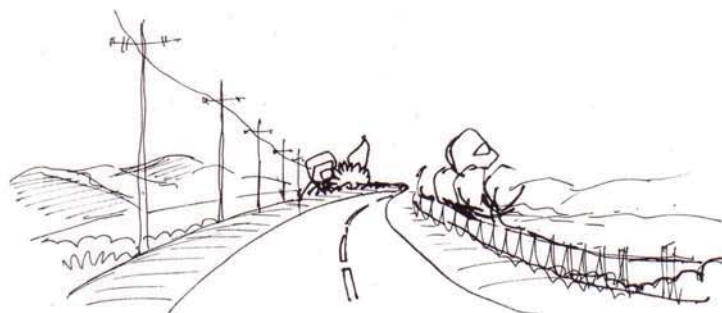
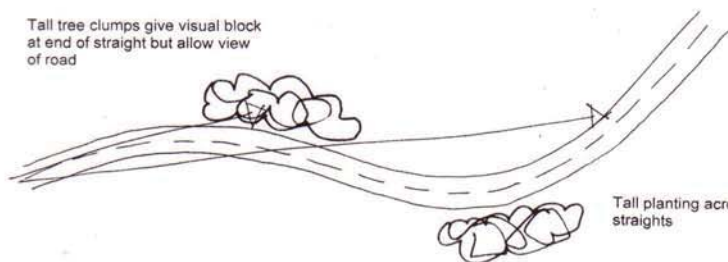


Figure 11 Using planting to articulate road alignment - 1

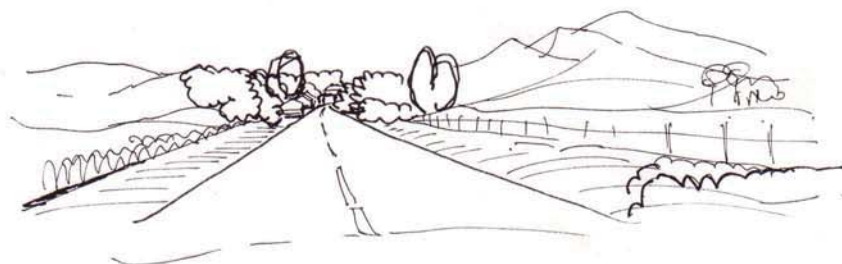


Tall tree clumps give visual block at end of straight but allow view of road



Tall planting across ends of straights

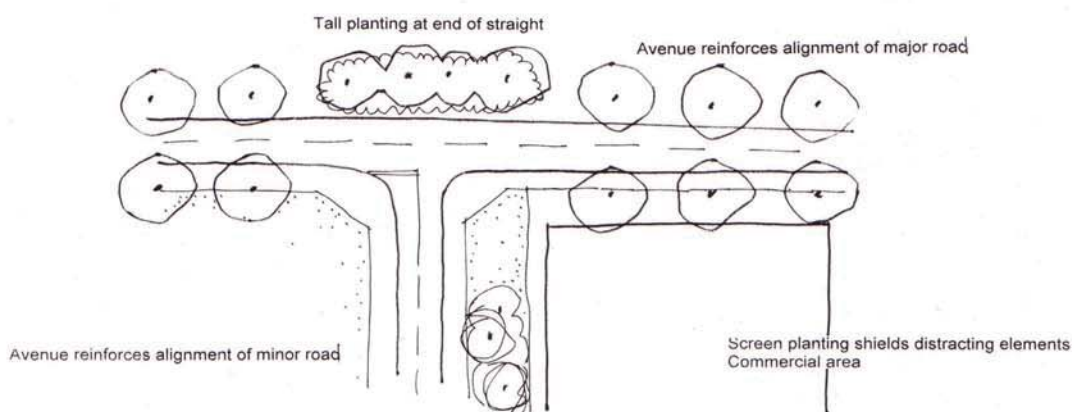
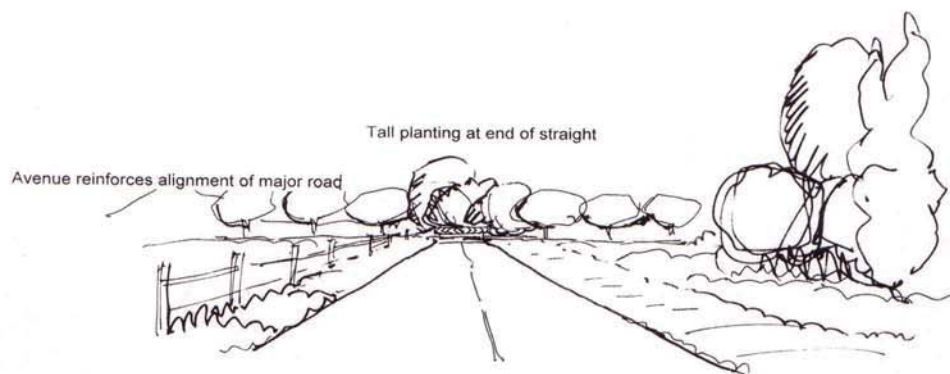
Planting through a reverse curve



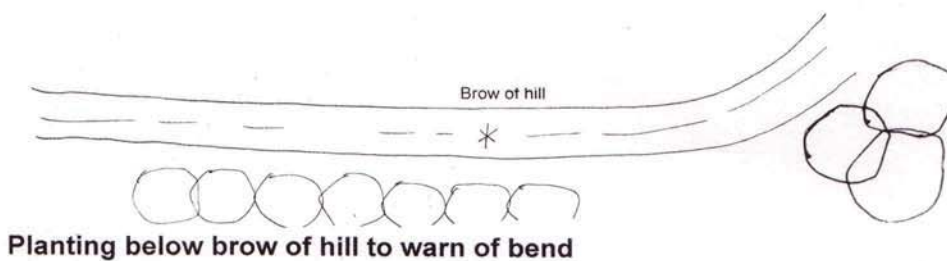
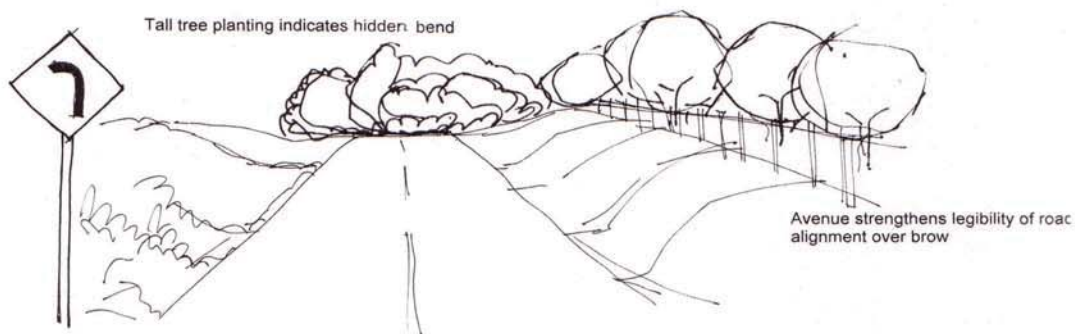
Planting to indicate rural settlement

Tall trees give warning of residential zone in rural landscape.

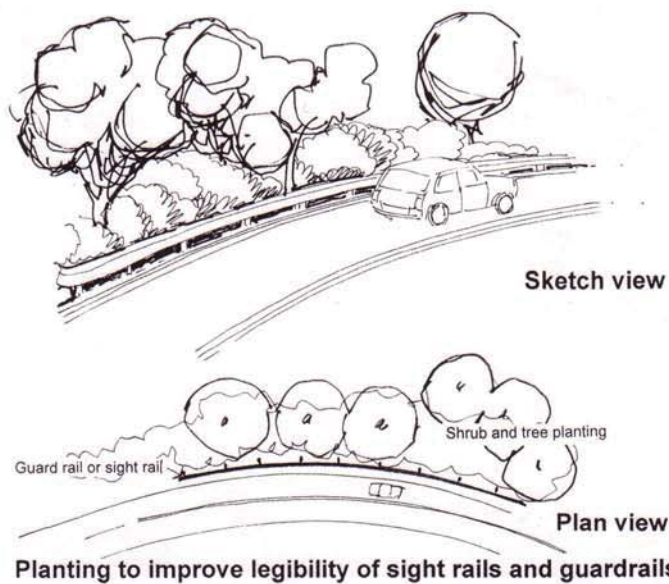
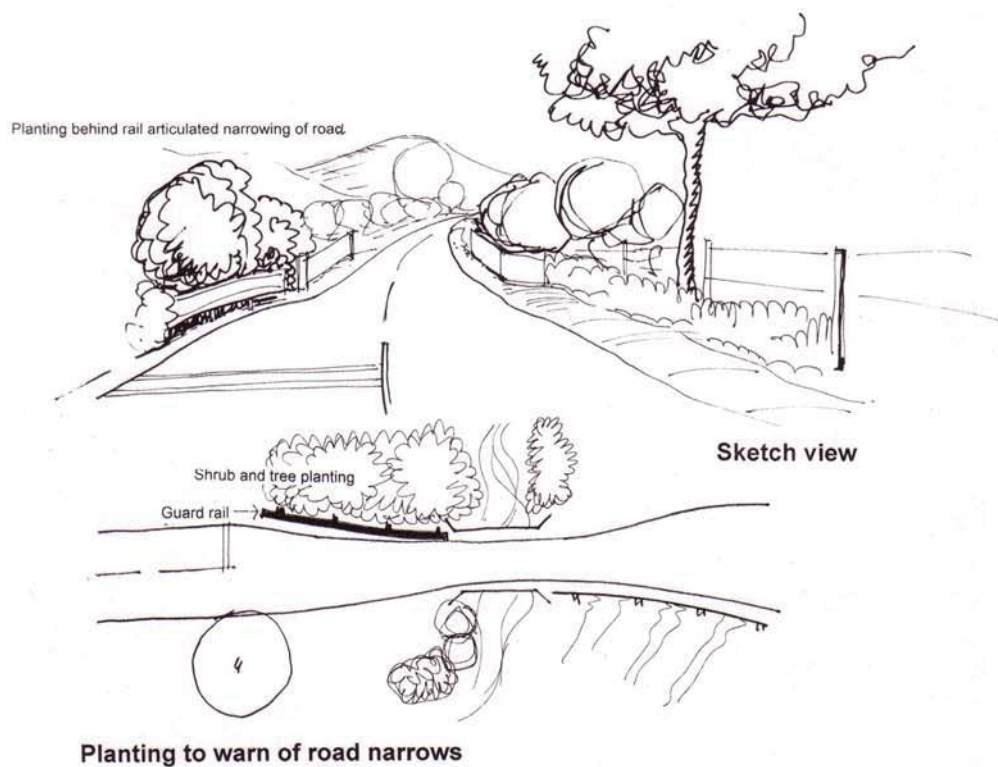
Using planting to articulate road alignment - 2



Planting to improve legibility of intersection



Using planting to articulate road alignment - 3



Using planting to articulate road alignment - 4

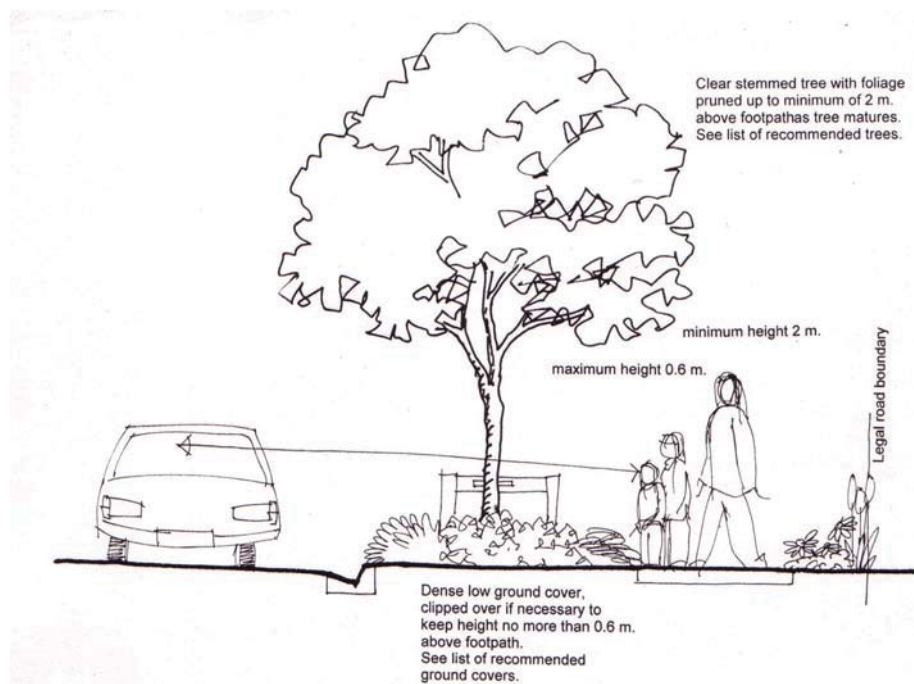


Figure 12 Typical residential berm planting opportunities

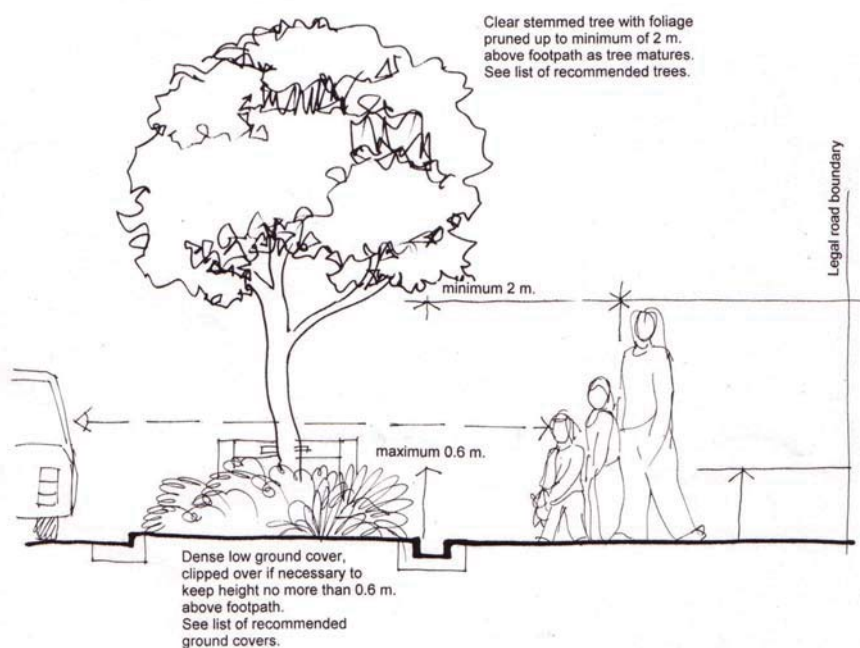
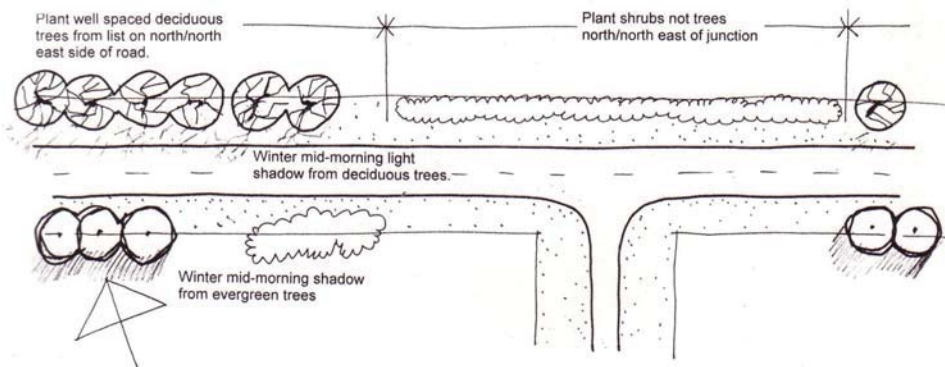
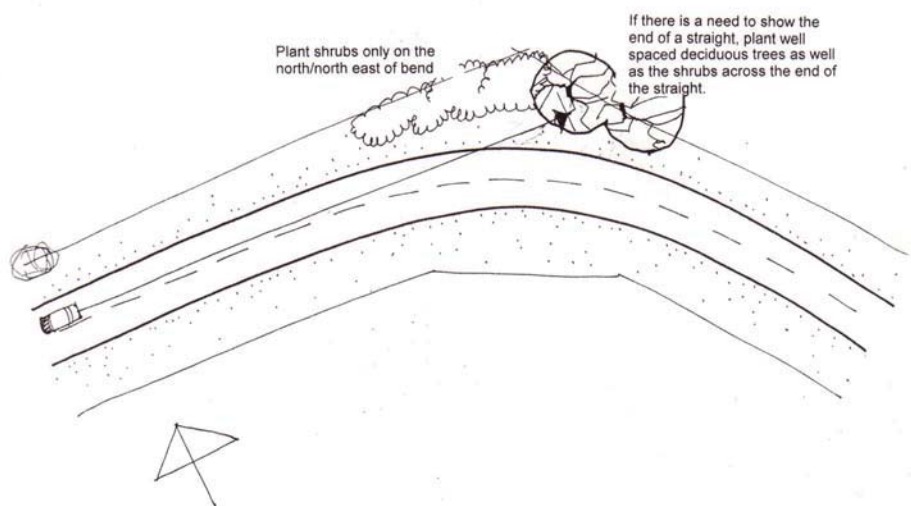


Figure 13 Typical urban kerb extension planting opportunities

Note that some of the planting opportunities shown may not be possible due to the presence of underground or overhead utilities



When planting on north side of intersections



When planting on north side of curve

Figure 14 Planting to avoid slippery conditions

5.5 AVOIDING SEVERE IMPACT IN COLLISION WITH TREES

5.5.1 Purpose

To reduce the risk of severe damage occurring caused by vehicles striking trees if they leave the road. Many shrubs and trees with slender stems, however, offer less resistance when struck and may in some circumstances assist in gradually slowing vehicles that have left the road and are out of control. These frangible trees and shrubs may be planted closer to the road and may, in some cases, be used to offer some measure of protection to vehicles from collision with dangerous structures and elements such as cliffs, deep riverbanks and existing large trees.

5.5.2 Guidance

Avoid planting trees too close to the road in general, and in particular avoid planting in locations which are typically subject to run-off-road accidents. Employ frangible shrubs in these locations. Frangible plants are those that absorb impact energy gradually or give way on impact. They tend to have, at maturity, a trunk diameter less than 100 mm measured 400 mm above ground level and not be of hard woods. Those species that are good at absorbing impact energy typically have numerous slender stems or branches close to ground level, all with a diameter less than about 100 mm. This means that only smaller species of trees are likely to be frangible, although a narrow, multi-stem habit of growth can be encouraged in larger trees by planting numerous seedlings very closely together.

The most frangible trees and shrubs include those listed in the following table. It should be recognised, however, that plants do not grow in an entirely predictable manner and the species listed can develop main stems that are thicker than 100 mm diameter, and typically larger growing species can be planted in such a way that they develop many thin stems rather than one massive one. Examples of planting tree species to favour a frangible, multi-stem habit are also given below.

If trees and shrubs planted develop a stem diameter that exceeds the advised limits they may be removed. As an alternative some species may be coppiced to encourage bushy multiple stem growth. Typically frangible trees and shrubs are also identified in 5.1.

5.5.3 Typical solutions

Refer figures 15 and 16 (facing page). Typically frangible plants include most shrubs, many large herbs and sub-shrubs and some small trees, including the New Zealand natives listed below in Table 5.5 and those marked (f) in the tables in 5.1. Note that the species below are not all indigenous to the Manawatu landscape areas, and so some are more suitable for urban areas.

Table 5.5.3 Frangible plants

Large Herbs and Shrubs	Common Name	Large Shrubs and Small Trees	Common Name
<i>Cortaderia toetoe</i> and <i>C. richardii</i>	North and South Island toetoe	<i>Brachyglottis repanda</i>	rangiora
<i>Phormium tenax</i> and <i>P. cookianum</i>	swamp flax and rock flax, harakeke and wharariki	<i>Cassinia leptophylla</i>	cottonwoods, tauhinu
<i>Pomaderris phyllicifolia</i> var. <i>ericifolia</i>		<i>Coprosma lucida</i>	shining karamu
<i>Coprosma propinqua</i> and <i>C. parviflora</i> (c)	mingimingi	<i>Coprosma robusta</i> and <i>C. repens</i> , (c)	karamu, taupata
<i>Hebe stricta</i> and <i>H. speciosa</i> (c)	koromiko and napuka	<i>Corokia cotoneaster</i> , x <i>virgata</i> ,	korokio
<i>Leptospermum scoparium</i>	manuka	<i>Entelia arborescens</i>	whau
<i>Macropiper excelsa</i>	kawakawa	<i>Lophomyrtus bullatus</i>	ramarama
<i>Olearia cheesmanii</i> , <i>O. avicenniaefolia</i> and <i>O. arborescens</i>	shrub daisies	<i>Lophomyrtus obcordata</i> (c)	rohuu
		<i>Melicope ternata</i> (c)	wharangi
		<i>Muehlenbeckia complexa</i> and <i>M. astonii</i>	pohuehue
		<i>Myrsine australis</i>	red mapou
		<i>Olearia paniculata</i>	akiraho
		<i>Olearia traversii</i>	Chatham Island akeake
		<i>Pseudopanax arboreus</i>	whauwhaupaku, fivefinger
		<i>Pseudopanax crassifolius</i>	lancewood, horoeke
		<i>Pseudopanax lessonii</i> and <i>P. laetus</i> (c)	houpara, lancewoods, shining fivefinger
		<i>Pseudowintera colorata</i>	horopito
		<i>Solanum laciniatum</i> , <i>S. aviculare</i>	poroporo

Trees and shrub suitable for coppicing are marked (c). Coppicing consists of the hard pruning to close to ground level of an established plant in order to cause multiple shoots to grow from near the base (refer figure 19 on page 83).

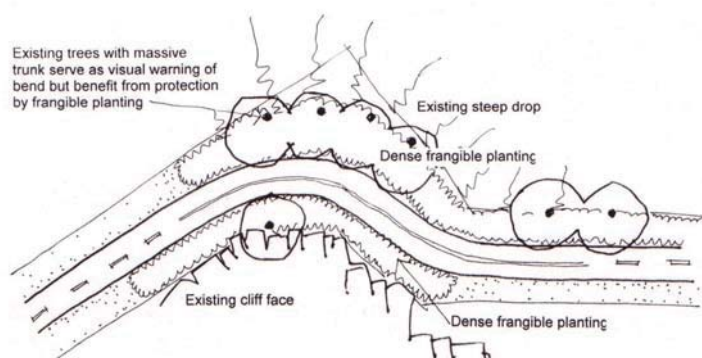


Figure 15 Examples of use of frangible planting to help protect against roadside hazards

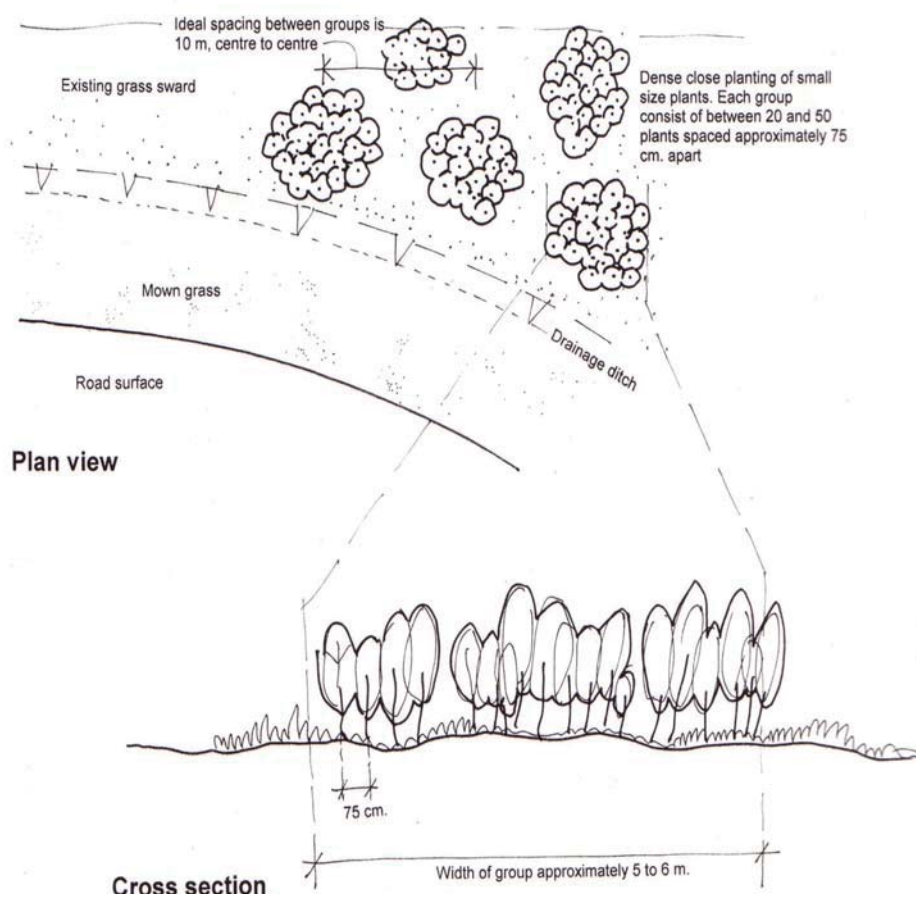


Figure 16 Ways of establishing dense frangible planting clumps

5.5.4 Exceptions

Trees may be planted between the road and the drainage ditch where they would be behind guard rails and in urban areas where traffic speeds are generally lower.

5.6 TREES AND STREET LIGHTING

5.6.1 Purpose

Effective street lighting is required for reasons of traffic safety, pedestrian safety and security. This guideline aims to reduce interference of tree growth with effectiveness of street light operation. The aim is to combine effective street illumination with an appropriate level of environmental amenity

5.6.2 Guidance

Any conflicts that occur between the interests of tree planting and street lighting tend to be either in urban areas or at intersections in rural areas. New tree plantings in the area of street lighting should be kept at a minimum distance of approximately 5 metres from the pole and the species chosen should be deciduous and large growing trees (refer the lists of species in 5.1 p.52). The deciduous habit helps to reduce interference with lighting during the winter months when street lighting operates for longer hours, and large growing trees can be trained so that their canopy is mostly above the level of the light. Tree canopies that are above the light level have two advantages: they cause less interference with illumination of the road and berm and they also help to reduce upward light pollution. Similarly appropriate distances should be maintained when locating trees near power poles and lines. A minimum recommended distance of 5 metres at tree maturity is required near overhead lines. The fall arc of trees should also be considered in these locations.

5.7 ARTICULATING ROAD ALIGNMENT

5.7.1 Purpose

To help drivers to read the alignment of the road and anticipate hazards ahead, and to conceal misleading and distracting elements in the road environment.

5.7.2 Guidance

Planting should be used in the following situations:

- To mark the intersection of a minor route and a major route which might otherwise be difficult to anticipate
- To mark the end of long straight stretches of the road at curves and intersections
- To help articulate road alignment at bends and the brow of hills
- To screen distracting views
- To improve legibility of guard rails and sight rails
- To warn of the road narrowing
- To warn of approach to a residential area or settlement in rural locations

5.7.3 Typical solutions

Typical examples of these uses of planting are illustrated in figure 11 parts 1, 2, 3 and 4 (p.67-70).

5.8 TRAFFIC CALMING

5.8.1 Purpose

To assist with traffic calming, the articulation of the road environment and appropriate speed, and to reinforce changes in road width and alignment. This alerts drivers to drive differently as they enter a section of road with differing conditions or speed limit.

5.8.2 Guidance

Planting should be used in the following situations:

- To emphasise thresholds at the entrance to settlements, busy pedestrian friendly areas and residential streets
- To mark the end of long straight stretches of the road at curves and intersections
- To help articulate road alignment at bends and the brow of hills
- To screen distracting views
- To improve legibility of guard rails and sight rails
- To warn of the road narrowing

5.8.3 Typical solutions

Refer to figure 17 (p.79).

5.9 EFFECTIVE TECHNIQUES OF PLANTING, ESTABLISHMENT AND MANAGEMENT

5.9.1 Purpose

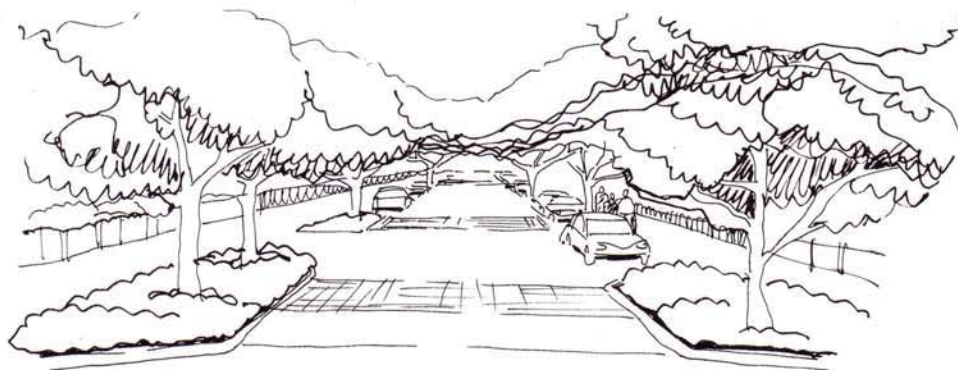
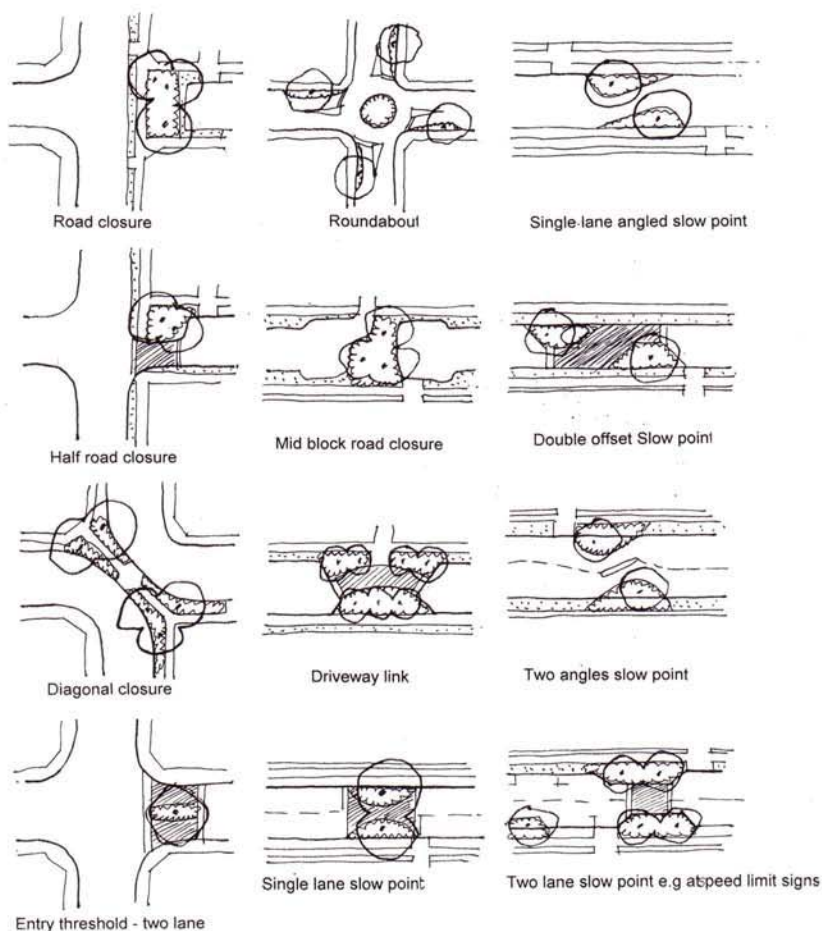
To ensure that planting is successful in its design objectives and can be effectively and efficiently managed. To do this the planting methods and stock specifications must take account of the site conditions and the likely management that will be available. This guideline also aims to provide future continuity for existing valuable plantings.

5.9.2 Guidance

Ensure that plants selected for a site are well suited to the growing conditions. Take special note of ground moisture, exposure and shade. Make sure that stock planted is good hardy stock and free from pests and diseases and disorders. Plant according to good horticultural practice and remember that the conditions on road berms and verges are much harsher for the plants than those found in gardens and urban parks.

The area around the planting positions should be kept free from grass and weed for three years after planting to allow quick and effective establishment of stock. Take particular care with staking larger trees as this gives them protection from the adverse effects of wind movement, mowing machinery and trampling. The traditional method of tying between two stakes with loose webbing is ineffective. The preferred method, using a rigid low staking frame is shown in figure 18 (p. 80).

When small stock is used dense group planting is recommended (refer figure 18 p.80) and planting groups may be spaced according to the resources available.



Impression of neighbourhood street

Showing role of traffic calming and tree and ground cover planting in helping to create an environment for people

Figure 17 Using planting to reinforce traffic calming

These sketches are redrawn from main Roads Department of Western Australia (1990)

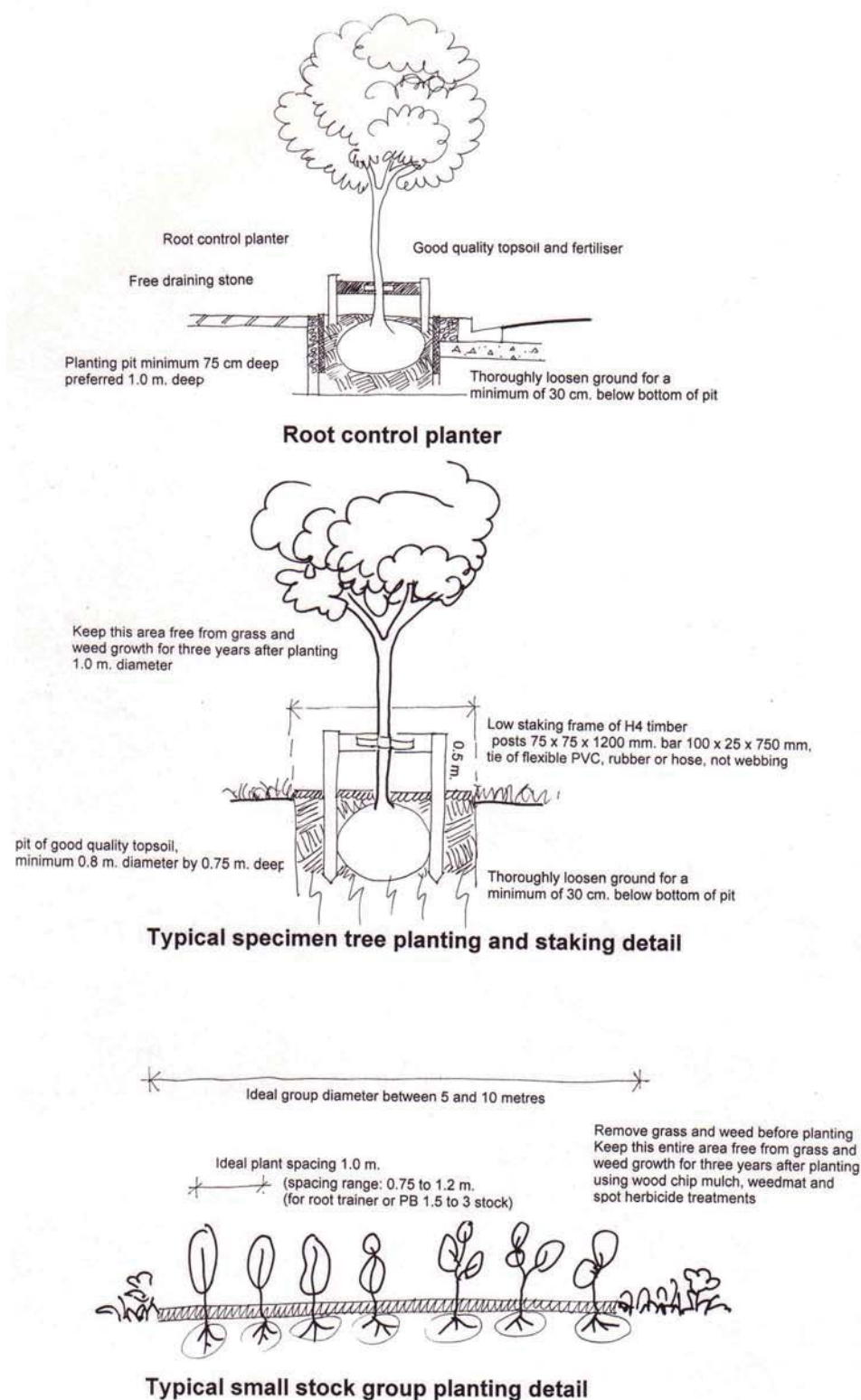


Figure 18 Recommended Planting Techniques

When planning planting allow for the work needed to properly establish the plants. This includes weed control and replacing losses each year for two years. An allowance for 5 to 10 % losses would be normal for a reasonably well prepared site with weed control.

5.9.3 Typical solutions

Refer to figure 18 (p.80).

For recommended tree and shrub species refer to 5.1 (p.52).

5.10 AVOIDING OR REDUCING PHYSICAL DAMAGE TO STRUCTURES

5.10.1 Purpose

To avoid or reduce the instances of physical damage to the carriageway, road berm structures and utility services.

5.10.2 Guidance

Planting of vigorous trees and shrubs should avoid locations where they are likely to cause damage in the future due to root heave, root penetration of drains and sewers, interference with power lines and Telecom or damage to pavements, kerbs and edgings. The following trees have particularly vigorous and searching root systems and are not recommended for planting in urban road berms:

Salix species	Pinus radiata
Populus species	Cupressus species
Ulmus species except Ulmus parvifolia	Eucalyptus larger species

Tree species should be carefully located to ensure the tree canopy does not encroach closer than 5 metres to overhead cables or lines, and that trees are not located closer than 3 metres to any underground services or utilities at planting. Clearance at maturity relates to the vertical or horizontal felling distance from lines and must consider the 'sag' of lines, conductors and cables. Tree and shrub planting should not impede maintenance access to structures.

Where trees are planted closer than 2 metres to road kerbs and road pavements it is recommended that a root constraint is used.

5.10.3 Typical solutions

Refer to figure 18 (p.80).

5.11 EFFECTIVE MANAGEMENT OF ESTABLISHED TREES

5.11.1 Purpose

To avoid hazards to the road and nuisance from established trees on the reserve.

5.11.2 Guidance

If likely to cause a hazard by dropping branches, by wind throw, or other structural failure, trees should have appropriate arboricultural work carried out by a professionally qualified arboriculturalist. The aim of this work should be to retain the tree with good form and in good health. However, if the tree is of an unsuitable species and in a location where it will continue to give frequent hazard and nuisance, it should be removed.

5.11.3 Typical solutions

Techniques of pruning, crown thinning, crown raising, crown reduction and coppicing are illustrated in figure 19 (p.83) and figure 20 (p. 85).

5.12 SURVEY OF EXISTING TREES

5.12.1 Purpose

To identify and protect existing trees of high value.

5.12.2 Guidance

If any works are to be carried out in an area where existing trees may be affected by the works, a survey of those trees should be carried out to establish their exact location, their size, value and importance, and whether they may be affected by the works. If trees of value are likely to be affected, measures should be taken to protect them from and during proposed works.

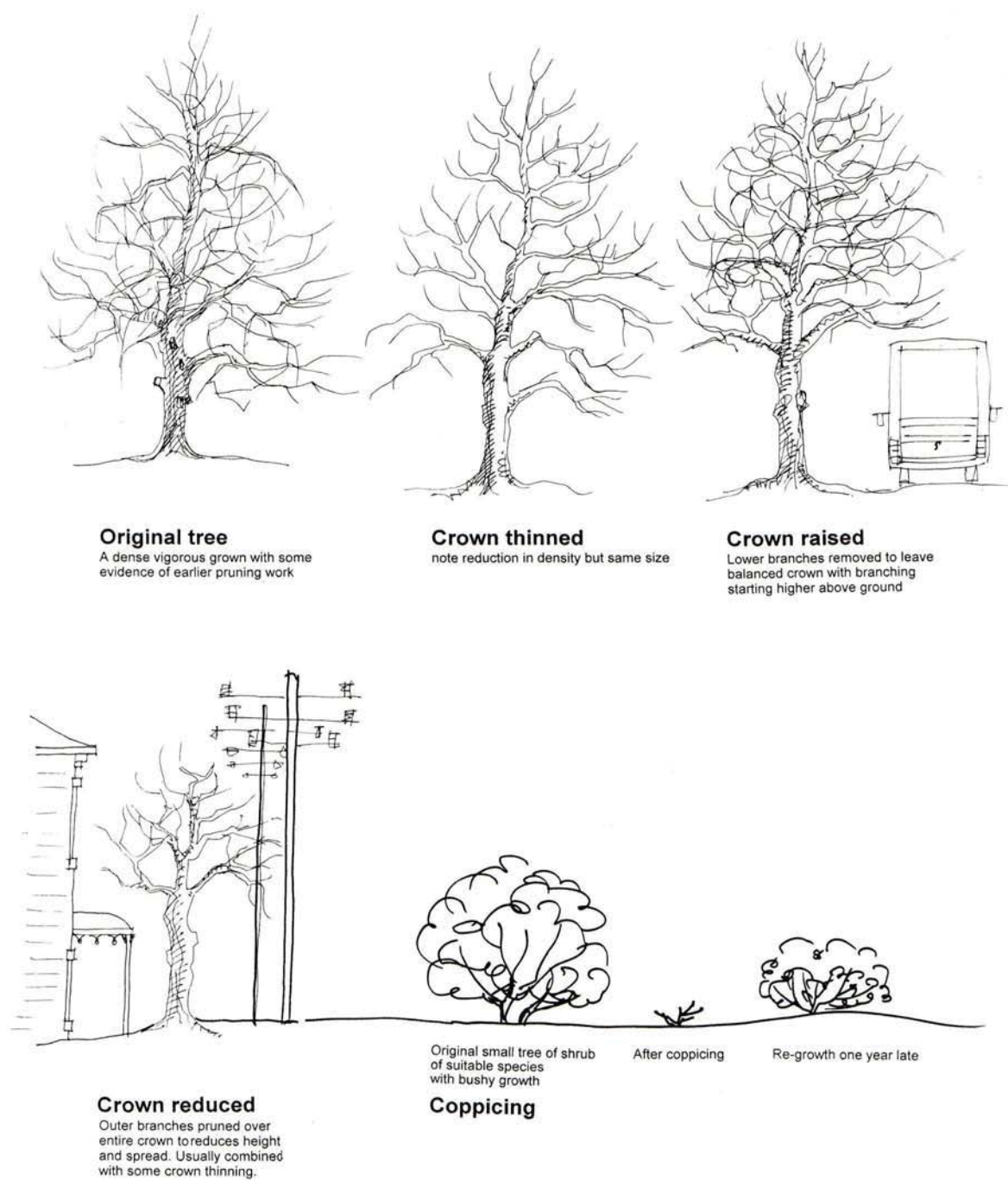


Figure 19 Recommended tree pruning techniques

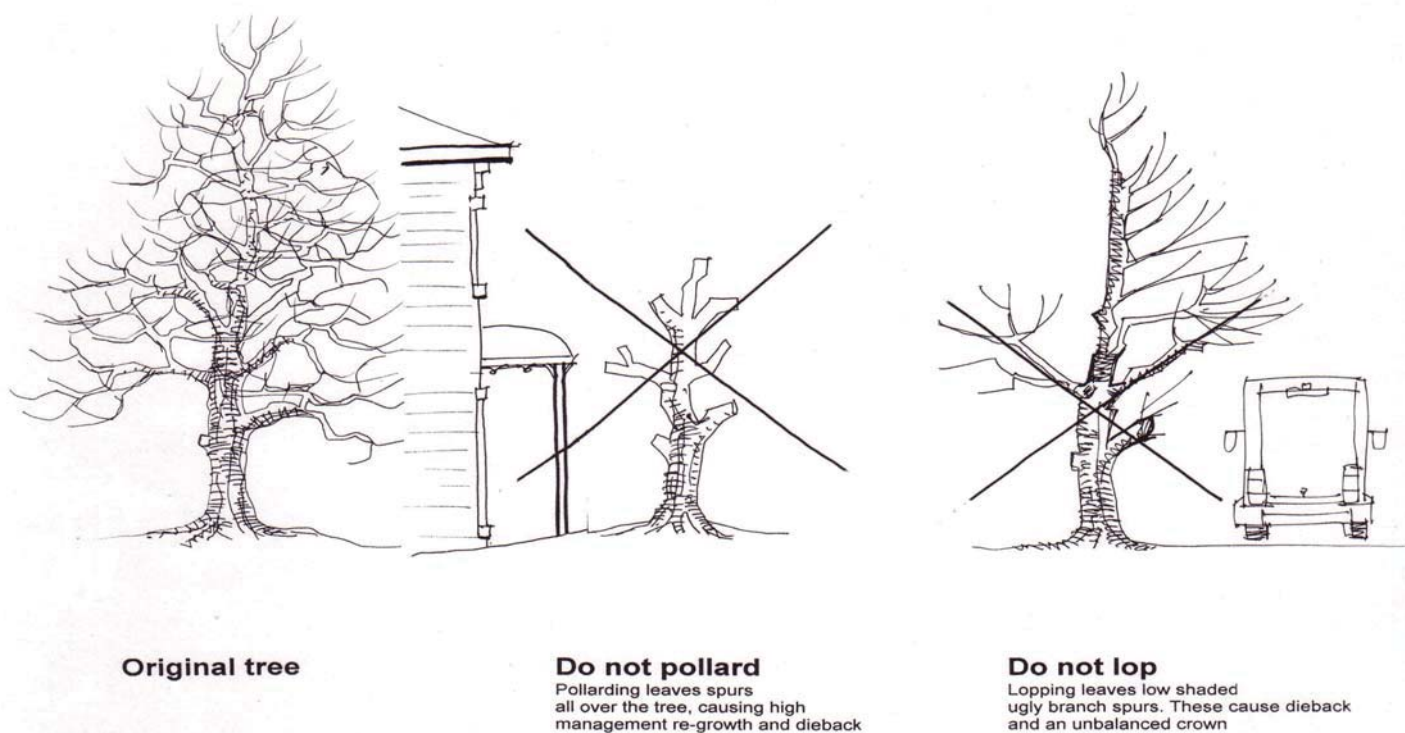


Figure 20 Tree cutting techniques to be avoided

5.13 DRAIN MAINTENANCE

5.13.1 Purpose

To allow for easier use of alternatives to herbicides and to allow for growth of beneficial wetland plants.

5.13.2 Guidance

When the opportunity arises, the road berm in rural areas should be re-graded to allow the section between the carriageway and the drain to be easily mown by an arm mounted flail or

rotary mower. The weed growth in the drain channel can be reduced by the use of large pebble layer in the base of the channel. This layer allows good water movement over its surface but provides a less favourable growing substrate for weeds than soil. Shrubs and trees may be planted in the section of the berm between the drain and the legal road boundary thus allowing access to the drain for periodic mechanical clearance.

In locations where mowing of the full berm is desirable (an adjacent resident may be carrying this out) a swale profile should be adopted so that the full width of the berm can be mown to an appropriate standard. This is shown in figure 21 (p.88). Hedge, tree, or shrub planting may also be included in this type of berm provided that it leaves the swale clear and accessible for maintenance.

5.13.3 Typical solutions

Typical proposed road berm profiles, illustrating the guidance given above are shown in figure 21 (p.88).

5.14 WEED CONTROL METHODS

5.14.1 Purpose

To reduce dependence on herbicides and to explore means of control that are more beneficial to the environment and visual amenity.

5.14.2 Guidance

There are a number of locations where alternatives to herbicide use can be employed. These include roadside drains, banks above the road, behind guardrails, chevrons and sight rails, the edges of urban grass berms behind road kerbs, and the road-side sward in general where this needs to be controlled for operational reasons.

Alternatives to chemical herbicide treatments include both other methods of removing vegetation growth and reducing the growth of weed by planting alternative, desirable trees, shrubs and ground cover, or to reduce weed opportunities (such as conversion of suitable drains to swales or filter strips as outlined in 5.13).

Appropriate alternatives to herbicide use include:

- Mowing general vegetation on banks adjacent to the carriageway using a hydraulic arm mounted flail, rotary mower or brush cutter, according to the type of vegetation present and mowing graded berm grass areas
- Flail mow edges to mown grass in urban areas
- Low ground cover planting in locations where access for maintenance operation is difficult. Suitable ground cover species are listed in Guideline 1. For large areas, the most economical ground cover plants include *Coprosma* $\times$ *kirkii*, *Coprosma* 'Prostrata' and some of the junipers including *Juniperus* $\times$ *media* 'Pfitzeriana'
- Dense shrub planting close to fence lines to reduce weed growth by shading

In locations where continued spraying is necessary, the extent of dead vegetation and the amount of herbicide used can be reduced in two ways:

- Precise specification and supervision of herbicide application, to ensure that only the optimum area is treated
- Precision in timing of operations, to ensure maximum effectiveness of application. Application timing may need to be adjusted from year to year according to allow for seasonal differences

Alternatives to herbicides should first be employed on sites such as uneven and steep banks and in association with bridge structures, fences and guard rails in areas where mowing is impracticable.

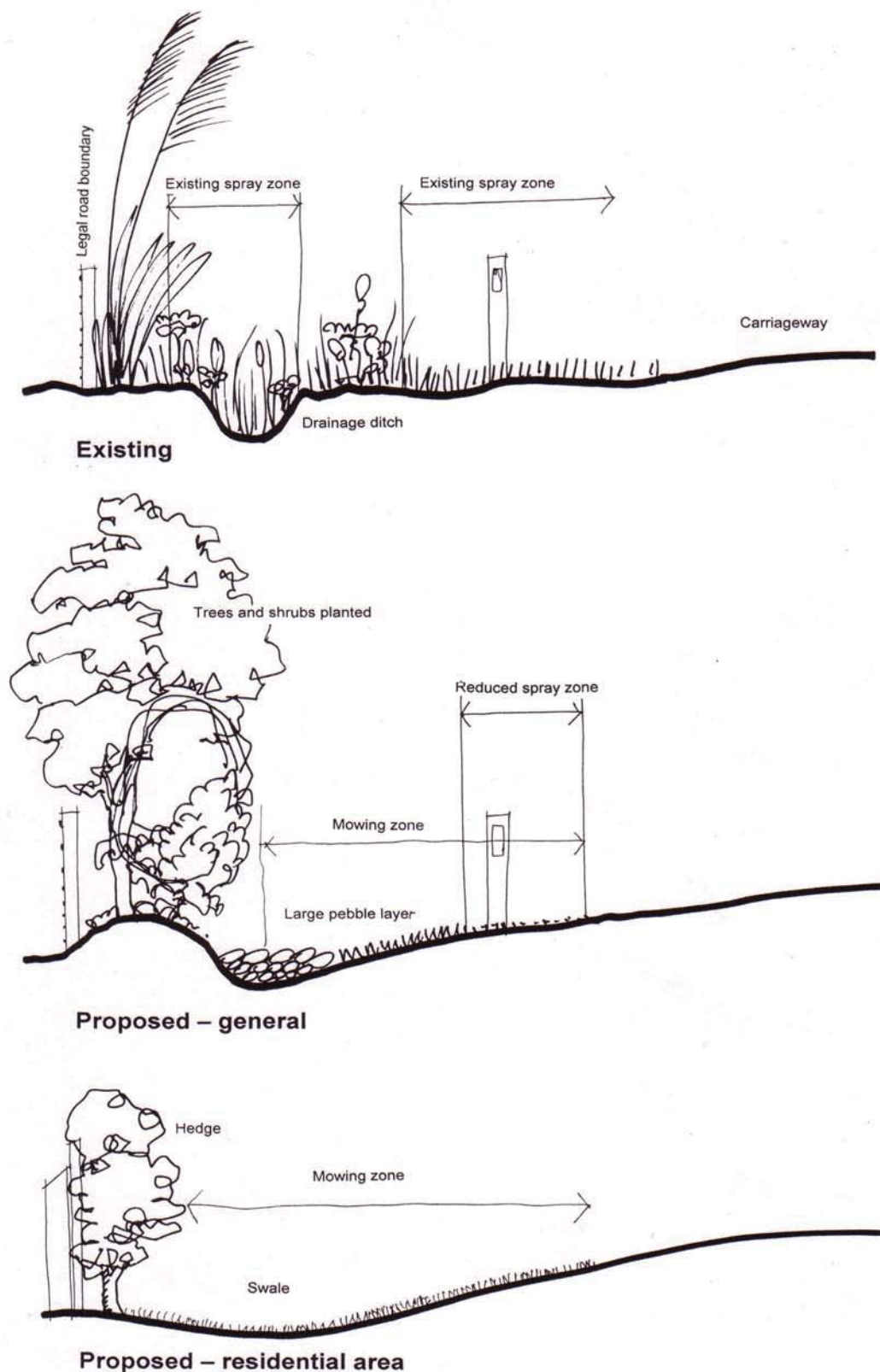


Figure 21 Typical rural berm profiles

5.15 MANAGEMENT OF INVASIVE EXOTICS

5.15.1 Purpose

To reduce the environmental problems arising from aggressive exotic species (plant pests).

5.15.2 Guidance

The plants in the following list should be identified and if present removed from road berm and verge areas because they are the plants most likely to have a serious and increasing adverse effect on the native vegetation of the Manawatu area. Advice on methods of removal is available from the Wanganui – Manawatu Regional Council.

Hedychium spp.
Solanum mauritanianum
Passiflora mollissima
Clematis vitalba
Tradescantia fluminensis
Ginger
Woolly nightshade (very poisonous)
Banana passionfruit
Old man's beard
Wandering Willy

For further information and for descriptions of other potentially troublesome species refer the booklet *National Plant Pests* prepared by Auckland Regional Council and available from horizons.mw.

Care should be taken when carrying out road and road berm maintenance that material and machines are not contaminated with the seed of plant pests, especially along biodiversity corridors and in areas with native vegetation. Care includes:

- Sourcing material from areas free of plant pests or from local areas
- Checking that material is not contaminated with the seed of plant pests and if it is either treating or re-sourcing the material
- Cleaning machines

5.16 PROTECTING SENSITIVE SITES

5.16.1 Purpose

To protect sensitive sites from road and roadside works and maintenance.

5.16.2 Guidance

Road berms and verges should be assessed for regenerating native plants and a database kept of these sites. It is essential to maintain up to date knowledge of these sites therefore on-going liaison should be established with the Department of Conservation, Forest and Bird Protection Society of NZ and other environmental groups.

On sites where road safety is affected by existing native vegetation best practice on maintenance of native vegetation should be established including pruning techniques and spraying.

Sensitive sites should also be assessed for road management needs and appropriate mechanisms identified for the protection of endangered native plant species.

Glossary

Amenity values: natural or physical qualities and characteristics of an area that contributes to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes (*Resource Management Act 1991*)

Biodiversity: the variety of all biological life (plants, animals, insects, fish, birds, invertebrates and micro-organisms), the genes they contain and the ecosystems and habitats in which they live

Bioengineering: using plants instead of mechanical means to, for example, filter pollutants and sediments from run off and stabilise steep banks

Ecological amenity: the suitability of the physical landscape to maintain the health of the ecosystem involved

Frangible: vegetation and structures such as lighting columns and signs that give way on severe impact

Herbaceous vegetation: plants with soft stems

Indigenous vegetation: plants native to a particular area, not introduced from other areas

Native plants: not known to have been introduced by humans

Road berms: the area between the edge of the road carriageway and the legal road boundary

Road verge: rural berms that are more or less covered in vegetation

Utility services: underground and overhead services including power and communication lines and cables and pipelines e.g. natural gas

Appendices

Review of existing information
and literature

Extracts from the legislation

Appendix 1: Review of existing information and literature

INTRODUCTION

Information was gathered on guidelines, policies and techniques that are currently being used or developed by councils and other organisations and agencies with an interest in managing roads. A number of these are in the process of developing policies and guidelines. Few, however, have completed policies and guidelines and it seems that similar issues are under investigation by organisations seeking a wider approach to the landscape of transport management. Transit New Zealand, for example, has recently released for comment guidelines relating to landscape enhancement of road reserves, (Transit New Zealand 2002).

Reference was also made to information available from organisations and bodies with an interest in the road environment, including conference proceedings of the New Zealand Arboricultural Association and the New Zealand Institute of Landscape Architects.

EXISTING APPROACHES TO ROAD BERM MANAGEMENT

The current practice of many district and city councils entails a traditional approach to vegetation on roads. For example, Buller District Council (2000) and Hamilton City Council (2002:3), in their Parks and Codes of Practice, predominantly retain mown grass berms (except in certain selected areas when "each case is treated on its merits"). In many cases, reference to planting roadsides is often made in documents and reports on initiatives undertaken.

Christchurch City Council, in contrast, has an innovative "Living Streets" project. This covers a range of techniques and initiatives to improve the quality of life on Christchurch's streets. The key to its success is to foster the perception by all concerned that the streets are not only a route for vehicles and pedestrians but are also the most accessible and frequented public open space that is available to its residents. Many towns, smaller cities and areas in larger cities have mainstreet and urban renewal programmes that also address the amenity and environmental aspects of the street and road, include planting suitable areas of roads.

Transit New Zealand provides literature on design for road safety. As well as seeking to remove or reduce vegetation hazards, Transit NZ also makes recommendations for the

positive use of planting for safety in both urban and rural areas (Transit New Zealand 1991 pg.1). A further source of information on how planting can promote road safety is *Highway 2000*, a project in Canterbury to plant the roads along State Highway 1.

CONTRIBUTING TO THE QUALITY OF OUR ENVIRONMENT

Overall, the search confirmed that there are four main areas where planting can contribute to the quality of our environment. These are road safety, bioengineering, ecology and wildlife and visual and cultural amenity. For each of these areas the main issues mentioned in the literature are as follows:

ROAD SAFETY

Transit New Zealand's *Guidelines for planting for road safety* (1991) outlines general principles and techniques for both urban and rural areas to address road safety (as well as enhancing the environment with plantings). A major hazard of roadside planting is tree strike. To help reduce this, plants need to be as frangible as possible to reduce the severity of collision and to absorb some of the impact of the vehicle. The recommended maximum diameter for trees that that will give way on impact is 100 mm., this is measured 400mm above ground (Transit N.Z 1991). Although most shrub species are very frangible, some that have many thick woody stems may be less so and can cause strike problems (Hammond 2002). Transit N.Z. (1991) has drawn up a list of New Zealand frangible shrub and tree species. Traffic Authority New South Wales (1987) also produces useful guidelines for planting frangible vegetation on roadsides. Lyndon Hammond of Land Transport Safety Authority (2002) suggested flaxes and other softwoods may be effective at slowing down cars.

In rural areas planting can be used to improve drivers' ability to 'read' the direction of the road ahead. They can also indicate hazardous sites such as bridges, major intersections and entrances to villages so that drivers reduce their speed naturally. Planting that enhances visual interest helps to keep drivers alert, screens unattractive and distracting views, and stabilises slopes, thus reducing safety hazards from slope erosion and collapse.

Canterbury 2000 (1998:2) describes a useful range of approaches to using planting to improve highway safety. In urban areas these include choosing plants that achieve results with

minimum maintenance, avoiding plants that may adversely affect drainage, damage services, shade the road resulting in icy spots in winter and whose leaf drop may block drains. Other considerations are ensuring that the effectiveness of street lighting is maintained and that traffic signs are visible. Possible techniques covered include using planting to focus on the foreground by blocking misleading background messages, focusing attention on a changes in the road environment by limiting lateral vision, highlighting traffic control measures such as traffic islands, and highlighting intersections.

A number of approaches to avoiding hazards of tree planting are used by councils. In dense urban parts of Hastings, such as in the inner city, trees are planted in concrete boxes to avoid root interference with structures and services. To ensure frangibility, trunks of these trees are allowed to grow to no more than a diameter of 100mm. This diameter is also the standard for street furniture recommended by Land Transport Safety Authority (Hammond 2002). In areas vulnerable to frost, trees are planted only on the south side of streets to prevent shading from the north. A variety of species are used and monitored on an on-going basis (McTeague 2002). In rural areas the street-side tree planting in new developments is restricted to the fence lines to reduce shading on the road in winter and to keep a 'clear zone' free of objects that could be struck. Rangitikei District also have a policy of removing non-frangible vegetation and vegetation that causes shading (Duncan 2002).

At present the commonest approach to maintaining open drain ditches and swales is herbicide spraying combined with mechanical clearing of ditches to maintain drainage. However, drainage ditches can be a safety issue for cars that leave the road, as well as having a high maintenance requirement. Provided that alternative means of storm water could be employed, some drains might be piped, but there is a problem of who would pay for this (Hammond 2002). An alternative is re-contouring drains and establishing grassed swales. According to a policy advisor at Transit N.Z., "the jury is still out on the amounts of water swales can handle" (McCallig 2000).

Other alternatives to swales are filter strips and a practice called a rain garden. The Auckland Regional Council is developing a design manual which outlines these approaches and will be available in late 2002 (Shaver 2002). A related approach to urban road run off currently being installed in Sydney is the use of swales planted with wetland species combined with vertical filter strip drains (Allan 2002). This is designed to return storm water to the ground water and remove pollutants including sediments and heavy metals. It also creates a valuable habitat niche for wetland plants.

ECOLOGY AND WILDLIFE

Roads offer an opportunity for integrating roadside management with the development of wildlife habitats and fostering of bio-diversity (Overton et al 2002). But road maintenance and improvements can also result in loss or damage to valuable vegetation, habitats and ecosystems, as well as introduce weeds and animal pests (Overton et al 2002; Transit New Zealand 1999; Williams 1999; Whyalla, South Australia 2000).

A number of studies have developed methodologies for characterizing the bio-diversity of roads by surveying and assessing vegetation and habitats. Such assessments reveal which habitats are represented, where they are located and what restoration effort is needed if any. A site assessment can also reveal special places and threatened species (Ferkins 2002).

One such survey in the Waikato found that roads in pastoral and horticultural areas tended to have a higher proportion of native vegetation than the surrounding land (Overton et al 2002). The proportion of species on the reserves that were native was greater again on elevated and sloping sites. The findings of such surveys could be used to predict the proportion of native species and inform management regimes.

In the national context, the New Zealand Biodiversity Strategy aims to “halt the decline of native biodiversity”. Wanganui-Manawatu Regional Council recognises the importance, even of small areas, of native vegetation. These can help to link the larger forest remnants and contribute to native bird corridors. It is hoped to reinforce and develop such wildlife corridors to link the extensive habitat areas in the northern parts of the district and to follow the Rangitikei, Oroua and Pohangina Rivers and connect these with Kitchener Park in Feilding and native coastal forests (Horizons.mw, 2002).

The main contribution that roadside vegetation can make to wildlife corridors is to provide frequent feeding sites for species such as bell bird (korimako) and allow them to move between the larger habitat areas. Plants that provide fruits and nectar-bearing flowers in winter and early spring are particularly valuable because these are periods when food for native birds is in short supply.

A common subject in the literature is the control of invasive weeds and plant pests. Roads are a corridor for invasive weeds and can spread from the road berm into areas neighbouring the

road. When these weeds are removed, the disturbed land is then susceptible to erosion and run off may contaminate ground water. Weed infestations, therefore, firstly need to be assessed and prioritised (Ferkins 2002).

The literature identifies a number of management strategies to control invasive weeds and shows that management tools and technologies can be adapted by varying and adopting a range of simple techniques (Ferkins 2002). Waitakere City, for example has reduced the cost of weed control by using innovative techniques and management strategies. A primary strategy is to re-vegetate using native plants adapted to the area (Ferkins 2002, Harper-Lore 2001, Henderson undated, Williams 1999; Whyalla South Australia 2000). Other techniques and management strategies include eradicating adult weed species; containing re-infestation; hydro-seeding slip faces and areas recently cleared of weeds, and developing gels and non-spray applicators of herbicides (Ferkins 2002). It is important to employ staff with the skills to be able to identify weed species, to identify native valuable plants, and to be able to eradicate weeds. Practicing weed hygiene is crucial to ensure that weeds are not spread by management activities. A weed hygiene plan would include proper cleaning of tools and equipment, taking care in the sourcing of imported top and subsoil soil, obtaining road metal and water locally, and reporting unwanted species as soon as they are discovered.

A strategy used in the United States is integrated roadside vegetation management programmes (Henderson undated). These are based on the established practice of integrated pest management and use monitoring and management to achieve the optimum benefit from any intervention. They reduce herbicide use, save money and add to visual and environmental benefits. The starting point for integrated pest management strategies is to establish locally adapted native vegetation. It is also important to reduce site disturbance and thus the opportunity for invasion. Spraying is carried out in the most effective way, only at the optimum moment by highly trained applicators. Spot spraying continues between the major herbicide applications and at the critical time necessary to prevent seed dispersal.

The two most common weed management methods used by the territorial authorities contacted are herbicide spraying and mowing. The main reason given for the use of herbicides is cost effectiveness. They do, however, have some disadvantages: they may destroy desirable species and threatened species, may disturb sites and encourage erosion (for example if mowers are set too low), look unsightly and create environments where opportunistic weeds can establish. Desirable plants, especially native plants may not then be able to compete.

Spraying, in addition, may affect the health of some people in the community.

Although all the territorial authorities contacted use herbicides, in some cases there is a desire to reduce dependence on chemical control. This is reflected in management directives or practices to minimise herbicide use and these include spraying on a 'as needed' basis only, having programmes, trying to limit spraying to around signage, stipulating high spraying standards in maintenance contracts, and promoting alternative methods and products.

Other approaches adopted with the intention of reducing herbicide use experimentation with alternative products such as fatty acids, 'Weed Balls' (although their use is limited because they need paved surfaces (Douglas 2000:15)), using different spray nozzles, using non-residual sprays only and spot spraying.

Non chemical means such as steam and hot air have often been found to be either ineffective or too expensive. Using steam was tried by the Kapiti Coast District Council on roadsides, but found to be ineffective (Douglas 2000:21). Wellington City Council has also abandoned this method on grounds of not being cost effective.

The most successful method to reduce the use of herbicides seems to be planting of vegetation that suppresses weeds. Tauranga District Council has found that re-vegetating roadsides is cost effective (Cannon 2002). Firstly they remove the weeds by spraying, then replant using native plants appropriate to the site. Auckland City Council has planted roads to the airport with native vegetation such as flaxes and coprosmas (Douglas (a) 2002). Waitakere City Council has found revegetating reduces maintenance and is cost effective (Ferkins, 2002).

Other types of roadside plantings continue to be tried: Carterton District Council has planted roadsides in wild flowers. Roadsides have also been planted with wildflowers in the Waikato and with lucerne near Turangi. Transit N.Z is trying wildflowers in Northland and Auckland, although many areas are not suitable for such plantings on environmental grounds, and Carter Holt Harvey are trying growing crops on wide roads. Transit N.Z and Agriculture Research are also trying low growing grass species to decrease road reserve maintenance (Douglas (b) 2001).

Another approach is planting clovers, which need less mowing, and other ground covers such as native grasses to suppress weeds so maintenance costs are reduced (Duncan 2002). Some of

the contractors in the Rangitikei District plant species to suppress weeds to reduce their maintenance costs, although there are no guidelines in their maintenance contracts. Rangitikei also uses a mulching cutter when carrying out their annual trim of trees. Mulching is another method to reduce maintenance.

Douglas ((b) 2000: 15) questions whether roadside vegetation needs to be controlled at all, as grass seldom grows higher than height restrictions. She also concludes that the growing trend of subdivision into lifestyle blocks and farm diversification may lead to conflict relating to the use of herbicides. She suggests that territorial authorities promote alternative roadside management systems such as planting native vegetation.

VISUAL AND CULTURAL AMENITY

Roadsides can be planted to: reflect landscape change; reinforce existing patterns; add structure when the road interrupts natural and cultural patterns; punctuate the journey giving a sense of place; link a series of 'events' in a journey; give amenity and identity to small towns, parts of urban areas and districts; frame views to draw travellers' attention to them; create landmarks (Turning Point 2000, 1998).

Landscape assessment can include the perception of the communities towards the landscape. The results may be used to develop approaches and produce road berm planting that has local value and relevance for the communities through which they pass. This gives communities a 'stake' in the planting. The outcome could be community stewardship of roadside plantings.

In addition to the general vegetation of roadsides, there are occasional trees of special individual merit. Some of these are already included in the RNZIH National Register of Notable Trees of New Zealand. Three of the 380 registered trees are in the Manawatu District. In order to register, protect and manage notable existing trees, councils require a method to identify and evaluate them. One such method is the Standard Tree Evaluation Method (STEM) developed by the Royal New Zealand Institute of Horticulture (RNZIH, undated).

Street trees have an important role in the visual and cultural amenity of the road environment and many territorial authorities have policies and guidelines on street tree planting that recognise the benefits that they can bring in both urban and rural areas. The commonest reasons given by councils for actively encouraging street tree planting were amenity, to identify

arterial routes and route changes (particularly in rural areas) and traffic calming. Planting is also used to give a sense of place.

Hamilton City Council (2002) gives a number of reasons for developing street tree policies and guidelines. These include the links with history and tradition that trees can provide, how they can assist in the functioning of urban ecosystems, add to urban and 'streetscape' amenity values and create a positive image for tourists and visitors. Policies prevent the loss of trees and identify and protect individual trees. Hamilton City Council has developed a variety of methods to implement their objectives and policies: increasing public awareness of the value of urban trees, developing a framework of urban trees, improving identification and protection of significant trees, and maintaining a significant tree register.

Dunedin City Council has an extensive Street Tree Planting Policy. It states that one role of street trees is to bring a sense of place or identity to neighbourhoods. The document details provisions for planting, management systems, selection of contractors, guidelines for contractors, species lists, and processes for planting. Greytown Ward in South Wairarapa has a policy to register and protect noteworthy trees on both public and private land, and has policies on the management of listed trees. Papakura District Council (undated) has a volunteer group of Tree Advisors who assist and work with the Council and the community in tree management and education.

Tasman, Marlborough, Tauranga, Hastings, Wanganui, Rangitikei and New Plymouth District Councils also supplied information on their policies and practices on road berm vegetation. These tended to be scattered through policy documents, rather than forming a separate road planting policy.

Hastings District Council uses planting to enhance legibility under a strategy they call 'Landmarks' (McTeague 2002). They plant major arterial routes through towns using strategies that include repetitive idioms and planting to identify entrances to towns. Many of these initiatives are community driven, for example, Bridge Pa near Hastings. Defining and identifying arterial routes with plants is one strategy used by Hastings and Tauranga to promote safety. The aim is to help motorists more easily identify these key routes. Another strategy used by these territorial authorities is to use planting along with road design to acts as a traffic calmer (Cannon 2002, McTeague 2002).

WORKING WITH STAKEHOLDERS AND COMMUNITIES

Community aspiration for roads is changing (Stone 1992 cited in Williams 1999). In Australia, the United States, Britain, Europe and in New Zealand, communities and organisations are recognising and actively promoting the role of roads in bio-diversity. A successful road planting programme, therefore, is achieved through working co-operatively with all stakeholders.

The literature reveals that there are a number of sound, transparent processes that can be developed to harness local knowledge, community aspirations and energy, as well as the expertise and resources of a range of organisations. Stakeholders need to be identified and a road berm reference group involving all stakeholders provides assistance and feedback (William 1999). North Carolina Department of transportation gained public support for their roadside plantings by pinpointing groups that were likely to support the programme, communicating with the community by developing news releases, developing a handbook to identify roadside plants, speaking at local groups and organisations, developing information packs, and picking special events to focus on (Johnson 2001). Transit New Zealand (1991) proposes promoting an "Adopt a Highway" programme to develop partnerships with local communities. As a part of their road planting programmes, Waitakere City Council uses expert facilitators to assist stakeholders re-vision the planting of their roads (Ferkins 2002).

A number of local authorities are working together with their communities and developers on road planting projects. In partnership with the local community or developers, entrances to rural settlements have been planted to reinforce local identity. Some authorities require developers to plant the roadsides as a condition of resource consent (Craig 2002), others encourage developers to plant streets (Cannon 2002). Other councils plant when approached by residents in both rural settlements and urban areas, or support these community planting initiatives by suggesting appropriate species (Cannon 2002, Hutchingson 2002).

TECHNIQUES FOR ESTABLISHING AND MANAGING ROADSIDE VEGETATION

This literature search revealed a myriad of sources of technical information on tree planting techniques, tree selection and the effects of tree planting on the environment.

In addition to the literature, many organisations, territorial authorities and individuals have developed expertise in establishing and managing native vegetation in environments such as roads. Much of this expertise, however, has not been published or presented in a written format.

A useful data base for a wide range of resources on re-vegetation and restoration is <http://www.bush.org.nz>. Another useful source is *Native Forest Restoration*, published by Queen Elizabeth National Trust, Wellington by Tim Porteous. A publication with a useful list of references is *Ecological restoration in the Wellington Conservancy*, published by the Department of Conservation, 1997, by Philip Simpson.

The New Zealand Arboricultural Association has conference proceedings and papers with much useful information as well as lists of relevant publications. Abstracts cover preparation and extended maintenance of trees, physical considerations influencing the selection of tree species, evaluation of urban soils and implications for tree growth, the action of horticultural chemicals and their effects on growth and development, and design issues and establishment problems associated with tree planting in hard landscapes.

SUMMARY OF EXISTING LITERATURE ON MANAGEMENT

Of the territorial authorities contacted, most expressed an interest in the issues of planting roads but few had fully developed policy or guidelines. Transit New Zealand has recently developed guidelines for roadside planting.

Road safety is clearly a major consideration when planting roads and this search found that not only is there a need for informed management of vegetation to maintain road safety, but planting can also contribute to safety. Another major issue raised is the control of weeds. Weed management strategies and techniques were identified that effectively control weeds and help to reduce cost. Features of these techniques include: weed hygiene, re-vegetating with locally adapted native vegetation, training staff and developing detailed specifications for contractors.

Other researchers are presently developing methodologies to assess landscapes through which roads pass, and fostering community stewardship by understanding the perception of the different communities towards the landscape and working with stakeholders and communities.

The search identified sources of technical information on planting trees in roads in the rural and urban landscape, and an effective approach to evaluating existing trees.

Overall, the literature supports the view that a proactive programme of roadside planting, particularly revegetating with native plants, will result in roads becoming a community asset with long-term environmental benefits. Such a programme involves a number of stages, beginning with assessment, followed by re-vegetating, monitoring and managing the roadside plantings. The consequences of the traditional mowing or treating roadsides with herbicides, apart from maintenance costs and environmental effects, the literature suggests can be "monocultures of grassy vegetation, and a 'front lawn' expectation from the travelling public" (Harper-Lore 2001). A Waitakere City Council officer commented, "we are advocating a change in mindset from viewing roads as a wasteland to be controlled, to viewing them as a valuable contributor to the physical and cultural landscape". This change in mindset is then reflected in management regimes and the management tools used.

Appendix 2: Extracts from the Legislation

Transit New Zealand Act 1989 Commenced: 1 Oct 1989

IV: Roading

43 Interpretation

PART IV ROADING

43. Interpretation---(1) In this Part of this Act,---

“Road” means a public highway, whether carriageway, bridle path, or footpath; and includes the soil of---

- (a) Crown land over which a road is laid out and marked on the record maps:
- (b) Land over which right of way has in any manner been granted or dedicated to the public by any person entitled to make such grant or dedication:
- (c) Land taken for road under the provisions of this Act or any other Act or Provincial Ordinance formerly in force:
- (d) Land over which a road has been or is in use by the public which has been formed or improved out of the public funds, or out of the funds of any former province, or out of the ordinary funds of any local authority, for the width formed, used, agreed upon, or fenced, and a sufficient plan of which, approved by the Chief Surveyor of the land district in which such road is situated, has been or is hereafter registered by the District Land Registrar against the properties affected by it; and the Registrar is hereby authorised and required to register any such plans accordingly, anything in any other Act notwithstanding, when the plans are presented for registration by or on behalf of the Minister:
- (e) Land over which any road, notwithstanding any legal or technical informality in its taking or construction, has been taken, constructed, or used under the authority of the Government of any former province, or of any local authority, and a sufficient plan of which is registered in the manner provided for in paragraph (d) of this subsection,---and, unless repugnant to the context, includes all roads which have been or may hereafter be set apart, defined, proclaimed, or declared roads under any law or authority for the time being in force, and all bridges, culverts, drains, ferries, fords, gates, buildings, and other things thereto belonging, upon the line and within the limits of the road:

55. Removal of trees, hedges, etc., that obscure visibility or interfere with public work---

(1) In this section and in sections 56 and 57 of this Act, unless the context otherwise requires,---

``Cut down'', in relation to any tree, hedge, or shrub, includes the total removal of the tree, hedge, or shrub:

``Responsible authority'', in relation to a public work, means---

(a) Any Minister of the Crown who is responsible for the work, where the work is a Government work:

(b)The local authority which has financial responsibility for the work, where the work is a local work,---and, in relation to a road, means the authority having control of the road:

``Road'' includes a motorway, access way, and service lane.

(2)The responsible authority may require the owner or occupier of any land adjoining a road or public work to do any of the following things:

(a)To cut down, lower, or trim any tree, hedge, or shrub that is overhanging or overshadowing a road to such an extent as to damage the road, or to endanger or obstruct the lawful use of the road, or to be detrimental to the maintenance of the road and any associated drainage system:

(b)To cut down, lower, or trim any tree, hedge, or shrub, or remove any debris, if parts of it may be blown on to any road or public work or if it may otherwise interfere with the lawful use of the road or any public work:

(c)To cut down, lower, or trim any tree, hedge, or shrub on any land that is in such a position that it interferes with or is damaging, or is likely to interfere with or damage, any road or public work or the construction, operation, or maintenance of any road or public work:

(d)To cut down or grub up, and remove any tree, hedge, or shrub that is obstructing a road or its drainage system owing to the growth of any vegetation or the spreading of roots upon or under the road up to its middle line:

(e)To cut down, lower, or trim any tree, hedge, or shrub or to lower or remove any wall, fence, or other structure, that in the opinion of the responsible authority wholly or partially obscures visibility at any bend of a road, or at any road or railway crossing, or at any road intersection, or that causes any danger to the traffic on any road:

Local Government Act 1974 Commenced: 1 Dec 1974

XXI: Roads (other than Regional Roads), Service Lanes, and Access Ways

315 Interpretation

[PART XXI

[ROADS (OTHER THAN REGIONAL ROADS), SERVICE LANES, AND ACCESS
WAYS

This Part (comprising ss. 315-361), together with Parts XVIII-XX and XXII, was enacted by s. 2 of the Local Government Amendment Act 1978. Refer s. 1 (4) of that Act.

[315. Interpretation---(1) In this Part of this Act, unless the context otherwise requires,---

``Access way" means any passage way, laid out or constructed by the authority of the council or the Minister of Works and Development [[or, on or after the 1st day of April 1988, the Minister of Lands]] for the purposes of providing the public with a convenient route for pedestrians from any road, service lane, or reserve to another, or to any public place or to any railway station, or from one public place to another public place, or from one part of any road, service lane, or reserve to another part of that same road, service lane, or reserve:

``Footpath" means so much of any road as is laid out or constructed by authority of the council primarily for pedestrians; and includes the edging, kerbing, and channelling thereof:

``Private road" means any roadway, place, or arcade laid out [[or formed]] within a district on private land, whether before or after the commencement of this Part of this Act, by the owner thereof, but intended for the use of the public generally:

``Private way" means any way or passage whatsoever over private land within a district, the right to use which is confined or intended to be confined to certain persons or classes of persons, and which is not thrown open or intended to be open to the use of the public generally; and includes any such way or passage as aforesaid which at the commencement of this Part of this Act exists within any district:

``Road" means the whole of any land which is within a district, and which---

- (a) Immediately before the commencement of this Part of this Act was a road or street or public highway; or
- (b) Immediately before the inclusion of any area in the district was a public highway within that area; or
- (c) Is laid out by the council as a road or street after the commencement of this Part of this Act; or
- (d) Is vested in the council for the purpose of a road as shown on a deposited survey plan; or
- (e) Is vested in the council as a road or street pursuant to any other enactment;--- and includes---
- (f) Except where elsewhere provided in this Part of this Act, any access way or service lane which before the commencement of this Part of this Act was under the control of any council [[or is laid out or constructed by or vested in any council as an access way or service lane]] or is declared . . . by the Minister of Works and Development as an access way or service lane after the commencement of this Part of this Act [[or is declared by the Minister of Lands as an access way or service lane on or after the 1st day of April 1988]]:
- (g) Every square or place intended for use of the public generally, and every bridge, culvert, drain, ford, gate, building, or other thing belonging thereto or lying upon the line or within the limits thereof;--- but, except as provided in [[the Public Works Act 1981]] or in any regulations under that Act, does not include a motorway within the meaning of that Act:

“Service lane” means any lane laid out or constructed either by the authority of the council or the Minister of Works and Development [[or, on or after the 1st day of April 1988, the Minister of Lands]] for the purpose of providing the public with a side or rear access for vehicular traffic to any land:

(2) Repealed by s. 9 (1) of the Local Government Amendment Act 1979.

(3) Nothing in this Part of this Act shall be construed as imposing any obligation on the council in relation to any private road or private way.

4) Every accretion to any road along the bank of a river or stream or along the mean high-water mark of the sea or along the margin of any lake caused by the action of the river or stream or of the sea or lake shall form part of the road.

(5) Where any road along the bank of a river or stream or along the mean high-water mark of the sea or along the margin of any lake is eroded by the action of the river or stream or of the sea or lake, the portion of road so eroded shall continue to be a road.

[317. Control of roads---(1) Subject to section 318 of this Act, all roads in the district shall be under the control of the council:

Provided that---

- (a) A State highway or part thereof shall be under the control of the council only where [[Transit New Zealand]] has, under [[section 62 of the Transit New Zealand Act 1989]], delegated that control to the council:
- (b) A Government road shall be under the control of the [[Minister of Transport]]:
- (c) A regional road or part thereof shall be under the control of the council only where the Regional Council or united council, as the case may be, has, under section 368 of this Act, delegated that control to the council.

[333. Dividing strips, etc.---(1) *The council may on any road construct, erect, or grow thereon or remove therefrom such barriers, dividing strips, guiding or sign posts, pillars or other markers, trees, hedges, lawns, gardens, and other devices as are, in the opinion of the council, necessary for separating, guiding, or warning traffic, intercepting glare, or for any other purpose.*

(2) The council may on any road construct for road safety purposes, and alter or remove therefrom, any segregation strip for the purpose of segregating from the roadway any land having a frontage to the road:

Provided that no such segregation strip shall be constructed or altered so as to unreasonably prevent access to any land having a frontage to the road:

Provided also that for the purposes of this Act and of any other Act, any land having a frontage to the road before the construction of a segregation strip shall be deemed to continue to have that frontage, notwithstanding the existence of the segregation strip.

[334. Erection of monuments, etc., and provision of facilities on or under roads---(1)

The council may---

- (a) Construct and enclose any part of a road as a pedestrian safety area:
 - (b) *Lay out or plant grass plots or flower beds or trees on any road, and prohibit traffic, in whole or in part, on any such plots and flower beds laid out in roads (whether laid out before or after the commencement of this Part of this Act) by or under the authority of the council:*
 - (c) Erect on any road a monument, statue, or other such erection:
 - (d) Construct or provide on, over, or under any road facilities for the safety, health, or convenience of the public, or for the control of traffic or the enforcement of traffic laws:
Provided that no such construction, erection, laying out, or planting shall be carried out, unless in the opinion of the council the construction, erection, laying out, or planting will not unduly impede vehicular traffic entering or using the road (not being a road or part of a road to which a special order under section 336 of this Act for the time being applies).
- (2) For the purposes of any resolution or bylaw of the council, anything constructed or provided under the authority of the council shall be deemed to be sufficiently described if the road in which it is constructed or provided and its approximate locality in that road are specified in the bylaw or resolution.

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