# Cannons Creek
# Restoration and Development Plan
## Belmont Regional Park

**Prepared by**
**Wellington Regional Council**
**and**
**Friends of Maara Roa**

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# Contents

***Acknowledgements***

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# PART ONE: INTRODUCTION, AIMS AND OBJECTIVES

*Wellington Regional Council and Friends of Maara Roa are working together to prepare a restoration and development plan for the Cannons Creek Valley, an area which is also known as 'Maara Roa'. The project area covered in this report includes two landowners – Porirua City Council and Landcorp. Porirua City Council owns the Cannons Creek Lakes Reserve; Landcorp owns the rest of the project area. Both areas fall within the boundaries of Belmont Regional Park, which is administered and managed by Wellington Regional Council (as shown on Maps 1 and 2).*

## 1.0 Background

In 1986 Wellington Regional Council (WRC) commissioned landscape design proposals for the Cannons Creek entrance to Belmont Regional Park. Porirua City Council's Cannons Creek Lakes Reserve adjacent to Cannons Creek shopping area was included in the proposals as part of an agreement between the two Councils.

A detailed brief prepared by WRC outlined the requirements to be met – a combination of providing access and tracks to the Park, recreation, interpretation, conservation and protection of native forest remnants (including two areas on Landcorp land protected by Conservation Covenants), and landscape enhancement through tree planting (both revegetation and woodlots). Brandon Intermediate School located adjacent to Cannons Creek Lakes Reserve and the Park had carried out plantings of native and exotic trees on slopes on the school boundary. Part of the WRC brief was to recognise this initiative and where possible extend it through similar plantings.

The proposals are described and illustrated in a report and plans[1]. WRC implemented many aspects of the landscape proposals over several years and Porirua City Council (PCC) has continued with development and maintenance in the Cannons Creek Lakes Reserve, in line with its management plan prepared in 1996[2].

## 2.0 Land Management

### 2.1 *Wellington Regional Council*

Belmont Regional Park is managed by Wellington Regional Council under the Belmont Regional Park Management Plan prepared in 1996. Under the Plan WRC manages recreation across the areas of land within the Park boundaries owned by the various parties, and takes on a 'caretaker role' for all land within the Park, seeking support from other landowners to achieve the aims of the Management Plan.

Under the Management Plan, WRC has extra responsibilities on its own land within the Park, and on other land within the Park in accordance with the WRC Animal and Pest Plant Management Strategies.

[1] Proposals for Cannons Creek Entrance, Belmont Regional Park, Boffa Miskell Partners, April 1987
[2] Proposed Porirua City Amenity Lakes Management Plan, 1996

For the purposes of this project WRC will be taking on responsibility for management issues on Landcorp land, including the two covenant areas, as they relate to the implementation of the Cannons Creek Restoration and Development Plan. WRC will also carry out work to implement the Plan in the Lakes Reserve, as agreed and in conjunction with, Porirua City Council. WRC work will be co-ordinated by the Belmont Regional Park ranger, and will planned alongside other WRC work programmes across Belmont Regional Park as a whole.

### 2.2 *Department of Conservation*

Officially the Department of Conservation (DoC) manages the Cannons Creek and Takapu conservation covenant areas. DoC has indicated, however, that it is happy for WRC to carry out work in the covenant areas, and given that, WRC will be undertaking pest control work in the conservation covenants

### 2.3 *Porirua City Council*

PCC has prepared a management plan for the Cannons Creek Lakes Reserve – the area of land in Belmont Regional Park in its ownership. The Belmont Regional Park Management Plan acknowledges the requirement on park landowners who own land within the Park protected under the Reserves Act (such as the Lakes Reserve), to prepare management plans for such reserves.

The Landcorp land within the project area falls in the Porirua City Council administrative area and this land is classified as Rural in the Porirua District Plan and it falls within the Landscape Protection Area.

The table below summarises responsibilities, as agreed between WRC, PCC, DoC and Landcorp, for management issues relating to the Cannons Creek Restoration and Development Plan project area.

| | **WRC** | **PCC** |
|---|---|---|
| Lakes Reserve | Pest Control<br>Water Quality | Maintenance<br>Planting<br>Pest Control<br>Recreation development |
| Landcorp land including covenants | Maintenance<br>Planting<br>Pest Control<br>Recreation development<br>Water Quality | |

## 3.0 The Situation Today

The Cannons Creek entrance to the Park has been transformed over the past 12 years by the WRC development work, ongoing maintenance work in Cannons Creek Lakes Reserve by PCC and the Brandon Intermediate tree plantings. Comparing a series of photographs taken in 1986 – 87 with those in September 2000 clearly illustrates these changes. This comparison is also

important because it illustrates not just what has occurred with planting, track construction, fencing, boardwalks, etc but what has also occurred through natural regeneration.

Twelve years ago much of the area was covered in gorse or in grazed pasture. As part of the Belmont Regional Park concept, Landcorp set aside, through two covenants in this part of the Cannons Creek valley, native forest remnants and surrounding buffer areas. This essentially meant retiring much of the lower portion of the catchment. The remnants comprise a canopy of tawa, kohekohe and the occasional podocarp with a developing understorey, which in places, particularly along the edges, is still relatively open.

The two areas of remnant forest and the younger regenerating native vegetation around them are protected by Conservation Covenants totalling 40 hectares. These covenanted areas are not only very significant in terms of Cannons Creek valley but to Belmont Regional Park overall.

Much of the gorse that was growing in the lower catchment in 1987 has been overtopped by secondary native vegetation and the gorse now is confined mainly to the more exposed spurs and ridge tops. It has been the exclusion of both stock and fire that has enabled this regeneration process to occur. Around 1983 large areas of scrub in the valley was rolled and burned as part of conversion by Landcorp into pasture. Apparently, during this period a controlled burn got out control and caused considerable damage and this is why the regeneration, even in the gullies is relatively young. Also a fire in 1997 through an area adjacent to the main track effectively halted this process and it is interesting to compare the burnt area with older areas of regeneration to understand how advanced the transformation is from gorse and pasture to native vegetation.

Exclusion of fire will continue to be a major issue, particularly given the proximity of the urban population and the presence of large areas of gorse.

The existing track linking Cannons Creek entrance to the rest of Belmont Regional Park bypasses the forest remnants, emerging from the lake Reserve along a cleared swathe through the gorse. Currently mown about once a year to keep it open and passable it emerges from the regenerating area on to Landcorp's open farmland and continues along an easy gradient to the main enclosing ridgeline. The open tops are a feature of Belmont Regional Park and provide for a host of recreation opportunities close to the region's metropolitan centres that are not found elsewhere (eg walking, running, mountain biking, etc).

However, the lower portion of Cannons Creek catchment, with its steep-sided gorge, wetland areas, native forest remnants, amenity and revegetation plantings and regenerating native vegetation is in contrast to these open tops.

In the 1987 development proposals, Cannons Creek gorge and waterway was acknowledged as providing a physical separation between the Park's main pedestrian route and Landcorp's Waitangirua Farm. Pedestrian access

through this part of the Park was confined to the swathe of open pasture with opportunities for excursions into the adjacent forest remnants.

The 1989 Transmission Gully investigations assessed the potential effects of the proposed motorway route on the Park overall and the various link road options from the route to Porirua. The route option eventually adopted requires construction of a viaduct over the steep upper Cannons Creek gorge and a subsequent link road across Waitangirua Farm. The investigations concluded that the routing of Transmission Gully through Belmont Regional Park would have some major environmental effects. However, the motorway will also open up an extensive tract of landscape that few people in the region are aware of, let alone ever visited. The viaduct spanning the Cannons Creek gorge will be quite spectacular. The route through the Park (and also through Battle Hill Farm Park) will, in effect, create a 'green corridor' into Wellington.

These positive spin-offs for the Park were highlighted in the Wellington Regional Council's 1990 submission to the Parliamentary Commissioner for the Environment who conducted an environmental audit on the proposed motorway route.

## 4.0 Friends of Maara Roa

The establishment of Friends of Maara Roa has provided a timely catalyst to realising the environmental and recreational potential of the Cannons Creek Valley and as a consequence, the Park overall. The group has articulated its objectives in its constitution and is keen to work alongside agencies to achieve these[3]. Formation of Friends of Maara Roa (Inc) arose from concern by a group of residents over the future of Cannons Creek Valley that was spelt out in a detailed submission to the Wellington Regional Council's 1999 Annual Plan[4]. The submission sets out in some detail, the issues evident in this part of the Park and puts forward a proposal for the development of Cannons Creek Valley.

Friends of Maara Roa's objectives sit comfortably with the Regional Council's long-term plans for Cannons Creek Valley and also with its initiatives in relation to forming stronger bonds with community-based groups[5]. The Council has met with Friends of Maara Roa on several occasions to explore possibilities for co-operation and to discuss key issues with a view to establishing priorities and how these will be tackled. This report describes the proposals.

## 5.0 The Way Forward

Both Friends of Maara Roa and Wellington Regional Council have been, and are, currently active in Cannons Creek valley and there is already close co-operation 'on-the-ground' between the WRC Ranger and the Friends. The Friends have organised walks through the valley and have planted local native seedlings in several areas along the main spine track using seedlings

[3] A copy of the Friends of Maara Roa (Inc) constitution is attached (Appendix 1).
[4] The Cannons Creek Lake Reserve & Valley. Report & Submissions to Porirua City Council and Wellington Regional Council by Sylvia Jenkin, May 1999
[5] WRC have recently created a Volunteers Co-ordinator position to work closely with groups such as the Friends.

supplied by WRC. They have also carried out important follow up maintenance work on the plantings.

The Friends have also compiled a plant species list[6] and have also comprehensively assessed potential walkway routes through the valley.

Both the Council and the Friends are very mindful that any long term plan for developing the ecological and recreational potential of Cannons Creek valley will require a high level of commitment over a sustained period. The ingredients appear to be in place to achieve this, namely:

> Initial development work (revegetation, woodlot planting, tracks, boardwalks, etc) undertaken by the WRC in 1987 and by Brandon Intermediate School (tree planting) have been successful and have laid a good foundation for any future works;

> Establishment of Friends of Maara Roa (Inc);

> Appointment of a WRC Volunteers Co-ordinator;

> Impetus for development of Transmission Gully within a much shorter time frame than previously envisaged thus potentially providing a greater exposure and interest in the Valley;

> Extensive and well advanced natural regeneration in lower valley;

> The aims, objectives and policies in the Belmont Regional Park Management Plan;

> Ongoing co-operation and input from PCC, particularly with regard to Cannons Creek Lakes Reserve;

> Recognition by both the Regional Council and the Friends that sound planning and achievable milestones are essential if the project is to succeed.

Objectives shared by both organisations have been developed, and are set out below along with a list of priorities.

### 5.1 *Objectives*

To develop a restoration and development plan which can be used to:

> Work towards achieving the aims and objectives of the Friends of Maara Roa constitution and the Belmont Regional Park Management Plan;

[6] Preliminary Species List of the Area Called 'The Vines' at Cannons Creek by Neil and Juliet Bellingham, Friends of Maara Roa (Inc) and Wellington Botanical Society – see Appendix 2..

- enable Friends of Maara Roa to initiate project work in Cannons Creek valley, in consultation with the WRC Ranger for Belmont Regional Park and PCC staff;

- work with Transit New Zealand to secure pedestrian access links through Belmont Regional Park and to ensure suitable landscape and ecological mitigation is completed as an integral part of the planning and construction of the Transmission Gully motorway;

- set realistic and achievable project goals;

- provide a plan with which Friends of Maara Roa can promote the project, and attract sponsors and volunteers;

- provide a document from which WRC can allocate resources to the project;

- provide continuity, so that the project can continue even if membership of Friends of Maara Roa and staff at WRC and PCC change; and which will be

- put together and carried out co-operatively, using the research, expertise, knowledge and experience of all those with an interest in the project.

### 5.2 *Restoration and Development Plan*

After meetings between the organisations the contents of the proposed restoration and development plan were agreed as incorporating the following:

- research on the site carried out by Friends of Maara Roa (ie historical research, plant species lists, identification of routes for tracks etc);

- identification of different types of planting sites across the project area;

- guidelines for a generic approach to restoration (eg general principles on site preparation, selection and propagation of species, seed collection, timing, planting, aftercare, maintenance and on-going management etc);

- guidelines on the best types of sites to plant, and prioritising these sites for planting;

- standards for work in the Park (eg on tracks, structures signs, etc);

- identification of possible interpretation points/vantage points;

- identification of any areas where general public access is undesirable at this stage (eg areas ‘opened up’ as a result of enrichment planting or where releasing of native plants in areas of gorse have occurred, or where recent plantings have been done);

> a strategy to protect the site from risks (pests, fire etc);

> definition of roles, responsibilities, and levels of commitment from all parties involved in the project.

A two-staged approach to restoration is proposed:

1. Linking the two covenanted areas and also focusing on the wetland area ;
2. Moving out within the wider project area, bounded by the western ridge above the old Farm Road, Transmission Gully Motorway, and the Link Road to Porirua.

A programme of how the proposed restoration and development work would be tackled is covered in Part Five (Funding and Programme).

# PART TWO: RESTORATION METHODS AND TECHNIQUES

## 6.0 Vegetation Description

The Belmont Regional Park landscape has been significantly modified through clearance of the original vegetation followed by many decades of farming. The Cannons Creek catchment was no exception to this. Fencing, tracks, establishment and management of pasture and stocking with sheep and cattle has until recently, occupied this landscape. However, since the late 1980s changes have occurred because the lower section of the catchment was retired from farming and the area left to regenerate.

The area in the lower catchment that was formerly grazed was retired about the same time and so the gorse and other vegetation that has become established, is relatively even-aged. In the gully bottoms and in a few isolated areas there is likely to be more variation in terms of age of vegetation. This is because of total vegetation clearance in these more inaccessible areas was not achieved or even if these areas were cleared, the difficult access for stock meant only light or periodic grazing occurred.

A division of Wellington into a series of ecological domains sees Cannons Creek fall into Inland Wellington – Porirua zone.[7] This eco-domain is characterised by a complex hilly terrain with turbulent wind resulting in lots of microclimates. The clay-rich soils are generally fertile and moisture-retentive. The five Wellington species of podocarps once dominated the cooler basins and valleys of this zone.

The vegetation that has regenerated in most of the areas that were formally grazed comprises colonising species such as mahoe, lacebark, kawakawa, hangehange etc rather than species composition of the original vegetation that grew in the catchment prior to European settlement, which would have included podocarps and other climax tree species.

From field inspections and general observations the key points concerning the vegetation in the project area can be summarised as follows:

> There are large areas of natural regeneration occurring throughout the project area where there is protection from stock grazing;

> The regeneration pathway of native vegetation has been from pasture to gorse and other exotic species to young secondary native forest species;

> The succession to forest has proceeded fastest in damp and sheltered situations;

[7] Wellington Regional Native Plant Guide: Using your garden to sustain our native ecosystems, Wellington Regional Council, 1999

> There are good available seed sources from the two covenanted areas as well as seed most forest floor and shrub species, all of which are becoming dispersed through the gorse;

> Milling has removed seed sources of podocarps (except kahikatea), northern rata, and possibly other species such as kamahi and rewarewa;

> Fires during the last several years have opened up tall gorse, and present an opportunity to forestall regrowth of the gorse by planting (however, to achieve this over even a small area will require planting of large numbers of plants at close spacings and timely follow up maintenance);

> The greatest danger to the process of natural succession is fire;

> Control of possums will encourage more prolific seedling growth.

By its very nature, restoration of the Cannons Creek catchment is a long-term project. Despite Friends of Maara Roa and Wellington Regional Council forging a close partnership to achieve this restoration, resources and effort need to be deployed in the most effective manner. That is, areas where results can be achieved should be targeted and other areas left to allow nature to take its course.

Restoring vegetation should be directed at the 'best' sites, the microsites that have attributes in terms of aspect, moisture, shade and shelter where high rates of plant survival are likely to be achieved. On 'hard' sites where it is difficult to establish plants because of the prevailing conditions, the rate of plant survival and establishment is likely to be considerably lower. It is important with any revegetation project, particularly in the early stages, to try and achieve a high level of plant survival and establishment because this helps to retain enthusiasm for the project and sustain morale

A mosaic of vegetation now covers this part of the Park. Gorse dominates, particularly on the ridges and spurs and the dry hill faces. However, in areas that are shaded, cool and moist, native vegetation has regenerated and spread. Providing fire and stock can be excluded and noxious animals numbers reduced, this pattern of regeneration will continue.

The current status of the vegetation of the Cannons Creek catchment provides many opportunities for speeding up this process through intervention. Given the circumstances the best form of intervention was determined as supplementary enrichment planting to complement the natural succession process.

The mosaic of cover comprises 8 vegetation associations that are and described in detail in Appendix 3. They are also illustrated in a series of photographs on the annotated aerial photograph (Map 1). A summary of

these vegetation types and comments on the opportunities each type offers is set out below:

| Vegetation Type | Comments |
|---|---|
| Dense, even-aged gorse | Gorse provides very aggressive competition. High costs of site preparation (spraying and cutting). |
| Young regenerating native vegetation under young gorse canopy | Native regeneration process well underway. Apart from 'opening up' in selected areas to plant, particularly along edges, these areas should be left to regenerate. |
| Young regenerating native vegetation under an older, open gorse canopy | Concentrate planting in these areas during first five years. |
| Regenerating mature vegetation overtopping gorse canopy | Well advanced to full native vegetation cover. Gorse being suppressed. Enrichment planting. |
| Tiered regenerating native vegetation, absence of gorse | Enrichment planting. Groups of climax species planted under canopy of regenerating native vegetation. |
| Remnant native vegetation | Planting confined to edges to provide protection to stand interior. |
| Rank pasture grassland | Relatively easy site preparation (spot spraying). Select microsites where there is tall surrounding vegetation to provide protection (native or gorse etc). |
| Open grazed pasture | Open exposed sites. Easy site preparation (spot spraying) but generally low plant survival rates. |

Friends of Maara Roa, with assistance and support of Wellington Regional Council, have determined that the specific areas where supplementary enrichment planting would best be carried out are described below and also shown on Map 2.

### 6.1 *Complete replacement of gorse*

This applies to a small area of west facing slopes that is presently gorse-covered. This area is visible from the main access track as it ascends from the lakes. It is envisaged that all gorse visible from the track would be removed and the area planted with sun tolerant species such as kanuka, karamu, lancewood, mahoe, manuka and pigeonwood. Given its high visibility and ease of access this could be suitable Arbor Day project. (Area 2A as shown on Map 2)

### 6.2 *Planting in existing open / grassed areas*

Planting in these areas is relatively straightforward in terms of site preparation and follow-up maintenance, particularly when compared to planting in areas of dense gorse. A priority would be concentrating planting alongside tracks where sun tolerant species would be used. In partly shaded hollows species such as hangehange and fivefinger would be used and along track edges lower growing species such as toetoe and *Carex* spp. could be planted. It is envisaged that as a start Friends of Maara Roa could plant about 500 seedlings per year in these areas. (Areas 7,8 and clearings in several other blocks, Map 2).

### 6.3 *Grassy flats and open grass areas in burnt over gorse*

This is mainly between the rear boundary of Porirua College and the Cannons Creek covenant burnt in 1997. Sun tolerant species would be used with intermittent plantings of canopy tree species where suitable conditions prevail (ie microsites) – kahikatea, kapuka, kohekohe, matai, miro, putaputaweta, rata, rimu, tawa, totara. (Area 6, Map 2).

### 6.4 *Areas of advanced regeneration*

Each year a number of microsites would be selected (say 10) and small groups of canopy tree species planted (say in groups of 10). Species selected to be planted in these areas would be matched to microsites available (damp hollows, semi-shade). (Area 1, Map 2).

### 6.5 *Riparian areas*

Each year stretches of streamside terraces and strips along stream banks would be selected and planted with species such as ti kouka, harekeke, kahikatea, nikau (say 100 seedlings per year initially). (Areas 3, 4 & 9, Map 2).

The remaining areas / blocks 2B, 2C, 5 & 10 are gorse-covered and revegetation of these areas will be carried out as described in the Priorities List in Part Five.

## 7.0 Revegetation

### 7.1 *General Principles*

There are some useful guides and handbooks that set out both general principles for restoration and revegetation and these should be referred to in the first instance. Three publications in particular should be used as initial references:

*Wellington Regional Native Plant Guide: using your garden to sustain our native ecosystems* published by the Wellington Regional Council, 1999. Whilst this guide is aimed primarily at gardeners, the principles set out in the introductory section are relevant for any revegetation project. The species lists included in the back of the guide are also useful.

*Revegetation Manual: Using New Zealand Native Plants* published by the Queen Elizabeth II National Trust in 1983 is a comprehensive handbook

written specifically for projects such as this. It sets out all the steps in a revegetation project, from planning what is to be done, selecting suitable species for planting, propagation, planting and management. There are also sections on planting in specific sites such as different types of shrub land and in grassland. The *Revegetation Manual* was extensively revised and expanded to include a wide range of new topics by the QE II National Trust in 1993 and published as the *Native Forest Restoration: A practical guide for landowners*. This handbook is the most comprehensive publication available and should be used by all those planning or carrying out a native vegetation restoration project. In addition to covering the topics in the earlier *Revegetation Manual*, the *Native Forest Restoration* handbook covers several new topics in some detail, particularly with regard to weed and animal control. Step by step flow charts similar to those used in the original *Revegetation Manual* are included. Details of planting in various types of gorse cover are described.

Rather than repeating what is covered in these various publications, the headings below highlight a few key points. In any native plant vegetation restoration project emphasis cannot be placed on just one aspect and the other aspects neglected; the key factors are inter-related and all are important.

Given the ecological value of the two covenanted areas and the aim to restore Cannons Creek to a native vegetation cover that approximates what grew there originally, it is intended that established revegetation principles are followed with regard to sourcing of plants.

### 7.2 *Planning*

Any large scale planting or revegetation project needs to be well planned to ensure that the right operation occurs at the right time. Seed collection and propagation needs to occur well in advance of when plants are actually required; site preparation such as spot spraying has to be done to ensure there is maximum kill of unwanted plants before planting; and maintenance work such as releasing has to be carried out at regular intervals and the right times of the year to achieve maximum effectiveness.

A noxious animal control programme needs to be included as an integral part of planning (see ‘Pest Plant and Animal Control’).

### 7.3 *Site Selection*

Some sites are more suitable for planting than others. Within each of the various planting sites described above there is variation at a detailed level. These smaller specific sites are generally referred to as ‘microsites’ and the best microsites should be selected for planting first for a large project such as this.

The concept of microsites can be understood by observing the natural pattern of regeneration. On any given hillside or gully system, plants will naturally establish on those areas where the conditions are the most favourable and

they will take much longer to establish on the 'hard' sites where conditions are not as good or poor.

Factors that influence both plant development and are:

> site location
> aspect
> degree of exposure
> substrate
> microclimate
> type and extent of surrounding vegetation
> soil moisture
> presence of noxious animals and stock.

The best microsites are those that have good shelter, aspect, soil moisture, soil development, etc.

Keen observation and experience will help determine the best microsites where planting efforts should be directed rather than treating an area uniformly and planting it totally as occurs with exotic pine plantations.

### 7.4 *Site Preparation*

Good site preparation is essential to long-term success. Poor site preparation means that newly planted seedlings will struggle to during the establishment phase with competing vegetation. The type of site preparation used depends entirely on the specific situation. For example, under a tall open canopy of gorse site preparation may simply involve cutting and opening in the canopy to let in light so newly planted seedlings can readily establish. It could involve cutting an area of gorse and then following this up with poisoning the cut stems when regrowth occurs before commencing planting.

In rank grassland, spot spraying with a knockdown herbicide such as Roundup, 2-3 weeks in advance of planting may be all that is required in the way of site preparation.

Failing to suitably prepare a site will lead to difficulties with plant establishment and survival and add considerably to the effort required to maintain plantings.

### 7.5 *Species Selection*

A species list has been prepared by Friends of Maara Roa and provides the basis for selecting suitable plants for revegetation. A copy of this list is included as Appendix 2. Different combinations of species should be used for revegetation of different sites.

On a bare site the first plants to establish or colonise are the species that are hardy and that are able to tolerate a wide range of environmental conditions. With time and as conditions are ameliorated other species that have particular requirements become established. Planting species that have more particular

environmental requirements initially will simply mean that they struggle to become established or simply die.

It is the colonising species that should be selected for the initial planting on open grassland sites or on sites where they need to compete with gorse and other fast-growing, light-demanding exotic species. A much wider range of species can be planted in those sites where there is already a canopy of young native vegetation established or where native species have over-topped the gorse. This type of planting is often referred to as 'enrichment' planting.

A list of suitable species for revegetation planting is as follows:

| | |
|---|---|
| *Aristotelia serrata* | wineberry |
| *Coprosma lucida* | karamu |
| *Coprosma grandifolia* | kanono |
| *Coprosma rhamnoides* | |
| *Geniostoma rupestre* | hangehange |
| *Leptospermum scoparium* | manuka |
| *Macropier excelsum* | kawakawa |
| *Melicytus ramiflorus* | mahoe |
| *Myrsine australis* | matipo |
| *Olearia rani* | heketara |

Species for enrichment planting can be selected from the species list prepared by Friends of Maara Roa taking care to match the species selected with the right type of site.

All plants that are planted in the catchment should be raised from local naturally occurring stock. That is they should be sourced from within the catchment or from the Inland Wellington – Porirua zone as illustrated in the *Wellington Regional Native Plant Guide*.

### 7.6 *Propagation*

Timing is critical for seed collection. It is anticipated that seed collection and plant propagation would be organised under contracts with specialist native plant nurseries. The contracts would mean that each year the nursery (ies) would supply certain numbers of particular species (see Funding and Programme).

### 7.7 *Planting*

It is important to ensure that the numbers of plants that are planted each year can be adequately maintained. On projects of scale it is often easier to get large numbers of people to carry out planting but a lot more difficult to find people prepared to do regular follow up maintenance. If the plants cannot be adequately maintained it is not worth planting them in the first place. Not only is this a waste of resources and effort but the sight of struggling or dead plants totally submerged under dense gorse or other competing vegetation is quite disillusioning.

Planting sites should be clearly marked for ease of identification in the future; a pipe driven into the ground at each site and projecting about 500mm above, and the locations recorded on a plan is often used.

Planting should follow one of two patterns, in lines or in groups. Planting in lines involves clearing a 1.0 - 1.5+m line through vegetation such as gorse and then planting at suitable spacings along the line. Lines should be 2.0 – 4.0 metres apart although this will depend very much on the site and species mix used.

Planting in groups involves clearing and preparing a series of areas (say 3.0-4.0+ diameter) and then planting them densely. In time these discrete groups of plants will coalesce.

The density of planting will vary according circumstances and the species mix used but the aim is to achieve canopy closure as quickly as possible. Maintenance reduces significantly once canopy closure is achieved. The denser the planting the quicker canopy closure occurs but a larger number of plants are required for the initial planting. On average plant spacings should be no greater than 1.0 metre centres.

### 7.8 *Aftercare and Ongoing Maintenance*

Aftercare, particularly during the first year after planting is crucial. A 100% survival rate is virtually impossible to achieve but on average survival rates after the first few months planting should be no around 80%, providing there are no extraordinary factors (eg unusually dry summer, or particularly wet winter). Survival rates significantly less than 75 -80% could be attributed to several factors:

- Wrong species for the site;
- Poor site preparation;
- Inadequate aftercare;
- High numbers of pest animals.

Maintenance work will mostly entail removal of competing vegetation (ie releasing). In most of the cannons Creek sites releasing would be done by hand. However, where planting is done in rank grassland or on pasture then releasing using a selective herbicide can be used.

The amount of follow up maintenance will decrease over time providing all the other factors are right (eg suitable site preparation, right species mix, etc). Generally revegetation plantings will require some degree of maintenance for the first three years (in some situations a longer period may be required). After this establishment period the plants should be able to continue unaided.

### 7.9 *Monitoring*

Monitoring plant survival rates, growth, levels of competition, time taken to achieve canopy closure, etc all provides valuable information for future work and also helps refine revegetation methods and techniques. The results from

monitoring plantings need to be recorded systematically, the results evaluated and then remedial action taken.

For example, if a particular species fails repeatedly to establish on certain sites or die-back of a species occurs after say, two years growth, etc then these results need to be incorporated into subsequent years' programmes.

There are only a few key things to monitor providing records of what was planted initially are kept:

- Survival rates of different species;
- Growth rates of different species;
- Health and vigour of plants;
- Browsing - occurrence and severity;
- Vandalism – damage, theft;
- Seasonal conditions.

### 7.10 *Fire Protection*

Given the close proximity of a large urban population with ready access to the Park and the large amount of gorse and other flammable vegetation, the threat of fire is constant. Fire protection is a priority and WRC has a fire management strategy for dealing with fires in the Park that involves co-ordination of agencies, provision of good access from strategic points, and maintaining effective communication networks in order that fire-fighting teams can be speedily mobilised.

Provision of firebreaks is not an option in Cannons Creek because for these to be effective in controlling the spread of fires they need to be wide (ie minimum 25 metres wide) which is far wider than the existing and proposed tracks. If fire breaks of these, or greater dimensions, were constructed in Cannons Creek valley then the revegetation objectives would be severely compromised because it would mean large areas of regenerating native vegetation would need to be removed which would defeat the overall purpose of the plan.

Instead fire protection will rely on the existing fire management strategy and established procedures.

# PART THREE: RECREATION

## 8.0 Tracks

Routes for new tracks are shown on the annotated plan. Friends of Maara Roa and Wellington Regional Council have agreed on a timeline and priority programme for the construction of new tracks, and this will allow WRC to plan for fitting the new tracks into its future construction and maintenance budgets.

In developing a strategy for route selection and track construction the following points were agreed to:

> Existing tracks/routes to be used wherever possible.
> The existing track from Cannons Creek entrance / Lake Reserve linking to other tracks in the Park will remain and be extended. It is intended that provision for access will be made when the Transmission Gully Motorway and the Link Road are constructed.
> Track construction beside and within areas of gorse to be avoided to reduce fire risk.
> Tracks among trees wherever possible.
> Tracks leading to viewing points are desirable.

The long-term intention is for a track to be constructed up the valley to link up with Takapu Road. However, it is acknowledged that to achieve this it will be necessary to integrate this with the access and construction tracks built for Transmission Gully.

In addition, it is intended that long-term, a separate access route for mountain bikes into the Park be developed which would link up with the existing track. This separate and defined route would mean that mountain bikes could be excluded from using the existing paths and boardwalks through the Lake Reserve, which are effectively for pedestrian use only.

### 8.1 *Track Construction*

WRC has set out standards for the design, construction and maintenance of tracks in regional parks in its *Regional Parks and Natural Forestry Asset Management Plan.* The standards for tracks vary depending on how the track is classified (major route/secondary route; metalled/unsurfaced), and whom the track is intended for (eg. walkers/trampers/mountain bikes/multi-use).

In the Cannons Creek area tracks are generally aimed at walkers (local people and family groups) with a reasonable degree of fitness. Due to the steepness of the terrain the proposed tracks will not be suitable for pushchairs or wheelchairs, but it should be possible to make a loop accessible that is suitable for prams, etc (eg around the Lakes Reserve).

The main loop tracks (as indicated on the plan) will need to be constructed to a good standard, rather than as rough tramping tracks. In terms of the WRC's track classifications, these tracks should meet the standards set out in the

*Regional Parks and Natural Forestry Asset Management Plan* for somewhere between a 'walking track' and a 'tramping track'.

Construction requirements and standards for each of the track types are covered in Appendix 4.

Volunteers may be able to carry out some clearance work to prepare for track construction, and may also be able to do some areas of track construction work, with supervision from the Belmont Regional Park Ranger. The Ranger will, however, need to be consulted on any track clearance work, to ensure that track construction can follow soon afterwards. Cleared, unformed tracks should not be left open for extended periods of time. The Ranger will be able to supervise track work from July 2001.

### 8.2 *Track Maintenance*

Under the plan, WRC and Friends of Maara Roa will share responsibilities for track work. One volunteer from Friends of Maara Roa, nominated from within the group for the role, will liaise with the Belmont Regional Park Ranger with regard to track inspection and maintenance work.

Friends of Maara Roa will undertake to complete quarterly track inspections, with a track report forwarded to the Belmont Regional Park Ranger (refer to copy of Track Inspection form in Appendix 5). WRC can start maintenance of new tracks in Cannon's Creek in the second half of 2001/beginning of 2002.

Track maintenance will need to meet the standards set out in the *Regional Parks and Natural Forestry Asset Management Plan.* Tracks will be inspected and maintained on foot. Inspection and maintenance standards are summarised as follows:

*Tracks*

- Quarterly visual inspections
- Culverts/water tables cleaned to remove water from track surfaces
- Track surfaces sprayed so that tracks are 90% free of weeds at any visible point along the track
- Vegetation cut back from tracks to appropriate clearance standards, with clean cuts and no protruding stumps, and cut material removed from the track. Vegetation cut back before it encroaches by 500mm on track width or height standards.

*Routes*

- Quarterly visual inspections
- Markers replaced/repaired to keep in tidy, readable condition, and route clearly marked.

Porirua City Council will continue to maintain tracks and boardwalks in The cannons Creek Lakes Reserve.

The tracks as shown on Map 1 are listed below in order of construction and have been named as follows:

***Takapu Track*** – (the former farm road), from the junction with the existing track to the Takapu Road entrance to the Park.

***Cannons Creek Loop*** – the loop track in the Cannons Creek Covenant.

***Lookout Track*** – from the Takapu Track along the side of the Cannons Creek Covenant to the farmland and existing track.

***Gorge Track*** – from the Lookout Track to the head of the gorge and then on to the Takapu Road entrance to the Park.

***Glenview Track*** – from the former farm bridge to the Glenview / Bedford Street Lake Reserve entrance.

### 8.3 *Track Structures*

Track structures (generally over 1.5m) may include footbridges/boardwalks, lookouts/viewing platforms, timber stairs, retaining walls and safety barriers.

Any structure must meet the standard procedures, and the design, construction and maintenance standards set out in the WRC *Recreational Trail and Walkways Structures Manual* (June 1998). WRC will take responsibility for the design and construction of any required structures in the project area. Construction of structures will generally need to be planned in advance and listed in WRC work programmes, to secure WRC funding.

Inspection and maintenance of track structures will be completed by WRC to the standards set out in the *Regional Parks and Natural Forestry Asset Management Plan*.

## 9.0 Signs and Waymarkers

### 9.1 *Direction Signs*

Generally direction signs are to be placed at track starts and track junctions, as indicated on the Plan. The number of signs needs to be kept to a minimum, as too many will start to make the area feel cluttered.

Where direction signs are within the boundaries of Belmont Regional Park, they will need to fit into the general WRC design guidelines for signs in Belmont Regional Park

Design standards and details are described in Appendix 6.

### 9.2 *Waymarkers*

WRC uses a system of plastic coloured discs on flexible posts to mark routes over farmland. WRC will provide and install these markers for routes over pasture in Cannons Creek.

# PART FOUR: PEST PLANT AND ANIMAL CONTROL

Pest plants and animals are covered under the Biosecurity Act and in terms set out under Section 71 of the Act WRC have recently prepared a 20-year pest management strategy[8]. This tackles both plant and animal pests unlike the separate pest plant and animal strategies prepared by WRC in 1996. The policies covering pest plants and animals in the Belmont Regional Park management Plan are still correct – WRC monitor and control peat plants and animals with support from other landowners, user groups and volunteers where appropriate[9].

## 10.0 Animal Pest Control

The Belmont Regional Park Ranger has ten bait stations already set up in the fenced covenant area. For this project bait stations will be extended across the whole project area.

Bait stations will need to be placed in the bush/regenerating areas at 150m spacings, to the planned grid system. The main track through the area will be used as a datum line (as marked on the plan), with lines cut through the gorse, stations placed along the lines (150m intervals), and landmarks (eg particular trees) or marks on the ground used to indicate the starting point of lines.

The bait used will be Brodifacoum. Brodifacoum is not a controlled pesticide, so no licence is required to use it. It is generally safer than the controlled pesticides.

Lines cut through the gorse need to start several metres off the track, so they are not obvious to people walking through the area.

Stations need to be checked and refilled once every month, and a bait station form filled in and returned to the Belmont Regional Park Ranger, to monitor progress. .

## 10.1 *Co-ordination and Responsibilities*

The running of the pest control programme is to be co-ordinated between the Wellington Regional Council and Friends of Maara Roa. There should be one point of contact for each group – the Belmont Regional Park Ranger for WRC, and a pest control 'co-ordinator' nominated for the role from within Friends of Maara Roa.

WRC will provide:

- the programme to work to;
- training for volunteers ( by WRC Biosecurity Division);

[8] Proposed Regional Pest Management Strategy 2001-2021, Wellington Regional Council, April 2001

[9] Pges 32-33, Belmont Regional park Management Plan, Part 1: Aim, Objectives and Policies, Wellington Regional Council, September 1996

- equipment for installing stations (forestry pruning shears, hand saw, leather gloves, hammer, compass, hip chain to measure distances between stations, iridescent tape, first aid kits);
- bait stations and bait (cost price from WRC Biosecurity Division);
- consents and warning signs;
- equipment to refill bait stations (bait bags and bait caps);
- bait station forms to monitor stations;
- 15 Timms traps;
- on-going support (WRC Ranger / Biosecurity Division)

Friends of Maara Roa will:

- install bait stations;
- check, refill and monitor stations on a monthly basis, with a monthly bait station form completed and forwarded to the Belmont Regional Park Ranger;
- set and clear Timms traps.

### 10.2 *Timing and Priorities*

Within the whole of Belmont Regional Park, the Cannons Creek forest remnant area (the fenced covenant) is one of the priority areas for pest control, but the wider Cannons Creek valley is not a priority for the Ranger at the moment. With help from Friends of Maara Roa the pest control programme in the Cannons Creek area can be expanded from the existing ten stations much earlier than would otherwise be possible.

Friends of Maara Roa have agreed to install further bait stations within this area, and then move onto placing stations in the larger valley, as numbers of volunteers allow. In the 2001 financial year WRC will be able to provide further funding for pest control work. This could include costs for labour to place and monitor stations.

## 11.0 Pest Plant Control

WRC will monitor the presence and spread of pest plants and will control pest plants as when required. WRC Biosecurity Division staff will normally only come and inspect a site if there is a complaint from a neighbouring landowner.

Recording the presence of pest plants in the Park, as noted in the regional pest management strategy (such as old man's beard and wild ginger) will rely on information provided by volunteers from Friends of Maara Roa, other Park users and the Ranger. Currently the WRC Ranger is dealing with the spread of convolvulus in the flax planting in the Lake Reserve as a result of garden rubbish being dumped in this area.

Presence and spread of pest plants should be formally recorded as part of the monitoring process.

# PART FIVE: FUNDING AND PROGRAMME

## 12.0 Funding

WRC has allocated funding to this project for each year for the next 10 years. It is possible that allocations could change over that time period, but within current planning the amounts allocated are:

| Year | $ Amount |
|---|---|
| 2001/02 | $5,000 |
| 2002/03 | $5,000 |
| 2003/04 | $10,000 |
| 2004/05 | $10,000 |
| 2005/06 | $5,000 |
| 2006/07 | $2,000 |
| 2007/08 | $2,000 |
| 2008/09 | $2,000 |
| 2009/10 | $10,000 |

This funding is in addition to the initial funding provided for planning of the project, and can be used for materials for new tracks, planting, and pest control work, and development of the area generally. The allocation for 2004/05 includes an amount for reassessment of the project and further planning if required.

WRC has recently established a Western Depot in the Porirua area, for maintenance of western regional parks. As part of this, new assistant rangers will be taken on, meaning that more help will be available to the Belmont Regional Park Ranger for work in the Cannons Creek area.

(Note: Allocations are based on the financial year from start of 1 July – 30 June.)

## 13.0 Priorities

| | AREA | PREDOMINANT VEGETATION & PROCEDURE |
|---|---|---|
| 1. | Cannons Creek Covenant | Remnant & advanced regeneration: microsite enrichment |
| 2. | Lake Entrance Gorse Slopes<br>2A: Between boardwalk & stile<br>2B: Bottom of Cannons Ck Covenant to Stream<br>2C: Below Glenview School | Dense, even-aged gorse: Complete replacement using sun-tolerant species<br>Older gorse canopy: underplanting, mixed species<br>Older gorse canopy with pest weeds: underplanting; selective spraying & clearing. |
| 3. | Takapu Covenant- Riparian, from wetland to bridge. | Regenerating, little gorse: streamside & micro site enrichment |

| | | |
|---|---|---|
| | | in moist gullies, avoiding spurs in dense gorse. |
| 4. | Takapu Covenant - Riparian, Southern section, above motorway to Takapu Farm road. | Regenerating, little gorse, exotic trees & weeds: streamside & micro site enrichment; manual removal of exotics. |
| 5. | Between the Covenants | Mixed young gorse canopy; some grass areas: planting of sun-tolerant species. |
| 6. | Burnt area between Cannons Creek Covenant & Porirua College | Burnt-over old gorse, regenerating gorse, pest plants: underplanting, sun-tolerant species. |
| 7. | Cut-off Farmland-northern, between Porirua College & Proposed Link Road | Open, grazed pasture, young gorse & weeds; some regeneration; landscaping & revegetation. |
| 8. | Cut-off Farmland-southern, between Covenants, Proposed Motorway & Link Road | Open, grazed pasture, young gorse & weeds; some regeneration: revegetation. |
| 9. | Takapu Covenant - Riparian, middle section – bridge to gorge. | Regenerating forest: streamside & microsite enrichment, avoiding spurs in dense gorse. |
| 10. | Takapu Covenant – gorse on upper slopes to western ridgeline. | Dense, even-aged gorse: review later in project |

NOTES:

- ?? Planting in the Conservation Covenants has already been approved by the landowner, Landcorp New Zealand.
- ?? A second stage involves joining the two Covenants, and joining the Covenants to the Cannons Creek Lake Reserve.
- ?? Although areas 2A, B & C are outside the covenanted areas, these slopes are highly visible and are of high priority for early work for aesthetic reasons.
- ?? A third stage, assuming the construction of the proposed Transmission Gully Motorway & Link Road, allows for mitigation work if needed and also completion of the project to these boundaries.

## 14.0 Programme

Based on the WRC funding allocations, Friends of Maara Roa and the Wellington Regional Council have put together a list of tasks and priorities for work in the Cannons Creek restoration project (Refer also to Map 2): The table above listing Priorities sets out the tasks and their sequence of implementation.

However, as with any revegetation project, a long-term programme can be only general and depends entirely on the results achieved each year. It is imperative therefore that monitoring of planting is completed each year to determine the success or otherwise of the work completed. As part of this

project and the allocation of funds WRC will formally review the planting and other work completed each year.

The programme outlined below is for the first two years of the project only. Beyond this the project will be reviewed annually by FMR and WRC, and the tasks and priorities set for the next year. This approach will assist Friends of Maara Roa with planning and co-ordination of members/volunteers, and ensure that goals set as the project progresses are achievable.

| Year | Action | Responsible |
|---|---|---|
| 2000/01 | > Project planning | Friends of Maara Roa (FMR), WRC, PCC |
| | > Collection of seed and growing on | FMR |
| 2001/02 | > Clearing old farm road along Creek; | WRC |
| | > Collection of seed and growing on | FMR |
| | > Planting | FMR and WRC |
| | > Animal pest control training for FMR volunteers | FMR and WRC |
| | > Animal pest control work (installation and monitoring Timms traps) in Cannons Creek Bush (fenced covenant area) | FMR |
| | > Animal pest control work (installation of stations and monitoring of bait stations) in wider valley area | WRC |
| | > Animal pest control work in Lake Reserve | WRC and PCC |
| | > Pest plant control | WRC |

At the end of this two-year programme tasks which will need to be considered are:

> Plant monitoring, maintenance and analysis of planting success
> Further planting
> Further collection of seed and growing on
> Any further animal pest control work required
> Track work and reconstruction of footbridge
> Continue pest plant control

# APPENDICES

## Appendix 1: Friends of Maara Roa (Inc) Constitution

**2. Objectives**

2.1 To enhance and restore the native forest in the Cannons Creek Valley inclusive of its catchment.

2.2 To see to the protection and development of the area for public ownership and recreational use.

2.3 To ensure the protection of all indigenous flora and fauna in the catchment.

2.4 To provide a venue for educational activities.

2.5 To work with such authorities, associations, and corporate bodies as may be involved in the achieving of these objectives.

**3. Powers**

3.1 The powers of this society shall, be to purchase, lease, hire or otherwise acquire any real or personal property.

3.2 To sell, let, mortgage, hire out, or otherwise dispose of or deal with any of the property or assets of the society.

3.3 To construct, maintain, or alter any buildings or property of the society.

3.4 To borrow, raise or invest money on such terms as may be thought fit.

3.5 To enter into or terminate any contract or arrangement with any society, educational institution, government department, corporation, or any other body.

3.6 To do all such other things that will further the objectives of the society.

**4. Membership**

4.1 Members are those individual persons or families who wish to assist in achieving the objectives of the society.

4.2 All membership is granted upon the payment of an annual subscription which is fixed at the annual general meeting.

4.3 Members can withdraw from the society by resignation or non-payment of annual subscription.

**5. General Meetings**

5.1 The annual general meeting of the society shall be held by the end of July in each year at a time and venue to be decided by the executive.

5.2 General meetings shall be called as and when required.

5.3 Special general meetings may be called by the executive or by any three members of the society jointly for specific issues as and when required.

5.4 Members will be advised of meetings by telephone or printed notice.

5.5 The chairperson or deputy appointed by the executive shall chair the meetings.

5.6 Decision-making at all meetings shall be by consensus, but failing a consensus, a simple majority shall make decisions.

5.7 Voting when required, will be by voices or show of hands, unless directed otherwise by the chairperson or demanded by the majority of members present.

**6. Quorum**

6.1 The quorum for annual, general and special general meetings shall be ten (10) members.

7. **Executive Committee**

**7.1** The executive shall consist of the following officers: chairperson, secretary, treasurer, and up to five committee members.

**7.2** The executive committee shall be elected at the annual general meeting.

**7.3** A vacancy may be filled by co-opting from the membership until the next annual general meeting.

**7.4** Quorum for executive meetings shall be: chairperson or deputy chairperson, and three others.

8. **Control of Funds**

**8.1** The executive through its treasurer shall keep proper books of accounts.

**8.2** All funds received by, or on behalf of the society, shall be paid into the society's bank account.

**8.3** The treasurer and two other members of the executive committee shall be the signatories to the society's bank account, and any two must sign cheques.

**8.4** The income and property of the society shall be applied solely to further the objectives of the society. No income or property shall be paid or transferred directly or indirectly to members of the society. This shall not prevent the payment of reasonable remuneration to any officer or employee of the society or to any members for any services performed by them for the society.

9. **Common Seal**

**9.1** The common seal of the society shall be kept in the custody of the executive committee.

**9.2** The common seal will be affixed with the signatures of two person designated by the executive committee to such documents as the executive committee decides.

10. **Alteration to the Rules**

**10.1** The rules of the society may be altered at any general meeting or at a special general meeting called for that purpose provided that 21 days notice of such alteration to the rules has been given.

11. **Winding Up**

11.1 In the event of the society winding up, the surplus assets shall be distributed to other societies or organisations with similar aims as determined by the Society at or by the time of dissolution.

# Appendix 2: Preliminary Species List

PRELIMINARY LIST OF INDIGENOUS VASCULAR PLANTS OF CANNONS CREEK COVENANT (MAARA ROA)

centred on NZMS 260 R27 Wellington, grid reference 67200465, compiled by Neil & Juliet Bellingham on 1 July 2000, 5 August 2000, 3 September 2000, 10 March 2001, 7 April 2001, 5 May 2001 during visits totalling 12 hours, and revised by Wellington Botanical Society on 3 August 2001 during a 4 hour visit.

| | Genus | species | Māori name | Common name | Notes |
|---|---|---|---|---|---|
| **Podocarps** | | | | | |
| | Dacrycarpus | dacrydioides | kahikatea | | |
| | Podocarpus | totara | tōtara | | |
| | | | | | |
| **Monocot trees** | | | | | |
| | Cordyline | australis | tī kōuka | cabbage tree | |
| | Rhopalostylis | sapida | nīkau | | (Takapu covenant) |
| | | | | | |
| **Dicot trees and shrubs** | | | | | |
| | Alectryon | excelsus | tītoki | | 1 individual |
| | Aristotelia | serrata | makomako | wineberry | |
| | | | | | |
| | Beilschmiedia | tawa | tawa | | |
| | Brachyglottis | repanda | rangiora | | |
| | Carpodetus | serratus | putaputawētā | marble leaf | |
| | Coprosma | areolata | | | |
| | | | | | |
| | Coprosma | grandifolia | kānono | | |
| | Coprosma | rhamnoides | | | |
| | Coprosma | robusta | karamu | | |
| | Coprosma | robusta X C. propinqua | | | |
| | | | | | |
| | Corynocarpus | laevigatus | karaka | | |
| | Dysoxylum | spectabile | kohekohe | | |
| | Elaeocarpus | dentatus | hīnau | | |
| | Fuchsia | excorticata | kōtukutuku | tree fuchsia | |
| | | | | | |
| | Geniostoma | rupestre var. ligustrifolium | hangehange | | |
| | Griselinia | lucida | puka | | 1 individual |
| | Hedycarya | arborea | porokaiwhiri | pigeonwood | |
| | Knightia | excelsa | rewarewa | | seedling, perhaps hinau |
| | | | | | |
| | Kunzea | ericoides | kānuka | | |
| | Laurelia | novae-zelandiae | pukatea | | |
| | Leptospermum | scoparium | mānuka | | |
| | Macropiper | excelsum | kawakawa | | |
| | | | | | |
| | Melicytus | ramiflorus | māhoe | whiteywood | |
| | Myrsine | australis | māpou | | |
| | Olearia | rani | heketara | | |
| | Olearia | solandri | | coastal tree daisy | |
| | Ozothamnus | leptophyllus | tauhinu | cottonwood | |
| | | | | | |
| | Pennantia | corymbosa | kaikōmako | | |
| | Pittosporum | tenuifolium | kohuhu | | |
| | Pseudopanax | arboreus | whauwhaupaku | fivefinger | |
| | Pseudopanax | crassifolius | horoeka | lancewood | |
| | | | | | |
| | Schefflera | digitata | pāte | seven finger | |
| | Solanum | aviculare | poroporo | | |
| | Urtica | ferox | ongaonga | tree nettle | |
| | | | | | |
| **Monocot lianes** | | | | | |
| | Ripogonum | scandens | kareao | supplejack | |
| | | | | | |
| **Dicot lianes** | | | | | |
| | Clematis | paniculata | puawānanga | | |
| | Parsonsia | heterophylla | kaihua | | |
| | Metrosideros | diffusa | rātā | white rata | |
| | | | | | |
| | Metrosideros | fulgens | akakura | scarlet rata | |
| | Metrosideros | perforata | akatea | clinging rata | |
| | Muehlenbeckia | australis | pōhuehue | | |
| | Muehlenbeckia | complexa | pōhuehue | | |
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | Muehlenbeckia | australis X M. complexa | | | |
| | Rubus | cissoides | tātarāmoa | bush lawyer | |
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Ferns** | | | | | |
| | Asplenium | bulbiferum | manamana | hen & chicken | |
| | Asplenium | flaccidum | makawe o Raukatauri | hanging spleenwort | |
| | | | | | |
| | Asplenium | hookerianum | | | |
| | Asplenium | oblongifolium | huruhuruwhenua | shining spleenwort | |
| | Asplenium | polyodon | petako | sickle spleenwort | |
| | Blechnum | chambersii | nini | | |
| | | | | | |
| | Blechnum | filiforme | pānako | thread fern | |
| | Blechnum | fluviatile | kiwakiwa | | |
| | Blechnum | membranaceum | | | |
| | Blechnum | novae-zelandiae | kiokio | | |
| | | | | | |
| | Cyathea | cunninghamii | pūnui | gully tree fern | |
| | Cyathea | dealbata | ponga | silver fern | |
| | Cyathea | medullaris | mamaku | black tree fern | |
| | Cyathea | smithii | kātote | soft tree fern | |
| | | | | | |
| | Dicksonia | squarrosa | wheki | | |
| | Histiopteris | incisa | mātātā | water fern | |
| | Hymenophyllum | demissum | mauku, piripiri | filmy fern | |
| | Hypolepis | ambigua | | | |
| | | | | | |
| | Lastreopsis | glabella | | smooth shield fern | |
| | Lastreopsis | hispida | | hairy fern | |
| | Microsorum | pustulatum | kōwaowao | hound's tongue | (= P. diversifolium) |
| | Microsorum | scandens | mokimoki | fragrant fern | |
| | Paesia | scaberula | mātā | ringfern | |
| | Pellaea | rotundifolia | tarawera | round-leaved fern | |
| | Pneumatopteris | pennigera | pākau | gully fern | |
| | Polystichum | richardii | pikopiko | common shield fern | |
| | | | | | |
| | Pteridium | esculentum | rārahu | bracken | |
| | Pteris | macilenta | titipo | sweet brake | |
| | Pteris | tremula | turawera | shaking brake | |
| | Pyrrosia | eleagnifolia | ota | leather-leaf | (P. serpens) |
| | | | | | |
| **Orchids** | | | | | |
| | Pterostylis | banksii | tutukiwi | green hood orchid | (reported) |
| | Thelymitra | longifolia | | sun orchid | near boundary stile |
| | | | | | |
| **Grasses** | | | | | |
| | Cortaderia | sp. | toetoe | | |
| | | | | | |
| **Sedges** | | | | | |
| | Carex | sp. | pūrei | | large |
| | | | | | |
| | Isolepis | prolifer | | three-square | |
| | | | | | |
| **Rushes** | | | | | |
| | Juncus | pallidus | wī | leafless rush | |
| | | | | | |
| **Monocot herbs** | | | | | |
| | Phormium | sp. | | flax | |
| | | | | | |
| **Dicot. Herbs** | | | | | |
| | Acaena | anserinifolia | piripiri | bidibid | |
| | Cardamine | sp. | panapana | bitter cress | |
| | Centella | uniflora | | centella | |
| | Dichondra | repens | | kidney weed | |
| | | | | | |
| | Oxalis | exilis | | oxalis | |
| | Ranunculus | reflexus | mārūrū | hairy buttercup | |
| | Urtica | incisa | ongaonga | scrub nettle | |
| | | | | | |

PRELIMINARY LIST OF ADVENTIVE VASCULAR PLANTS OF CANNONS CREEK COVENANT (MAARA ROA)

centred on NZMS 260 R27 Wellington, grid reference 67200465, compiled by Neil & Juliet Bellingham on 1 July 2000, 5 August 2000, 3 September 2000, 10 March 2001, 7 April 2001, 5 May 2001 during visits totalling 12 hours, and revised by Wellington Botanical Society on 3 August 2001 during a 4 hour visit and revised by Chris Horne and Mark Kearney on 31 August 2001 during an 8 hour visit

| | Genus | species | Māori name | Common name | Notes |
|---|---|---|---|---|---|
| **Adventive trees and shrubs** | | | | | |
| | Cytisus | scoparius | | broom | |
| | Leycesteria | formosa | | Himalaya honeysuckle | |
| | Phytolacca | octandra | | inkweed | |
| | Pittosporum | crassifolium | karo | | (native) |
| | Pittosporum | ralphii | | | (native) |
| | Rubus | fruticosus agg. | | blackberry | |
| | Ulex | europaeus | | gorse | |
| **Adventive lianes and vines** | | | | | |
| | Clematis | vitalba | | old man's beard | |
| | Lonicera | japonica | | Japanese honeysuckle | |
| **Adventive grasses** | | | | | |
| | Anthoxanthum | odoratum | | sweet vernal | |
| | Dactyl | glomerata | | cocksfoot | |
| | Ehrharta | erecta | | veld grass | |
| | Holcus | lanatus | | Yorkshire fog | |
| **Adventive sedges** | | | | | |
| | Cyperus | eragrostis | | umbrella sedge | |
| **Adventive herbs** | | | | | |
| | Achillea | millefolium | | yarrow | |
| | Apium | nodiflorum | | water celery | |
| | Carduus | nutans | | nodding thistle | |
| | Cirsium | vulgare | | Scotch thistle | |
| | Conyza | sp. | | Canadian fleabane | |
| | Daucus | carota | | wild carrot | |
| | Digitalis | purpurea | | foxglove | |
| | Galium | aparine | | cleavers | |
| | Geranium sp. | | | | |
| | Lotus | pedunculatus | | lotus | |
| | Mimulus | guttatus | | monkey musk | |
| | Nasturtium | officinale | | water cress | |
| | Polygonum | persicaria | | willow weed | |
| | Prunella | vulgaris | | self-heal | |
| | Ranunculus | repens | | creeping buttercup | |
| | Rumex | acetosella | | sheep's sorrel | |
| | Rumex | sp. | | dock | |
| | Senecio | glastifolius | | holly-leaved senecio | |
| | Senecio | jacobaea | | ragwort | |
| | Solanum | chenopodioides | | velvety nightshade | |
| | Solanum | nigrum | | black nightshade | |
| | Sonchus | oleraceus | | sow thistle | |
| | Stellaria | media | | chickweed | |
| | Vicia | hirsuta | | hairy vetch | |

# Appendix 3: Vegetation Descriptions

Eight vegetation associations are recognised in the project area:

1. Dense even-aged gorse
2. Young regenerating native vegetation under a young gorse canopy
3. Young regenerating native vegetation under an older, open gorse canopy
4. Regenerating advanced native vegetation overtopping the gorse canopy
5. Tiered regenerating native vegetation with an absence of gorse
6. Remnant native vegetation
7. Rank pasture grassland
8. Open grazed pasture

These are described more fully below.

***Dense, even-aged gorse***
Gorse in these areas is young and forms a dense closed canopy, generally with an absence of regenerating native vegetation. These areas are in the early stages of succession. In the Cannons Creek catchment the areas of dense gorse are now mostly confined to the exposed dry ridge crests, spurs and hill faces or along the edge of places that were until recently, grazed.

Adjacent areas where the gorse is older and more open would have 10 years previously been similarly covered in dense gorse.

There is little point in concentrating clearing and planting in these types of areas. It is far more effective to try and exclude fire and allow nature to take its course. In time these dense stands will open up and provide opportunities for intervention.

***Young regenerating native vegetation under a young gorse canopy***
Gorse is a light-demanding species, which means that young seedlings and plants compete for light. As stands of gorse mature they tend to open up with the lower branches dying back leaving growing, branches only at the top of plants. As this process occurs, a new environment is created below the canopy, an environment that is favourable to several types of native species. These species are shade-tolerant, that is they are able to establish and grow under the gorse (or other) canopy.

As the gorse canopy opens up and lets in more light to the understorey and ground it promotes growth of the young and newly-established native species growing underneath. The seeds for these species may have been dropped by birds or have been dormant in the soil for many years waiting for favourable conditions for germination to occur. They may also be dispersed from adjoining areas of native vegetation.

In time these species overtop the gorse and suppress its vigour and begin to dominate. There are many areas in the catchment where this process is occurring.

In these types of sites, intervention should be confined to opening up the gorse canopy in places to allow light and moisture to the native seedlings below or planting along the edges of such areas/stands to provide a future seed source.

***Young regenerating native vegetation under an older, open gorse canopy***

This type of vegetation cover is simply an advanced state of the situation described immediately above. There are many examples of this vegetation cover in the project area. These microsites are ideal for underplanting with native seedlings. The gorse plants are reaching senescence, becoming less vigorous and dying back, a layer of litter and organic material has been built up on the ground, and the tall open gorse plants provide ideal shade and shelter for the establishment and growth of the native seedlings.

This process could be simply left to continue because the native vegetation is well established and will in time overtop and finally suppress the gorse. Intervention could include a combination of cutting back old gorse plants to expose the native plants and /or inter-planting with suitable native species.

***Regenerating native vegetation overtopping gorse canopy***

Regeneration in these areas is well advanced and it will be only a matter of time that native vegetation will dominate entirely, providing fire can be excluded. Intervention as identified in the situations described above is not necessary, apart from enrichment planting of climax tree species that are not present in the regenerating vegetation (eg podocarps). It is a matter of letting nature taking its course. Enrichment planting with these species could in fact be carried out in any of the situations described above but it is likely to be the most effective here and in the category described below.

***Tiered, regenerating native vegetation, absence of gorse***

These areas are often found in the gully bottoms where ideal environmental conditions prevail. Over time this vegetation expands and finally separate patches will coalesce to form a continuous native vegetation cover. This process should simply be allowed to continue with possibly some enrichment planting.

However, in terms of priorities areas such as this would rank fairly low because the emphasis should be on hastening the change from high fire risk gorse to native vegetation over the entire catchment as quickly as possible. Intervention in areas where regeneration is very advanced or complete is more ‘fine tuning’ once the project is well underway and on a strong footing.

***Remnant native vegetation***

The native forest remnants are very important ecological and landscape elements in the catchment and their long-term viability is paramount. There is

a wide range of species present in the remnants and they will provide the seed source for natural regeneration within the remnant itself and also for other areas.

Whilst these remnants have been protected by Conservation Covenants for some years, a decade or so ago stock had access to them and they were surrounded by pasture. Since retirement from grazing of this part of catchment, the gorse and other vegetation that has regenerated around them has provided and important buffer and protection to the edges that were previously very exposed.

Although much of the remnant edges are 'closed' and thereby the remnant interior protected from the ravages of wind, stock and sun, there is still some important work to do to improve the health and long-term viability of these areas.

Reduction of pests, particularly possums is a priority. A local resident has been running trapping line in the remnants for a few months and has reported a reduction in possum numbers. However, pest eradication and control needs to be tackled in a far more comprehensive fashion as part of an overall pest management programme (see section 10.1 on 'Pest Animal Control').

In addition, there are several places along the edge of the remnant where dense planting is required – areas of rank grass between the gorse buffer and the remnant. These should be priority areas for planting because creating a densely planted edge of local native species will help to protect the remnant interior and provide more suitable conditions for natural regeneration.

Given the diversity of species present in the remnant and the advanced state of regeneration, enrichment planting is not necessary.

***Rank grassland***

There are patches of pasture and rank grassland present in various places in the lower catchment. Many of these patches are located alongside the main access track that is mown twice a year to keep it open and accessible but there are also other areas with a similar vegetation cover, such as along the fence line separating the retired lower catchment and the grazed farmland.

Any planting carried out alongside the main track, providing it doesn't encroach on the track and thereby risk getting damaged by mowing, has the advantage of relatively easy planting as little or no clearance is required, apart from knock-down herbicide prior to planting to reduce weed competition during plant establishment. It also means easy access and ease of location of plants for follow up maintenance. However, planting that is too obvious and too close to track could be vulnerable to vandalism or theft. Friends of Maara Roa have already completed planting in various places along the main track and also carried out follow up maintenance, and theft and vandalism have fortunately not been a problem so far.

Species selected for this planting should once again be drawn from plants that are colonising species, hardy, easy establishment and fast growing. A list of suitable species is included in section 7.5, 'Species Selection'.

***Open grazed pasture***

There are areas currently being farmed as open grazed pasture that in time should be revegetated as part of the overall aim of restoration of the Cannons Creek catchment. The areas that fall into this category are mostly east of the fence line that defines the area that has been retired from grazing. The residual land between the motorway route and the lower catchment will, in time, also fall into this category. While it may seem obvious to most people engaged in revegetation projects, it is worth re-stating the importance of ensuring these areas are permanently fenced to exclude domestic stock prior to any planting being started. Temporary electric fencing is generally unsatisfactory and stock-gaining access to a newly planted area can very quickly destroy many years of planting and growth.

Planting of these areas are seen as being of a lower priority than the areas already described. The revegetation of these areas that are currently grazed but that should be included in the catchment restoration plan would best be tackled as part of the comprehensive revegetation that is proposed as part of the preparatory works for the Transmission Gully motorway and the 'Link Road to Warspite Avenue.

# Appendix 4 Track Construction and Standards

*Main tracks*

> Minimum width of 750mm; maximum gradient 15 degrees (1:4 slope), with maximum gradient being over short stretches only. Clearance of 1.5m wide and 2.5m high. Crushed metal surface may be required in some areas, otherwise surfaces will be of grass or clay.

> Culverts/water tables/run-off drains should be formed where excess water runoff could pose a problem.

> Construction of steps/retaining walls may be required in some places.

> Routes over existing grass marked with coloured discs supplied by WRC

*Secondary tracks*
Secondary tracks (indicated on the plan) will be constructed to tramping track standards:

> Minimum width of 300mm; maximum gradient of 20 degrees, with 20 degrees being over short stretches only. Clearance 1.5m wide and 2.5m height. Generally these tracks will be unsurfaced (ie not metalled).

> Culverts/water tables/run-off drains may be required in places.

> Construction of steps/retaining walls may also be required

> Routes over grass marked with coloured discs supplied by WRC.

# Appendix 5 Track Inspection Form

**Date of Inspection:** _____

**Contact:** _____ **Ph:** _____

**Condition of:** **Number**

**Seats:** _____ _____

**Tables:** _____ _____

**Way Markers:** _____ _____

**Information Boards/Signs:** _____ _____

---

**Trail Surface Report**

**Please report any hazards or track maintenance needed, e.g., weeds, overgrowth etc, WRC Parks & Forests (04) 526 4133**

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**Recommendations**
**(suggested improvements e.g., planting, safety, aspects further development)**

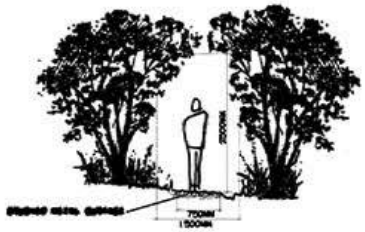
# Appendix 6: Signs

WRC standards for sign design and construction can be summarised as follows:

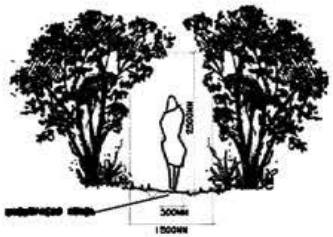
> Simple timber structures, with one or two supports. Posts need to be H4 treated timber, and sign faces H3 treated. Sign faces should be bolted to the posts, with bolts recessed and covered. The tops of posts should be cut at a 45% angle, and posts set into concrete in the ground at about one third of the height of the sign. (See sketches).

> Sign faces should be painted Resene … (the official Belmont Regional Park colour). Signposts should be left to weather. Lettering and arrows should be routed out, and painted Resene …. Letter sizes should measure 50mm for upper case, and 38mm for lower case, to enable pedestrians to read them from a distance of about 30m. Lettering should be Arial.

> Direction signs should be placed low to the ground, with a maximum height of 300-500mm from the ground to the bottom of the sign face. Signs should also be set against a background of landform or foliage. Avoid signs silhouetted against the sky.

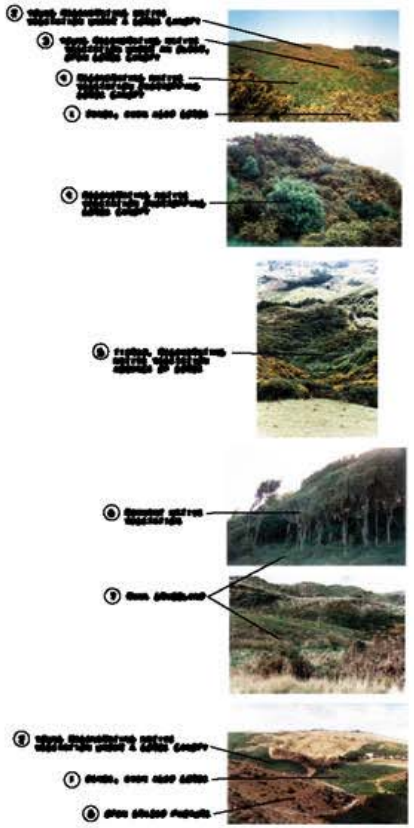


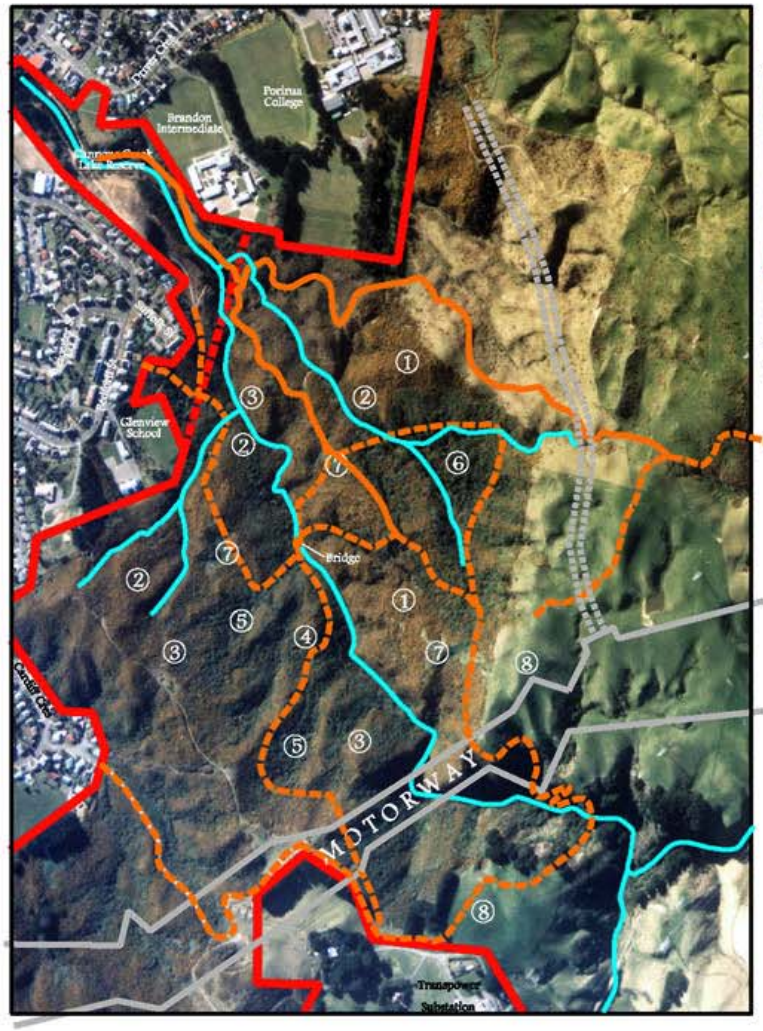
Main Tracks



Secondary Tracks

Vegetation Types (Refer to Appendix 1 of report)







Context Plan

KEY

- Belmont Regional Park Boundary
- Boundary between Porirua City Council's Cannons Creek Lake Reserve & Landcorp New Zealand land
- Proposed Motorway Corridor
- Proposed Link Road
- Proposed Tracks
- Existing Tracks
- Cannons Creek and tributaries

# Cannons Creek Restoration Plan

*A project by Friends of Maara Roa, the Wellington Regional Council, and Porirua City Council to restore native forest to Cannons Creek Valley*

This valley is important to the Porirua Basin community for the bush walking and other recreation opportunities it provides so close to peoples homes. In the future the valley will become even more important as a 'green buffer', separating residences from the Transmission Gully motorway.

The Cannons Creek Restoration Plan is about helping the naturally regenerating native bush in the valley - and the remnant forest already present, to grow and spread. We are trying to increase the range of native species in the area; increase and improve native wildlife habitat; and provide the people of the region with an improved recreation area.

# Cannons Creek Restoration and Development Map 1

## Belmont Regional Park

Prepared by:
Wellington Regional Council
and Friends of Maara Roa

Date: 14/05/01
Dwg Reference: W00174/1/C
Scale: 1:5000 (A1)

0 100 200 500m

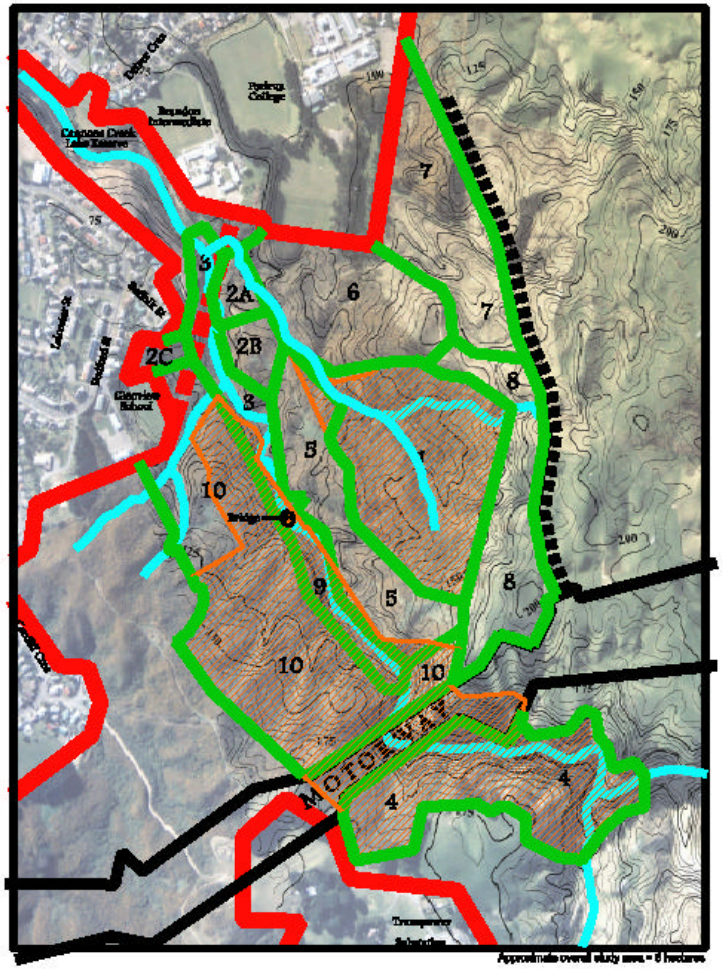
Graphic Scale (1:5000 A1)

THE REGIONAL COUNCIL
caring about you & your environment

PRIORITIES FOR RESTORATION PLANTING WORK have been established as follows:

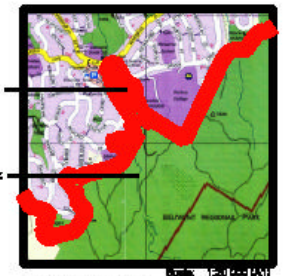
| | AREA | PREDOMINANT VEGETATION & PROCEDURE |
|---|---|---|
| 1. | Cannons Creek Covenant | Remnant & advanced regeneration: micro-site enrichment. |
| 2. | Lake Entrance Gorse Slopes<br>2A: Between boardwalk & stile<br>2B: North of Cannons Creek Covenant to Stream<br>2C: Below Glenview School. | Dense, even-aged gorse: Complete replacement using sun-tolerant species.<br>Older gorse canopy: underplanting, mixed species<br>Older gorse canopy with pest weeds: underplanting; selective spraying & clearing. |
| 3. | Takapu Covenant - Riparian, from wetland to bridge. | Regenerating, little gorse: streamside & microsite enrichment in moist gullies, avoiding spurs in dense gorse cover. |
| 4. | Takapu Covenant - Riparian, Southern section, above motorway to Takapu Farm road. | Regenerating, little gorse, exotic trees & weeds: streamside & microsite enrichment; manual removal of exotics. |
| 5. | Between the Covenants. | Mixed young gorse canopy; some grass areas: planting of sun-tolerant species. |
| 6. | Burnt area between Cannons Creek Covenant & Porirua College. | Burnt-over old gorse, regenerating gorse, pest plants: underplanting, sun-tolerant species. |
| 7. | Cut-off Farmland - northern, between Porirua College & proposed Link Road. | Open, grazed pasture, young gorse & some regeneration & revegetation. |
| 8. | Cut-off Farmland-southern, between Covenants, proposed Motorway & Link Road. | Open, grazed pasture, young gorse & weeds; some regeneration; landscaping & revegetation. |
| 9. | Takapu Covenant - Riparian, middle section - bridge to gorge. | Regenerating forest: streamside & microsite enrichment, avoiding spurs in dense gorse. |
| 10. | Takapu Covenant - gorsed covered slopes to western ridgeline. | Dense, even-aged gorse: review later in project. |

NOTES:
Planting in the Conservation Covenants has already been approved by the landowner, Landcorp New Zealand.
A second stage involves joining the two Covenants, and joining the Covenants to the Cannons Creek Lake Reserve.
Although areas 2A, B & C are outside the Covenants, these slopes are highly visible and are prioritised for early work.
A third stage, assuming the construction of the proposed Transition Gully Motorway & Link Road, allows for landscape mitigation work and completion of the project to these boundaries.

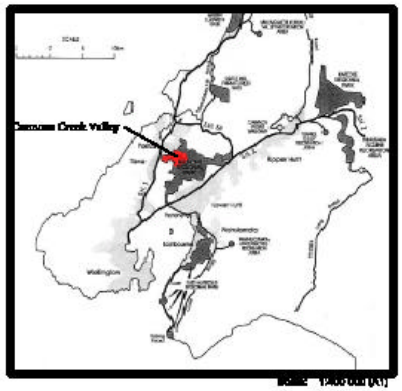



KEY

- Belmont Regional Park Boundary
- Boundary between Porirua City Council's Cannons Creek Lake Reserve & Landcorp New Zealand land
- Proposed Motorway Corridor
- Proposed Link Road
- Covenant Areas
- Boundaries of Restoration Priority Areas
- Streams




Context Plan




# Cannons Creek Restoration and Development Map 2

## Belmont Regional Park

Prepared by:
Wellington Regional Council
and Friends of Maara Roa

Date: 14/05/01
Dwg Reference: W00174/2/B
Scale: 1:5000 (A1)

0 100 200 500m
Graphic Scale (1:5000 A1)

THE REGIONAL COUNCIL
caring about you & your environment