CHRISTCHURCH
THE GARDEN CITY
The city that shines

Cashmere Spur and Bowenvale Valley Reserves

Management Plan

Christchurch City Council - July 1991

Foreword

This management plan for the Bowenvale Valley and Cashmere Spur Reserves incorporates the following reserves: **Elizabeth Park, Victoria Park, Thomson Park, Douglas Scenic Reserve, Sugarloaf Scenic Reserve (in Part), Scott Reserve and Bowenvale Park.**

Public Notice of the intention to prepare a plan was given on 25 November 1989 for Elizabeth Park, Victoria Park, Thomson Park, Sugarloaf Scenic Reserve (in Part) and Douglas Scenic Reserve. As a result 8 submissions were received and considered in the preparation of the draft management plan. At this stage it was determined by Council that all reserves forming part of the Bowenvale Valley and skyline should be included in the one management plan to enable more effective integrated planning to take place. Thus Bowenvale Park and Scott Reserve were incorporated in the draft plan.

The draft management plan was advertised for public comment on the 12 December 1990. The closing date for submissions was 1 March 1991. A total of 157 submissions were received. These were all given full consideration by a Reserves Hearing Panel set up to hear submissions, and a number of amendments to the draft plan were made. In submitting this plan for approval the Christchurch City Council has provided a summary of the objections and comments received on the draft plan and a statement as to whether they have or have not been accepted.

The management plan has been approved by the Christchurch City Council for the following Reserves: **Elizabeth Park, Victoria Park, Bowenvale Park and Scott Reserve**.

The Minister of Conservation's approval is granted for the management plan covering the following reserves: **Thomson Park, Sugarloaf Scenic Reserve (in Part) and Douglas Scenic Reserve** which have been prepared in accordance with the procedures set out in section 41 of the Reserves Act 1977.

Dated this 13th day of May 1994

M Richardson
City Manager
Christchurch City Council

In accordance with the provisions of Section 41 of the Reserves Act 1977 this management plan was approved on the
day of 1994.

Minister of Conservation

Introduction

The Cashmere Spur / Bowenvale Valley reserve complex comprising 319 ha is the most extensive area of land available for public recreation in the Christchurch area.

It is characterised by an expansive landscape, remnant native vegetation of intrinsic heritage value and over a hundred years of European cultural influences such as farming and tree planting.

The plan includes the following reserves:

Elizabeth Park
Victoria Park
Douglas Scenic Reserve
Thomson Park
Sugarloaf Scenic Reserve (in part)
Scott Reserve
Bowenvale Park

The above reserves have been grouped together in this plan because they form a logical management unit which has common boundaries, interrelated topography and vegetation and a shared water catchment. They are also part of the same fire control area.

157 public submissions were received in response to Council notification that the draft management plan was available for comment. All respondents were given the opportuity to be heard in support of their submissions and 10 organisations/individuals exercised that right before the Reserves Hearings Panel on 29 May 1991. The Plan was approved by Council on 22 July 1991.

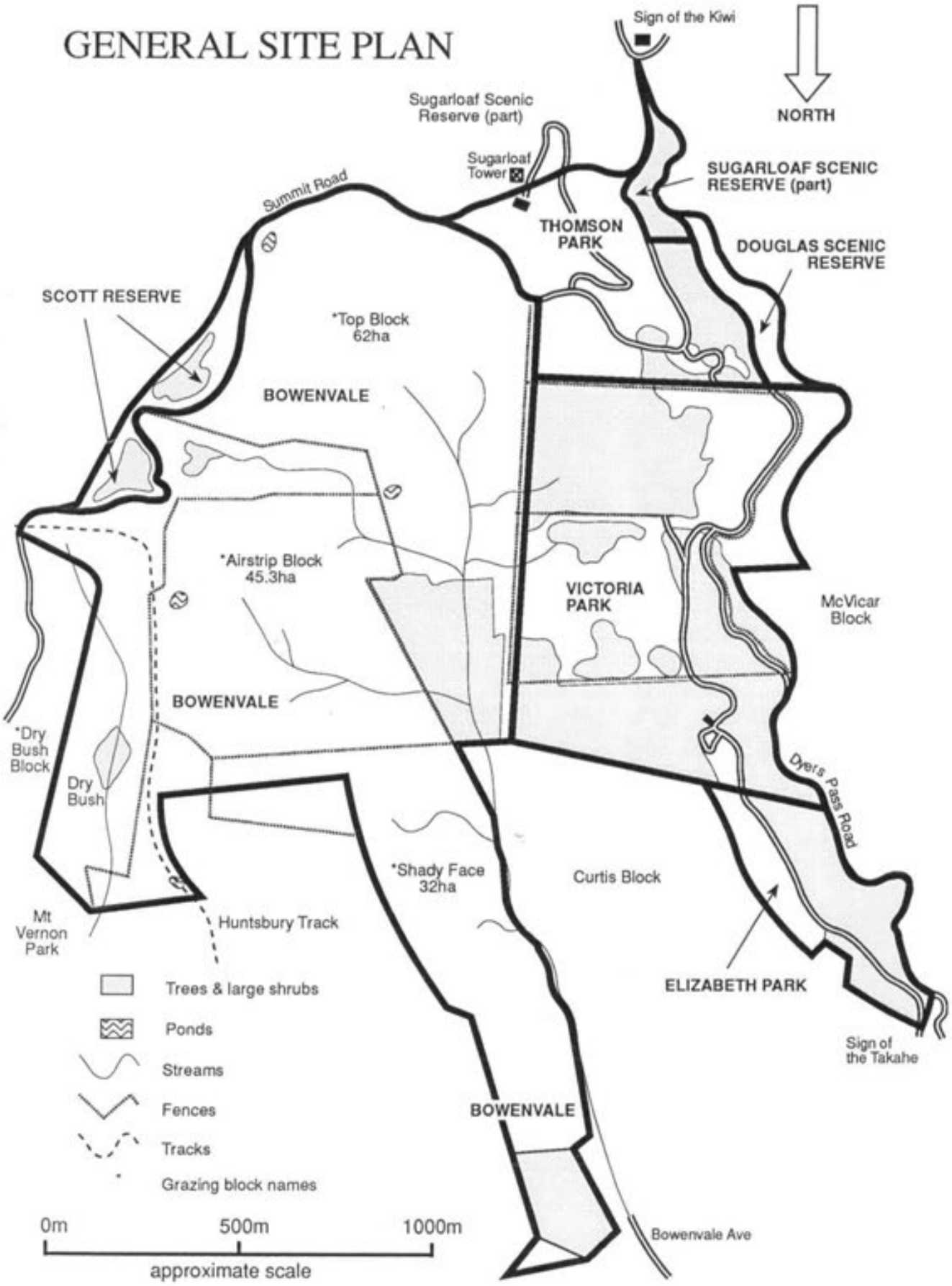
This is the first management plan for all of the above reserves except Bowenvale Park which had its first management plan approved in 1987. Bowenvale Park was included in the plan because of its crucial influence on the management of the whole reserve area and the need to integrate its management with that of the surrounding reserves.

The plan is divided into two parts:

Part 1: Resource Section. This section sets the scene and provides the background information. Where appropriate, discussion of the management issues is included.

Part 2: Policy Section. This section provides the goals objectives and management policies of the plan. Implementation of the policies in this plan is based on a five year planning period.

GENERAL SITE PLAN



SUMMARY

The Management Plan area constitutes the largest and most accessible tract of public land in the Port Hills, and provides a diverse and attractive environment for active recreation. The rugged and sometimes dramatic topography creates opportunities for exploration and movement which are unavailable on level ground. Freedom from urban development, a variety of natural features and uncrowded open space combine to form a major recreational resource of a size and quality seldom found within city boundaries. In addition it should be noted that;

i) The plan area requires a quite different management regime from urban parks and fulfils a different recreational role;

ii) This management plan will lay the foundation for a co-ordinated and comprehensive approach to managing the whole of the Port Hills;

iii) The planning timescale is very long-term.

The conservation of this resource, and of the essential qualities of the landscape contributing to it, depend largely on judicious management of grazing animals (sheep), fencing, fire prevention and control and control of user pressures and access. Continuing development of the path system will serve to spread use intensity more evenly; at present it is concentrated along the peripheral roads, especially the Cashmere/Dyers Pass access. The present haphazard pattern of planted vegetation can be modified to complement landforms, sightlines and access routes, thereby enhancing the attractions of the landscape. In many areas, notably the sheltered valley floor, regeneration of the indigenous forest vegetation would enrich the environment with an essential ingredient largely missing at present. Integrated management of grazing, planting and conservation measures are a prerequisite for this to be achieved.

In addition attention needs to be given to protecting the park resource from fire and vandalism and providing appropriate accommodation for the parks supervisory staff.

Rock outcrop; Victoria Park

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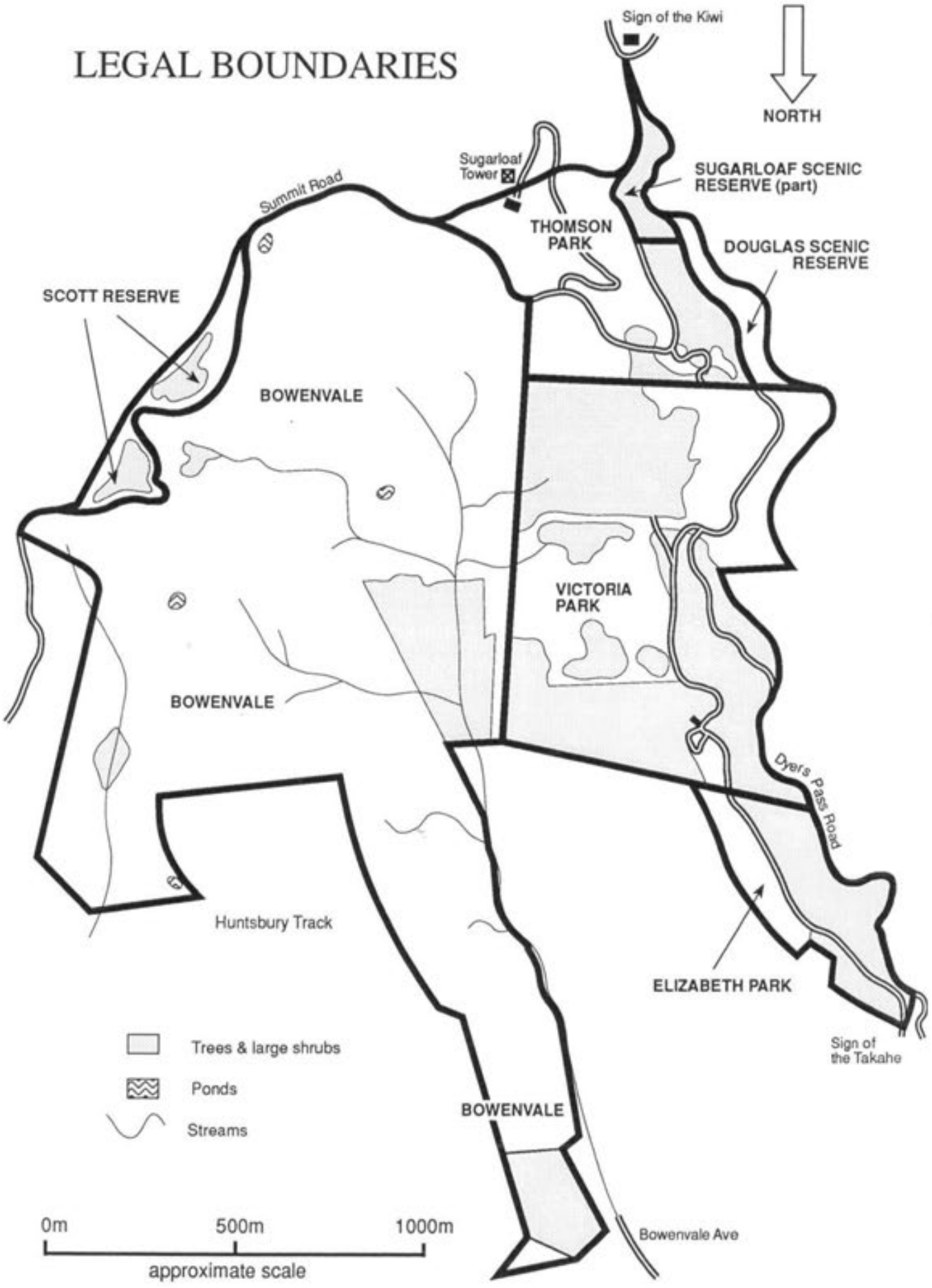
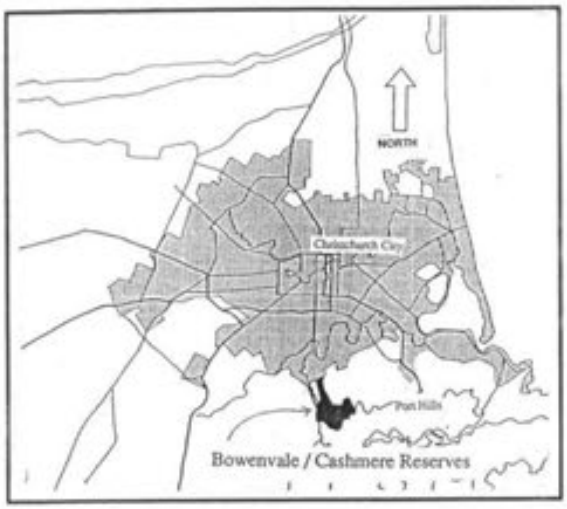

LEGAL BOUNDARIES
Sign of the Kiwi
NORTH
Sugarloaf Tower
SUGARLOAF SCENIC RESERVE (part)
Summit Road
THOMSON PARK
DOUGLAS SCENIC RESERVE
SCOTT RESERVE
BOWENVALE
VICTORIA PARK
BOWENVALE
Dyers Pass Road
Huntsbury Track
ELIZABETH PARK
Sign of the Takahe
Trees & large shrubs
Ponds
Streams
BOWENVALE
0m
500m
1000m
approximate scale
Bowenvale Ave

PART 1: BACKGROUND AND RESOURCE INFORMATION

1.0 LOCATION ACCESS



Dyers Pass Road Reserves (Elizabeth, Victoria, Douglas, Skellerup and Thomson Parks) are situated along the spur of the Cashmere spur from the Sign of the Takahe to Sugarloaf Peak on the Port Hills above Christchurch City. Access to Elizabeth and Victoria Parks can be gained from Dyers Pass Road and Victoria Park Road. Douglas Park is accessible off Dyers Park Road, Skellerup Park from Dyers Pass and the Summit Road, and Thomson Park from the Summit Road and the Crater Rim Walkway.

Bowenvale Park is situated in the valley and hill slopes between Victoria Park and Mt Vernon Park. Its upper boundary is formed by the Summit Road. Access is possible from Bowenvale Avenue, Huntsbury Spur Track, the Summit Road and Victoria Park.

Scott Reserve is situated above the Summit Road between Sugarloaf Peak and Mt Vernon. Access is possible from the Summit Road.

1.1 REGIONAL SETTING

The Port Hills are recognised as an outstanding natural feature of regional significance by the Canterbury Regional Council.

(a) They provide: a contrasting natural backdrop to the city; a broad range of recreation opportunities; and elevated views out over the city and the region.

(b) The apparent natural appearance of much of the hills backdrop is derived from the present pastoral landuse. The presence of tussock grassland is a vital factor contributing to the existing Hills character.

(c) The areas of regenerating natives and the presence of rock formations also make an important contribution to the character of the setting.

(d) Another special feature is the location of the hills within half an hour's drive from the City centre and even closer from the Hill residential areas.The plan area also adjoins Mt Vernon Park. Possible purchase of Huntsbury Spur land would increase the link between the above parks.

Port Hills Conservation Overview

In botanical terms the reserves are situated in a transition area between the potentially heavily forested areas of the southern Port Hills (higher rainfalls) and the more open grassland/shrubland dominated north facing eastern Port Hills which terminate at Godley Head (lowest rainfall in Canterbury). The ecological potential of the Plan area is still predominantly toward woody vegetation. However there are much smaller areas of aspect and altitude influenced soils which would historically have supported podocarp hardwood forest than further south.

The Park area contains two botanical features of significance on the eastern side of the hills.

1. The last two stands of bush on the north side side of the Port Hills facing the city (remnants of the once virtually complete forest/scrub cover that mantled the hills over 1,000 years ago). Dry Bush valley is shared between the adjoining Mt Vernon Park and Bowenvale Park.

2. Extensive areas of silver tussock grassland in the upper Bowenvale Valley (a natural response to the burning and grazing regime that dominated Port Hills management for over 80 years).

The reserve's ability to support native fauna is limited due to lack of suitable habitat inspite of extensive planting of exotic food bearing plants in Elizabeth and Victoria Parks. However it is probably still an important wildlife link in the chain of Port Hills forest remnants and planted areas (see Vegetation, Section 8; and Fauna, Section 10, for more detail).

Port Hills Recreation Overview

The Park's form an important link in the Port Hills

LEGAL DESCRIPTION

NAME	LEGAL DESCRIPTION	CERT OF TITLE NO	OWNERSHIP	VESTING/GAZETTE DATE/PAGE	RESERVES ACT 1977 CLASSIFICATION	CLASSIFICATION GAZETTE DATE/PAGE	AREA
Elizabeth Park Recreation Reserve	DP 11796, Lot 2, Pt Lot 1	592/31	CCC	1951-1091 vested	Recreation Reserve	1990 (resolution)	15.3508 ha
	RS 37957	592/31	CCC	1952-1734			
Victoria Park Recreation Reserve	RS 41112	657/51	CCC	1969-1429	Recreation Reserve	1982-3397	57.9554 ha
	RS 41113	657/51	CCC	1969-1429	Recreation Reserve	1982-3397	11.9554 ha
	RS 41114	657/51	CCC	1969-1429	Recreation Reserve	1982-3397	5.0053 ha
	RS 41115	657/51	CCC	1969-1429	Recreation Reserve	1982-3397	0.3956 ha
				vested		Total Area	74.5345 ha
Douglas Scenic Reserve	Pt Rs 11170	18K/1466	Crown	1983-14 vested	Scenic Reserve 1(b)	1983-14	1.7100 ha
Thomson Park Scenic Reserve	Res 4259, DP9794	427/252	Crown	control and manage 1947-1924	Scenic Reserve 1(a)	1990-2079	25.6090 ha
Sugarloaf Scenic Reserve Part	Pt Res 4170, DP 7758	387/8	Crown	control and manage 1947-1924	Scenic Reserve 1(a)	1990-2079	2.8000 ha (in part)
Scott Reserve Recreation Reserve	Res 4477	482/36	CCC	1969-1429	Recreation Reserve	1990-2078	2.9491 ha
	Res 4478	482/36	CCC	1969-1429	Recreation Reserve		4.8360 ha
						Total Area	7.7851 ha
Bowenvale Park Recreation Reserve	DP 28705, Lot 2, Pts Lot 1 & 3	25F/638	CCC	Vested on deposit	Recreation Reserve	1989-2926	177.8191 ha
	DP 28817, Lot 13	25F/634	CCC	Vested on deposit	Recreation Reserve	1989-2926	4.0544 ha
	DP 28817, Lot 14	25F/635	CCC	Vested on deposit	Recreation Reserve	1989-2926	4.0822 ha
	DP 28817, Lot 15	25F/636	CCC	Vested on deposit	Recreation Reserve	1989-2926	4.0772 ha
	DP 28817, Lot 16	25F/637	CCC	Vested on deposit	Recreation Reserve	1989-2926	4.1126 ha
						Total Area	194.1455 ha

traffic and walkway network. The Crater Rim Walkway and Summit Road extends through the top of the reserves and links the southern reserves with the eastern reserves including the adjoining Mt Vernon Park.

Recreation activities suitable for different reserves often compliment each other. For example horticultural interest related walks are available in Victoria Park whereas experience of 'native bush' is available at Ahuriri Bush Reserve. Quiet secluded walkways are available in the Bowenvale Valley whereas experience of wide open space is available on the adjoining Mt Vernon Park.

2.0 LEGAL DESCRIPTION

(see diagram previous page)
The Council named Skellerup Park is comprised of 7.2ha of Thomson Park and 2.8ha of Sugarloaf Scenic Reserve.

This Management Plan is only encompassing the portion of Sugarloaf Scenic Reserve below the Sign of the Kiwi containing exotic conifers. The bulk of Sugarloaf Scenic Reserve including the native bush remnant will be dealt with in a future plan.

Victoria Park Road finishes opposite the access point to the Telecom Microwave Station. The road which continues through the Park is not legal road.

3.0 ADMINISTRATION

All the above Reserves are administered by the Christchurch City Council pursuant to the Reserves Act 1977. (See classification listed under legal description.)

All of the reserves along the Summit Road and Dyers Pass Road are included under Section 6 of the Summit Road (Canterbury) Protection Act 1963.

The reserves are designated on the old Heathcote County Council District Planning Scheme as:

Existing Public Reserves for Recreation Purposes:
- Elizabeth Park
- Victoria Park
- Scott Reserve
- Bowenvale Park

Scenic Purposes:
- Thomson Park
- Sugarloaf Reserve

3.1 STAFF

Three staff are employed full time at Victoria Park. They are involved in general maintenance including activities related to farming (based at Victoria Park) as well as recreation related activities, i.e. mowing, gardening, track maintenance, fencing, spraying noxious weeds, waterline and stock water maintenance, drenching, shearing etc.

Approximately half a day each week is spent supervising and assisting various voluntary groups with work in various Port Hills Reserves.

Periodic Detention workers are also used for track maintenance work and grass cutting along the roadsides.

An important component of staff work is fire prevention and control and ensuring public safety during and after storms. Direct oversight of the parks results from having a ranger permanently located on site. This is important to combat vandalism and to maintain an efficient fire fighting capability in the area.

The Ranger based at the Sign of the Kiwi is responsible for the reserves along the Summit Road including upkeep of the walking tracks.

3.2 FINANCE

Estimated Budget for 1990/91 Financial Year

VICTORIA PARK AND ELIZABETH PARKS

Salaries and Wages	$60,780
Telephones	1,386
Electricity	1,600
General	24,750
Trees	4,500
Pathways and car parks	4,000
Fences	3,000
Building maintenance	8,000
Equipment maintenance	1,000
Allocated Overhead - Building Rent	5,200
TOTAL COST	$114,198
TOTAL REVENUE -	$8,000
NET COST - VICTORIA AND ELIZABETH PARKS	$106,198
	======
BOWENVALE PARK	$10,910

Thomson Park, Scott Park and **Douglas Scenic**

Reserve are included in the wider Summit Road Reserves budget which has a net cost of $93,856 and covers 17 reserves. The major costs involve the employment of the Ranger at the Sign of the Kiwi, fence maintenance and equipment maintenance.

4.0 CLIMATE

The exposed position of much of the Parks, orientated NNW-SSE, influences their climate.

Wind

The exposed north western slopes of the Parks are subject to the full force of the dry north west winds over summer, while the eastern slopes are exposed to the cooler drying north easterly winds. Wind velocity tends to be higher on the hilltops and upper slopes (oreographic uplift) than on the lower slopes. Gale force winds usually occur in the area on three days in winter and three days in summer (recorded on Mount Pleasant in 1980). The inner valleys of Bowenvale provide a more sheltered environment from wind.

Precipitation

Rainfall varies significantly from year to year but always appears to be greater on the upper levels of the Parks. Rain gauges installed in the Bowenvale valley since 1988 have recorded a 20-30% increase in rainfall between the base of the Bowenvale valley and the upper valley. The corresponding increase in the number of rain days between the lower and the upper valley is significant, eg 1989 24 days and 1990 12 days. 75% of the rain comes from between the south and west. Rainfall over the winter period may be double that of the summer months (September to April).

Rainfall In The Bowenvale Valley

Elevation	23m	341m
1989 Rainfall	864mm	1058mm
1990 Rainfall	613mm	716mm

Snow, hail and fog also add to the total moisture received. Several falls of snow occur on Sugarloaf Peak every winter.

Drought conditions may occur in summer as the warm dry north westerly winds accentuate the effect of lower rainfall over this period. Occasional easterly fog and low cloud at the higher elevations helps reduce evaportranspiration rates for plants at this time of year. South and east facing slopes sheltered from the north west wind retain their moisture longer. It is notable that the humid zone with higher rainfall descends below 300m in parts of Bowenvale Valley.

Bush Head (bottom); Low cloud below Scott Reserve

Normally the humid zone occurs on south and east facing slopes above 300m.

Temperature

The north facing nature of much of the reserve area means it receives more radiant energy than a corresponding area of flat land. This is most significant in winter. Cold air drains off sloping land so plants suffer less from low temperatures and frosts. The temperature reduction with increase of altitude is not significant. Mean January air temperatures are in the range of 16°C at lower altitudes to 13.5°C at higher altitudes sunshine hours for the park are in the vicinity of 1,984 hours (Mount Pleasant 1980).

The climatic conditions prevailing in the Bowenvale Valley are virtually the same as for the Cashmere Spur Reserves. However the more sheltered nature of some of the valleys within Bowenvale reduce the amount of moisture loss over the summer period. Scott Reserve receives slightly higher rainfall than Bowenvale due to its higher altitude.

5.0 TOPOGRAPHY, GEOLOGY AND SOILS

The Port Hills originated in the eruptions of the Lyttelton volcano approximately 11 million years ago, which slowly built up a large cone of basalt over what is now Lyttelton Harbour.

The terrain encompassed by the Parks comprises a sector of the lower flanks of the volcanic cone, now eroded into a series of radial valleys. One of these catchments, containing the Bowenvale Stream, forms the core of the reserve area. Oriented almost due north-south, it forms a natural amphitheatre rising steeply and in places precipitously to the crater rim. To the east and west the enclosing spurs climb relatively gently towards the summit, joining it at the peaks of Mt Vernon and Sugarloaf respectively.

Topographical details reflect the underlying structure of volcanic materials deposited on the volcano's flanks. Erosion has exposed successive layers of varying character - ash, scoria, lava etc - which slope gently downwards from the crater rim. The harder materials stand out as cliffs in the valley walls or as outcropping knolls on the ridges, often weathered into picturesque groups of boulders. At the summit the beds are abruptly truncated, falling away in impressive cliffs towards Lyttelton Harbour.

The later mantle of loess lies undisturbed over much of the terrain, particularly where gradients are slight. Its effect is to smooth out the contours and to heighten the contrast of those points where underlying rock is exposed by erosion. Where the loess lies deep on the steeper slopes, the original smooth contours are often scarred by slumping and tunnel gully erosion.

The main tributary streams are deeply incised into the valley slopes, descending in steps at some points, which become waterfalls after heavy rain. On the valley floor the stream gradient is still relatively steep, allowing only a narrow strip of alluvial flat above the Bowenvale entrance. Within the whole reserve zone, significant areas of level ground are largely confined to the ridge-lines.

Soil and Water Conservation Controls

Subject to Section 34 of the Soil Conservation and Rivers Control Amendment Act 1959 the Canterbury Regional Council has imposed controls over the Port Hills including the Management Plan area which prevents clearing of vegetation greater than 1ha in area, in any one calendar year, without prior written consent of the Regional Council.

> "Clearance" means the cutting, destruction or removal by chemical or mechanical means (including cultivation) or by burning, and includes the felling or harvesting of wood or timber from woodlots, but excludes grazing by stock and the cutting and harvesting of hay, silage, arable and horticultural crops.
>
> "Vegetation" means grass, tussock, scrub, bush, forest and plantation.

Unless revoked, this notice will remain in force for two years from 5 February 1990.

This restriction is intended to prevent the clearing of vegetation likely to facilitate soil erosion, floods, or cause deposits in watercourses, lakes or the sea.

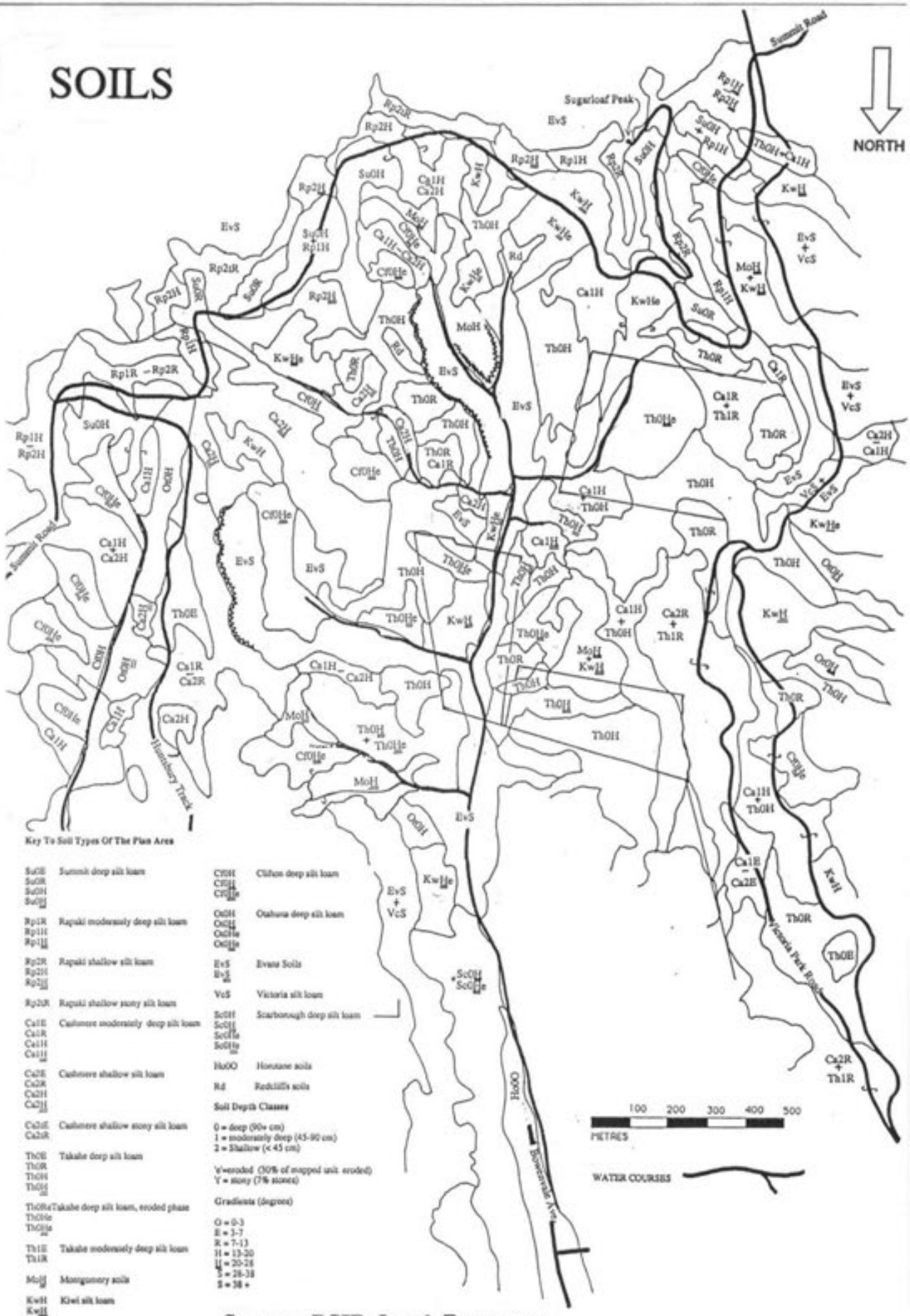
5.1 SOILS

The altitude range of the Cashmere Spur reserves ranges from approximately 220m above sea level (Elizabeth Park) to 496m on Sugarloaf Peak.

The altitude range of Bowenvale ranges from approximately 23m above sea level to near Bowenvale Avenue to 400m above sea level adjacent to the Summit Road.

The soils of the Port Hills derive from the parent materials of basalt and loess. On sloping land the loess has been stripped away in varying amounts to partly or completely expose the basalt. On such slopes colluvial mixtures of loess and basalt are formed,

SOILS



Key To Soil Types Of The Plan Area

SuSE, SuSR, SuSH, SuSH	Summit deep silt loam
RpIR, RpIH, RpIH	Rapaki moderately deep silt loam
Rp2R, Rp2H, Rp2H	Rapaki shallow silt loam
Rp2tR	Rapaki shallow stony silt loam
CaIE, CaIR, CaIH, CaIH	Cashmere moderately deep silt loam
Ca2E, Ca2R, Ca2H, Ca2H	Cashmere shallow silt loam
Ca2tE, Ca2tR	Cashmere shallow stony silt loam
ThOE, ThOR, ThOH, ThOH	Takahe deep silt loam
ThOEe, ThOHe, ThOHe	Takahe deep silt loam, eroded phase
ThIE, ThIR	Takahe moderately deep silt loam
MoH	Montgomery soils
KwH, KwH, KwHe	Kiwi silt loam
CfOH, CfOH, CfOHe	Clifton deep silt loam
OtOH, OtOH, OtOHe, OtOHe	Otahuna deep silt loam
EvS, EvS	Evans Soils
VcS	Victoria silt loam
ScOH, ScOH, ScOHe, ScOHe	Scarborough deep silt loam
HuOO	Horotane soils
Rd	Redcliffs soils

Soil Depth Classes

0 = deep (90+ cm)
1 = moderately deep (45-90 cm)
2 = Shallow (< 45 cm)

'e'=eroded (30% of mapped unit eroded)
't' = stony (7% stones)

Gradients (degrees)

G = 0-3
E = 3-7
R = 7-13
H = 13-20
H = 20-28
S = 28-38
S = 38 +

Source; DSIR Land Resources

and these mixtures comprise the parent materials of most of the soils.

The soils of the Parks are arranged below according to climatic influence (humid or subhumid climate). Soil depths range from 0 on bare rock to 1 m or more in the deep loess soils.

Humid Climate Soils

Humid Climate soils are found at altitudes of 300 m and above where rainfall levels are higher. Loess soils in this zone show evidence of leaching due to the higher rainfall.

Summit Deep Silt Loam

This soil type has developed from loess and loess colluvium. Soils are generally over 1 m deep and are found in the upper levels of the Bowenvale Valley on the rolling tops of the ridges, and on sections of Scott Reserve and around Sugarloaf Peak. These soils were probably formed under podocarp forest which was later destroyed by fire and replaced by silver tussock.

Soil moisture is at or above field capacity from March to September (7 months) and below field capacity from October - February (5 months). In spite of this these soils rarely drop to wilting point. Aspect has a pronounced affect on soil moisture with south facing soils remaining moist all year.

Rapaki Silt Loams

Rapaki soils are found at altitudes above 300 m on ridge summits and shoulders. They are formed from weathered volcanic rock. Soil depths vary from 0.5 m - 1 m deep in Rapaki moderately deep silt loam to less than 0.5 m in the shallow series. These soils hold their moisture well and are reasonably fertile. The major constraint for plant growth relates to their generally exposed positions and often limited soil depths.

Subhumid Climate Soils

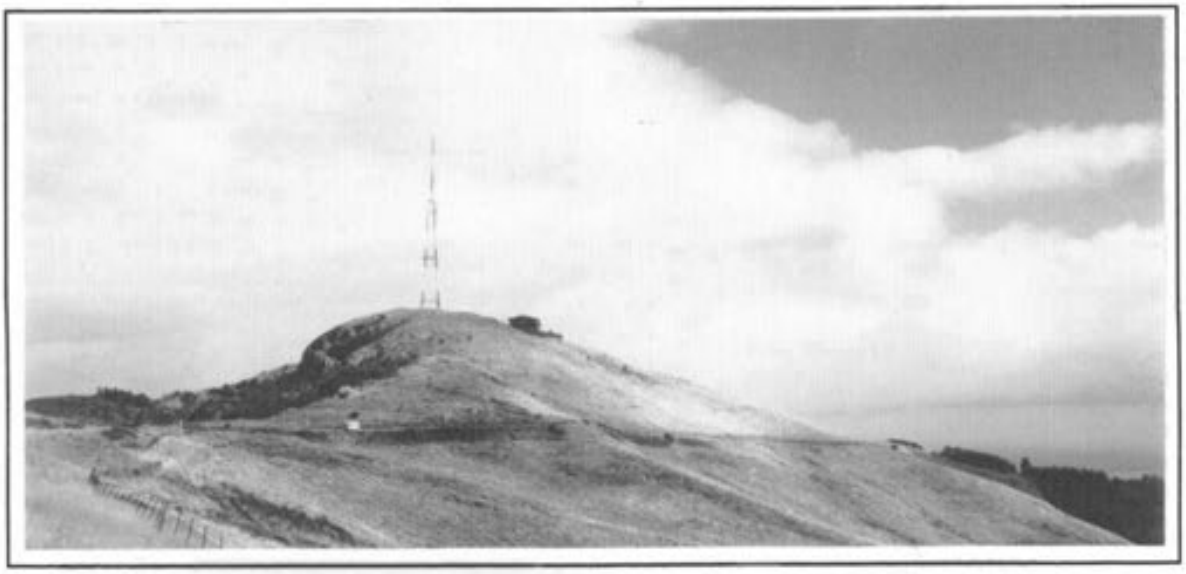
Cashmere Silt Loams

These soils are formed from weathered volcanic rocks on ridge summits, shoulders and nose slopes where the loess cover has been eroded away. The soils range from 0.5 m - 1 m deep to less than 0.5 m in depth. They are well drained overall and have higher water-holding capacity than the loess soils.

Takahe Silt Loams

Takahe silt loams cover large areas of the Bowenvale Valley on easy rolling to strongly rolling ridge summits and shoulders. They are formed from loess which varies in depth from 1 - 3 m. Many of these loess covered ridges tend to have a northerly facing aspect which leads to higher evaportranspiration rates and moisture deficits between January and April. Drainage is impeded by the presence of a frangipan 0.5 - 0.6 m down in virtually all the Parks Takahe soils.

Tunnel gully erosion is common in Takahe soils and widespread in the parks. Special care needs to be taken if general earthworks or tracks are constructed on these soils. Apart from susceptibility to drought in summer and water logging in winter these soils are reasonably fertile and have good potential for plant growth.



Sugarloaf Peak, Thomson Park and Bowenvale Park below the Summit Road

Redcliffs Deep Silt Loam

Redcliffs deep silt loam is formed from colluvium and some alluvium mostly derived from loess and some from volcanic rock. They occur in poorly drained gully heads and seepage points and in depressions on ridge summits and shoulders. Their presence is often indicated by large concentrations of rushes.

Soil moisture levels remain high throughout the year with the soil being saturated for considerable periods in winter. Redcliffs deep silt loam will support moisture tolerant trees, shrubs and herbs.

Kiwi Silt Loams

Kiwi soils are formed from loess colluvium and mainly occur on moderately steep north or north-west facing back slopes. Up to 10% of their profile may be comprised of basalt gravels, stones and boulders. Boulders may occur on the surface and rock outcrops are common. These soils tend to dry out in summer. The Kiwi soils mapped in the plan area are of very variable depth. Slips and or tunnel gully erosion are present on several areas of Kiwi soil in the Bowenvale Valley with areas greater than 30% being affected. Slips often occur below seepage zones.

Clifton Deep Silt Loam

Clifton deep silt loam is derived from mixed colluvium derived from loess and volcanic rocks. It occurs below outcrops and in gully heads on upper and lower backslope positions in areas with a dominantly shady aspect. Clifton soils retain moisture well through the year due to the more sheltered sites where they occur and their higher volcanic soil content. They are also subject to mass movement especially during winters with higher than normal rainfall. Tunnel-gully and sheet erosion also occur locally. Clifton soils are well suited to tree growth due to their greater moisture holding ability. Tree cover is also desirable to reduce the high incidence of slipping that can occur in wet years. The two remnant patches of bush found in the Parks largely occupy areas of Clifton soil.

Otahuna Deep Silt Loam

Otahuna deep silt loam is derived from loess colluvium and is differentiated from other loess soils by its position on the shady sides of slopes. Otahuna soils are mostly restricted to Dry Bush Valley in the plan area. They become more prevalent as the influence of aspect on soils increases further south along the Port Hills.

Evans and Montgomery Soils

Both soils are derived from colluvium derived from volcanic rocks and occur on steep to very steep mid back slopes 10-15% of the surface is marked by rock outcrops. Surface boulders and stones are common. Depth to rock is extremely variable with depths as great as 0.8 - 1 m in places. Internal drainage is medium but runoff is often rapid.

Scarborough Deep Silt Loam

Scarborough deep silt loam occurs on colluvial aprons forming the lower slopes below cliffs and containing up to 10% volcanic rock. It is usually layered and up to 6 m deep often overlying loess. The only Scarborough soil found in the plan area occurs in the lower Bowenvale Valley. It has extensive tunnel gully erosion.

Horotane Soils

Horotane Soils are formed from alluvium derived from loess and in part from volcanic rock. They only occur at the base of the Bowenvale Valley. They are fertile and tend to have slow drainage with waterlogging in winter aggrevated by seepage from the surrounding hills.

Upper Bowenvale- kiwi, Cashmere, Summit soils,

6.0 HISTORY

The Maori people have a long history of pre-European occupation of the Port Hills. However there appear to be no archaeological or traditional sites to be found

within the Parks boundaries. Stone walls in Dry Bush are evidence of early European activity.

6.1 VICTORIA PARK

Victoria Park is the oldest of the Parks covered by the Management Plan.

It was originally part of the Cracroft Wilson estate and was first set aside by Crown Grant for a public quarry reserve in 1870. The purpose of the reserve was changed in 1883 to recreation purposes by the Superintendent of Canterbury, the Hon William Rolleston, and later vested in the Selwyn Road Board. On the abolition of this Board the reserve was vested in the Cashmere Domain Board.

Victoria Park was officially opened on 22 June 1897 in commemoration of the Diamond Jubilee of Queen Victoria. A marble plaque was erected at the old Dyers Pass Road entrance to commemorate the event.

In 1911 the Christchurch City Council was by Order in Council constituted the Domain Board for Victoria Park.

The first plantings in Victoria Park were carried out by Mr J B Armstrong, son of J F Armstrong, Curator of the Botanic Gardens.

Further planting was carried out by Mr A L Taylor, Curator of the Botanic Gardens from 1889-1907. Under his supervision small plantations of pines and Eucalypts were established in the vicinity of the tea rooms and at the entrance to the park from Dyers Pass Road. Later, about 1920, Mr Wickens, Superintendent of Parks and Reserves for the Christchurch City Council established a small patch of native bush in the gully on the western side of the tearooms. No further planting was done until about 1926 or 1927 when Mr James Young advocated the afforestation of Victoria Park and a block of approximately fifty acres (20.2 ha) was planted with pines, eucalypts and Douglas fir on the slope below Sugarloaf.

This plantation was later destroyed by fire and replaced with plantings of *Pinus radiata, P. laricio, P. ponderosa* and *Cupressus macrocarpa* in 1929 under Mr M J Barnett, Parks Superintendent 1929-55.

Over the depression years, 1930's, large numbers of relief workers were employed in Victoria Park.

Many trees and shrubs were planted including over 12,600 in 1935. These mostly consisted of conifers and natives. Much of the stone walling still evident in the park today was constructed during the depression. Mr H G Ell was also involved in track formation and planting as part of his wider Port Hills activities.

Some of the events of the depression era and beyond include:

1929	Recommendation that park be used purely as a scenic reserve for public recreation rather than for forestry purposes as had occurred previously.
1928-31	H G Ell involved in path formation and native shrub planting.
1931	Fire above park burns 1/3 of plantation.
1934	Eastern valley planting from tearooms to Bowenvale commenced (mostly native).
1937	Replanting of 60 acre block (Upper East Side Block) with forest trees plus small groups of trees through grazed eastern slopes below the rock outcrop to give a more 'park like' appearance.
1938	First park caretaker appointed.
1939	Formation of a native shrub and alpine rock garden on the eastern rock face below the tearooms. Verandah and outer stone walls added to Kiosk Shelter.
1941	Formation of an exotic garden for half hardy plants on western slope. 2,400 trees, shrubs and herbaceous plants planted.
1946	40 oaks planted by Mayor, Councillors etc grown from acorns collected in Royal Park, Windsor, to mark the King's Coronation.
1951	19th Battalion World War II Memorial.

The memorial planting scheme was designed to be incorporated in the general planting and beautifying of the park. Four separate groups, each of 19 trees, were planted and these represented the four squadrons of the regiment. As the regiment saw service in North Africa, Greece, Crete and Italy, trees peculiar to these countries were planted and they were the Atlantic cedar, the Italian cypress, the Corsican pine and the aleppo pine. These trees formed the dominant groups, but later plantings were of other trees and shrubs such as the olive, Cretan gumcistus and Spanish chestnut. Also a memorial plaque, together with a stone seat to blend in with the surroundings, was erected.

1975 August storm - Destruction of much of the large plantation block at the top of the park.

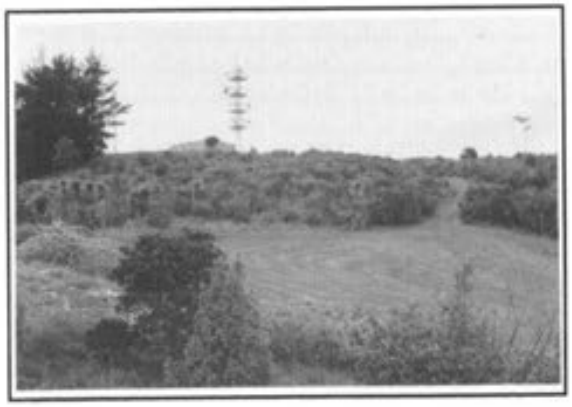
1981 Construction of hexagonal picnic shelters by Christchurch South Rotary.

1982 Closure of the Victoria Park tearooms due to health requirements and poor patronage during the week.

1988-89 Extensive fire damage to upper plantation block.

6.2 ELIZABETH PARK

Elizabeth Park was gazetted as a recreation reserve in 1951 and was named in honour of the accession of Queen Elizabeth to the throne.



Planting, Elizabeth Park

Half the area was excluded from grazing and various community groups commenced planting on Queen's Birthday 1954. Planting included:

1,300 Native species
500 Exotics
1,026 Conifers

Another 200 native species and 120 exotics were planted by City Council Parks and Recreation staff. Significant later planting includes a seedling from the 'Lone Pine of Gallipoli', *Pinus halepensis,* to commemorate the Gallipoli Campaign and a large group of olives.

In 1962 a 40,000 gallon reservoir was constructed on Elizabeth Park with a 100mm fibrolite pipe leading down to Dyers Pass Road.

6.3 THOMSON PARK

Thomson Park was gifted to the people of Canterbury by Mr J J Thomson.

The official opening ceremony was held in 1931 at a stone shelter constructed above the Summit Road. A memorial tablet which marked Mr Thomson's gift was unveiled by Mr George Harper, the founding Chairman of the Summit Road Reserves Board (1908) and founder of the Summit Road and Reserves Association (1919).

The plaque reads:

Thomson Park
63 acres

The gift of
John James Thomson
to connect Victoria Park with
the Sugarloaf Reserve
272 acres

Previously given to him in conjunction with
William Graham Jamieson for the benefit of the people of Canterbury 1931

Mr Thomson loved walking the hills. "Once a week, every Tuesday, I used to go to Kennedy's Bush, every Thursday to Mount Pleasant, and once a month to Cooper's Knob."

"Once a year I stayed the night at Kennedy's Bush, breakfasting the next morning at Cooper's Knob, and then on to the lighthouse at Godley Head." In his lifetime Mr Thomson was reputed to have walked some 1,500 miles over the hills. After his death, Mr Thomson's famous old walking stick was presented to the Canterbury Museum.

In 1966 the then New Zealand Broadcasting Corporation (now Television New Zealand) leased a 4.9ha section of the reserve from the Crown on the summit of Sugarloaf Hill and installed a transmission tower and control building.

6.4 SKELLERUP PARK

Skellerup Park, comprising the steep slope above Dyers Pass Road between the southern boundary of Victoria Park and the Sign of the Kiwi, was first planted in 1952. The planting was funded by the donation in 1950 of 1,000 pounds to the Summit Road Society by Mr George Skellerup for the specific purpose of planting the Park. The planting was predominantly of native trees and shrubs.

In 1955 the Council officially named the area Skellerup reserve in honour of Mr Skellerup. However, in 1962 approximately 60% of the reserve was burnt in a major fire. 250 pounds was donated to the Summit Road Society in 1963 by Skellerup Industries for use by the Council to replant and maintain the reserve.

6.5 DOUGLAS SCENIC RESERVE

Douglas Scenic Reserve was purchased by the Summit Road Society and transferred to the Crown in 1982. It was vested in the City Council in 1984. The reserve has since been planted with natives.

6.6 BOWENVALE PARK

Bowenvale Park was formerly part of a 606 hectare grazing property which incorporated "Bowenvale" and "Mt Vernon". When first purchased by the Bowenvale Farming Company in the mid 1960's, the property carried six stock unit equivalents per hectare. Through subdivision, top dressing and oversowing, the farm carried up to 7.7 stock unit equivalents per hectare. This stocking level was not sustainable in the long term and the combined area did not form an economic unit. Breeding ewes, ewe hogget replacements and store cattle for fattening were grazed on the property at the time it was split up and sold.

The property received an annual topdressing of 125 kilograms of superphosphate per hectare. From time to time clover species were introduced by aerial oversowing, though establishment was not overly successful.

In 1966 a block of pine trees was planted part way up the Bowenvale Valley and adjacent to Victoria Park.

In 1981 as a result of a North Canterbury Catchment Board Soil and Water Conservation Plan, an area of 15.5 hectares of steep to very steep soils above residential property at the foot of the Bowenvale Valley was planted in trees. These were predominantly *Pinus radiata* but also included eucalyptus, *Cedrus deodara, Cupressus arizonica* and larch species. Consultation on silvicultural management of the trees is required by the catchment Board (now part of the Canterbury Regional Council).

On 29 February 1984 Heathcote County Council bought Bowenvale from the Bowenvale Farming Company for $260,000 with final payment being made in June 1986.

The Park was officially opened to the public on 7 July 1985.

6.7 SCOTT RESERVE

Scott Reserve was donated to the Christchurch Domains Board by the Scott Family in 1942. The land was planted by the Board in response to a request by Mrs J E Scott that the area be developed by planting suitable trees and shrubs. The official name of the reserve requested by the donor and approved by the Board was "John Flinders Scott Reserve".

7.0 LANDSCAPE

Landscape Character

The Port Hills as a whole are notable for the sharp contrast they present against the unbroken levels of the Canterbury Plains. Within the reserves area there are strong contrasts of character between the exposed ridgelines and the basin enclosed between them.

The general pattern of the landscape is of broad sweeps of hill pasture punctuated by rock outcrops, patches of native shrubbery, and (particularly on the western ridge) exotic forest trees disposed in arbitrarily-shaped patches. Much of the grassland displays the distinctive colour and texture of the native tussock. Manmade structures are generally unobtrusive,

Natural and Exotic Vegetation Pattern

with the exception of the television transmission mast on Sugarloaf Peak and, to a lesser degree, the pylons of the electrical supply route crossing the valley. Because it closely follows natural contours, the Summit Road has minimal visual impact, in spite of its prominent position.

Though similar in origin, the two radial ridges present quite different appearances. On the east Huntsbury Spur forms a broad open almost level plateau before rising smoothly to the summit. The western (Cashmere) spur, which provides the main access route to the area via Dyers Pass Road, is narrow and sinuous, ascending in a series of terraces and rock outcrops. Further complexity is added by the patterns of planting and the concentration of structures and facilities. The siting of these facilities reflects the topographical sequence, culminating in Sugarloaf Peak with its crowning mast.

Vegetation patterns

While some of the exotic planting comprises stands of radiata pine, there is a rich if unco-ordinated diversity

of mature trees and shrubbery to be seen in Victoria and Elizabeth Parks. Variations in density, from scattered specimens to closed woodland, complement the range of species. The introduced vegetation has yet to achieve any coherent relationship to landform. Remnant or regenerating patches of indigenous vegetation, on the other hand, closely reflect topographical factors favouring humidity, shelter and moist soil, though grazing pressure plays a dominant role.

Landscape Values

Three aspects of the Port Hills, including this particular sector of them, are important for visitors and local residents:

(i) they form a distinctive backdrop to the urban environment, and a primary orientation feature for the entire city area;

(ii) they provide an easily-accessible natural viewing platform from which much of Canterbury - city, coast, plains and Alps - can be viewed;

(iii) their rugged topography constitutes a natural recreation resource and brings elements of a wilderness experience potentially within easy reach of city dwellers.

Each of these categories of value implies a somewhat different range of management objectives if it is to be effectively conserved, though in general there is no inherent conflict.

'Scenic Backdrop' Function

As seen from the city below, these reserve areas register primarily as distinctive landforms on which patterns of vegetation are superimposed, the vegetation appearing as surface colour rather than form. The strongest visual contrasts occur on the skyline and between grassland and woodland. Appropriate planning objectives would include the development of vegetation patterns which enhance and complement the landforms, elimination of arbitrary rectilinear boundaries and alignments, and removal or screening of intrusive man-made elements. In general, the most important areas in this context are the higher altitudes along the crater rim, and the north-facing slope around the head of the valley below the Summit Road.

'Viewing Platform' Function

The Summit Road both identifies and serves this important role of the Port Hills, where the view is outwards and downwards to the vast panorama beyond the city environs. Though almost anywhere on the Summit Road provides an impressive view, some points naturally invite the traveller to stop. Within these reserve areas, the obvious points are those where the road skirts the edge of the crater, affording simultaneous views on both sides of the rim. There are other important strategic viewing-points along the western ridge and on the highest accessible point, the Sugarloaf Peak carpark. The more recently developed network of walking tracks greatly enhances the value of the scenic attractions.

Conservation of viewing opportunities requires that unnecessary physical obstructions, including vegetation, be eliminated. It also extends to provision of adequate comfort and safety for visitors, the safety aspect being quite significant for vehicular traffic. To the extent that the Summit Road provides many foreign visitors with a first clear impression of the Canterbury landscape, information and interpretation facilities may deserve more attention than they have been given in the past.

'Recreation Function'

The Management Plan area constitutes the largest and most accessible tract of public land in the Port Hills, and provides a diverse and attractive environment for active recreation. The rugged and sometimes dramatic topography creates opportunities for exploration and movement which are unavailable on level ground. Freedom from urban development, a variety of natural features and uncrowded open space combine to form a major recreational resource of a size and quality seldom found within city boundaries.

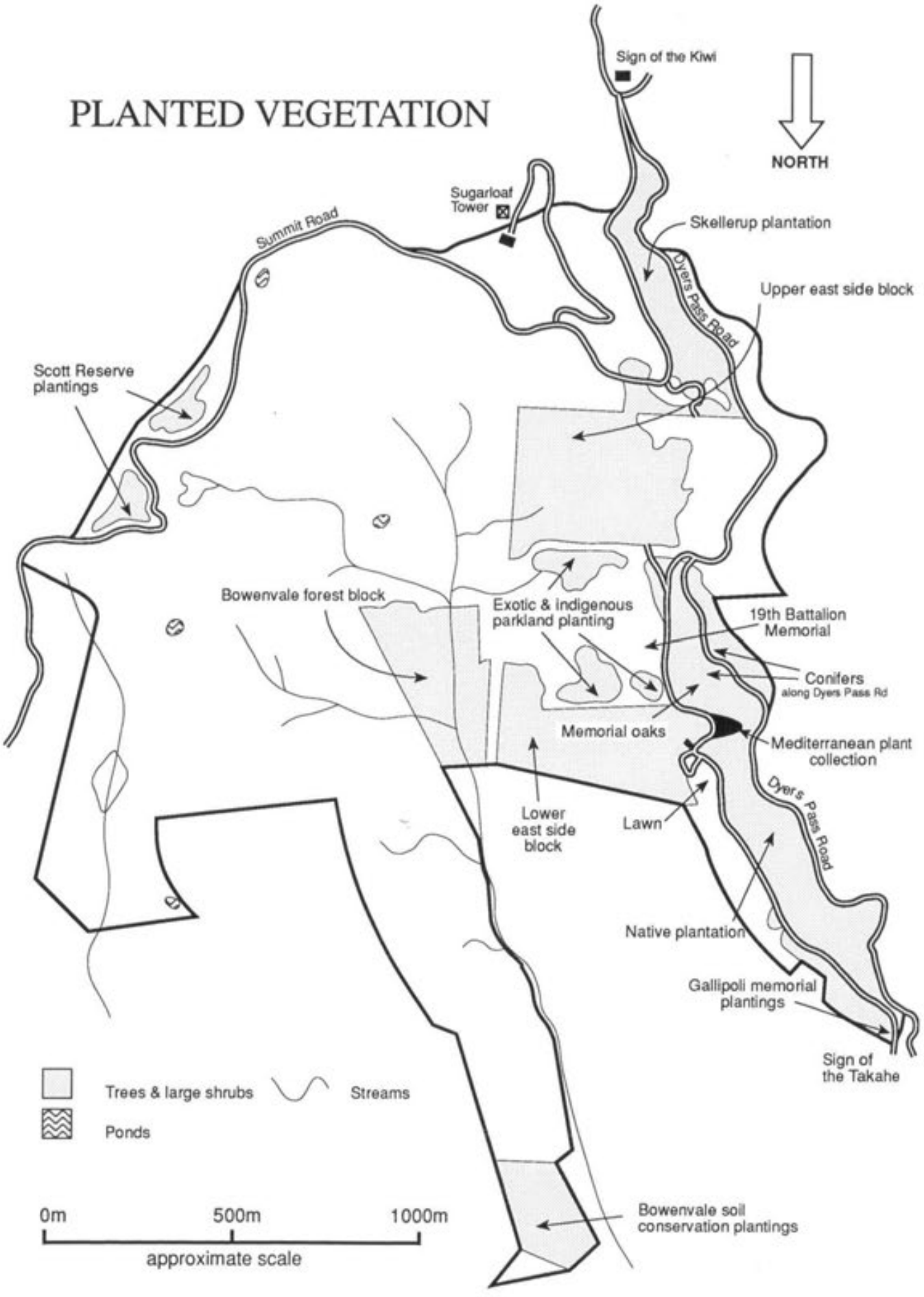
8.0 VEGETATION

8.1 VEGETATION OVERVIEW

Vegetation in the Bowenvale/Dyers Pass Road Parks consists of the following:

PLANTED VEGETATION

	AREA	% OF TOTAL
Exotic Plantation (mostly Conifers, some Eucalypts)	56.6ha	17.8
Deciduous	1.0ha	0.3
Native Plantation	12.3ha	3.8
Native mixed with Exotic	13.4ha	4.2
Lawn	2.0ha	0.6
Total:	85.3ha	26.9


PLANTED VEGETATION
Sign of the Kiwi
NORTH
Sugarloaf Tower
Summit Road
Skellerup plantation
Dyers Pass Road
Upper east side block
Scott Reserve plantings
Bowenvale forest block
Exotic & indigenous parkland planting
19th Battalion Memorial
Conifers along Dyers Pass Rd
Memorial oaks
Mediterranean plant collection
Lower east side block
Lawn
Native plantation
Gallipoli memorial plantings
Sign of the Takahe
Trees & large shrubs
Streams
Ponds
0m
500m
1000m
approximate scale
Bowenvale soil conservation plantings

REMNANT NATIVE VEGETATION

Tussock Grassland	228.0ha	72.0
Forest Remnants	1.3ha	0.4
Scrub/Scattered Trees	2.0ha	0.6
Total:	231.3ha	73.0

8.2 PLANTED VEGETATION

Exotic Conifer And Eucalypt Plantations

8.2.1 UPPER EAST SIDE BLOCK

The 18ha of upper east side block contains a stand of macrocarpas and mixture of regenerated eucalypts, macrocarpas and pines with a thick understory of *Ribes sanguineum* (flowering currant), and some broom and gorse.

As a result of the 1975 storm, the slopes are still covered by large numbers of windthrown logs. Due to the steep slopes and general topography recovery of the fallen timber proved to be a major and very difficult operation. Most of the area was severely and unavoidably scarred by the operation of heavy equipment required for recovery and despite the considerable amount of restoration work carried out since, it will be some years yet before the land is completely restored and stabilised.

At the time of the 1975 operations special dispensation was required to transport logs and both the public and internal roads suffered considerable damage.

In addition the top quarter of the plantation was destroyed by fire in 1988. Where pines were the dominant pre-fire tree the 'bared' soil has been colonised by a mass of thistles, flowering current and foxgloves. The burnt-over eucalypts are now resprouting from the base and will in two to three years form a dense coppice. Soil erosion in the burnt portion is a significant problem. Native shrubs have now established themselves in a gully on the eastern side of the block.

Unfortunately upper east side block was planted in a pattern that ignored the underlying topography of the site. The east and northern boundaries follow the straight lines of the legal boundaries rather than the natural contours (ie between Bowenvale Park, Victoria Park and Thomson Park). The straight edges of the plantation also detract from the semi-wilderness opportunity (RO4) available to users of the upper valley's of Bowenvale Park. (See Recreation Section.)

Boundary between Bowenvale Park & Victoria Park

The enormous problems that have been encountered in the rehabilitation of this old forestry block indicate that further planting of large blocks of exotic conifers and eucalypts etc should not be contemplated in the Management Plan area. Forest blocks on the relatively exposed hillsides are very prone to wind throw and fire damage, and once an area is planted it is difficult to modify to non forested vegetation types . The current condition of Upper East Block makes return of the forested area to grassland virtually impossible.

8.2.2 LOWER EAST SIDE BLOCK

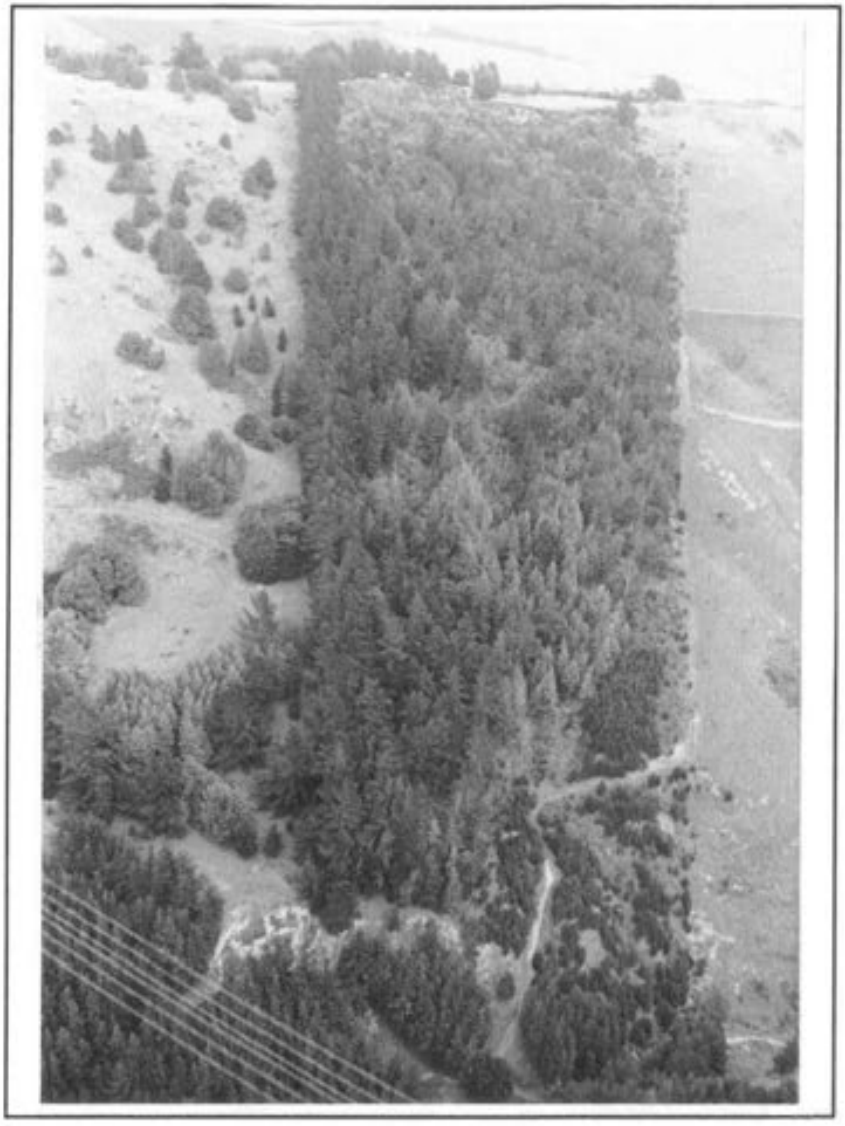
Lower East Side Block was originally planted between two straight pine shelter belts on the hillside facing Bowenvale.

The northern shelter belt has since been removed. In spite of this the overall pattern of the plantation is not very compatible with the underlying topography.

Planting in the upper portion consists of a mixture of natives, mostly consisting of large shrubs such as *Pseudopanax sp.* and *Pittosporum sp.* A 5m high kauri is situated not far from the Victoria Park car park. Downslope planting mostly consists of a mixture of large size eucalypts and conifers, some silver birches and an understory of natives in addition to the remaining southern pine shelter belt.

Remaining macrocarpa & eucalypts, upper east side block

Burnt out portion, upper east side block



Lower East Side Block

8.2.3 BOWENVALE FOREST BLOCK

Bowenvale forest block

This 9ha block of Pinus radiata joins with lower east side block at the bottom of the Bowenvale Valley. It was originally planted to control gorse and provide long term revenue. Unfortunately the block was left unthinned and unpruned for many years. Only recently has some high pruning been carried out.

The relatively young stand (around 24 years) has a dense canopy and a thick needle litter on the ground which excludes other species except around the fringes and along the gullies. In the former case are etiolated grasses including some nasella tussocks - *Nasella trichotoma*. Other woodland species along tracks and gullies are: mahoe, elderberry, pohuehue, poroporo, flowering currant, oxalis, male fern (*Dryopteris filix-mas*), NZ bitter cress, *Hypolepis ambigua*, *Blechnum penna-marina*, *B. fluviatile*, blackberry (*Rubus procerus*), water fern (*Histiopteris incisa*), shrubby fuchsia (*Fuchsia x colensoi*),, kohuhu, akiraho, fivefinger seedlings, *Asplenium bulbiferum*, *A. fla-*

bellifolium, pennywort (*Hydrocotyle moschata*), coprosmas, and the diminutive moss (*Rhynchostegium laxatum*), on banks. The turfy sedge (*Carex resectans*) was also noted.

Visually the block forms an unacceptable pattern on the side of the Valley, a problem contributed to by its straight edges, dark colour and regular texture which do not relate well to the underlying and surrounding landscape.

As the trees are now 24 years old they could be logged at any time over the next 10 years depending on prevailing timber prices. Obviously the larger the trees the higher the return per log. If the block was felled in, say, three to five years time it would have a market value of approximately $140,000 - $150,000 based on todays rates of return. Clear felling the whole block at some time in the future is considered to be the only realistic way of removing the trees that is cost effective. From a practical and economic point of view it would be desirable to synchronise the removal of any trees in lower east side block that need removing at the same time.

8.2.4 BOWENVALE SOIL CONSERVATION PLANTINGS

The 15.5ha of mixed plantings situated on the hillside above Bowenvale Avenue, now 9 years old, consists of *Pinus radiata*, eucalypts, cedars, *Cupressus* sp and larch. The pines have been thinned and pruned. Problems are now starting to occur with residents in the houses below losing their morning sun in winter due to the increasing height of the trees. In the future the option of removing these trees and replacing them with lower growing or deciduous species will need to be assessed.

8.2.5 VICTORIA PARK KIOSK PLANTINGS

It is thought that many of the pines, macrocarpas and eucalypts in the vicinity of the old kiosk were planted in the 1890's by A L Taylor (see history section). These trees, especially the macrocarpas, have reached a considerable size considering the exposed nature of the site.

In 1945 a group of 55 *Cupressus torulosa* trees were planted south west of the old kiosk building. By 1981 the trees had reached 13m in height and measured 0.25m at dbh. As the stand produces seed and is suitably isolated from other *Cupressus sp* the New Zealand Forest Service has registered the stand as an official seed source (No CY29). A large group of Douglas fir is planted on the slope below the cypress trees.

Generally these tall trees provide an attractive entrance to the central part of Victoria Park as well as providing shelter from southerly winds. Unfortunately the large macrocarpas near the old kiosk are now obscuring views of the City and Southern Alps.

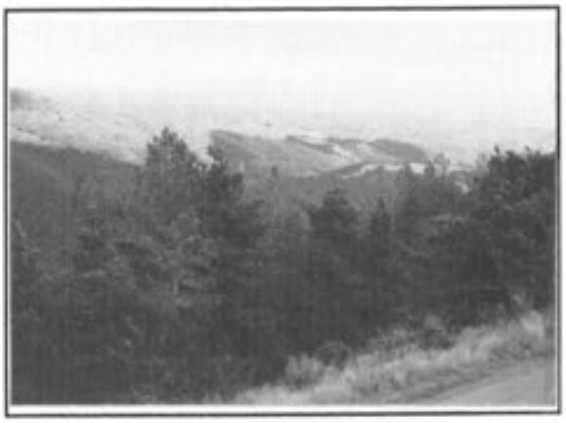
8.2.6 DYERS PASS CONIFER PLANTINGS

There are several large groups of conifers planted at various places along the slopes above and below Dyers Pass Road These trees are now overmature and are potentially unstable.

Elizabeth Park contains several groups of pines including a prominent group of *Pinus halepensis* on the rise in the bend of Dyers Pass Road a few hundred metres south of the last residential properties. A mature pine situated on a rise at the north end of Elizabeth Park is notable in being a seedling of the Lone Pine of Gallipoli.

Victoria Park contains a belt of mature *Pinus radiata* on both sides of Dyers Pass Road between the old Victoria Park entrance and the southern entry to Victoria Park Road. A significant number of pines from this group near the Dyers Pass/Victoria Park Road intersection were blown down during a storm in 1975.

8.2.7 SKELLERUP PLANTATION



Skellerup plantation further up Dyers Pass Road contains a varied assortment of 20 coniferous species ranging from pines and macrocarpa to various *Picea* and *Abies* species. A number of other deciduous and broadleaf species grow in the park including *Baccharis hamifolia* a potentially noxious weed (see appendix 1).

The dominant trees near the Sign of the Kiwi are mostly *Pinus contorta* on the upper slope and macrocarpas lower down. The trees are unevenly spaced and unpruned. Further north is a group of European larch (*Larix decidua)* and several groups of Blue Atlas cedar and Himalayan cedar (*Cedrus atlantica glauca* and *C. deodara*).

Groups of *Abies pinsapo* (Spanish fir) appear quite healthy. A group of 8 *Abies procera* are a prominent feature of the slope. Their straight columnar shape and large cones make them quite distinctive. At 15-17m they are not particularly large for their age and have very tapered trunks. *Picea abies* (Norway spruce) is also a prominent tree of Skellerup Reserve. Generally the *Abies, Larix* and *Picea sp.* planted on this site are showing the effects of the low rainfall and rocky shallow soils with reduced growth rates and shortish tapered trunks. These trees are better suited to higher rainfall areas. It is also likely that the cedars will start to suffer from snow damage as they get older. Cedars are particularly prone to branch damage in snow prone areas and as there is usually one moderate snowfall at this altitude every year the chances of their disfigurement is fairly high.

The following information on conifer spread in Skellerup Park is from a DSIR report by W Sykes. Below the *Pinus contorta* are large plantings of *Pinus nigra* subsp *laricio* (Corsican pine). Windblown seed from these pines has colonised approximately 1ha of the Thomson Park tussock grassland above the Summit Road. In order of abundance the following three conifers grow in this strip; *Pinus nigra* subsp. *laricio,* (Corsican pine), *P. contorta,* (contorta pine), *P. pinaster,* (maritime pine). Of these three pines, young plants of Corsican pine far outweighed the other two numerically. However amongst the largest of the saplings, around two metres high, there are several maritime pines and these are already starting to cone. No cones were seen on saplings of the other two species.

Seedling pines, Thomson Park

In view of the fact that contorta pines line the roadside below in Skellerup Park and several mature planted trees grow alongside Thomson Park above the Summit Road, one might have expected this species to be the main one to regenerate. Although the contorta pine is the most aggressive species in areas like the Volcanic Plateau in the North Island, it is unlikely to be a serious problem in Thomson Park because the climate is too dry. An indication of this is the small size of the trees which have been planted; if the site had been in the foothills of the Southern Alps they would probably have been much larger because they are well into maturity now.

The other two species, Corsican and maritime pines, are both species from the western region of the Mediterranean, i.e. Spain, southern France, Italy and the islands between them. This region's climate has many parallels here, particularly the droughty summers and cool and moist, but not extremely cold, winters. In addition, the well-drained volcanic soil of the Port Hills favours the growth of these trees.

Corsican pines are naturalised in other parts of Canterbury and both species grow wild around Hanmer, but maritime pines only in the driest and warmest places. Thus *Pinus pinaster,* (maritime pine), and *Pinus nigra* subsp. *laricio,* (Corsican pine), are the two most likely threats to the integrity of the Thomson Park grasslands with *Pinus contorta,* (contorta pine),

ranking third as a potential nuisance. Other tree species noted in Skellerup Park are unlikely to regenerate in the area due to climatic unsuitability.

As the Skellerup exotic plantings are on reserve land classified as Scenic la (Reserves Act 1977) the problem arises as to their long term future. Scenic la Clause (2)a states:

"Except where the Minister otherwise determines, the indigenous flora and fauna, ecological associations, and natural environment and beauty shall as far as possible be preserved, and for this purpose, except where the Minister otherwise determines, exotic flora and fauna shall as far as possible be exterminated:"

8.2.8 SCOTT RESERVE PLANTINGS

Exotic plantings on the western portion of Scott Reserve

The two crests of the crater rim that comprise Scott Reserve are planted with a mixture of exotic conifers including *Cupressus arizonica, C. macrocarpa, Chamaecyparis lawsoniana, Larix decidua, Pseudotsuga menziesii, Cedrus deodara* and *C. atlantica glauca.* The trees on the north side are quite stunted

Scott Reserve with Sugarloaf Peak in the Background

in growth. Trees on the interior and west-southwest slope of the reserve are of larger size (larch and Douglas fir). Eucalypts have been planted at the eastern end of Scott Reserve and natives on the western end. An assortment of exotic shrubs occur on the margins of the conifer blocks. These include *Berberis sp.* and *Arbutus unedo.* The Scott Reserve plantings have been described as misfit elements in the Port Hills landscape study. However from a recreation viewpoint they provided a welcome change from the open tussock grassland which is sheltered from the often cold winds encountered on the exposed tops.

As Scott Reserve is classified as a Recreation Reserve there is no legal requirement to remove plantings. Some adjustment of the vegetation pattern however will be needed to ameliorate the plantations visual effect on the landscape.

8.2.9 EXOTIC AND INDIGENOUS PARK-LAND PLANTINGS

Exotic conifers east side of Victoria Park

Between Upper and Lower East Side blocks Bowenvale Park boundary and Victoria Park Road conifers and a few eucalypts have been planted singularly or in groups through the tussock grassland.

Planting consists of various Pines (*Pinus halepensis* plus a number of unidentified species), *Chamaecyparis sp. Cupressus sp., Cedrus atlantica, C. atlantica var. glauca* and *Casuarina stricta.* A notable group of *Cedrus atlantica var. glauca* exists as part of a semi-circle of trees called Barnett's flat near the bottom of lower East Side Block. Overall the growth of the trees is reasonable considering the harshness of the site. Pine species growing on the main Victoria Park ridge clearly show the effects of limited soil depths and summer droughts in their slow growth rates. Trees on the lower slopes and in more sheltered locations tend to have better growth rates.

Overall the variety of trees planted on the east and west slopes of this portion of Victoria Park form a collection of botanical interest.

8.2.10 19TH BATTALION WORLD WAR II MEMORIAL PLANTING

(see history section)

8.2.11 DECIDUOUS PLANTINGS

Victoria and Elizabeth Parks contain a limited amount of deciduous tree planting.

Of historical significance are 40 *Quercus robur* planted beside Victoria Park Road. These trees are a clear indicator of the extreme growing conditions prevalent on exposed sites on the Port Hills. Even though the trees are over 54 years old, most are only 6-7m high and have contorted branches and trunks. Two metre high holly trees (*Ilex aquifolium*) are growing among the oaks.

Another group of deciduous trees is situated on the hillside above the intersection of Victoria Park Road and Dyers Pass Road. These include ash trees, purple plums and birch trees. A small group of turkey oaks grow in a gully just above the main Bowenvale valley in Victoria Park.

8.2.12 NATIVE PLANTATION

Significant areas of natives have been planted in the Cashmere Spur reserves and a few parts of Bowenvale. These plantings stretch almost unbroken from the bottom of Elizabeth Park to the Sign of the Kiwi. A small block of natives surrounds the Thomson memorial in Thomson Park as well as amongst the conifers below the Summit Road.

Natives planted in the above reserves consist of a wide range of species many of which are not indigenous to the Port Hills. Common species planted include *Cordyline australis, Pittosporum spp., Pseudopanax and Olearia spp.*

Douglas Scenic Reserve beside Dyers Pass Road has also been planted in natives by members of the Summit Road protection society.

Much of the native planting in the plan area lacks visual diversity and largely appears to have been used to reduce the area of fire prone grass.

8.2.13 VICTORIA PARK MEDITERRANEAN-CLIMATE PLANT COLLECTION

Victoria Park also contains a significant area of amenity planting of horticultural and botanical interest. A collection of exotic trees and shrubs is situated below the stone kiosk and on the western slope above Dyers Pass Road. The western slope planting consists of many half-hardy shrubs including members of the families *Proteaceae* and *Ericaceae*. A number of shrubs and trees feature on this slope that are uncommon in Canterbury. These include various *Melaleuca sp., Hakea laurina, Gordonia sp., Abelia floribunda Smilex aspera* (Mediterranean climber, rare in New Zealand) *Syncarpia glomulifera* - Turpentine, a forest tree from Australia, and *Agonis flexuosa.*

Erica arborea is well established with localised self seeding occurring. The remnants of a number of herbaceous and bulbous plantings can still be seen beside the stone steps which link the main park road with the lower garden areas.
Notable on the rock walls are large numbers of native ferns.

Situated on a slope above an old Quarry face upslope from the exotic borders are large numbers of *Cistus sp.* probably *C. ladanifer* and *C. laurifolius.* These populations are notable in being one of the few 'wild' colonies of Cistus in New Zealand.

In various places seedlings from the adjacent plantings have established themselves amongst the 'Mediterranean' climate plants e.g. *Pittosporum sp., Cotoneaster lactea.* The occasional broom, gorse orbriar (*Rosa rubiginosa*) is also to be found.

Overall the exotic western slope planting comprises a somewhat degraded collection (due to lack of horticultural maintenance) of Mediterranean climate type plants originating from Australia, South Africa and Mediterranean Europe; notable for its sprinkling of rare or unusual plants and large examples of the *Proteaceae* family (*Protea* and *Banksia*).

Generally woody plants from the Mediterranean region grow very well in Canterbury, especially on the Port Hills. The significant climatic/soils difference between the Port Hills and the plains provides an opportunity to grow plants of botanical and horticul-

Victoria Park, Proteas and Aloes

tural interest which are more difficult to grow on the plains. A collection of Mediterranean climate plants in Victoria Park could be used to complement the more climatically limited collections in the Christchurch Botanic Gardens.

8.3 REMNANT NATIVE VEGETATION

Matagouri, Bowenvale

Browsed native broom and solitary cabbage tree, Bowenvale

8.3.1 HISTORICAL OVERVIEW

In pre-Polynesian times the Port Hills were forested (Meurk and Wilson 1990). The pre-Polynesian vegetation was considerably modified by more than 1,000 years of natural and later Polynesian fires which were carried up onto the Port Hills by north west winds. Thus the vegetation of the open ridges and dry slopes was generally kept in a fire induced non 'climax' state. Given freedom from fire the majority of the Port Hills would eventually have been colonised by woody vegetation as the natural 'climax' vegetation of a temperate climate with rainfall in excess of 500mm is woodland or forest" (Meurk and Wilson 1990).

The pre-European vegetation of the Bowenvale/Dyers Pass Road Parks probably consisted of a mosaic of silver tussock (*Poa cita*), matagouri (*Discaria toumatou*) and New Zealand broom (*Carmichaelia arborea*) scrub on the dry sunny ridges and slopes with scattered patches of kanuka (*Kunzea ericoides*) and kowhai (*Sophora microphylla*). Mixed forest with matai (*Prumnopitys taxifolia*), totara (*Podocarpus totara*) and hardwoods probably grew in the gullies. Dry bush is a remnant of this type of forest. Seepages were characterised by flax (*Phormium tenax*), toetoe (*Cortaderia richardii*) with various sedges and rushes and occasional taller trees such as kahikatea (*Dacrycarpus dacrydioides*) (Meurk 1989).

European settlement of Canterbury brought the added impact of sheep farming to the Port Hills. The hills were regularly fired to clear scrub (*Discaria* and *Leptospermum*) and plants such as speargrass (*Aciphylla subflabellata*) and to produce fresh young growth from the otherwise unpalatable tussocks in spring. Overstocking resulted in removal of palatable species and in some cases, elimination of the tussock. The reduction in cover and the competitiveness of many introduced plants allowed them to colonise the indigenous grassland. Farming practice in later years also included oversowing with clover species and top dressing with fertilizer, as occurred in Bowenvale. Intensive sheep grazing also led to accelerated nutrient cycling. In addition to introduced grasses and clovers the European brought plants such as gorse and broom. These plants have significantly changed the character of much of the Port Hills.

The following paragraph is adapted from Meurk & Wilson 1990.

By and large it seems as though the moderately grazed grasslands have attained some sort of steady state with little change in the past 50 years. Structurally this is certainly the case, indeed tussock size may have even increased since the more severe grazing and burning of early colonial times. However many of the palatable soft grasses were grazed out remaining only

under the protective cloak of the tussocks or on inaccessible rock ledges, and there has probably been a continuing attrition of inter-tussock forbs as a result of ongoing competition from the exotic grasses. These changes may have been exacerbated by the warming and corresponding drying of the climate during the past century. In the wetter areas toetoe has been greatly depleted but otherwise the main change in the wetter areas seems to have been in the continuing process of opening up of the tall tussocky sedge vegetation due to fire and grazing, and the virtual elimination (from Bowenvale anyway) of fuchsia. These habitats deserve greater protection.
If some of the rocky outcrops were fenced off in the gullies they would develop a greater woody component around their borders.

8.3.2 FOREST REMNANTS

The two most significant bush remnants in the management plan area are dry bush and the fenced gully below Scott Reserve called 'bush head'.

Dry Bush

In 1854 Dry Bush covered approximately 12 acres (4.85 hectares) of Dry Bush valley. Over the first twenty years of settlement much of the bush was felled for firewood and fencing materials.

In 1870 J F Armstrong recorded 98 species of trees, shrubs, herbs, lianes, parasites and ferns (see appendix 3 for species list), mosses, two lichens and four fungi from Dry Bush. He commented:

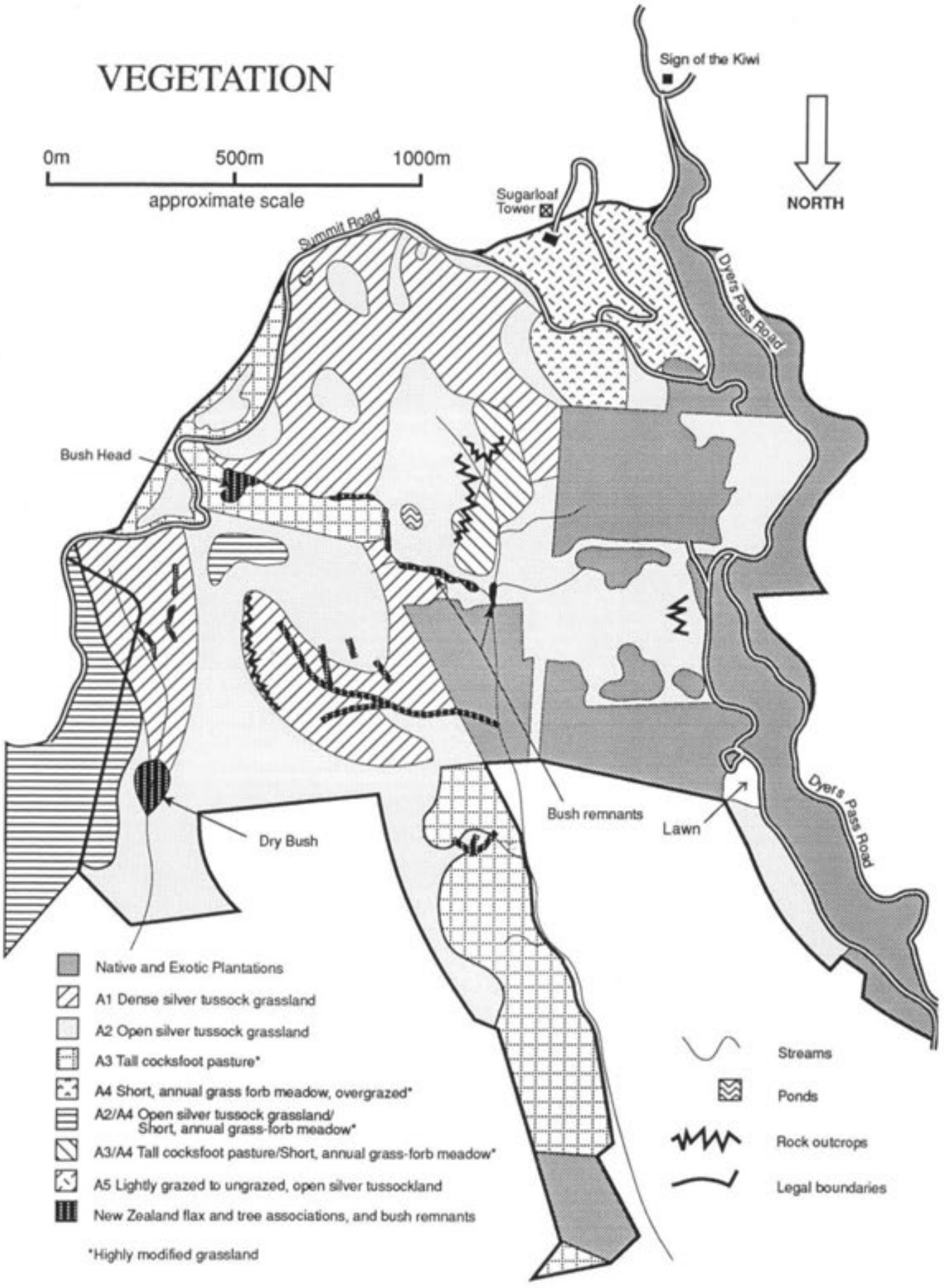
"Another interesting locality in the neighbourhood of Christchurch and visible from our streets, is the so called Dry Bush, which from the numerous fires having passed through it, has a scorched appearance. Although there are some large coniferous trees in this small forest, it has more the characteristics of that portion of our bush vegetation which invariably edges our larger forests, of which Mount Pleasant bush is a still more characteristic representative ..."

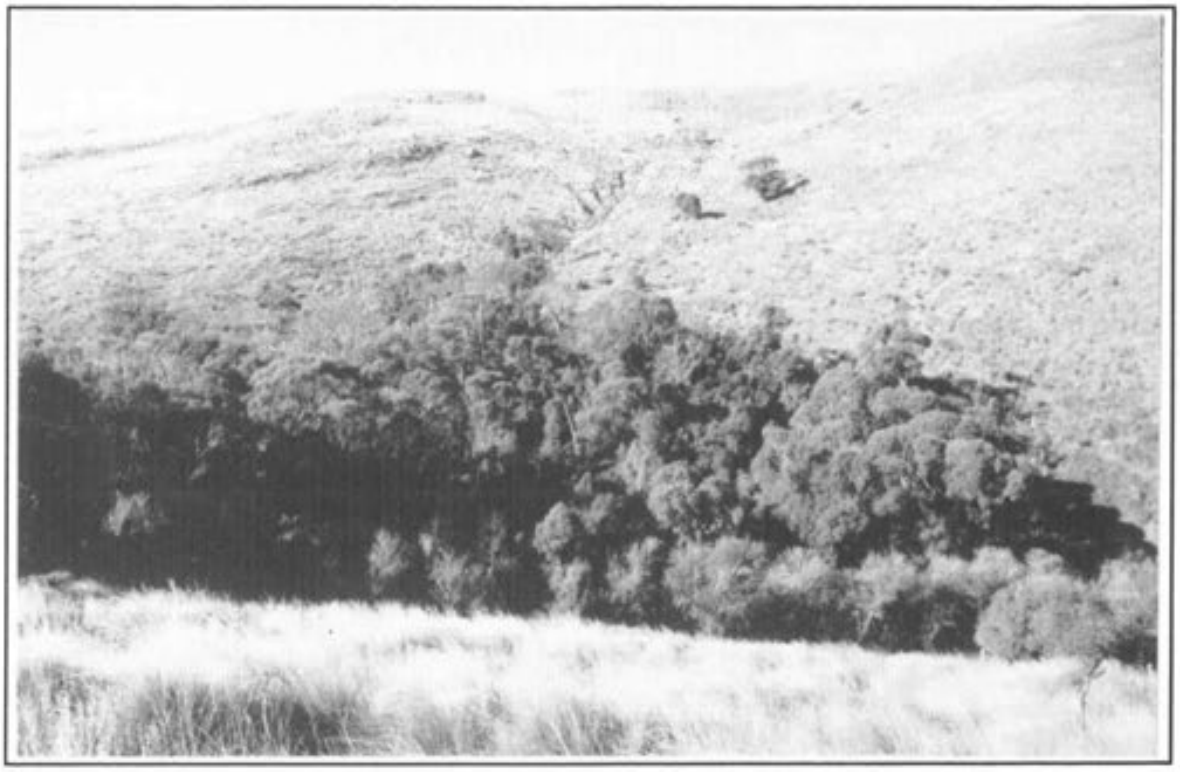
By 1939 Boyce noted that there were about 50 species other than grasses, sedges and rushes and that cattle and sheep had destroyed all undergrowth with no regeneration taking place. The Summit Road Society decided in 1968 that the Dry Bush should be saved. With the co-operation of the then owner, 0.6ha was fenced.

Today Dry Bush has an extensive understory of herbs, ferns and sedges. The fenced area was extended in 1989 to accommodate the 1990 Sesqui plantings of native plants typical of the Dry Bush area.

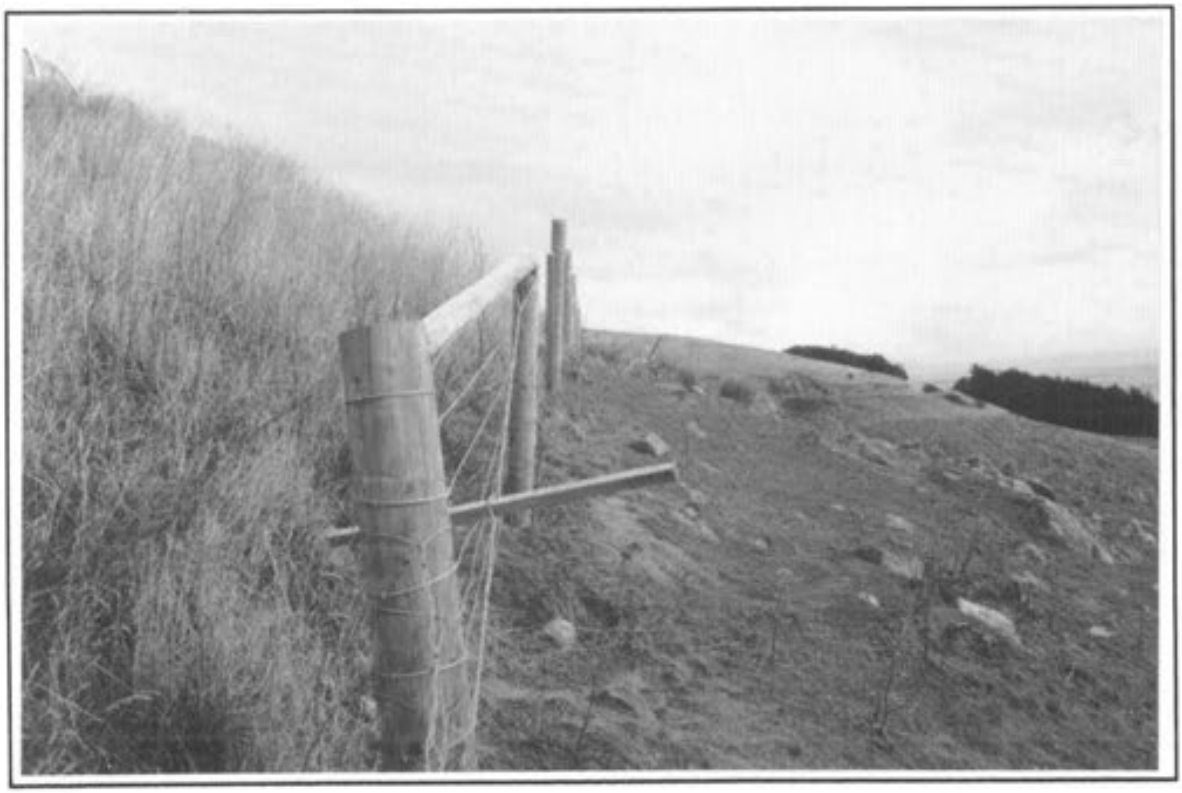
Bush Head

Besides 'Dry Bush', the one relatively extensive patch of "bush" (about 0.5 ha) is in the fenced off gully block below the summit road where it passes beneath the Scott Reserve. There is a rank growth of cocksfoot among the silver tussocks surrounding the bush, and there is also some regeneration of tree seedlings under the bush canopy where soils are deep enough and there is sufficient shade to suppress the herbaceous "weeds" - notably miners lettuce *(Claytonia perfoliata)*. Seedlings observed were mapou, mahoe, karamu, *Coprosma crassifolia*, manatu (*Plagianthus regius*), and kowhai. There was also vigorous sprouting of mahoe from epicormic shoots. Out in the grassland there are a considerable number of young harakeke, although it is possible that some of these have been planted.


VEGETATION
0m
500m
1000m
approximate scale
Sign of the Kiwi
NORTH
Sugarloaf Tower
Summit Road
Dyers Pass Road
Bush Head
Bush remnants
Lawn
Dry Bush
Native and Exotic Plantations
A1 Dense silver tussock grassland
A2 Open silver tussock grassland
A3 Tall cocksfoot pasture*
A4 Short, annual grass forb meadow, overgrazed*
A2/A4 Open silver tussock grassland/ Short, annual grass-forb meadow*
A3/A4 Tall cocksfoot pasture/Short, annual grass-forb meadow*
A5 Lightly grazed to ungrazed, open silver tussockland
New Zealand flax and tree associations, and bush remnants
*Highly modified grassland
Streams
Ponds
Rock outcrops
Legal boundaries



Dry Bush



Left, cocksfoot (A3), right; overgrazed pasture (A4)

8.3.3 GRASSLAND PLANT COMMUNITIES

The indigenous tussock grasses cover the bulk of the area covered in the management plan and are still the dominant vegetation type over most of the Port Hills. The tussock grasses grow to a medium height of 50cm and give the hills their characteristic tawny brown colour. The majority of the tussocks are *Poa cita* and comprise over 90% of tussock plants. Tussock density and size varies greatly, the largest tussocks occur on sunny slopes with adequate moisture. On damp shaded sites they may be separated by no more than 30cm forming an almost complete cover. In most situations they are spaced at intervals of 1m or more. On dry exposed slopes they may be nearly absent or confined to a limited space.

Moisture content in grassland between soils on north and south facing slopes has been shown to vary by an average of 17% in May (Boyce 1939). The implications of this are that after long periods of low rainfall, when soil moisture may be at critical levels for many plants, aspect is an important factor in the species' composition of Port Hills vegetation. Soil moisture deficiency on northern slopes over the summer/autumn period also leads to greater desiccation of the vegetation which in turn makes it more fire prone. In addition sheep tend to favour the warmer northerly slopes leading to overgrazing. *Poa cita* has a very important role in the maintenance and protection of the grassland in the Plan area. It protects palatable species from grazing and ameliorates the climatic conditions for the smaller plants by reducing wind velocity and shading from the sun thus increasing humidity at ground level.

The spaces between the tussock grasses are occupied by a range of indigenous and exotic herbs and grasses (see grassland species appendix 2). A number of plants grow within the tussock clumps themselves. One of the most obvious with its distinctive blue or white flowers is the native *Wahlenbergia gracilis*. The composition of the grassland is as follows:

A. GRASSLANDS AND OPEN SHRUBLANDS

Rock outcrop, silver tussock and browsed matagouri

Five main variants can be discerned:

The following paragraphs are adapted from Meurk & Wilson 1990.

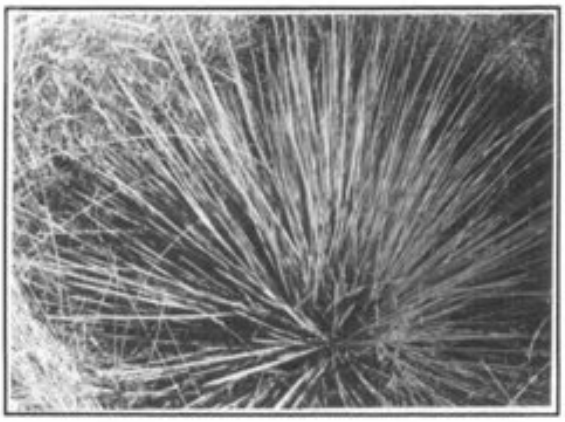
1. **Dense silver tussock grassland.** These are scattered patches of a few square metres up to larger areas of a hectare or so dominated by more or less continuous, tall (0.75 m) silver tussocks (Poa cita). These are on gently sloping to shady aspect terrain in the upper part of the catchment where grazing is extensive. Scattered shrubs of New Zealand broom (*Carmichaelia arborea*), scrub pohuehue (*Muehlenbeckia complexa*) and rushes may stand above or in the tussock canopy. There is a lax, shaded understory of adventive soft grasses ; cocksfoot (*Dactylis glomerata*), Yorkshire fog (*Holcus lanatus*), browntop (*Agrostis capillaris*) and the forbs; pennywort (*Hydrocotyle sp*), *Dichondra repens*, NZ bitter cress (*Cardamine debilis* agg), chickweed (*Stellaria media*), piripiri (*Acaena novae-zelandiae*, *Oxalis exilis*, and dove's foot cranesbill (*Geranium molle*).

2. **Open silver tussock grassland.** These grasslands are largely physiognomically dominated by silver tussock but the canopy is broken and there is a much more vigorous growth of inter-tussock soft grasses (those mentioned above plus *Elymus rectisetus* or "Australian wheat grass", some danthonia (*Rytidosperma racemosum*), crested dogs tail (*Cynosurus cristatus*), rough dogstail (*C. echinatus*), sweet vernal (*Anthoxanthum odoratum*), soft brome

Libertia ixioides, rock outcrop, Victoria Park

(*Bromus mollis*), and occasional chewings fescue (*Festuca rubra*), couch (*Agropyron repens*), plume grass (*Dichelachne crinita*), *Poa pratensis*, and perennial ryegrass (*Lolium perenne*). Native rushes occur in patches, especially along seepage lines (*Juncus distegus, J. australis, J. gregiflorus*). In addition are a range of largely adventive forbs, the main ones being hedge mustard (*Sisymbrium officinale*), slender winged thistle (*Carduus pycnocephalus*), catchfly (*Silene gallica*), piripiri, dove's foot cranesbill, clovers (*Trifolium sp*), vetch (*Vicia sativa*), catsear (*Hypochoeris radicata*), hawksbeard (*Crepis capillaris*), spear thistle (*Cirsium vulgare*), rayless daisy (*Solenogyne gunnii*), harebell (*Wahlenbergia gracilis*), and quite rarely the spaniard (*Aciphylla subflabellata*).

3. **Tall cocksfoot pasture.** On the lower slopes where there is moderate moisture and fertility levels, and the silver tussock and woody plants have been burnt and browsed out, the taller adventive grasses form a dense, rank sward. Widely scattered silver tussock and shrubs cling on in a few places.



Spaniard (Aciphylla subflabellata).

4. **Short, annual grass-forb meadow.** On sunny, dry aspect flats and slopes, that are intensively (over-) grazed or are used as stock camps, the soil may be bared with seasonally dominant, annual grasses; squirrel tail fescue (*Vulpia bromoides*), soft brome, and probably barley grass (*Hordeum sp.*) and forbs; variegated thistle (*Silybum marianum*), catchfly, soldier's button (*Cotula australis*), hedge mustard, storksbills (*Erodium spp.*). Various perennials are also typical; sheeps sorrel (*Rumex acetosella*), piripiri, oxalis, catsear, danthonia, and horehound (*Marrubium vulgare*). Scattered, chewed down silver tussocks and browsed shrubs of matagouri (*Discaria toumatou*), scrub pohuehue and broom (*Cytisus scoparius*) emphasise the role of hard grazing in the genesis of this degraded vegetation.

5. **Lightly grazed to ungrazed, open silver tussock grassland.** On the north slopes below the summit of Sugarloaf (Thomson Park) is a grassland that has been recently destocked. It is on a slope comparable to and separated only by the Summit Road from an overgrazed area typical of that described in (A.4) above. It is dominated by silver tussock with a cover of about 40-50%. Australian wheat grass, crested dogstail, sweet vernal, browntop and danthonia (*Rytidosperma clavatum*) are the predominant grasses. A mixture of forbs, those mentioned under (A.l) above, are associated, together with *Gnaphalium audax*, the onion-leaved orchid (*Microtis unifolia*), *Helichrysum filicaule*, scattered fescue tussock (*Festuca novae-zelandiae*), and the fine-leaved sedge (*Carex colensoi*).

Areas of silver tussock that have been ungrazed for several years, such as that surrounding the fenced, bush remnant below Scott Reserve, appear to be engulfed by the rank growth of cocksfoot. At present the tussock density seems little altered from the former condition, but the tussocks have apparently contracted in size. Other evidence (Meurk, Norton and Lord 1989) suggests that it is only a matter of time before such ungrazed grasslands lose their tussock component altogether. However it is important to be sure one is describing the same ecological situation in terms of moisture, fertility, and exposure before applying such generalisations. For instance, it does not necessarily follow that the Sugarloaf grasslands will become swamped by tall cocksfoot. To begin with there is not a lot of cocksfoot in the grassland at present and this may be partly due to the higher elevation, and the more leached and less fertile soils. On the other hand, the brief period since destocking may obscure the longer term potential. Careful monitoring will be required to resolve the dynamics of these grasslands so that appropriate intervention can be planned and implemented before specific values are lost.

B. NEW ZEALAND FLAX AND TREE ASSOCIATIONS

In gullies, valley floors, shady slopes and seepage lines it is common to find more or less extensive patches of NZ flax/harakeke (*Phormium tenax*). This is often associated with remnant or regenerating shrubs and small trees especially where there is also some protection from fire afforded by rocky or rubbly terrain. Examples are: mahoe (*Melicytus ramiflorus*), kohuhu (*Pittosporum tenuifolium*), fivefinger (*Pseudopanax arboreus*), small-leaved coprosmas, in particular *Coprosma crassifolia*, cabbage tree (*Cordyline australis*), elderberry (*Sambucus nigra*), karamu (*Coprosma robusta*), flowering currant (*Ribes sanguineum*), akiraho (*Olearia paniculata*), kowhai (*Sophora microphylla*), poroporo (*Solanum laciniatum*), NZ broom, gorse (*Ulex europaeus* - largely under control and recently sprayed), rushes, tussock sedges (*Carex virgata*), shield fern (*Polystichum richardii*), scrub pohuehue, occasional kanuka (*Kunzea ericoides* - in surrounding grassland), bracken (*Pteridium esculentum*), and also rare broadleaf (*Griselinia littoralis*), mapou (*Mysine australis*), and tree tutu (*Coriaria arborea*). There are some particularly fine stands of mature cabbage tree.

C. ROCK OUTCROPS

The Park area, and especially Bowenvale Valley, contains numerous steep rock faces and rock outcrops. These rock faces act as refuges for vegetation that is subject to damage by grazing animals and fires.

Observation of the many rocky areas and cliffs show that all palatable shrubs and herbs within reach are grazed, often in seemingly inaccessible places. This results in the normally low growing shrub *Muehlenbeckia complexa* forming erect cylindrical

Naturally regenerated flax & tree associations, Hidden Valley, Bowenvale

clumps about 1m high. The cylindrical shape results from sheep browsing the soft growing tips thus trimming the plants. These sheep pruned cylindrical shrubs are a distinctive feature of rock outcrops throughout the plan area. Sheep also browse the young shoots of prostrate kowhai to some extent.

Crevices, ledges and rockfields provide a refuge for a mixed array of species and growth forms. On the one hand there are woodland species on deeper soils among rocks, which are protected from fire by the broken terrain, and on the other hand there are the rupestral species specially adapted to rock ledge habitats with their inherent dryness and the limitations they impose on growth form and therefore competition. Some woodland species found only in the vicinity of rocks are: poataniwha (*Melicope simplex*), prostrate kowhai (*Sophora prostrata*), mikoikoi (*Libertia ixioides*), *Asplenium terrestre, A. hookerianum*, shield fern, porcupine shrub (*Melicytus alpinus*), *Ranunculus reflexus*, and *Coprosma lucida*. *Sophora prostrata* is distinguished by its stiff divaricating branches and bright yellow branchlets. Its small yellow flowers tend to be hidden amongst the foliage.

Among the typical rupestral species are: the ferns *Cheilanthes humilis, C. distans, Asplenium flabellifolium*, and *Anogramma leptophylla*, and also *Luzula banksiana var. orina, Arthropodium candidum, Crassula sieberiana, Colobanthus strictus and* scrub pohuehue. **One of the most striking features of the basalt rock outcrops is the almost total cover of crustose lichens** *(Lecanora, Rinodina, Caloplaca, Neofuscelia, Rhizocarpon, Pertusaria, Xanthoria, Candelariella, Buellia?),* foliose lichens *(Parmotrema, Xanthoparmelia, Pseudocyphellaria, Physcia)* and some fruticose lichens *(Teloschistes, Usnea)*, along with a few mosses *(Hypnum, Lembophyllum, Triquetrella, Bryum, Grimmia, Bartramia, Breutelia)* and liverworts *(Frullania, Targionia, Lophocolea)*. Other characteristic species include bracken, harakeke, small-leaved coprosmas, matagouri, wheatgrass, danthonias, fescue tussock, harebell, oxalis, wire moss (*Polytrichum juniperinum*), and *Senecio glaucophyllus* as well as the adventives stonecrop (*Sedum acre*), catchfly *(Stuartina muelleri)*, , silvery hair grass (*Aira calyophyllea*), horehound, sheeps sorrel, and ripgut brome (*Bromus diandrus*).

RARE OR ENDEMIC SPECIES

The only Banks Peninsula endemic species noted within the block is a ground hugging herb *Leptinella minor*. This is uncommon here, but it is common on the Port Hills generally. Two endemic Banks Peninsula hebes are also common on the Port Hills but not yet seen on the Bowenvale and adjacent blocks - these are *Hebe strictissima* and *H. Iavaudiana*. Nor has the Port Hills form of *Brachyglottis lagopus*, earlier known as *Senecio saxifragoides* been noted on Bowenvale. All these species should be capable of growing on at least the higher, shady bluffs. Another Peninsula endemic is an undescribed, attractively blue, tussocky fescue species. This may well be present on south-facing gully sides, but so far it has not been seen.

Species of particular interest at Bowenvale /Dry Bush include two that are close to their southern natural limits (titoki and NZ passion vine) and three fern species of dry rock outcrops (*Anogramma, Cheilanthes spp, Scandia geniculata* and the nationally rare climbing groundsel (*Brachyglottis sciadophila*) are local curiosities.

None of the surviving rarities/specialities are threatened. However some rehabilitation of populations presently absent could be considered.

8.4 NOXIOUS WEEDS

8.4.1 GORSE, (*ULEX EUROPAEUS*) (SEE SUCCESSIONAL PROCESSES)

Gorse is a difficult to eradicate noxious weed of potential threat to agricultural land and in this situation, short tussock grassland. Gorse is classified as noxious under Class B (Widespread Plant). Class B covers plants that are widely distributed and abundant. Control programmes are aimed at preventing the plants from spreading to new areas or into neighbouring properties where control is being carried out. To this end a 10m boundary clearance strip is required.

Gorse can be controlled by chemical, and manual means (hand slashing, rolling etc) . Heavy stocking can be used to control young gorse plant infestation, however heavy stocking also damages the tussocks at the same time. As noted under **successional processes** gorse establishes less quickly in areas with a dense grass cover. Maintenance of a vigorous grass sward with abundant tussock cover combined with careful grazing management and sporadic spot spraying where necessary is the key to gorse control in tussock grassland.

Chemical eradication is probably the most effective short term control method for gorse, however care must be taken not to overspray as residual effects can occur with some chemicals (ie damage to clovers and some flatweeds).

A vigorous chemical gorse eradication programme has been carried out in Bowenvale over the last few

years. Some regrowth is now occurring and a follow-up spray is required. In the longer term options for this block either include re-establishment as tussock grassland, planting with natives, planting with exotics or a combination of the above.

8.4.2 BROOM, (*CYTISUS SCOPARIUS*) (SEE SUCCESSIONAL PROCESSES)

Broom is more abundant on the west - south west faces and valleys of Elizabeth, Victoria, Skellerup and Douglas Parks. There are also a few scattered plants in Scott Reserve . Most of the areas where broom is evident have been planted with native or exotic plantation so broom is currently not a serious problem. Broom is classified as a Class B widespread plant. Like gorse, chemical control followed by careful grassland management will help control it. As noted broom can have an important role in assisting regeneration of native forest.

8.4.3 VARIEGATED THISTLE, (*SILYBUM MARIANUM*)

Young variegated thistles

Gazetted as a Class B Target plant, variegated thistle is regarded as a plant of limited distribution where eradication is considered possible provided a suitable and sustained programme is implemented.

The plant is annual to a short-lived perennial up to 1m or more tall. The rosettes have a distinctive variegated appearance and cover an area up to 1m wide. It often forms dense colonies. Variegated thistle is poisonous to stock especially cattle. Sheep are not affected to the same degree. Generally the plant is not browsed by stock unless grazing is very poor (Connor 1977).

Infestation of areas with variegated thistle is likely to vary with the season and the grassland management. The serious infestation of 1989 was a result of the serious drought conditions of the 1988/89 summer and thus lack of competing grasses which would otherwise have prevented germination of thistle seedlings. Evidence suggests that given a normal rainfall year and freedom from overgrazing, serious thistle infestation will cease to be a problem. Attention may need to be given to reducing stocking rates on the upper sunny grassland slopes.

Variegated thistle can also be hand grubbed or sprayed. Oversowing bare patches created when the thistles die back in late autumn also reduces re-establishment.

Spiked seed heads of variegated thistle

8.4.4 OLD MANS BEARD (*CLEMATIS VITALBA*)

Clematis vitalba is gazetted as a Class B target plant and could potentially be a very serious weed of the plan area especially in the native forest remnants. Currently there is some infestation of the native forest in Sugarloaf Scenic Reserve and the occasional plant has been noted along the Summit Road. Control is usually by cutting the vines down to ground level and treating the stumps with herbicides.

8.4.5 NASSELLA TUSSOCK, (*STIPA TRICHOTOMA*)

Nassella Tussock is a grass that looks very similar to silver tussock. It is categorised as a Class B Target plant in Christchurch. Mature nassella tussocks are dense and grow up to 70cm tall with a leaf spread to 70cm. Young tussocks are more erect. The plants have a strong fibrous matted root system and are difficult to pull out. A mature plant can produce up to 120,000 seeds which can be wind or water borne over large distances. The seed can also be disbursed by stock, vehicles and people. Seed remains viable in the soil for over 20 years. Nassella is extremely competitive and will colonise virtually any situation up to 600m above sea level. Generally it prefers dry sunny sites at an optimum altitude of approximately 100m above sea level. It is expensive to control and eradicate, is unpalatable to livestock and if not controlled, overgrazing of other species and shading caused by its long leaves soon result in a dense cover. Nassella has the ability to replace the silver tussock grassland over most of the Port Hills.

Major areas of nassella infestation on the Port Hills include the Sumner - Godley Head area, above McCormacks Bay, and the Horotane Valley. The Cashmere Valley beside Victoria Park was very badly infested before suppression was achieved by the planting of pines. It is probable that nassella will quickly re-establish itself once the pines are logged. A small area of infestation also occurs on the Huntsbury Spur above Coronation Hospital. Surprisingly Bowenvale appears to be relatively free of nassella tussock although it provides a potentially ideal habitat. A small infestation of nassella was recently cleared from the west face of Thomson Park above the Summit Road. Other plants have been found in the Bowenvale forest block. The most effective means of controlling nassella tussock is hand grubbing. Herbicides can be used for very dense infestation but tend to remove other vegetation as well.

8.5 SUCCESSIONAL PROCESSES

(A discussion on the role of bracken, gorse, broom and kanuka and exotic conifers in the re-establishment of native forest on the Port Hills and the relationship between grazing, shading and competition as it relates to the above. Adapted from Meurk & Wilson 1990)

Stands of **bracken, gorse, broom and kanuka** have long been recognised as seral vegetation, acting as a **nursery** for the establishment of tree seedlings on the successional path to **forest.** This is a correct picture, although it is often an oversimplified one. It is now recognised that early and later dominants often actually establish together with the faster growing and smaller species gaining the initial eminence ultimately to be superseded by the longer-lived, slower growing and taller species (see Bray 1989). Thus facilitation of establishment of one species by another is not a necessary condition of succession or vegetation change.

The nature and speed of succession can be greatly affected by many factors - by the order in which propagules arrive and establish at a site, by soil fertility, moisture and structure, by the shape and aspect of the substrate/land, by local climate, by grazing and browsing pressure, and by the intervention and frequency of fire or other major perturbation.

All four species mentioned above behave differently as nurse canopies. For example, **gorse** (see Lee *et al.* 1986) grows to a maximum height of about 4-7 m. It grows vigorously and densely for the first few years after germination, but after 10-15 years the canopy senesces and opens up. Maximum recorded ages are 30-40 years. **Gorse regenerates very poorly if at all under shade**, whether under its own shade or that of **shade tolerant native species** which, given **adequate seed sources** and sufficient **freedom from browsing**, will grow through and **overtop gorse.** This process may take **25-60 years** and be complete only after a second generation of gorse.

It is true that on some sites, if appropriate native seed sources are very distant and sparse, if dispersal agents such as birds are uncommon, and if browsing continually removes any shade tolerant species that do germinate under the gorse, some second-generation gorse may get away to replace canopy gaps left by dying older plants, and then gorse scrub may be long persistent. Also, on very dry or cool sites, slow decomposition rates mean that deep accumulation of acidifying litter on the floor may create a very difficult environment for seedlings already struggling with moisture deficits. The longer a gorse canopy persists, the higher the chance that fire will travel through it, initiating a repeated phase of vigorous growth from the copious seedbank in the soil - and also from surviving rootstocks.

Broom, while similar in many respects to gorse, **prefers more fertile soils** and initially **gains height faster in most Port Hills environments** and **regenerates under its own shade a little more readily than does gorse.**

Williams (1983) described inferred successions in the relatively moist Hoon Hay Valley at about 200 m. Broom was established in areas that had been covered in bracken 20 years previously. Although fire may have had a role in promoting this change, breaking of

Solitary Olearia, Summit Road above Bowenvale

the canopy by sheep and cattle, allowing light onto the ground, must also be implicated (P.A. Williams pers. comm.). After 10-15 years elderberry was asserting itself with native forest seedlings appearing at about 10 years. The native trees and lianes (notably mahoe, pohuehue, coprosmas, pittosporums and manatu) emerged at 15-20 years and were dominating at about 50 years from the inception of the broom - at least on shady slopes. As has been stated, initial species composition and moisture are important in determining subsequent dynamics and elderberry may play a larger part in Hoon Hay Valley than is likely in the management plan area.

Kanuka also regenerates poorly under shade and vigorously in conditions of plentiful light, but it lives to perhaps 120 years and attains heights of 15 m or more.

Bracken fronds typically grow up to 1 or sometimes 2 m, but more or less die back each winter, tending to smother a proportion of any young shrubs or trees trying to establish underneath. **Droughtiness can again greatly suppress directional change.** T.R. Partridge (pers. comm.) has observed seedlings germinating under bracken in the spring, but failing to get root penetration into the soil beneath the duff in time for the summer drought. These perched seedlings then wither and perish in the heat of the summer. Nevertheless, **mahoe, fivefinger and *Coprosma robusta* are successfully overtopping bracken on many Port Hills sites** (H.D.W. pers. obs.). Obviously some seedlings do get away, their chances probably enhanced in wetter than usual years and on sites where broken or rocky terrain or marginal shading reduces bracken competition.

It is often largely a matter of chance whether bracken, gorse, broom or kanuka, or a mixture of some or all of them, establishes first at any one site, but subsequent events are at least partly determined by the initial canopy. **Succession to forest** by whatever path is often rapid in the wetter parts of Banks Peninsula, taking only a few decades, but even here the rates and courses vary according to proximity of surviving seed sources, aspect, substrate, and, **very importantly, herbivore pressure.** Boyce (1939) observed the grazing out of all palatable herbs in experimentally cleared patches of bracken even when these were in the midst of what was thought to be an impenetrable tangle of fronds.

On the drier parts of the Peninsula, with annual rainfalls of less than about 1000 mm, succession into forest can be greatly prolonged, and the slowness may be reinforced by the much sparser survival of appropriate seed sources. Lee et *al.* (1986) have demonstrated the persistence of gorse communities on the Dunedin hills for at least 25-30 years. **In the driest parts of New Zealand, in Central Otago where rainfall does not exceed 650 mm, kanuka**

"forest" may be a quasi-permanent "climax" vegetation, irrespective of fire (Burrell 1965).

Another complicating factor is that most woody species have great difficulty establishing under rank, ungrazed, exotic pasture which, once in place, may persist for a long time. Boyce reckoned this to be the case with cocksfoot. Sites on banks or beside rocks usually allow saplings to get underway, but otherwise the establishment of trees and shrubs can be chancy and sporadic - probably favoured by a sequence of moist summers. **Once a sapling does overtop the grass it shades and weakens it, allowing the establishment of further tree seedlings and the gradual expansion of scrub and forest outwards from what may be widely scattered nuclei - a kind of domino effect.**

Paradoxically, several native shrub and tree species are actually favoured when moderate grazing by sheep removes much of the competing tall grass sward. Kanuka, kowhai, lacebarks, ribbonwoods, small-leaved coprosmas, and totara, are among those benefiting from a moderate grazing regime. Although some shrubs and trees are consumed along with the grass, this is less inimical to tree establishment than an ungrazed, tall, dense sward. **At the same time some other woody species are completely precluded even by light grazing** (mahoe, broadleaf, fivefinger and karamu). Gorse and broom establishment is likewise inhibited by dense, ungrazed, rank, exotic pasture, is favoured by moderate grazing, and inhibited again to some extent beyond a certain threshold of grazing pressure.

The same relationship between grazing, shading, competition and establishment applies to the exotic tree species in the Park area.. The palatability of the species concerned (pines, cedars, firs, larches, spruces, gums and wattles) is probably similar or even lower than the least palatable natives. But they generally grow faster than the indigenes apart from kanuka. Although kanuka has capsules adapted to fire, most native species have no such adaptations, whereas many of the exotic species are actively promoted by periodic fire. **While forests of these tall exotic trees may also act as a nursery for native forest the development is likely to be much more attenuated than under the scrub and small tree species.** It takes at least 30 years before pine canopies begin to thin out and accumulation of dense needle litter slows. Furthermore, the exotic forests remain prone to fire for this much longer time. Unaided the establishment of native species in these dry environments is a very drawn out process. Ferns, coprosmas, pittosporums, cabbage tree, pohuehue, daisies, sedges and orchids are generally the first plants to arrive (Norton 1989).

As far as the management plan area is concerned, the above observations and research are relevant in a general way. **The broad principles of plant succession or vegetation change are likely to be very much as described above although the time scale may be protracted in the drier conditions, with limited seed sources and under present management (grazing).** As Lee et *al.* (1986) point out succession to native forest can be hastened by disturbance of litter, [under dense, exotic scrub], to provide sites for natural establishment, by planting native shrubs and trees into [perhaps thinned] stands, or perhaps by dense sowing of native seed [and planting] on sites newly cleared. These approaches will be necessary in moving towards more natural wooded gullies.

9.0 FARMING

Sheep grazing is used in the parks to reduce fire risk by removing excess grass growth which would dry out in summer and to help control noxious weed growth.

The Council farming unit carries from 230-260 sheep which graze fenced areas within the reserves up to the the Summit Road (approximately 5 sheep/ha). Drenching, shearing and other routine farming activities are assisted by the yards and a new shearing shed in Victoria Park.

Thomson Park above the Summit Road is grazed with sheep on a leasehold basis. (See lease section). Areas that are planted with shrubs etc. are fenced off from sheep grazing. Currently Bowenvale is farmed on a leasehold basis by Mr D Scott (see lease section).

The predominant stock are half breed sheep which are farmed for fat lamb production and wool. Ewes are bought in with lambing taking place in August. The lambs are sold in November just before feed levels start to drop off in summer. Ewes are culled in Autumn to reduce stocking numbers over the winter period when feed is less abundant. Currently Bowenvale is carrying approximately 2.5 sheep per hectare. The ideal level from a farming point of view for all year round is around 3 sheep per hectare (Fechney pers comm 1990). However it should be noted that stock numbers on the exposed drier faces and ridges should be reduces to zero levels in very dry years to avoid damaging the tussock grassland (Newman pers comm 1990). Spring grass growth can sustain up to 6-8 stock units per hectare (Newman pers comm 1990).

Bowenvale was topdressed after the 1988/89 drought. This contributed to the vigorous vegetation growth of

Sheep the dominant herbivore in the Parks

the 1989 spring. Cattle were used to reduce the long grass growth resulting from this 1989 spring flush of growth. The lessee was unable to control the growth as stock numbers were lower than normal after the previous years drought. Sheep are not very effective in controlling grass growth once it becomes long.

Maintenance of the silver tussock is important to provide protection during lambing and thus is an important farm management aim.

One of the major issues that arises in respect of the farming of the Bowenvale/Thomson/Victoria/Elizabeth Park block is which farm management system best enhances the dominant conservation and recreation values of the Parks.

One of the main constraints of farming on the Port Hills is the inability to carry fixed stock numbers all year round while keeping grazing levels at an optimum level. This influences the type of management that is most effective in this situation. Another factor is the existence of a shearing shed and yards at Victoria Park.

9.1 GRAZING AND ITS EFFECT ON SILVER TUSSOCK GRASSLAND COMMUNITIES

Studies by Lord (1988) indicate that on Port Hills sites removal of grazing results in dominance by exotic species of limited diversity and a reduction in the number of indigenous species. Her results indicated that to maintain good tussock density and the maximum number of native species in highly modified short tussock grassland on the Port Hills grazing at controlled intensities must be included as part of the management system. Three of the sites evaluated in her study were Sugarloaf Peak and Rapaki and Huntsbury Spurs.

The Following 5 Paragraphs are From A DSIR Vegetation Survey Of The Parks Conducted By H Wilson And C Meurk, 1990)

Grazing impact in the Parks can be attributed to sheep, cattle, goats (sporadically), and, to an unknown degree, rabbits, hares and opossums. By and large sheep at current average stocking rates (2.5 s.u. / ha) do not appear to be detrimental; indeed they may ensure continued tussock dominance if we accept that the silver tussock would succumb to competition from tall adventive grasses and shrub weeds such as gorse, broom and wilding pines, in the absence of grazing. There is now little opportunity for maintenance of a "natural" short tussock grassland with its original inter-tussock flora of native species. The only native species presently surviving the competi-

tion are one or two grasses and forbs (danthonia, wheat grass, pennywort, etc). Of course even the pristine, dense tussock grassland would have had a relatively low species richness (within any particular small area) because of the heavy shade. On the other hand areas with shallow, droughty soils have a naturally more open canopy and a correspondingly greater species diversity of both native and adventive species. Such habitats (rocky and rubbly sites, riverbeds and gorges) are in fact the original home of the temperate grassland flora.

Although light sheep grazing appears to be necessary for sustaining the short tussock grasslands, there is nevertheless a problem with the uneven spread of grazing pressure. This results in some areas being grazed at about the right level (in terms of the above objectives) whereas other favoured areas and stock camps are severely overgrazed. Such areas tend to become degraded with loss of topsoil and the resulting colonisation by seasonally vigorous annual weeds with little natural or agronomic merit. In some instances of variegated thistle infestation tussocks have actually been shaded out and killed.

From a management point of view there is something of a dilemma since reducing the stocking rate too far will lead to the less favoured areas becoming "undergrazed" with a corresponding loss of tussock to competition. One solution to this conundrum involves tighter control of grazing by subdivision. Greater subdivision would be expensive and unless there was concomitant intensive development with oversowing and topdressing the economic returns would not justify the investment. Furthermore this option would greatly detract from the "wilderness" aspect of these open grasslands. The "natural" way to maintain temperate grasslands here is by fire, but this is unlikely to be a viable management option because of the danger to other recreational, natural and capital values. The default solution is acceptance of the patchwork of heavily and weakly grazed sites much as we have now. The best option, so far as natural values are concerned, would be to reduce the stocking rate to below that currently applying - say to 2 or even 1.5 s.u./ha - and monitor the situation for re-evaluation after 2 years. It may be that such a reduction should only apply to the Victoria Park area, particularly the overgrazed block below the Summit Rd,. The indication is that current stocking levels there are in the order of 5 s.u./ha, obviously detrimental to the condition of the grassland.

Soil damage by cattle

Cattle have recently been grazed over the whole of Bowenvale Park, with greater intensity at the lower elevations to control gorse regrowth. This seems quite unsuitable in a park situation where natural values are being promoted. In various places the damaging effects of cattle grazing are obvious. This is especially so on harakeke, tussock sedges and NZ broom. Cattle clearly inhibit regeneration of native shrublands and woodland species. Impact on soils and nutrient cycling is pronounced.

Soil compaction and damage to native shrubs caused by stock

Cattle grazed flax

The damage that goats can cause to native vegetation is well documented and for Banks Peninsula the destruction is especially bad because rocky crags have hitherto afforded some refuge for palatable plants. With the spread of goats almost no plant is safe. Among those species particularly vulnerable to local extermination by goats are prominent trees such as fivefinger, mahoe, lacebark, and kowhai, and the Banks Peninsula endemic hebes - *Hebe strictissima* and *H. lavaudiana*. Goats have, on previous occasions, escaped into Barnett Park, several kilometres eastwards along the Port Hills, although this situation was eventually controlled. Goats are at present grazed just outside the Bowenvale Park at the bottom of the valley. There was evidence of ringbarking of mature fivefinger trees in this area of Bowenvale Park.

9.1.1 ECOLOGICAL INDICATORS OF GRAZING LEVELS (BOYCE 1939)

Light Grazing

Under conditions of light grazing there is a good sward between the tussocks often containing a large proportion of more palatable species such as cocksfoot, crested dogstail, perennial rye grass, *Poa pratensis*, *Agropyron scabrum* , and white clover plus vigorous growth of sweet vernal, Yorkshire fog, and catsear.

Heavy Grazing

Heavy grazing is indicated by the absence of palatable species, cocksfoot, crested dogstail, white clover and closely grazed turf of the less palatable grass, *Rytidosperma sp* sweet vernal and Yorkshire fog.

Overgrazing

Overgrazing is indicated by sparse grass covering between the tussocks and grazing of what are usually thought to be unpalatable plants, *Carmichaelia arborea* (almost always chewed in the grassland), gorse, *Muehlenbeckia complexa*, *Aciphylla subflabellata* (Spaniard), *Cirsium sp*, and variegated thistle

Overgrazed tussock grassland (left of fence)

Another indicator of overgrazing is stock grazing of silver tussock. This occurs where the pasture is very poor. There is also some evidence that grazing of juvenile silver tussock may kill young plants.. Large amounts of sweet vernal and *Acaena novae-zelandiae* also indicate overgrazing. Accidental fires over the

dry summer period followed by grazing is very detrimental to the growth of tussock plants especially those on the drier exposed ridges.

10.0 FAUNA

Little information is available on the fauna of the plan area.

10.1 VERTEBRATE FAUNA

The survey by Kelly (1972), only covers the Thomson Park/Sugarloaf area where he noted five indigenous bird species and five exotic species. A further two indigenous species and four exotics were noted by Brumley 1980, eg:

Total Bird Species Noted (indigenous*)	
* Bellbird	*Anthornis melanura*
* Grey Warbler	*Gerygone igata*
* Harrier	*Circus approximans*
* Shining Cuckoo	*Chalcites lucidus*
* Silvereye	*Zosterops lateralis*
* South Island Fantail	*Rhipidura fuliginosa*
* Tomtit	*Petroica macrocephala*
Blackbird	*Turdus merula*
Chaffinch	*Fringilla coelebs*
Hedge Sparrow	*Prunella modularis*
Goldfinch	*Carduelis carduelis*
Greenfinch	*Carduelis chloris*
Magpie	*Gymnorhina hypoleuca*
Redpoll	*Acanthis flammea*
Skylark	*Alauda arvensis*
Yellowhammer	*Emberiza citrinella*

As the native bird species are generally only found in the larger areas of native forest and scrub they are less likely to be found in the grasslands of the Plan area. The exception would be the harrier hawk. Dry Bush may also be used by some native birds. The Thomson and Victoria Park plantations are popular with many exotic birds. The native bellbird is often seen in Victoria Park and possibly silvereye, fantail and grey warbler which readily colonise second growth scrub areas (Brumley 1980).

The most common species utilizing the grassland are the introduced finches. An increase in native forest vegetation within the plan area would probably make the area more attractive to indigenous forest dwelling species.

The Park contains a number of exotic mammals such as rabbits and hares. Yearly control measures have been undertaken in the Victoria Park area for rabbit control over a number of years. The poison 1080 has been the principal means of control. Pest control is now the responsibility of the Canterbury Regional Council.

There is no obvious sign of browsing by hares, rabbits or possums although all can cause considerable damage to young trees that are planted in their territories and possums can seriously damage adult trees such as five finger, seven finger and fuchsia. The use of egg and paint repellent sprays is one proven method of deterrence against hares and rabbits. Possums can be humanely trapped by the use of killing traps, although their use on near tracks could involve a risk of injury to children.

10.2 INVERTEBRATE FAUNA

The invertebrate fauna of the plan area has not been recorded, however Dry Bush is of scientific importance as a type location for a number of native beetles and moths. These were discovered by C M Wakefield and E Meyrick in the 1880's when Dry Bush was more extensive than it is now. It is probable that the number of species once found in Dry Bush has declined with the reduction in bush area. The short tussock grassland area probably supports a range of exotic and indigenous species of a fairly unspecialised nature. The influence of fire and grazing has probably reduced the number of native species originally found in the area when a greater variety of forest habitats were available.

11.0 FIRE

Fire control is an important part of the management of the Bowenvale/Cashmere Spur Parks. Historically fires have had a major influence on the vegetation types and patterns occurring in the plan area. See History Section 6.0 and Section 8.3 Remnant Native Vegetation.

The majority of fires that now occur are of human causes. Of the ten fires occurring over the dry 1988/89 summer most were caused by carelessness, (ie cigarette butts out windows, sparks from machinery and vehicles etc). Several fires were the result of dumped vehicles being torched. Only four fires occurred over the 1989/90 summer probably due to the higher rainfall that season. Arson, vehicle accidents and burning garden rubbish are other potential causes of fires in the plan area.

The highest risk area for fires is Dyers Pass Road from Elizabeth Park to the Sign of the Kiwi. Within this area the roadside bordered by exotic conifers is most at risk. All of the significant fires recorded along

HAZARD COMPONENT	HIGH-RISK FACTORS	EXAMPLE/COMMENT	DEVELOPMENT OPTIONS	MANAGEMENT OPTIONS
Vegetation: - distribution	continuity, uniformity	dense monoculture	- avoid dense continuous planting	- phase out existing pine plantations
- type/structure	evergreen canopy	pine plantation	- exclude high-risk species	- phase out high-risk species in high-risk areas
	annual herbage/tall grass	ungrazed pasture	- incorporate firebreak network	- exploit grazing regimes for grass control
- productivity/litter	open texture, large volume	eucalypts, rank grass	- exploit low-risk species	- monitor buildup of dry matter
- chemistry	oil/resin content	pines, eucalypts	- exploit mown irrigated sward	
Structures - buildings	Timber, plastic		- ensure high fire-retardant rating for building exteriors	- strictly control vehicle movement
&Materials: - vehicles, machinery	open form	shelters	- leave adequate firebreaks around & between buildings - mown grass	- monitor traffic density, accidents
	fuel; exhaust sparks;	high risk on or off road	- exploit paving as firebreak	- provide secure storage for inflammable materials
- storage	accidents; traffic density		- provide easily managed circulation network	- prohibit all fires (including smoking) except in approved safe areas Gas BBQ
- rubbish	fuel			- ensure safe and efficient refuse disposal
- powerlines	cigarettes, paper, plastics	broken glass may focus sun		
	sparking, storm damage	access/easement required		
Topography: - gradient		burning faster uphill	- site vulnerable elements away from high-risk areas	
- orientation	N - NW	maximum temperatures	- consider creation of ponds and wetlands	
- exposure	NE - W	drying by wind ans sun	- dispose vegetation to conserve water supply	
- altitude		correlates with climate		
- water (subsurface)	absence	affects humidity, vegetation		
- water (surface)	absence	possible firefighting resource		
Climate, - precipitation	seasonal drought	increases with altitude	- dispose vegetation to enhance humidity	- program firefighting resources to match seasonal hazard
Weather: - temperature	consistently high		- relate firebreaks to likely wind directions	
- wind	strong or persistent; NW	fire propagated by sparks		
- humidity	very low (NW conditions)	affected by topography, vegetation		
Fire Sources: - natural		negligible risk; lightning	- zone in accordance with hazard level	- obvious fire prevention and protection policies
- accidental	vehicle routes; adjacent residences; picnic sites; roadworks; building sites		- create adequate access for firefighting vehicles	- monitor and document all outbreaks
	seclusion; vehicle access			- adjust access restraints to match hazard level
- deliberate				- ensure adequate monitoring/lookout

Dyers Pass Road have occurred on the uphill side probably due to the prevailing wind movement up the Cashmere Valley. The worst fires occur during strong northwest wind conditions.

The worst fire in recent years was that of 13-14 January 1989 where approximately 16ha of Victoria Park was burnt. The fire spread up the tussock covered hillside below the main plateau and destroyed 13 groups of exotic conifers. As a result this slope was rendered unstable and falling rocks became a danger to traffic on the road below. A second fire front spread into upper east side block destroying pines and Eucalypts. The result was a total burnout including tree stumps from the 1975 storm and extensive damage to tracks through washouts and bulldozers.

Whilst the total cost of the fire was difficult to establish due to the armed services (Air Force helicopters and Army personnel) and the Metropolitan Fire Service absorbing their charges, the Council's costs were estimated to be $61,098 as at 12 May 1989. Further cost would obviously be incurred in restoration work and replanting.

The Summit Road from the Sign of the Kiwi to Mt Vernon is the second highest fire risk area. Within this stretch of road the three larger car parks (Thomson Memorial car park, Sugarloaf car park and the lookout over Lyttelton Harbour between Sugarloaf Scenic Reserve and Scott Reserve) are especially prone to vandalism and torching of dumped cars. A tight bend between the Thomson Memorial and the Kiwi is also a source of frequent accidents with cars often leaving the road and landing in the pines below (ie six accidents over the last six months, approximately December to May 1990). Generally theses do not result in fires.

The speed and severity of fires in the plan area is determined by wind direction, slope and vegetation cover

Observations of fires in the plan area indicate that fires do not establish as well or as quickly in native 'bush' areas as in the relatively open pine forest areas. Obviously once the fire reaches a certain intensity everything burns. Fires can reach high speeds up tussock covered hills which makes it imperative that immediate control action is taken once a fire is sighted. As short a time as five minutes can make the difference between a small fire and a major fire fighting emergency.

The latest fire control measure is the use of chemical fire inhibitors. These chemicals are applied in powder form by helicopter or aeroplane across the path of the approaching fire. Use so far in Canterbury has found

Coniferous forest, Victoria Park, potentially at risk from fire

them to be very effective in containing fire. Council has a store of this chemical at Bottle Lake Forest.

The four ponds in Bowenvale can form an important source of water during fires. The lower pond was extensively used to fill helicopter mounted monsoon buckets during the 1989 Victoria Park fire. This pond was deepened four years ago. The top pond was deepened in 1989 to increase its capacity. A further pond could be dug at the north end of the airstrip to further increase the available water for fire fighting purposes.

A fire hydrant was installed at the end of Bowenvale Avenue in 1989 to provide water in event of fire in the plantations above Bowenvale Avenue. The location of overhead wires in Bowenvale Avenue and the pylons just up the valley make this hydrant site too dangerous for helicopter use.

12.0 BUILDINGS AND EQUIPMENT

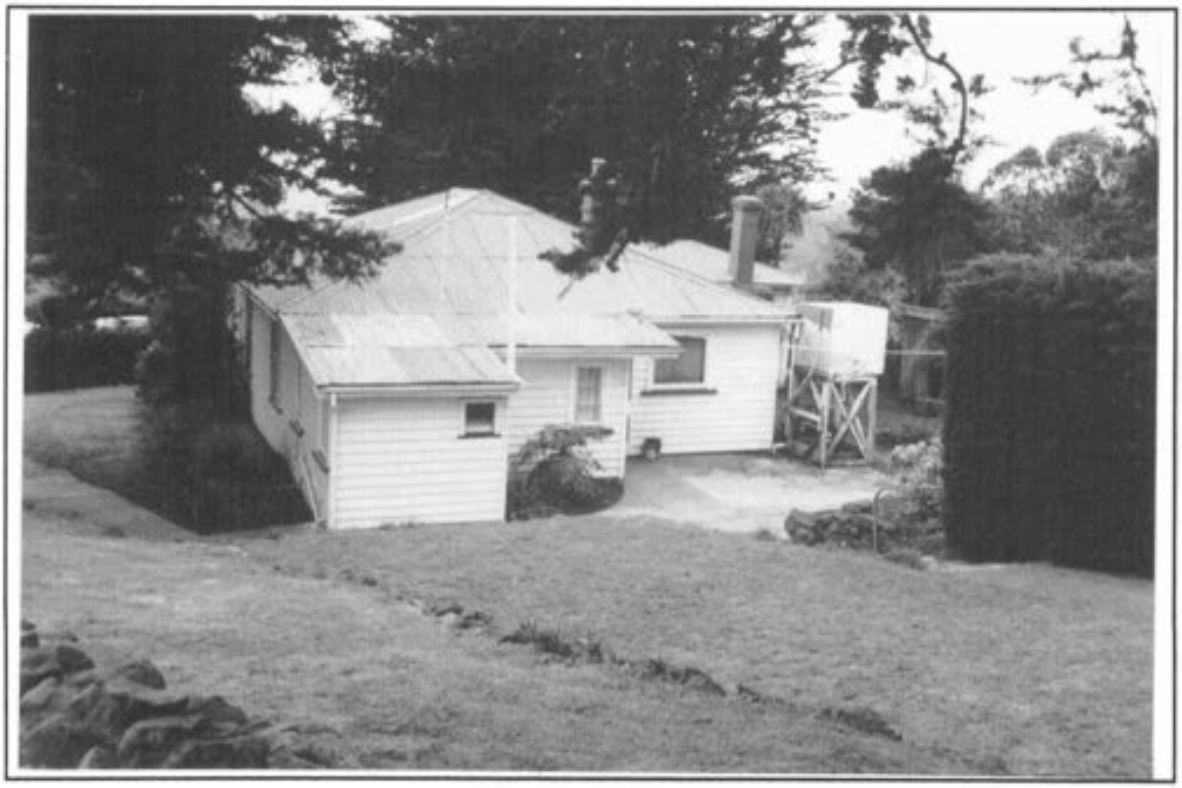
12.1 CARETAKERS HOUSE VICTORIA PARK

Although the exact age of the house in unknown the original part comprising three bedrooms, living room and kitchen was constructed about 1885-1895. Since then at least five additions were made including a bathroom and pantry, washhouse, tearooms, kitchen for tearooms and an outside toilet.

Construction throughout is timber framing, weather-board sheathing, iron roof and timber floor, the whole of which appears to rest on rock and timber piles. Very little ground clearance has been allowed except on the north side where the contour of the hillside has provided an acceptable underfloor ventilation space. The structure is surrounded by trees on three sides, only the north side being exposed to the sun.

A .**Structure**; There are two major areas of concern:

(1) In some instances the timber floor framing has become detached from the stone piles or concrete foundations, and there has also been some sinking of the piles themselves, causing the building to move



Caretakers house, Victoria Park

and rack to such an extent that the existing timber casement windows have jammed. To remedy this problem, the building would need to be jacked up and substantial sub floor work carried out.

(2) Part of the roof framing has shown insufficient strength for the load placed upon it. This has caused substantial "bowing" of the roof framing and subsequent "popping' of the corrugated iron. On closer inspection it is obvious that this existing framing does not comply with current code requirements, and therefore substantial reframing would be required prior to the replacement or refixing of existing roofing. Part of the corrugated roof has rusted out and where sheets of iron have in the past been replaced, building paper has been omitted causing condensation to form on the iron and drip onto ceiling linings.

B .**Maintenance**; Some of the important current requirements are as follows:

(1) Approximately 50% of the existing roofing needs replacement because of rusted areas and bent sheets. Also, on the remaining roofing nails are loose and require substantial mainte nance
(2) Some rot and borer is apparent in the exterior weatherboards and those affected need replacing.
(3) All timber windows need checking for rot, replacing where necessary, and easing of casements, because, **in their current jammed state, they represent a serious fire hazard if the occupants needed to vacate the resi dence in an emergency.**
(4) The total exterior of the building needs a repaint.
(5) Spouting and downpipes need checking and replacing where necessary as several areas of rust were evident.
(6) The recent introduction of a log burner in the kitchen/living area has dried out the match lining to such an extent that the ceiling lining has pulled away from the wall lining, and in conjunction with the failure of the floor fram ing, has caused a substantially large gap to appear between skirting and flooring causing unacceptable draft conditions.
(7) **The electrical wiring is original 1906 wiring and may cause a fire.** If the residence is to be retained, it is recommended that all wiring be replaced to modern standards together with new plugs and switches and the switch and meter board checked for compliance with modern codes.
(8) No kitchen cupboards are usable because of dampness and mould, and need replacing.
(9) Floor coverings are substandard and need re placing.
(10) Some internal walls need to be relined and repainted.
(11) All internal door hardware needs replacing.

NOTE: Although this list is substantial, it by no means covers all the items needing urgent attention.

12.2 STONE KIOSK VICTORIA PARK

A large octagonal stone shelter is situated on the outcrop above the car park. The original construction date of this building is unknown.

12.3 PICNIC SHELTERS VICTORIA PARK

The five hexagonal picnic shelters were officially opened for public use on 2 May 1982. They were designed by Lucking and Vial Architects, Christchurch and constructed as a community project by the Christchurch South Rotary Club.

The shelters are situated beside the stone wall between the car park and children's play equipment.

12.4 CHILDREN'S PLAY EQUIPMENT VICTORIA PARK

The children's play equipment at Victoria Park consists of timber and metal climbing frames, tyre and conventional seat swings (for toddlers and older children), and a metal slide off a rock outcrop. The playground is situated at the northern end of the grassed picnic area.

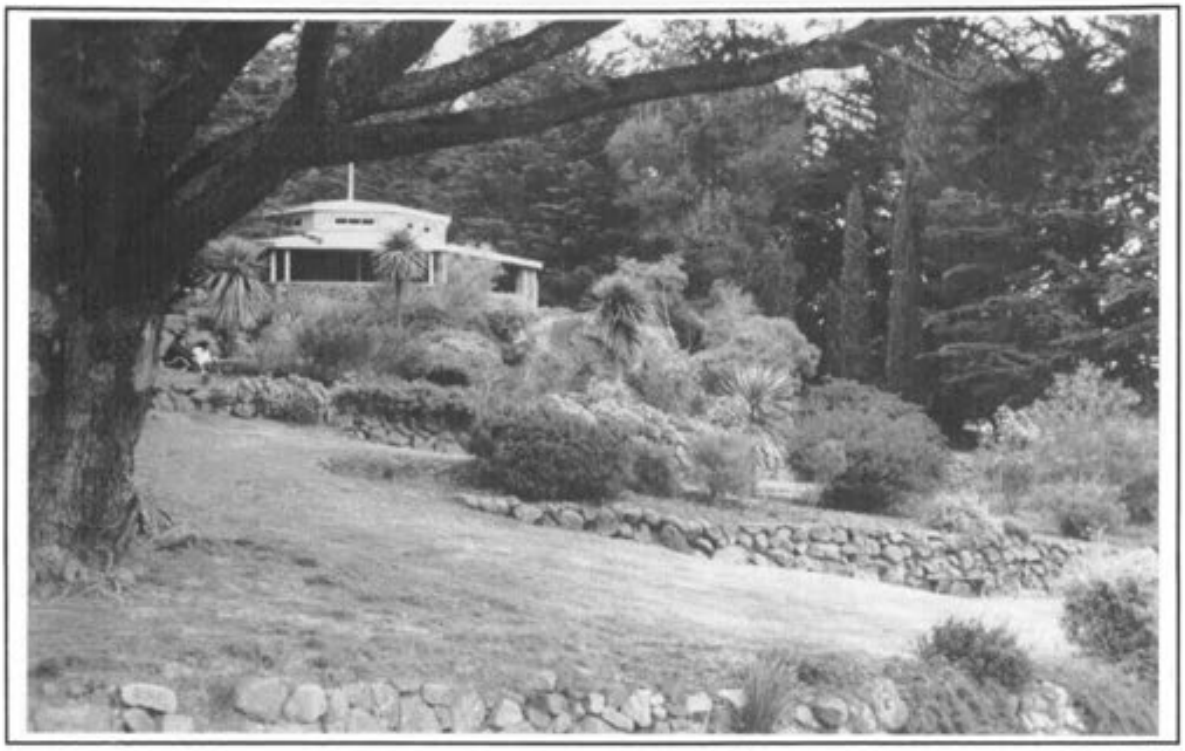
12.5 PUBLIC TOILETS VICTORIA PARK

Victoria Park contains the only toilet block in the Cashmere Spur reserves although a public toilet at the Sign of the Kiwi provides for park users in the vicinity of Thomson Park.

In 1989 the old septic tank system at Victoria Park was replaced by a sewer outfall as the then Christchurch Drainage Board would not continue to allow raw effluent to discharge within the park. The new sewer services the existing house, shearing shed, staff facilities and public toilet block as well as having the capacity to service a future toilet block for the playground area.

12.6 SERVICE BUILDINGS VICTORIA PARK

Victoria Park contains three service related buildings; a shearing shed, main workshop and a shed to house



Stone kiosk, Victoria Park

the spray unit. All have board and batten exterior cladding, are in good condition and generally relate well to the rural surroundings.

The shearing shed is also used to house the fire unit and eventually, staff mess rooms and toilets.

12.7 THOMSON PARK MEMORIAL

Situated on the north facing slope of Thomson Park, it consists of a semi-circular stone faced concrete shelter and seat containing an engraved plaque commemorating the gift of the reserve to the people of Canterbury by John James Thomson.

12.8 DRINKING FOUNTAIN VICTORIA PARK

A drinking fountain is situated beside the Crater Rim Walkway approximately 200m south of the Dyers Pass entrance.

13.0 LEASES

The following organisations and companies lease land in the Dyers Pass Reserves.

Grazing Lease: Stewart and Duffy, Lyttelton (Part Thomson Park)

Lease No. 40 (CCC index)
Lease 5 years from 1 June 1976 with two rights of renewal of 5 years each - $1,000 per annum
Land area held: 71ha
The Lease was renewed on 1 June 1986.

The Lessee has the option of either paying:

(a) The sum of $1,000 per annum plus GST from 1 October 1986, or

(b) (i)The sum of $200 per annum plus GST from 1 October 1986 on or before 31 March each year.
(ii)Undertake a weed spraying programme under the direction of the Director of Parks and Recreation for which a credit up to a sum of $550 (includes GST) shall be applied to the rent.
(iii) Annually provide manual labour to a value of $330 to be utilised on renewing fencing on the common boundary between your neighbouring property with the reserve.

The Council undertakes to supply fencing materials annually in a quantity as determined by the Parks Manager to fence the reserve boundary.

Grazing Lease P Scott (Bowenvale)

Lease under preparation

Television New Zealand (Thomson Park)

Lease No:
Lease 33 years from 1 September 1963 with rent reappraisals every 11 years - $6,935 per annum from 1 October 1986
Land area held: 4.8ha

Of the 4.8ha leased to the Corporation, approximately 0.5ha is covered by buildings and a transmission tower. The Corporation has the right to fence off and exclude public entry to the immediate site of any building, tower or other structure (subject to Council approval), and to prohibit public vehicle access from the public car park to the transmission station.

The public car park and access road in Thomson Park was build and is maintained by Television New Zealand. .

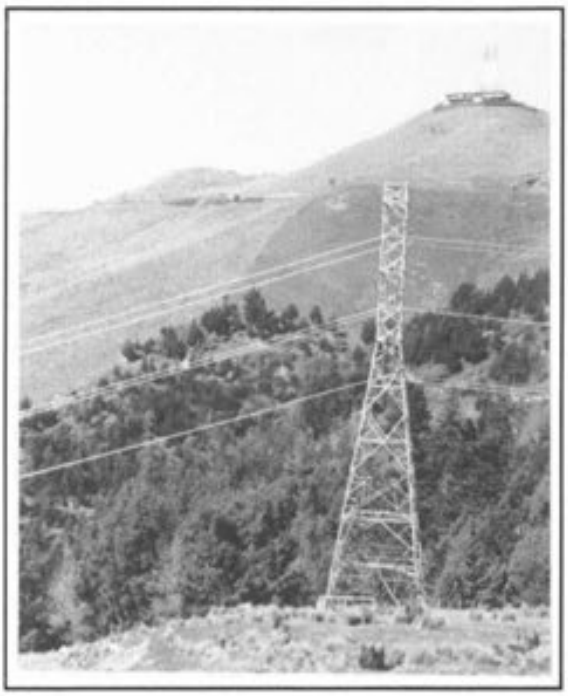
Workscorp Wind Generator (Bowenvale Park)

Wind Generator (without propeller), Bowenvale Park

Works & Development Services Corporation run an electricity producing wind generator situated on Huntsbury Spur within Bowenvale Park. Currently there is no formal lease for this facility. A lease is required pursuant to the Reserves Act 1977. WorksCorp. have a five year agreement with Southpower concerning the running of this facility. The agreement expires at the end of November 1991. The generator is currently run on an experimental basis to test the viability of wind generated electricity production in New Zealand. Electricity output for commercial production is currently of secondary importance.

The generator operates at wind speeds of 5 metres/ second (19km/ hr) or greater. Noise problems have occurred in the past when the machine was not functioning correctly. Visually it tends to add to the clutter of built elements on the Huntsbury Spur On the other hand it is of interest to the public as an example of modern technology.

Trans Power N.Z.. Ltd



Pylon, Victoria Park

Trans Power N.Z. Ltd own 4 pylons and associated 220 kv transmission wires that run through the park. The pylons and transmission wires are visually checked every six months. Pylons are climbed every five years. Vegetation is required to be kept a distance of six metres from transmission wires.

Southpower

Southpower own the 66kv pylons and wires that cross Elizabeth Park.

Playground plateau

14.0 RECREATION AND CIRCULATION

The Port Hills Recreation Study of 1985 prepared by the Canterbury United Council (now Canterbury Regional Council), identified the unique recreational characteristics of different sections of the Port Hills. It grouped these areas according to their suitability for inclusion in a system of Recreation Opportunity Spectrum classes (ROS) ranging from Urban (RO1) to Natural non roaded (RO5). It should be noted that these ROS categories are of a local nature and relate only to the Port Hills. The Port Hills ROS system fits into the wider Canterbury regional ROS category of Peri-Urban. Peri-Urban has a natural appearing environment with easy access, high user interaction, and boundaries on the edge of urban areas.

Open space and nature related values are the key values inherent in recreation on the Port Hills. The Port Hills ROS system takes these factors into account. It should be noted that the ROS system does not determine quality (ie RO5 is not better than RO1). The reserves covered by the management plan generally fall into the following ROS classes.

RO2
Victoria Park (in part)
Elizabeth Park

RO3
Victoria Park (in part)
Thomson Park
Douglas Scenic Reserve

RO4
Bowenvale Valley
Scott Reserve

The RO4 category is the most susceptible to change in the plan area (from a recreation viewpoint) and therefore requires protection of its natural values. Pastoral farming and resource management are the only non recreation uses needed to maintain RO4 settings.

In addition the 1985 survey also asked respondents to indicate whether their enjoyment of the Port Hills as an area for recreation would be made more or less enjoyable by a number of stated development options. 78% and 65% of respondents felt that regeneration of native vegetation and more public reserves respectively would increase their enjoyment of the hills whereas more restaurants (44% of respondents), hotels/motels (67%), intensified farming (55%) and more public works would make their visit less enjoyable.

Overall the plan area can be included in two broadly based areas of recreational opportunity identified by the Canterbury United Council.

a) **Victoria Park Corridor,** Sign of the Kiwi and Sugarloaf to Sign of the Takahe including Victoria Park RO2/RO3

The Victoria Park Corridor carries the greatest amount of traffic of any roadway on the Port Hills. Over a 24 hour period on a Sunday, recreation generated traffic on this stretch of road amounts to 52% of the total vehicle count. Victoria Park is also the second most important visitor destination on the Port Hills (after the Sign of the Kiwi), as well as being visited by 25% of visitors to the Port Hills as part of their journey.

b) **Bowenvale Track to Castle Rock** (Middle Summit Road) RO4

This area has been identified as offering a more remote type of recreation opportunity that is dependant on a 'natural' setting.

14.1 VICTORIA PARK CORRIDOR

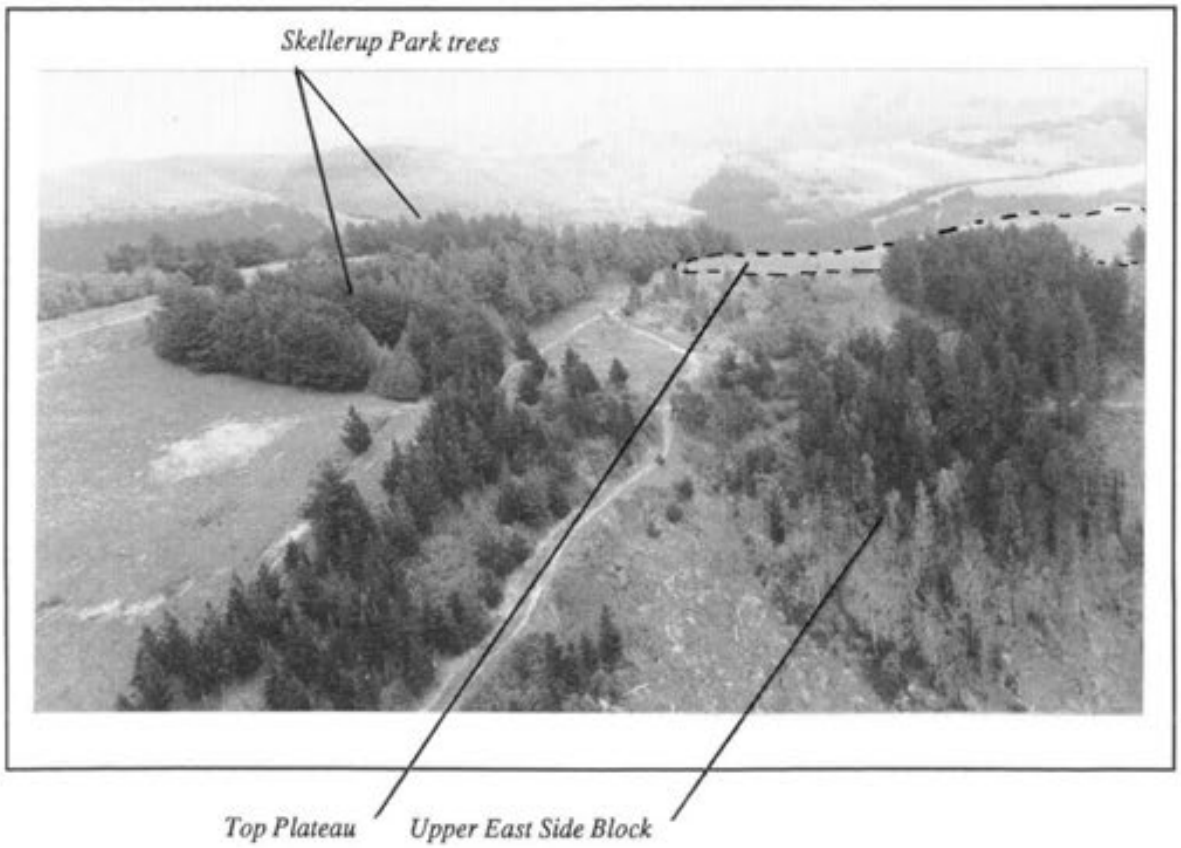
Victoria, Elizabeth and Thomson Parks provide a wide range of recreation opportunities and facilities;

Circulation

- Three high profile walking tracks;
- A sealed circuit road (Victoria Park - Dyers Pass Road);
- A maze of fire breaks and tracks;
- Access from the Summit Road and Bowenvale Avenue;
- The remains of the old Dyers Pass Road;
- Four major car parks (ie 15+ cars), includes the Sign of the Kiwi carpark

Facilities And Special Interest Areas

- Three large flat Plateaus;
- Two public toilets (including one at Sign of the Kiwi);
- One large viewing kiosk;
- One Rangers house;
- One shearing shed;
- One playground;
- Picnic shelters;
- Monuments and memorial sites;
- Vegetation (see Vegetation Sections);
- Two major restaurant/tearoom facilities in close proximity (Sign of the Kiwi and Sign of the Takahe)



TOLERANCE FOR NON-RECREATION USES ACROSS THE RECREATION OPPORTUNITY SPECTRUM (Modified From CUC)

ROS Areas Found In The Parks

RO CLASS	APPROPRIATE RECREATIONAL ACTIVITIES	COMPATIBLE NON-RECREATIONAL USES	INCOMPATIBLE NON-RECREATIONAL USES
1. URBAN	Organised and Casual Outdoor Sports	Housing Development	Industrial
2. MODIFIED	Viewing City/Harbour Drive for Pleasure Walking Picnicking Photography Jogging/Running Cycling Play with Children Courting Painting/Sketching Horse-riding	Residential Accommodation For Staff Agricultural/Horticultural Commercial concessions (including restaurants)	Industrial Forestry
3. DEVELOPED NATURAL (roaded)	As for (2) above - including aerial sports	Agricultural/Horticultural Amenity Planting Revegetation of Natural Areas	Industrial Commercial Buildings Housing Forestry
4. DEVELOPED NATURAL (non-roaded)	As for (3) excluding Drive for pleasure; including Cross country running Rock-climbing Orienteering Nature Study	Resource Management Pastoral Farming Revegetation of Natural Areas	Industrial Housing/Buildings Forestry Public Works (ie changes to visual landscape)
5. NATURAL (non-roaded)	As for (4) excluding Viewing City/ Harbour; including Viewing Pastoral Countryside	Resource Protection Only extensive ongoing natural processes endemic to area	Industrial Housing/Buildings Forestry Public Works Agricultural/Horticultural

Note: The Reserves Act 1977 precludes some activities in Scenic 1a reserves such as forestry and planting of exotics.

14.1.1 CIRCULATION

There are three major walkways in the Victoria Park Corridor, these are:

A) The track from the Sign of the Takahe to the playground through Elizabeth Park.

B) The Harry Ell Memorial Walkway.
This starts just above the Sign of the Takahe and travels parallel to Dyers Pass Road up to the Sign of the Kiwi.

C) The access road from Thomson Park/Summit Road car park to the central Plateau (see map). It passes the top plateau.

There are also many secondary walkways throughout the corridor including a significant walkway link with Bowenvale from Lower East Side Bush.

The Takahe - Victoria Park Playground (A) and Takahe - Kiwi (B) walkways would be two of Christchurch's most important public walkways. For example a count taken on track B on a fine Sunday afternoon in summer estimated a total of approximately 500 users. Ten fine Sundays per year at this rate would bring the total to 5,000 walkers. This track also appears to be popular with tourists and joggers. The start of the track is also very accessible from the bus terminal at the Takahe.

A list of common complaints by track users gives an indication of the type of problems involved in the parks generally:

- mountain bikes conflicting with pedestrian use;
- water fountains not working;
- joggers pushing past pedestrians;
- track wet and muddy;
- long grass covering part of the track;
- holes in the track;
- trees overhanging the track.

BMX and mountain bikes and joggers tend to cause more track damage than pedestrians. They are also a real danger to walkers on tracks which are winding with many blind corners.

Cyclists appear to be using the Victoria Park tracks because they offer a challenge, more interest and are less dangerous than Dyers Pass Road.
Recently barriers have been erected across the track to reduce the problem.

Periodic Detention workers have done considerable track maintenance and grass mowing work in Victoria Park in recent years.

Victoria Park is also used about four times a year for orienteering events and at other times of year for training events.

Overall the track network in the Victoria Park Corridor requires better signposting and delineation into major and minor tracks, (ie some networks such as in Upper East Side Block are very confusing to people who are not familiar with the Park), with alternative routes for cyclists.

Victoria Park has three large flat accessible plateaus. The Playground Plateau, Central Plateau and Top Plateau.

14.1.2 PLAYGROUND PLATEAU

This contains a playground, parking area, large reasonably flat grassy area and a picnic site with tables and shelters. The Rangers house is situated to the south beside the car park.

The Victoria Park playground is popular with visitors but is very exposed to the cold north easterly wind. Although the slide is interestingly sited off a rocky outcrop, there is potential to expand the range of play equipment. The play equipment does not have fall resistant undersurfacing.

A wind barrier on the eastern side of the play equipment would make the playground much more usable. The large trees to the west of the slide could be a good site for a tree hut or adventure 'playground' structure.

The large grassed area between the play area and car park appears to be level but contains a number of humps and hollows. If this area was more level it would be ideal for schools and larger social and family groups to participate in informal games in association with picnics etc. Opportunities may exist for hire of sports equipment eg softball bats, balls and pads etc. More shelter planting would improve the area as well.

The picnic shelter, car park site is an area most visitors to the park who stop will use. There is no information board sited in this area. The picnic shelters form an attractive addition to the Park but are not very well integrated with their surroundings. The nearest water is approximately 80m away, and the toilets 150m on the other side of the car park. Greater numbers of more attractive rubbish bins are needed in the vicinity of the car park and picnic shelters. Currently half gallon drums are used

In its current layout the car park detracts from the amenities of the area. The parking area is ill defined and requires more screening from view with planting. At night the car park area is locked up to reduce the activities of undesirables in cars.

The most under-utilised site in Victoria Park is the Old Stone Kiosk building (see Building Section). Because it is located in such a prominent position most visitors to the park walk up the hill to investigate. The majority must be somewhat surprised to find an empty shell.

The Kiosk is on route to the Victoria Park toilet block approximately 50m to the south. Although sign posted, the toilet block is still difficult to find. The route to the toilets passes by piles of farm maintenance equipment such as wire posts and the maintenance sheds. There is no indication as to whether this area is open to the public or not.

In addition to being isolated the toilets are very old and generally unpleasant. An upgraded toilet block needs to be sited closer to the main public use areas.

14.1.3 CENTRAL PLATEAU

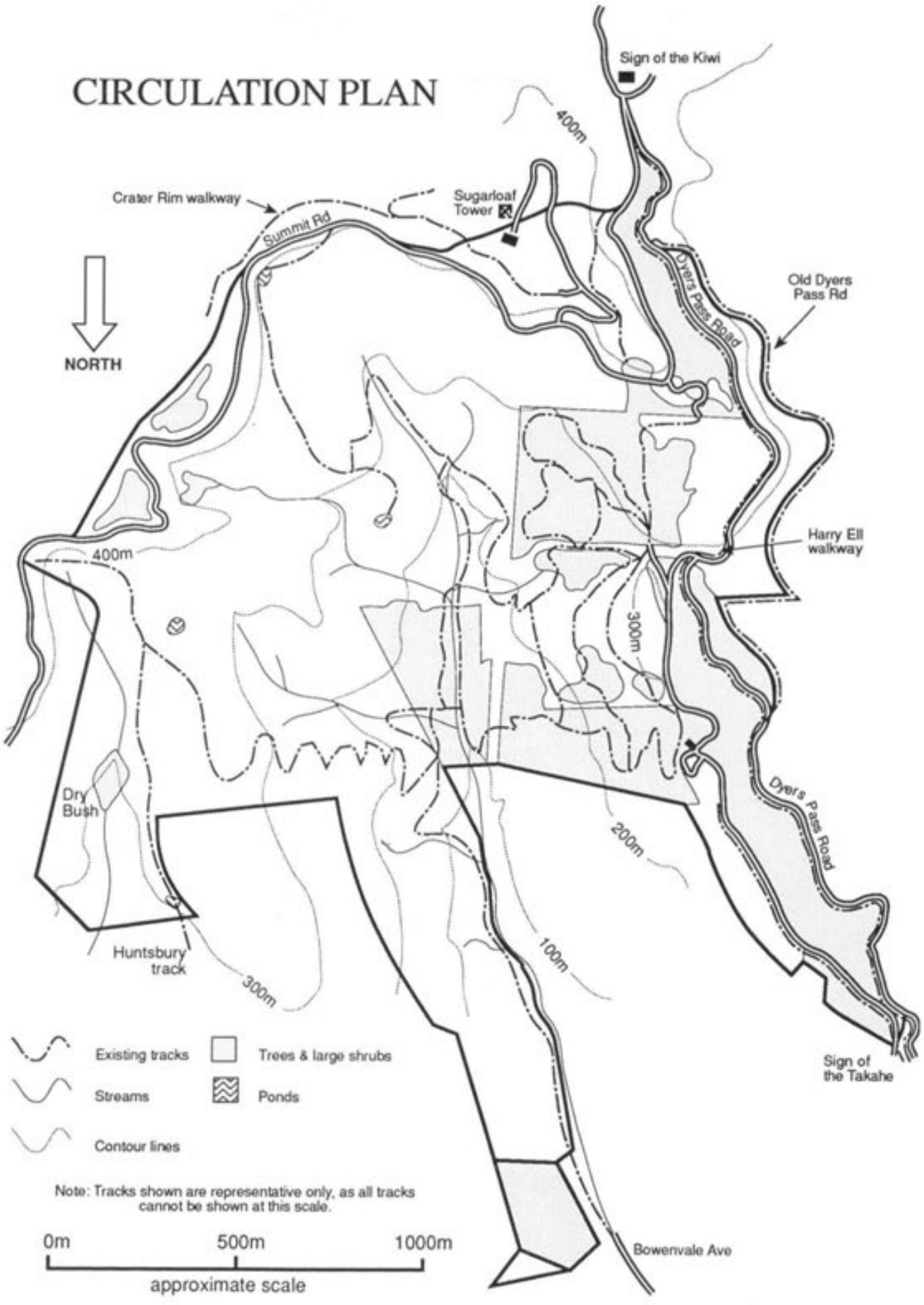
The Central Plateau is the meeting point for most of the fire breaks and tracks of Upper East Side Block. It has a good shingle road in from Victoria Park Road and four fire break roads leading off. It is a large flat area surrounded by trees gradually sloping up to a steep rise which leads to the upper Plateau and Thomson Park. Pylons run across the northern side of the Plateau. The Plateau is used as a mobile headquarters site during fires and for burning rubbish. This site offers possibilities for medium sized public events and picnics if it were upgraded. It could also make a good site for an overflow car park for activities on the Top Plateau.

14.1.4 TOP PLATEAU

The Top Plateau is fairly open and windswept with some of the sheltering conifers being lost in the 1989 fire. It offers excellent views of the Southern Alps, Canterbury Plains and southern Christchurch.

A shingle access road connects it to the Thomson Park car park. This road is closed to public vehicles. The Top Plateau also acts as a site for a mobile headquarters in the event of fire. A high pressure water line on the eastern side of the Plateau provides water to the reservoir in Thomson Park. The Top Plateau provides ample parking space. In 1989 it was used for a display of vintage tractors.

This area offers the greatest scope in the plan area for large scale outdoor events, including outdoor displays, concerts and for large picnics. The parking potential of this area is approximately 150 cars whilst leaving enough room for events, though it is preferable to keep car parking away from the event area. An additional 120 cars could be accommodated on the Central Plateau just a short walk away. A major deficiency of this site is the lack of toilet facilities. Three phase power points would also need to be provided. As the cost of upgrading this area for major events would be high development is only likely if it was developed by a sponsor for a major event or the recreation needs of the city warrant development at some stage in the future. Parking and access problems will limit the number of people who can use the site in the long term.


CIRCULATION PLAN
Sign of the Kiwi
400m
Crater Rim walkway
Summit Rd
Sugarloaf Tower
Dyers Pass Road
Old Dyers Pass Rd
NORTH
Harry Ell walkway
400m
300m
Dry Bush
Dyers Pass Road
200m
100m
Huntsbury track
300m
Existing tracks
Trees & large shrubs
Streams
Ponds
Contour lines
Note: Tracks shown are representative only, as all tracks cannot be shown at this scale.
Sign of the Takahe
Bowenvale Ave
0m
500m
1000m
approximate scale

14.2 RECREATION OPPORTUNITIES IN BOWENVALE / SCOTT RESERVE

As noted in the introductory recreation section, the recreation values of Bowenvale are primarily based of the sites natural values. These values compliment the more 'developed' opportunities available in the Victoria Park Corridor above the Bowenvale Valley. The recreation opportunities of Bowenvale and the Victoria Park Corridor are part of a recreation continuum that includes the adjacent Mt Vernon Park and the Summit Road walking tracks.

The dominant recreation activity in the Bowenvale Valley is walking. To date the walkways in the park appear to be well used.

A major value of walking in the Bowenvale Valley is undoubtedly the experience of isolation in a semi-natural landscape dominated by natural features, ie indigenous vegetation, rock cliffs etc. This experience is also common to parts of the Victoria Park section of the Bowenvale Valley. The enclosed nature of the inner valley gives it a semi wilderness appeal with views of the city blocked by the topography and tree plantings. This is a valuable commodity in a site easily accessible to most Christchurch residents. Three factors that detract from this experience are; the transmitter tower on Sugarloaf peak, the geometric patterns of some of the Victoria Park and Bowenvale conifer plantings and the pylons that cross Bowenvale and Victoria Parks. Of these three the vegetation pattern is the only one that can be easily amended. It can be argued that the pylons and Sugarloaf transmitter have certain architectural qualities but they do not improve the site's wilderness value.

Generally the Bowenvale track network works reasonably well. Signposting and information stations in strategic locations and incorporation of an additional track along the 300m contour would improve the Park's usability for pedestrians. The position of access points between Bowenvale and Victoria Park is not particularly clear.

Track siting is especially critical in the open tussock grassland as any disturbance caused by 'track' construction tends to be very obvious. This is especially obvious on the Huntsbury Spur above Dry Bush where the graded vehicle track and Huntsbury track visually disrupts the flow of the tussock covered land form.

The four wheel drive track down to the lower pond in Bowenvale Valley is also quite obvious.

Bowenvale is used by school groups and Scouts and Guides in addition to casual walkers.

Care is required when walking over untracked portions of Bowenvale due to the occasional hole caused by tunnel gully erosion. In some areas the track has been undermined by tunnel gully erosion. The greatest deficiency in the Bowenvale track system is the lack of public access all the way up the Bowenvale stream from Bowenvale Avenue to the base of Victoria Park.

A small wedge of private land extends across the valley and up the hill on the Bowenvale side of the stream thus effectively cutting off public access. This forces the walking track to take a circuitous route up the hillside and then down through the pine trees to reach the base of the valley again. A vehicle track does exist through the private land which was created during the 1970's to assist the removal of logs from Victoria Park.

Bowenvale has similar problems to Victoria Park concerning mountain bikes on walking tracks especially during the school holidays. Trail bikes are also a problem. Considerable damage was done to the airstrip over the 1989 winter by trail bikes.

Cyclist, Huntsbury Track

Horse riding is an activity that is suited to the wide open areas of the plan area. Unfortunately pedestrians and horses do not mix well. However given the low concentration of pedestrians over much of the plan area, this may not be a major problem.

Generally the forest and farm tracks of Bowenvale/ Cashmere Spur do not suffer any appreciable damage from the existing level of horse riding activities. Walking tracks however, are more likely to suffer damage. Given the size of the plan area, it should be possible to provide a network of horse trails based on the existing farm tracks and roads such as the Huntsbury track.

Liaison would be required with the pony and riding clubs in the area to provide detailed information on the standard of facilities required and the siting.

14.3 VEHICLE CIRCULATION

The plan area contains a number of formed roads, four wheel drive tracks and sealed roads

The tracks in Bowenvale are necessary for vehicle access to the pylons and farm ponds and have to be retained. It is desirable that no more farm tracks are developed in Bowenvale due to their effect on the landscape.

The existing car parks around the plan area appear to meet current car parking requirements. Car parks exist at Victoria Park, Thomson park, along the Summit Road and at the end of Bowenvale Avenue. The Sign of the Kiwi car park is also used by recreation users of the plan area.

15.0 MANAGEMENT ISSUES & OPPORTUNITIES

There are three major issues arising from the Resource Section.

These are the need to:

1. Recognise the conservation value and ecological trends in large areas of the Bowenvale Valley;

2. The need to integrate the Valley's landscape patterns;

3. The need to provide for the varied and sometimes conflicting recreation uses.

a) Conservation Values

The bulk of the management plan area has conservation significance. Approximately 62% of the 205 vascular plant species recorded in the grassland are indigenous. The plan area also contains two of the last indigenous forest remnants to be found on the city side of the Port Hills (ie Dry Bush and Bush Head). Another significant factor is the potential ecological trend on the Port Hills toward afforestation. This trend has been 'frustrated' by grazing and burning since European colonisation. Continued grazing prevents recolonisation of the grassland by most native woody shrubs and trees. The 'natural' vegetation of most of the plan area is forest or shrubs. One of the major conservation issues to be resolved is how much silver tussock grassland should be maintained (by grazing) and how much should be allowed to revert to native forest and shrubland (ie fenced off from grazing animals). An associated issue is the type of grazing animal that should be allowed in the Parks and grazing levels appropriate to maintaining the conservation values of the grassland. The scope for increasing the variety and numbers of native fauna will depend to a large degree on the successful establishment of greater areas of native forest.

b) Landscape Patterns

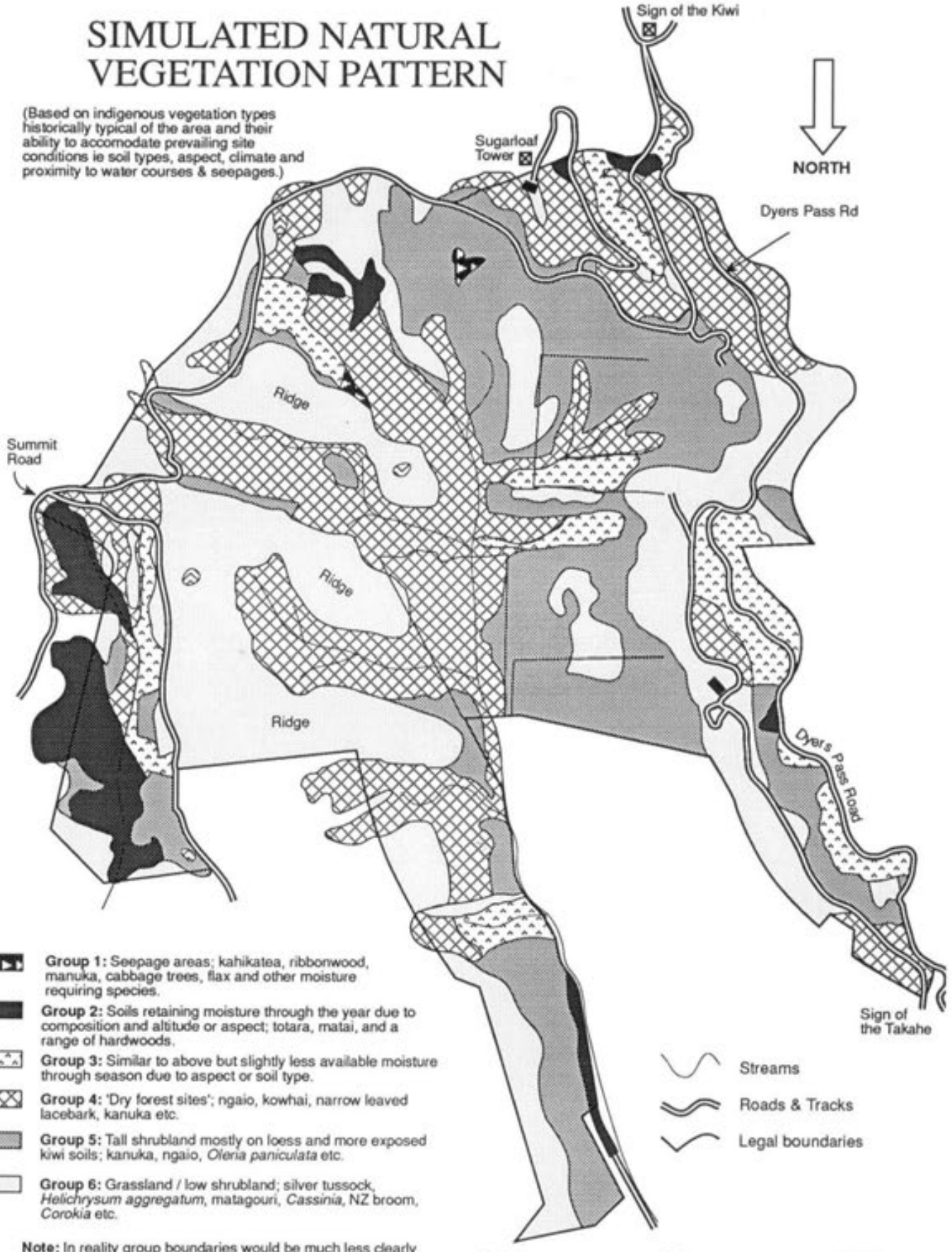
Over the last 100 years land use in the Bowenvale Valley has varied according to the aims and objectives of the various adjoining land owners. Now that most of the Valley is administered by the one authority for reserve purposes, the opportunity arises to integrate the various existing landscape patterns to better reflect the underlying topography and ecology of the valley.

Much of the planted vegetation has been planted in either geometric patterns and or aligned with legal boundaries thus creating unnatural straight lines across the underlying rolling topography. The uniform blocks of colour of the pine plantings are also somewhat out of place in relation to natural colour graduation.

Factors that need to be taken into account when determining a new landscape pattern for the Parks are the soil types and the influence of aspect and altitude aswell as the conservation of significant existing cultural plantings. In order to aid the planning of a new landscape pattern for the parks a 'natural' vegetation plan has been drawn up (see plan page 60) which relates indigenous vegetation types to the site conditions found in the Parks, (ie soils, climate, aspect and shelter). The effect of

SIMULATED NATURAL VEGETATION PATTERN

(Based on indigenous vegetation types historically typical of the area and their ability to accomodate prevailing site conditions ie soil types, aspect, climate and proximity to water courses & seepages.)



Group 1: Seepage areas; kahikatea, ribbonwood, manuka, cabbage trees, flax and other moisture requiring species.

Group 2: Soils retaining moisture through the year due to composition and altitude or aspect; totara, matai, and a range of hardwoods.

Group 3: Similar to above but slightly less available moisture through season due to aspect or soil type.

Group 4: 'Dry forest sites'; ngaio, kowhai, narrow leaved lacebark, kanuka etc.

Group 5: Tall shrubland mostly on loess and more exposed kiwi soils; kanuka, ngaio, *Olearia paniculata* etc.

Group 6: Grassland / low shrubland; silver tussock, *Helichrysum aggregatum*, matagouri, *Cassinia*, NZ broom, *Corokia* etc.

Note: In reality group boundaries would be much less clearly defined than indicated. Species and groups would mix and intergrade according to local site conditions which cannot be mapped at the above plan scale.

altitude is also important with significantly higher rainfalls being recorded above 300 m.

Overall the present landscape pattern is more related to existing management than to soils and climate and other ecological constraints and trends. The plan aims to better reflect these processes.

c) Recreation

The plan area encompasses an expansive and accessible tract of public land with varied opportunities for outdoor recreation. Adjoining existing and potential reserve land adds to the diversity of recreation experience available on this part of the Port Hills.

Opportunities range from those centred on the parks natural values (bush, topography, tussock grassland) to those based on culturally related plantings and recreation areas (eg playgrounds, historic sites, picnic areas, horticultural plantings). Views are an important aspect of the Park users recreation experience and need to be safeguarded where appropriate.

The Parks are also unique in providing areas of relative isolation in a semi-natural setting very close to a large metropolitan area. This aspect needs to be safeguarded to ensure that any facilities (toilets, signs, track layout etc) do not detract from this type of experience.

Generally there is room in the Park area to accommodate a wide range of activities with minimum conflict. To this end the plan needs to provide separate areas or tracks for those activities which potentially conflict. The major problem in this area at present is conflict between pedestrian and cycle use of tracks.

Further information by way of sign posting, information centres and interpretive material is needed to assist public appreciation and enjoyment of the Parks.

PART TWO

MANAGEMENT GOALS, OBJECTIVES AND POLICIES

MANAGEMENT GOALS

INTRODUCTION

The conservation and enhancement of the natural and culturally introduced values of the parks provides the basis for the proposed Management Goals.

These values result from the:

- Topography
- Expansive open space
- Indigenous vegetation and existing vegetation pattern
- Cultural planting
- Forest climate
- Historic/cultural sites
- Farming

Goal 1 **To conserve the existing and restore the historical natural values of the management plan area.**

Goal 2 **To enhance the management plan area as a mixed forest/grassland 'park' providing multiple recreation opportunities.**

Goal 3 **To promote and enhance indigenous and exotic botanical values.**

Goal 4 **To promote and enhance indigenous fauna values.**

MANAGEMENT OBJECTIVES AND POLICIES

1.0 ADMINISTRATION

Objective: 1 Administration, management and control of the management plan area shall be in accordance with the appropriate provisions of the Reserves Act 1977, and the current District Planning Scheme of Christchurch City, ie Reserves Act 1977 Classifications.

Elizabeth Park	Recreation Reserve
Victoria Park	Recreation Reserve
Douglas Scenic Reserve	Scenic Reserve 1b
Thomson Park	Scenic Reserve 1a
Scott Reserve	Recreation Reserve
Bowenvale Park	Recreation Reserve
Sugarloaf Scenic Reserve (in part)	Scenic Reserve 1a

Note: *The Reserves Act 1977 requires Ministerial approval for scenic reserve management plans.*

Policy: 1.1 Community, recreational and commercial activities shall be administered under a negotiated lease or licence pursuant to the Reserves Act 1977.

Policy: 1.2 A key criteria in accessing applications for commercial ventures shall be the degree to which they complement and or enhance the public's enjoyment of the environmental, cultural and landscape qualities of the parks.

Objective: 2 Community groups and individuals shall be encouraged to take an active role in the planning of development proposals.

Policy: 2.1 Any Community groups or "Friends Society" especially interested in the reserves shall be given opportunity to comment on landscape plans or other major development issues. Practical community input in development projects shall be encouraged where appropriate.

2.2 Honorary Rangers shall be appointed (as available) to help assist the public and provide extra security for the Parks.

Comment: It is important that community groups, honorary rangers and interested individuals take an active interest in the management plan area. They can complement the Parks Unit's work by providing day to day park monitoring, the raising of funds, physically doing approved work or by assisting the public with recreational and interpretive enquiries.

2.0 SOILS

Many of the soils in the Parks are subject to erosion upon removal of their protective vegetation cover. See Section 5 Background Information.

Objective: 1 Soil conservation shall be a primary objective of park management.

Policy: 1.1 The Canterbury Regional Council shall be consulted when major deforestation projects are to be implemented to ensure appropriate soil and water conservation measures are undertaken.

NOTE: Vegetation removal greater than 1ha in area in any one calendar year requires Canterbury Regional Council approval.

1.2 Damp slip prone Clifton soils shall be planted in suitable trees and shrubs (see appendix 5 for suitable species types for each area).

1.3 Earthworks required for tracks, fencelines and ponds shall be kept to a minimum.

1.4 Special care shall be taken when siting tracks in areas subject to tunnel gully erosion as well as on deeper loessial soils on steeper slopes.

3.0 HISTORICAL/CULTURAL SITES

The management plan contains a number of sites and features of historical/cultural value, notably:

1. The Lone Pine of Gallipoli (Elizabeth Park)
2. The Stone Kiosk in Victoria Park
3. The 19th Battalion Memorial (Victoria Park)
4. The Thomson Park Memorial

5. The Dry Bush Stone Walls (Bowenvale Park)
6. Various Victoria Park Stone Walls

Objective: 1 The above sites and features shall be maintained and preserved in keeping with their intrinsic values.

Policy: 1.1 The 19th Battalion Memorial site shall be kept free of weeds and long grass and maintained in a neat and tidy condition appropriate to its position on a rocky hillside.

1.2 The Thomson Memorial shall be maintained in good condition and the front lawn kept free of weeds and long grass.

1.3 All visually or structurally significant stone walls shall be kept in a good state of repair.

4.0 LANDSCAPE PATTERNS AND VEGETATION

As seen from the city the park areas register primarily as distinctive landforms on which patterns of vegetation are superimposed. The strongest visual contrasts occur on the skyline and between grassland and woodland.

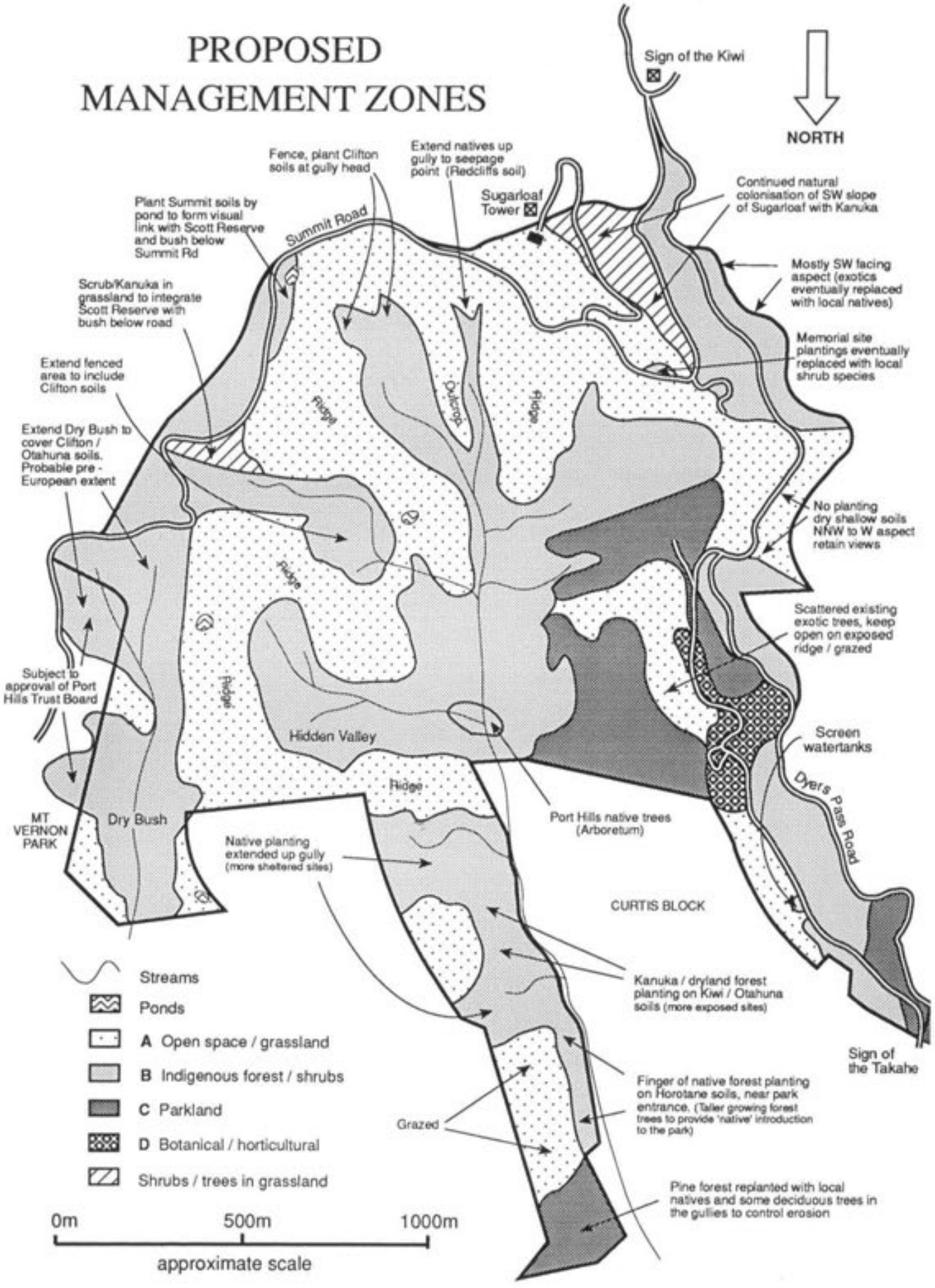
The general pattern of the landscape is of broad sweeps of hill pasture punctuated by rock outcrops, patches of native shrubbery, and (particularly on the western ridge) exotic forest trees disposed in arbitrarily-shaped patches. Much of the grassland displays the distinctive colour and texture of the native tussock.

Views from the Park areas are an important component of their landscape value. Conservation of viewing opportunities requires that unnecessary physical obstructions including vegetation be eliminated.

The vegetation of the management plan area consists of an underlying mosaic of remnant native vegetation, highly modified by human activities, but which still reflects the underlying ecological processes of the Port Hills area, ie soil types, climate and topography combined with plant and animal interaction and variety.

Overlying the natural vegetation pattern is a cultural vegetation pattern which often does not reflect the sites existing values or constraints ie soils, climate, topography, fire risk etc.

One of the greatest visual problems of the Victoria, Elizabeth and Skellerup Park planted areas has been the historical emphasis on applying urban park landscape treatments to a relatively natural rural environment.


PROPOSED
MANAGEMENT ZONES
NORTH
Sign of the Kiwi
Fence, plant Clifton soils at gully head
Extend natives up gully to seepage point (Redcliffs soil)
Sugarloaf Tower
Continued natural colonisation of SW slope of Sugarloaf with Kanuka
Plant Summit soils by pond to form visual link with Scott Reserve and bush below Summit Rd
Summit Road
Mostly SW facing aspect (exotics eventually replaced with local natives)
Scrub/Kanuka in grassland to integrate Scott Reserve with bush below road
Memorial site plantings eventually replaced with local shrub species
Extend fenced area to include Clifton soils
Ridge
Outcrop
Ridge
Extend Dry Bush to cover Clifton / Otahuna soils. Probable pre - European extent
No planting dry shallow soils NNW to W aspect retain views
Ridge
Scattered existing exotic trees, keep open on exposed ridge / grazed
Subject to approval of Port Hills Trust Board
Ridge
Hidden Valley
Screen watertanks
Ridge
Dyers Pass Road
MT VERNON PARK
Dry Bush
Port Hills native trees (Arboretum)
Native planting extended up gully (more sheltered sites)
CURTIS BLOCK
Streams
Ponds
A Open space / grassland
B Indigenous forest / shrubs
C Parkland
D Botanical / horticultural
Shrubs / trees in grassland
Kanuka / dryland forest planting on Kiwi / Otahuna soils (more exposed sites)
Sign of the Takahe
Finger of native forest planting on Horotane soils, near park entrance. (Taller growing forest trees to provide 'native' introduction to the park)
Grazed
Pine forest replanted with local natives and some deciduous trees in the gullies to control erosion
0m
500m
1000m
approximate scale

Other problems have resulted from the planting of exotic forestry blocks in patterns which do not respond to the underlying topography.

In spite of the above comments the exotic planting has added to the values of the parks by providing shelter, providing for a more varied recreation experience (closed and open areas) and providing greater plant species variety.

Manmade structures in the Parks are generally unobtrusive, with the exception of the television transmission mast on Sugarloaf Peak and, to a lesser degree, the pylons of the electrical supply route crossing the valley.

LANDSCAPE MANAGEMENT ZONES

The management plan area has been divided into four generalised management areas which relate to the topography and existing site values.

The proposed zones are:

A. Open Space/Grassland
B. Indigenous Forest Zone
C. Parkland - Mixed Exotic/Indigenous Woodland Zone
(low maintenance standard)
D. Intensive Botanical /Horticultural Management Zone
(high maintenance standard)

A. OPEN SPACE/GRASSLAND ZONE

Objective: 1 To conserve the open tussock grassland for its ecological and landscape values.

Comment: The short tussock grasslands have historical, ecological and botanical significance in terms of their cultural origins and maintenance, the structural response to disturbance in a forest environment, and a range of native species typical of temperate seral vegetation. They also allow unimpeded vistas across the hills, city and plains.

Policy: 1.1 Extensive sheep grazing, with stock numbers varied according to seasonal pasture growth, shall be used to preserve the open tussock grassland dominated landscape and control weeds and intertussock grass competition.

Comment: Light sheep grazing at a level of approximately 2.5 sheep per hectare (average per year) is necessary for the continued maintenance of the silver tussock grassland. The two critical aspects of grazing management are control of the spring pasture growth, and maintaining adequate grass cover in autumn to suppress seedling thistle growth. Without sheep grazing fire risk will increase markedly and the native intertussock species and silver tussocks will be smothered by the more aggressive exotic grasses (eg cocksfoot) over most of the management plan area. (This may not be the case on the higher altitude Sugarloaf Peak grassland, however which contains a low cocksfoot component.)

1.2 Areas of grassland that suffer from soil erosion, are overgrazed (A4) or have an open silver tussock cover with a high exotic plant component (A2) shall be planted with indigenous small trees and shrubs that naturally occur in the tussock grassland (see map for areas), ie matagouri, *Muehlenbeckia complexa*, native broom and Kanuka and on suitable sites Kowhai (*Sophora microphylla*), *Sophora prostrata*, *Corokia cotoneaster*, *Helichrysum aggregatum* and *Coprosma crassifolia*.

Comment: The above plants are a natural component of the open tussock grassland usually growing on the drier more open sunny ridges. As some of the above are palatable to sheep and will be planted on sites where grazing is usually more severe fencing would be required to aid establishment. Removal from grazing of the above areas will also help 'even out' the grazing pressure over the entire park. Planting will only take place on ecologically suitable sites and be planted in a natural pattern. Appropriate specialist advice will be sought on this where necessary. Fencing is only intended to aid initial establishment and will be removed after two or three years.

1.3 An experimental planting of Kanuka shall be undertaken on one of the above sites with no protection from stock grazing.

Comment: Kanuka is able to withstand sheep grazing being generally unpalatable. It is also promoted in situations where grazing reduces competition from grasses. Seeding of Kanuka onto some of these sites may also be a possible method of revegetation.

1.4 The overgrazed grassland in Thomson Park between Victoria Park and the Summit Road shall be spelled from grazing over the summer, autumn and winter period until a viable grass sward has been reestablished. Limited grazing will be maintained over the spring period.

Comment: Current stocking levels on this area (approximately 5 sheep per hectare) are detrimental to the condition of the grassland and soils. Severe thistle infestation and erosion can result from this situation. Most of the silver tussock has been eliminated from this area.

1.5 Cattle grazing shall not be permitted in the management plan area. Cattle

grazing of the eastern slopes between Bowenvale Avenue and the pine plantation shall be phased out and replaced with sheep grazing. (see policy 4B 1.4)

Comment: Cattle clearly inhibit regeneration of native shrublands and woodland species. Impact on soils and nutrient cycling is pronounced. The lower Bowenvale valley grassland has low grassland conservation value but potential for revegetation with native trees and shrubs.

1.6 Fertilizer applications shall not be permitted in the Grassland Zone.

Comment: Fertilizer applications promote rapid lush growth of exotic grasses which require greater stock numbers to control. If the growth is not controlled fire risk is increased. 'Rank' growth of exotic grasses also suppresses the tussocks and intertussock soils are also altered. In the past the lush growth caused by the combination of fertilizer application, a wet spring and low stock numbers has necessitated the use of cattle to control the rank growth with resulting damage to native shrub and tree species.

1.7 Representative areas of grazed and ungrazed tussock grassland shall be monitored with permanent belt transects so that there is a research basis for grassland management. A minimum set will include the Sugarloaf block, a dense grazed tussock grassland (A1), an open grazed tussock grassland (A2), the fenced tussock grassland below the Scott Reserve, and a grazed area below the Summit Road topographically comparable to the Sugarloaf site.

Comment: Establishment of permanent belt transects will assist fine-tuning of grazing management objectives and practice.

1.8 Noxious weeds shall be controlled in the Grassland Zone by careful grazing management and chemical means where necessary.

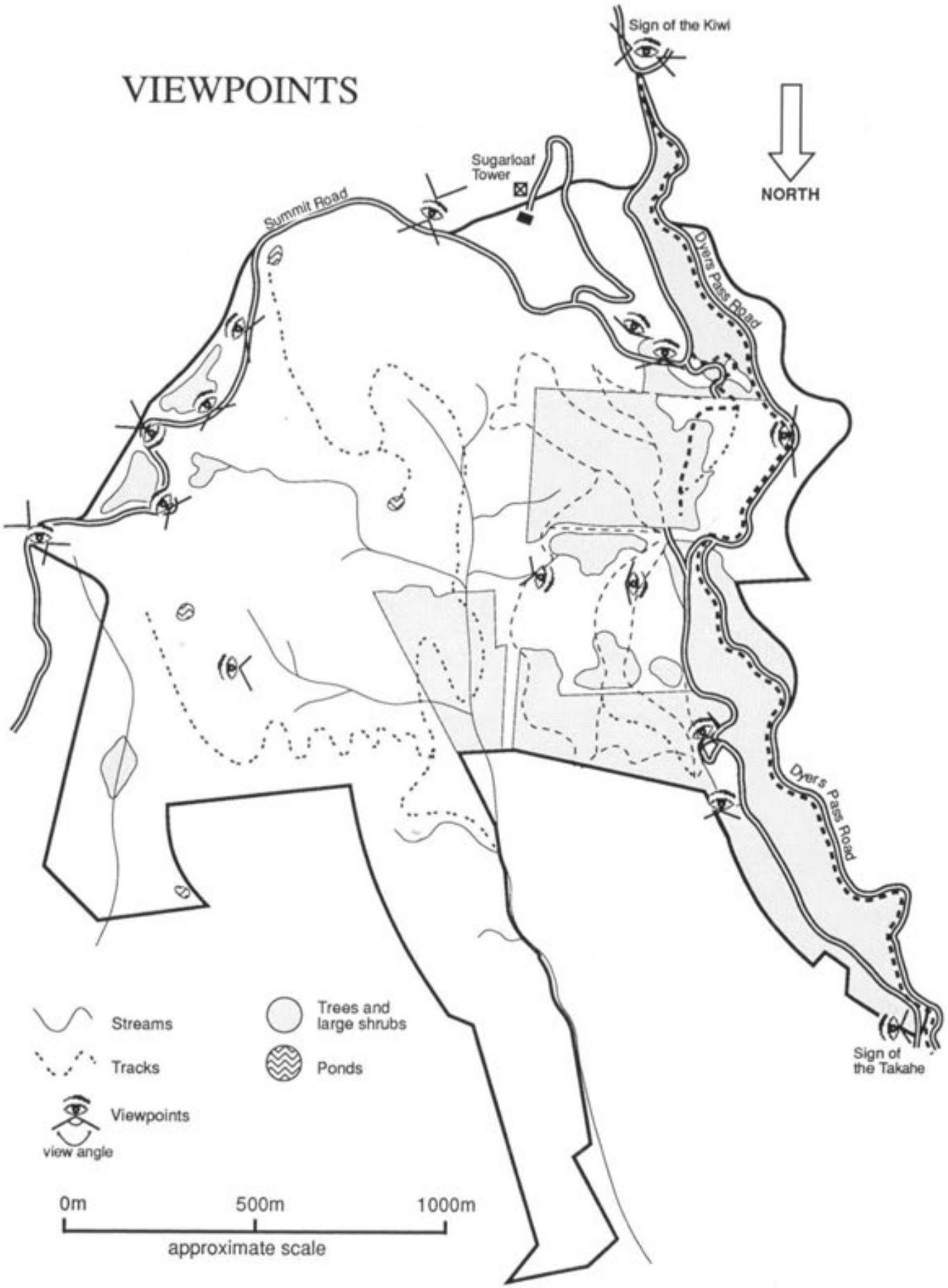
Note: Plants that have potential to become widespread include flowering current, Cape weed, Spanish broom, gorse, broom, briar and variegated thistle.

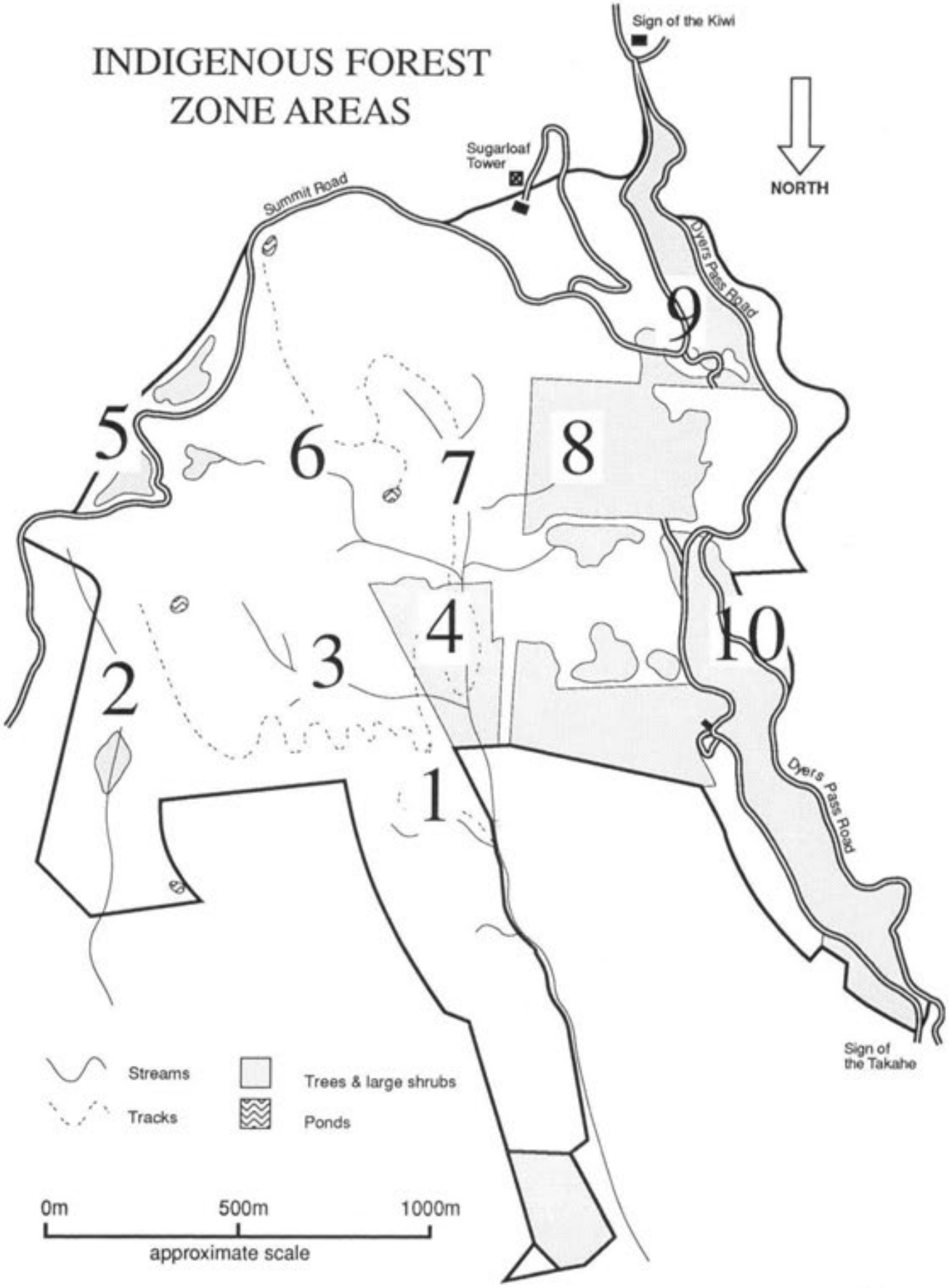
Objective: 2 Significant views of the park landscape and from the park(s) shall be maintained and keep clear of obstructive elements.

Policy: 2.1 Significant view points marked on view points plan shall be kept clear of obscuring vegetation or structures.

2.2 The trees immediately below the Thomson Park Memorial lookout shall be removed.

Comment: The large group of macrocarpas below the Summit Road are


VIEWPOINTS
Sign of the Kiwi
NORTH
Sugarloaf Tower
Summit Road
Dyers Pass Road
Dyer's Pass Road
Sign of the Takahe
Streams
Tracks
Viewpoints
view angle
Trees and large shrubs
Ponds
0m
500m
1000m
approximate scale


INDIGENOUS FOREST
ZONE AREAS
Sign of the Kiwi
Sugarloaf
Tower
NORTH
Summit Road
Dyers Pass Road
9
5
6
7
8
4
10
2
3
1
Dyers Pass Road
Sign of
the Takahe
Streams
Tracks
Trees & large shrubs
Ponds
0m
500m
1000m
approximate scale

already severely restricting the views from the memorial. Some of the shrubby natives planted on the slope below the lawn will also cause problems in the future.

2.3 All seedling and mature naturally regenerated exotic conifers shall be removed from the Grassland Zone.

Comment: There are several self sown mature pine trees on a rock outcrop in Bowenvale and one on the significant outcrop to the east of the 19th Battalion Memorial in Victoria Park. These trees are visually out of place and in the case of the 19th Battalion, three are obscuring views.

Another area of concern is the grassland of Thomson Park above Skellerup Park which pine seedlings have colonised.

2.4 No further planting shall be permitted in the grassland zone around the large rock outcrop to the east of the 19th Battalion Memorial

2.5 The wind generator and associated structures including the foundations shall be removed by 31 December 1992 and the two sites from which experiments have been conducted returned to their original condition, to the satisfaction of the Parks Manager.

2.6 Alternative siting of the electricity pylons outside reserve boundaries shall be encouraged if future conditions make this practicable.

B. PROPOSED INDIGENOUS FOREST ZONE

The Proposed Forest Zone encompasses ten areas:

1. The eastern slopes above the Bowenvale stream between Bowenvale Avenue and the forestry block.
2. Dry Bush Valley.
3. Hidden Valley.
4. Bowenvale pine plantation.
5. Scott Reserve.
6. Bush Head Gully.
7. The main Bowenvale Valley above the pine plantation.
8. Upper East Side Block.

9. Skellerup Park and Dyers Pass Road plantings.

10. Dyers Pass Road conifers &Douglas Scenic Reserve

General objectives and policies

Objective: 1 Council shall revegetate and allow natural regeneration in the indigenous forest zone with forest and shrub flora types historically typical of the area.

Policy: 1.1 Planting in the forest zone shall be of plants propagated from seed or stock obtained from the Port Hills ecological district or nearest Canterbury source if stock plants no longer grow on the Port Hills.

Comment: Sources of seed or propagation material could include Dry Bush or Sugarloaf Scenic Reserve. The objective is to maintain the genetic uniqueness of the native plant populations of the area. Planting of outside sourced plants can lead to intermixing of the gene pool of the remnant native forest in the area leading to a reduction in genetic diversity.

1.2 The boundaries of the forest zone shall be progressively fenced as part of the Parks Capital Works programme over a number of years. See Section 10.

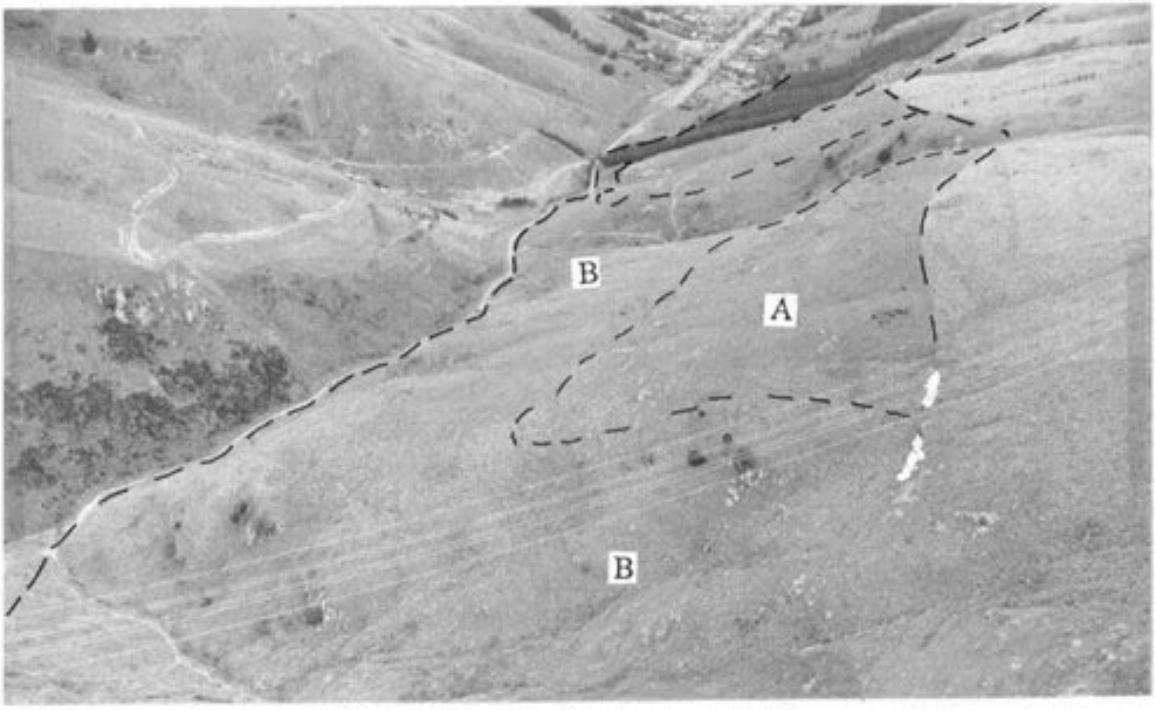
1.3 An experimental planting of kanuka, kowhai, lacebarks, ribbonwoods, small leaved coprosmas and totara shall be undertaken outside the fenced areas to ascertain their resistance to sheep grazing and suitability for planting in the Forest Zone outside fenced areas.

Comment: These shrubs and trees are 'naturally' favoured under situations of moderate grazing by sheep which removes much of the tall competing sward. Obviously there will be some losses but possibly less so than amongst plantings in fenced areas which have to compete with tall aggressive grasses such as cocksfoot.

This type of planting restricts the species range but there is sufficient visual variety to make it a potentially useful means of extending the forest zone without the expense of fencing. Stocking levels will have a significant effect on the outcome.

AREA 1 **Eastern slopes above the Bowenvale Valley stream** (between Bowenvale Avenue and the Bowenvale pine plantation).

These slopes have recently been cleared of a severe gorse infestation problem by chemical means and cattle grazing. The grassland mostly consists of tall cocksfoot pasture (A3) with little remaining silver tussock. A few native shrubs survive in two small gullies. A strip of open tussock grassland (A2) survives at a higher altitude, though this has recently been affected by cattle grazing. The northern end is planted in exotic conifers.



Proposed Zones A- Grassland, B- Forest

Policy: 1.4 The eastern slopes dominated by cocksfoot shall be planted with native shrubs and trees in a natural pattern in the gullies and on the kiwi and otahuna soils to suppress gorse regrowth and prevent erosion. The base of the valley beside the track shall be planted with indigenous forest trees and shrubs to allow a representative example of lowland forest to be grown on the better soils at the base of the valley. See management zones plan. The remainder shall be grazed.

1.5 Gorse regrowth in this block shall be controlled by chemical means or hand slashing until the natives have achieved sufficient height to 'outgrow' and shade out future gorse growth.

AREA 2: **Dry Bush Valley**

Dry Bush Valley is situated on the easternmost side of Bowenvale Park below Mt Vernon Park and the eastern portion of Scott Reserve. The remnant bush area was once more extensive containing a larger number of species than are currently present. Old tree trunks can still be seen on the eastern slopes above the current bush.

The pasture on the west facing hill slope consists of a mixture of open silver tussock grassland (A2) and intensively overgrazed areas (A4). The slopes of the valley leading up to Scott Reserve are mostly covered by dense silver tussock grassland (A1).

Policy: 1.6 Dry Bush shall be extended up the valley to the Summit Road on the Summit, Clifton and Otahuna soil series. See the management zones map.

Comment: The above mentioned soils in Dry Bush Valley are especially suited for native forest re-establishment.

1.7 Discussions shall be held with the Port Hills Trust Board concerning the extension of Dry Bush into Mt Vernon Park on the Clifton soils where native trees probably grew last century.

AREA 3: **The Eastern Valley above Bowenvale Pine Forest Block (Hidden Valley)**

This valley contains extensive 'riparian' stands of New Zealand flax and associated shrubs and small trees along the water courses and seepage lines. The head of the valley is punctuated by steep cliffs. The south-facing slopes contain a good cover of dense silver tussock (A1). This valley probably has the most extensive area of native shrubby vegetation aside from Dry Bush.

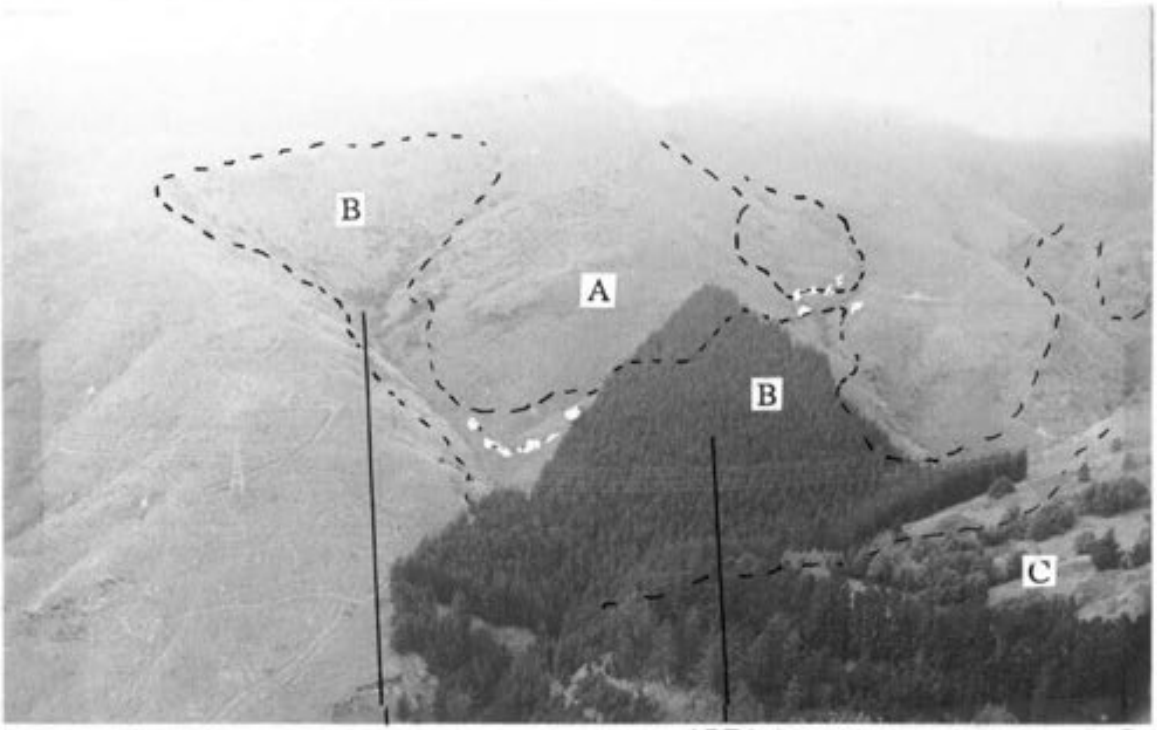
Policy: 1.8 The riparian strips of regenerating vegetation shall be fenced off to protect them from stock intrusion.

1.9 Fencing shall encompass the entire head of the valley with the top fence situated along the top of the cliffs. Some of the south-facing dense silver tussock grassland slope shall be excluded from the fenced area.

AREA 4: **Bowenvale Pine Forest**

This 9ha block of Pinus radiata joins with Lower East side plantation at the bottom of the Bowenvale Valley. It was originally planted to control gorse and provide long term revenue. Unfortunately the block was left unthinned and unpruned. Visually the block forms an unacceptable pattern on the side of the valley. However the trees do provide a

recreation experience quite different to the open tussock grassland.



AREA 3: AREA 4: Proposed Zones A, B, C

Policy: 1.10 The pine plantation shall be retained in the short term, with the exception of limited strategic felling on the upper plantation edge to ameliorate the current unnatural forest/grassland interface. As the plantation ages and becomes unsafe it shall be progressivly replaced with natives.

Comment: It is considered that the above policy will maintain existing recreation values in the short term but allow establishment of native forest in the medium to long term.

AREA 5: **Scott Reserve**

The two crests of the crater rim that comprise Scott Reserve are planted with a mixture of exotic conifers including macrocarpas, cedars and larch. The trees on the north side are quite stunted in growth. Trees on the interior and west-southwest slope of the reserve are of larger size (larch and Douglas fir). Eucalypts have been planted at the eastern end of Scott Reserve and natives on the western end. An assortment of exotic shrubs occur on the margins of the conifer blocks. The Scott Reserve plantings have been described as misfit elements in the Port Hills landscape study. However from a recreation viewpoint they provide a welcome change from the open tussock grassland by providing shelter from the cold winds often encountered on the exposed tops.

As Scott Reserve is classified as a Recreation Reserve there is no legal requirement to

remove plantings. Some adjustment of the vegetation pattern and type will however will be needed to ameliorate the plantations visual effect on the landscape.

Policy 1.11 The exotic vegetation shall be gradually replaced with native vegetation historically typical of the higher elevations on the Port Hills including taller growing plants such as kanuka to supress potential broom regrowth.

AREA 6: **Bush Head Gully**

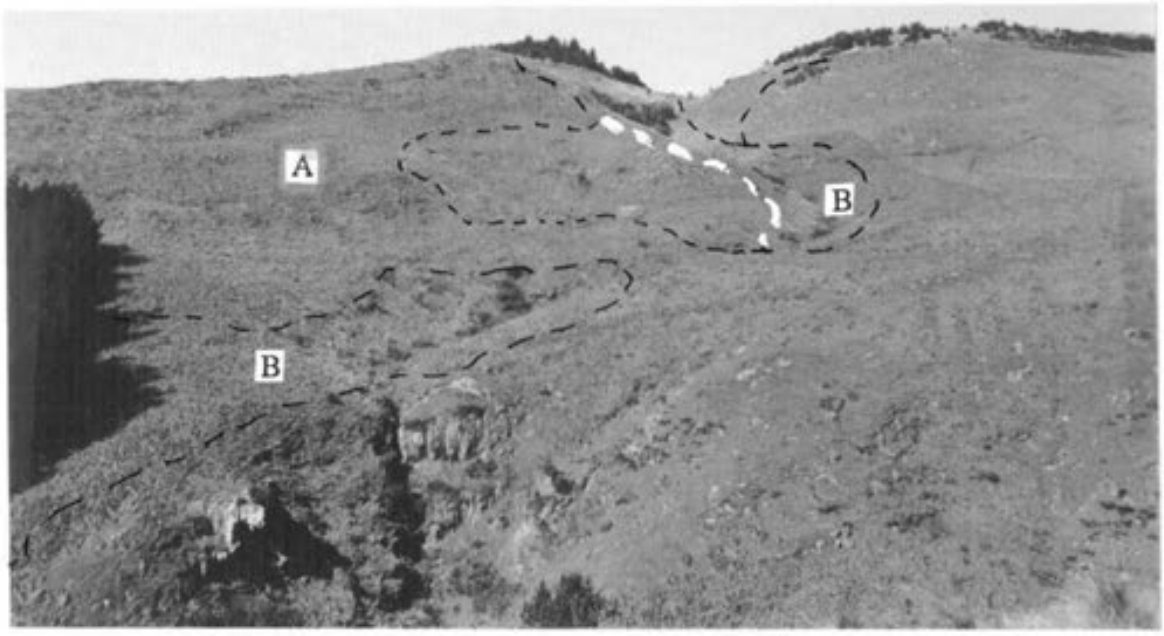
This gully descends from between the two parts of Scott Reserve to the main Bowenvale Valley in a dogleg shape. The top sector contains a small remnant of native bush. The rest of the gully contains scattered patches of flax and scrub. A large rock outcrop is situated at the bottom of the gully over which waterfalls flow during the wetter times of the year.

The top half of the gully containing the bush remnant has been fenced off and partially planted. The grassland in this area has largely reverted to a rank growth of cocksfoot.The south facing side of the lower part of the gully has a covering of dense silver tussock whilst the north facing slope is more sparsely vegetated.

Top of gully with bush remnant

Policy: 1.12 Planting shall be continued inside the existing fenced area with first priority on the road margins to reduce fire risk caused by the long grass in the fenced area. Fencing shall be extended to encompass the Clifton soils to the north of the existing fenced area. See the Management zones map.

1.13 The north facing slope below Scott Reserve shall be used as an experimental site for the planting of kanuka on the higher slopes and browse resistant trees and shrubs lower down.



Bush Head gully, waterfall at base. Proposed Zones A- Grassland, B- Forest

1.14 A section of the lower gully shall be fenced above the rock outcrop.

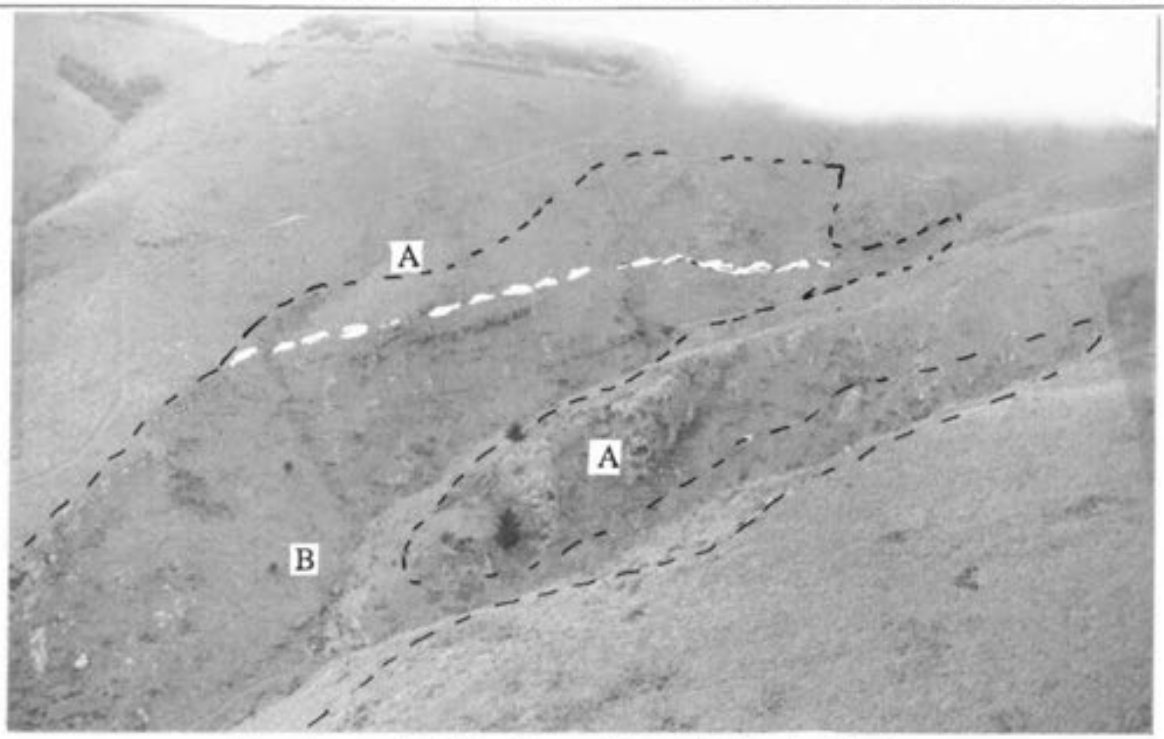
1.15 The area surrounding the rock outcrop shall not be fenced in order to retain views of the outcrop and waterfall.

1.16 Shrub and tree planting shall be used to integrate the adjoining pine plantation with the gully and the future Bowenvale Valley forest areas.

AREA 7: The Main Bowenvale Valley above the Plantation

This valley contains the main Bowenvale Stream along which grow a scattered collection of shrubs and small trees. Some stands of bracken occupy small areas below a central rock outcrop around which the valley forks in two directions.

The grassland in the valley generally consists of scattered tussocks (A2). A large area of degraded grassland (A3, A4) also occupies the lower west facing slopes and upper east facing side of the valley.



Upper Bowenvale Valley. Proposed Zones A- Grassland, B- Forest

Policy: 1.17 The valley floor and upper two forks of the valley on Clifton, Evans, Takahe and Redcliffs soils shall be fenced and revegetated. Unfenced scattered planting of browse resistant species shall be undertaken on the west facing slope covered by exotic grasses.

AREA 8: **Upper East Side Block and Adjoining Lower Valleys**

The 18ha of upper east side block contains a stand of macrocarpas and mixture of regenerated eucalypts, macrocarpas and pines with a thick understory of *Ribes sanguineum* (flowering current), broom and some gorse.

As a result of the 1975 storm, the slopes are still covered by large numbers of windthrown logs. In addition the top quarter of the plantation was destroyed by fire in 1988. Where pines were the dominant pre-fire tree the 'bared' soil has been colonised by a mass of thistles, flowering current and foxgloves. The burnt-over eucalypts are now resprouting from the base and will in two to three years form a dense coppice. Soil erosion in the burnt portion was a problem. Native shrubs are established in a gully on the eastern side of the block.

Unfortunately upper east side block was planted in a pattern that ignored the underlying topography of the site. The east and northern boundaries follow the straight lines of the legal boundaries rather than the natural contours (ie between Bowenvale Park, Victoria Park and Thomson Park).

The current condition of Upper East Side Block makes return of the forested area to

grassland virtually impossible except for some minor areas along the plantation edges. Thus 'reafforestation' appears to be the only solution.

Policy: 1.18 Kanuka shall be planted on the drier slopes and broadleaf natives such as pittosporums, akiraho, karamu, fivefinger, cabbage tree, ngaio, mahoe and mapou planted in the two main gullies to form initial cover. In areas of open bare ground poroporo can be direct seeded. Long term forest tree species such as totara and matai would also be planted in appropriate positions at the same time.

Comment: Native planting offers the greatest possibility of a sustainable planting in this area being slightly more fire resistant and less subject to windthrow as well as being ecologically suited to the area.

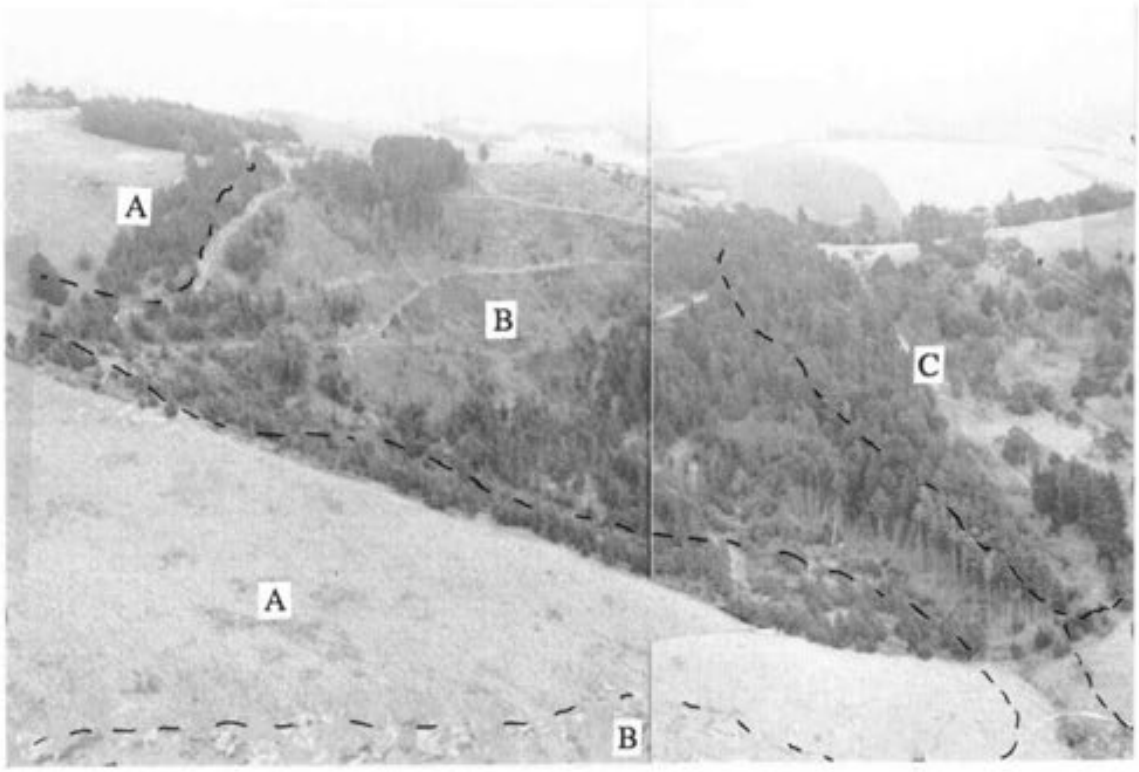
1.19 The seedling pines and eucalypts on the south and eastern sides of the block shall be felled and where possible removed for firewood or burnt.

Comment: The dark green colour solid mass and regular texture of the pines growing on the margins of the block help to reinforce the block's unsympathetic pattern on the landscape. Removal of these trees will allow for a more irregular boundary between trees and grassland and remove the sharp colour contrast currently existing.

1.20 The fence on the eastern boundary shall be shifted to follow the general line of the eastern gully where natives shall be planted to bolster the regeneration already occurring.

1.21 Native planting shall be extended up the eastern gully into the degraded grassland between upper east side block and the Summit Road to ameliorate the visual effect of the top plantation edge. Forest margins shall consist of shrubby species to provide a natural edge to the forest.

1.22 The two gullies between Upper East Side Block and the Bowenvale Valley floor shall be fenced to allow native plant regeneration and planting to link the forested areas together thus integrating the plantation with the downslope future forested landscape.



Upper East Side Block. Proposed Zones A- Grassland, B- Forest, C- Parkland

AREA 9: **Skellerup Park**

Skellerup plantation further up Dyers Pass Road contains a varied assortment of 20 coniferous species ranging from pines and macrocarpa to various spruce and fir species. A number of other deciduous and broadleaf species grow in the park including large areas of native shrub planting. The whole park area except that above Victoria Park is very steep.

The dominant conifers are Corsican pine, contorta pine and macrocarpas. Seedlings from the pine trees in Skellerup Park have colonised the grassland on Sugarloaf peak. Most of these seedlings are Corsican pines.

The coniferous plantings in Skellerup Park also pose a high fire risk being especially vulnerable to vehicle fires due to the high accident rate on the Summit Road above.

As the Skellerup exotic plantings are on reserve land classified as Scenic 1a (Reserves Act 1977) the problem arises as to their long term future. Scenic 1a Clause (2)a states:

> "Except where the Minister otherwise determines, the indigenous flora and fauna, ecological associations, and natural environment and beauty shall as far as possible be preserved, and for this purpose, except where the Minister otherwise determines, exotic flora and fauna shall as far as

possible be exterminated".

Policy: 1.23 The exotic trees shall be phased out as they reach the end of their useful life starting with those seeding into the open grassland above the Summit Road. They shall be replaced with natives.

Comment: This policy will achieve the aims of the scenic 1a classification in the long term yet retain the existing values of the semi-mature planting over the short to medium term. It would also allow controlled removal of trees and thinning and replanting with natives over a number of years thereby reducing the risk of erosion and weed infestation.

AREA 10 **Dyers Pass Road Conifer and Native Plantings including Douglas Scenic Reserve**

Dyers Pass Road is bordered by areas of large exotic conifers, (mostly pines), through the Victoria Park section and in parts of Elizabeth Park. These trees pose a significant fire risk being mostly situated on the northwest side of the Cashmere ridge. They are also susceptible to windthrow. Douglas Scenic Reserve situated just below Dyers Pass road has been planted with a range of native trees and shrubs.

Policy: 1.24 A progressive programme of replacement of the large mature pine trees along the Victoria Park section of Dyers Pass road shall be implemented and the area replanted in natives.

Comment: These large pine trees are now overmature and a danger to the public. In some cases the weight of the trees is more than the shallow root systems are able to support, especially when the trees are on steeper slopes over smooth bedrock. A combination of saturated soils and high winds will result in further trees falling.

1.25 Douglas Scenic Reserve shall continue to be planted in native trees and shrubs for amenity purposes.

C. PARKLAND - MIXED EXOTIC FOREST ZONE (LOW MAINTENANCE)

The parkland zone encompasses a section of the exotic plantation areas of the lower Bowenvale Valley, lower east side block and associated grassland conifer plantings, the valley to the north of Upper East Side Block and the lower portion of Elizabeth Park.
The major problem with these areas (and especially those in Victoria Park) is the lack of integration into the surrounding landscape.

The Parkland Zone can be divided into three main areas.

1. Lower Bowenvale Valley
2. Victoria Park
3. Lower Elizabeth Park

Objective: 1 To display exotic tree species of horticultural or botanical interest in a visually attractive manner.

1.1 No healthy trees should be removed unless properly identified to ensure that no rare species are lost.

1.2 A tree inventory of all significant exotic tree species shall be carried out noting location and health.

AREA 1: **Lower Bowenvale Park**

The lower part of the soil erosion control planting nearer the houses would be better planted in deciduous trees or lower growing evergreens rather than the potentially tall conifers which are starting to create shade problems for the residents below and are a potential fire risk.

Policy: 1.3 The soil erosion control pine planting shall be removed at the most appropriate stage and replaced with a mixture of natives and ornamental deciduous trees in the gullies and dryland native planting on the ridges. An implementation plan shall be drawn up outlining the staging of tree removal and replacement planting. Further exotic planting shall not extend further south up the valley than the old Quarry.

AREA 2: **Victoria Park**

Victoria Park contains plantings of exotic conifers and Eucalypts in the 'plantation' area of lower east side block and scattered through the grassland of the eastern slope below the 19th Battalion rock outcrop. The diversity of these plantings is of horticultural and botanical interest. However the Port Hills are generally not a suitable site for an arboretum where a wide variety of exotic conifers can be grown to sizes reminiscent of trees in their natural habitat. Exotic trees which will do well on the Port Hills mostly originate from areas that have a Mediterranean climate.

Policy: 1.4 The tall shelter belt on the southside of lower east side block shall be removed to allow better integration of the block with the adjoining grassland tree planting and to maintain a greater level of public safety in

the area.

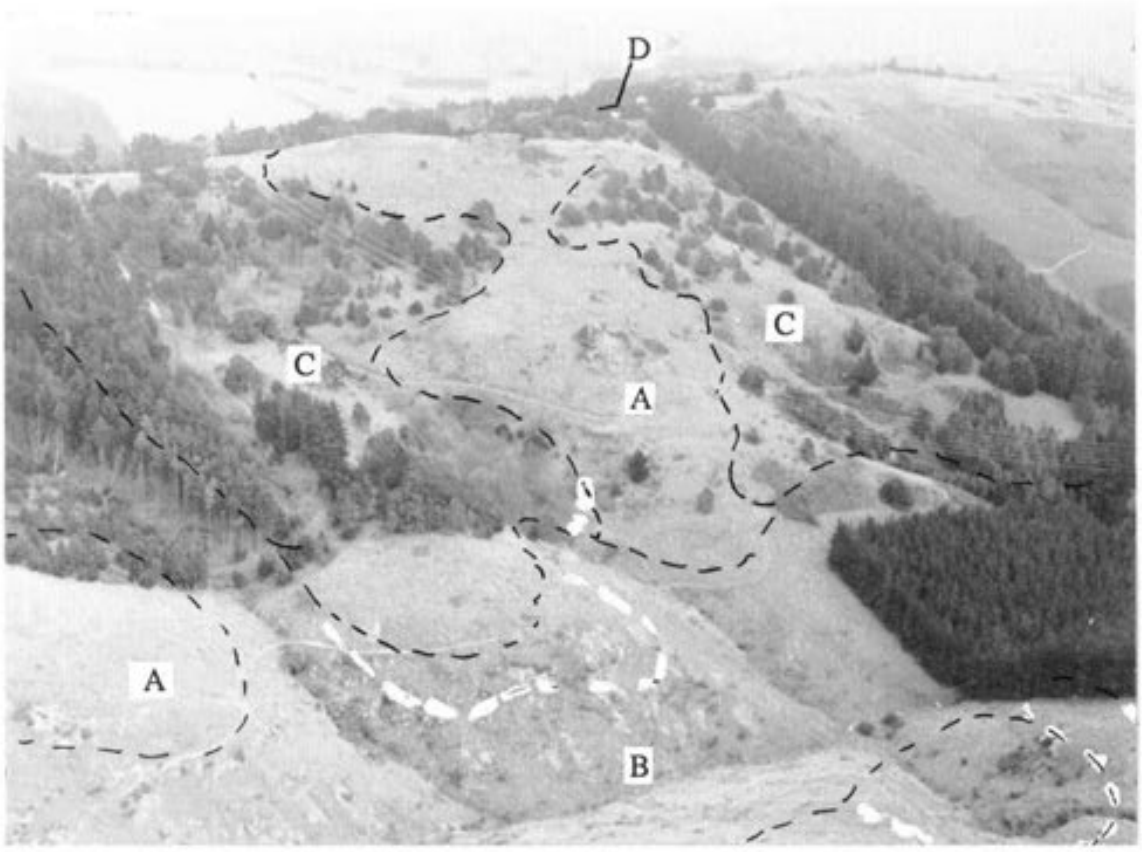
Comment: The row of large pines creates an undesirable visual boundary between forest and grassland. The trees are now very tall and over mature.

1.5 The open space between Lower East Side Block and the conifers immediately to the south shall be infilled with conifers and Eucalypts able to withstand the site conditions (ie conifers and other trees of Mediterranean climate region origin etc).

1.6 The lower east facing slopes shall be planted with native trees and shrubs amongst the existing conifers to integrate the parkland planting with the indigenous forest zone in the Bowenvale Valley.

1.7 Native shrubs and small trees shall be used around the margins of the exotic plantings to integrate them with the topography and dominant yellow brown colour of the grassland.

1.8 The southern portion of the Victoria Park parkland zone shall be limited to its current area. Infill and replacement plantings shall be of Mediterranean climate tree species.



Proposed Zones A, B, C, D

1.9 Fast growing evergreen species shall be used to screen the view of the pylon on the central ridge, from the 19th Battalion rock outcrop.

1.10 Natural regeneration of kanuka in the Victoria Park Southern Parkland Zone shall be allowed to continue.

1.11 A maintenance regime shall be prepared for all tree work in the Parkland Zone to ensure proper maintenance of the tree collection.

Comment: Many of the trees in this zone have not been maintained over the years. Many semi mature specimens still have the protective wire netting wrapped around their trunks. Other trees such as those at Barnetts Flat require pruning.

AREA 3: **Elizabeth Park Parkland Area**

This area contains a significant area of cultural planting including the Lone Pine of Gallipoli and a grove of olives in close proximity to the urban boundary and existing large numbers of exotic plants. The proposed boundaries of the zone extend from the large group of *Pinus halepensis* on the corner between Victoria Park Road and Dyers Pass Road to the urban fringe.

The zone on the upper side of Victoria Park Road is bounded by the urban fringe to the north and dense native planting to the south, below the microwave tower.

Policy: 1.12 Large trees shall not be planted to the north of the stone seat to retain the existing view of the city and plains.

1.13 Planting shall consist of species of Mediterranean climate region origin and Eucalypts.

1.14 The existing Gallipoli planting shall be extended to form a special cultural focus for the area.

1.15 Park vegetation shall be maintained to ensure that it does not interfere with existing telecommunications corridors. The position of new telecommunications corridors shall be subject to discussion with the Parks Unit to ensure that amenity values are considered.

D. HORTICULTURAL /BOTANICAL ZONE (HIGH MAINTENANCE)

The zone encompasses the area of Victoria Park around the kiosk, the open lawn, the Mediterranean plant area extended to Dyers Pass Road, and the 19th Battalion site.

This zone is intended to complement the plant collections of the Christchurch Botanic Gardens by providing a relatively frost free warm environment for the growing of semi-hardy trees, shrubs and perennials.

Objective: 1 To complement the plant collections of the Christchurch Botanic Gardens by the growing of semi-hardy and Mediterranean climate region trees, shrubs and perennials.

Policy: 1.1 No healthy trees should be removed unless properly identified to ensure that no rare species are lost.

1.2 A tree inventory of all significant exotic tree species shall be carried out noting location and health.

Policy: 1.3 The Mediterranean climate plant collection on the west facing slope shall be extended downslope to Dyers Pass Road and include representative examples of vegetation from the five different world Mediterranean climate regions.

Comment: Plants from the Mediterranean climate zone (hot dry summers and mild moist winters), grow well on the northern and western slopes of the Port Hills where frost incidence is lower and greater exposure to the sun is possible. In their natural state modern Mediterranean climate areas are dominated by an open woodland of small trees and shrubs known as sclerophyll forests. This climate based vegetation type is found in five areas of the world:

1. The Mediterranean basin;
2. Southern California;
3. Central Chile,
4. Much of the southern fringes of Australia;
5. The Cape of Good Hope, South Africa.

1.4 Plants in the geographically orientated sections shall be planted in a pattern that corresponds to that occurring in the wild. Species to be planted shall be carefully checked to ensure they do not have noxious weed potential.

Comment: Ecological exactness is not necessary for the geographical displays as long as the plants are from similar climate zones and planted in ecologically appropriate patterns. The aim is to give an impression of

the way in which Mediterranean plant 'communities' grow.

1.5 A section of the above area shall be used for the display of horticulturally significant members and cultivars of the plant family *Proteaceae (ie Protea, Banksia, leucadendron, Leucospermum, Grevillea etc).*

1.6 The large over mature *Pinus radiata*, and the *Pinus contorta* just above Dyers Pass Road shall be removed to allow expansion of the Mediterranean section.

Comment: See comments under policy 4B 1.26 regarding the need to remove the large pine trees.

1.7 The creation of a 'rock garden' shall be investigated for the front and northern end of the Quarry face beside Victoria Park Road for the growing of exotic succulent species.

Comment: There is a vast range of succulent species from many different plant families (*Mesembryanthemaceae, Crassulaceae, Portulacaceae, liliaceae* etc) for which Victoria Park provides better growing conditions than the Botanic Gardens (and plains generally). The succulent collection in the Gardens is severely restricted by space limitations and many of the larger growing species cannot be accommodated.

1.8 The colony of *Cistus sp.* above the Quarry face shall be protected for their botanical value.

Comment: These *Cistus* plants form one of the few self propagating colonies of *Cistus* in New Zealand. The plants response to their environment is of educational value.

1.9 The terraces in front of the kiosk shall be used for a mixed collection of 'half hardy' shrubby plants and low growing plants, which will not obscure the view from the building.

1.10 The traffic island in the Victoria Park car park shall be planted with drought resistant Mediterranean climate region flowering plants.

1.11 Informal planting shall be planted to the north of the Victoria Park car park to visually separate it from the open lawn area. Use shall be made of less commonly seen members of the family *Myrtaceae* which include, *Kunzea, Calothamnus, Darwinia, Callistemon, Verticordia* etc in addition to other half hardy plants.

Comment: As well as screening the car park use of various *Myrtaceae* will complement the existing beds of Callistemon situated beside Victoria Park Road. The above plantings should be sufficiently spaced to allow views in and out for security reasons.

1.12 The following steps shall be taken to ensure that the continued survival of the specimen of the endangered Easter Island kowhai in Victoria Park is ensured.

1. All maintenance staff in Victoria Park shall be made aware of the trees importance and significance.

2. The tree is not to be publically identified by labels etc.

3. Efforts shall continue in propagating further offspring from the tree by vegetative means.

5.0 FARMING

The grazing of sheep over large parts of the plan area is a vital part of its management. Appropriate levels of grazing are discussed and policies included under the landscape and vegetation sections.

The following objectives and policies relate to management of the farming operations in the park area. In the parks farming operations are primarily to be used as a means of managing the landscape for visual, ecological and recreation objectives and secondly for profit. The proposed controls placed on the farm operators are such that they may well reduce the profitability of farm operations, ie no fertilizer applications and lower grazing levels.

Objective: 1 To maintain an efficient and low cost farming operation for the maintenance of recreational, visual and ecological purposes.

Policy 1.1 All grazing rights in the plan area shall be leased to private operators.

Comment: Private graziers and adjoining landowners are better able to manage the fluctuating stock numbers that are required for Port Hills farming. Leasing avoids the cost of employing a farm manager and stock management problems. Provided leasees management practices are properly monitored leasing the Parks for grazing is the most efficient method of grazing management.

6.0 FAUNA

The Management Plan area contains a limited selection of native birds and invertebrate fauna. To date seven species of native birds and nine exotics have been recorded in the plan area.

The lack of native forest in the park area severely restricts available habitat for the native species although use is made of the exotic forest and Mediterranean plant collection areas where there are large numbers of Eucalypts and other nectar bearing plants. Implementation of the Forest Zone policy and an increase in nectar providing exotics in the Botanical/ Horticultural Zone will increase available habitat.

Exotic mammals in the park are mainly restricted to rabbits and hares. Control of these animals is the responsibility of the Canterbury Regional Council.

Objective: 1 To protect native and exotic wildlife and their habitats subject to the requirements of the Wildlife Act 1953, and the management plan vegetation objectives and policies.

Policy 1.1 The possibility of reintroducing native fauna to the management plan area shall be investigated.

1.2 A survey of existing indigenous fauna shall be undertaken as resources permit.

1.3 Shooting shall not be permitted except for authorised pest control purposes.

Objective: 2 Noxious animals and vermin shall be controlled in the management plan area subject to the requirements of the Agricultural Pests Destruction Act 1967 and plan objectives and policies.

Policy: 2.1 Noxious animals and vermin numbers shall be monitored by Parks Staff and the Canterbury Regional Council sought to implement control methods where the damage to flora and fauna is significant.

2.2 Domestic animals (eg dogs) shall be excluded from scenic reserves/ walkways/native bush and areas being grazed by sheep to prevent disturbance and injury to wildlife. (Enforcement of this policy shall be under Section 95 of the Reserves Act 1977 or Bylaw 118.)

7.0 FIRE

Fire control is an important part of the management of the Bowenvale/Cashmere Spur reserves. Historically fires have had a major influence on the vegetation types and patterns occurring in the plan area. See History section and Ecological Systems and influences.

The high cost of fighting fires in addition to the loss of vegetation makes fire control imperative. Most fires are caused by people use of the main through routes and car parks (ie on Dyers Pass Road and the Summit Road).

The highest fire risk zone extends from Elizabeth Park to the Sign of the Kiwi along the margins of Dyers Pass Road. The type of vegetation growing along the road margins has a considerable influence on the incidence and rate of spread of fires. A fire tender is located in Victoria Park. A water storage tank is situated at the Sign of the Kiwi which fed from a header tank at Thomson Park. Bowenvale has four farm ponds of which only two are deep enough for helicopter monsoon bucket use.

Objective: 1 To protect the management plan area from wild fires.

Policy: 1.1 Fire risk signs shall be placed at all major park entrances during times of fire risk.

1.2 All highly flammable vegetation, including pines and eucalypts shall be removed to a minimum distance of 10m on both sides of Dyers Pass Road from Elizabeth Park to the Sign of the Kiwi (within Park boundaries).

Comment: The 10m fire barrier zone is derived from the Californian Public Resources Code 4291 (effective in 1988) which required home-owners to maintain a fire break around their homes clearing all flammable vegetation within 30ft (9.1m) of their dwellings. Flammable refers to all dead vegetation matter and enough live crowns to avoid the direct spread of fire from one tree to the next. In the case of the management area flammable includes long dry grass and dry leaf litter under large pine and Eucalyptus trees and shrubs. Observations of fires in the area indicate that they establish and spread quicker through pine covered areas than under thick native bush. The relatively open understory under conifer plantations may increase fire speed due to increased air speeds between the trunks during windy conditions. The volume of flammable material also tends to be higher in conifer and eucalypt plantations.

1.3 All Dyers Pass Road grass verges shall be kept mown and the cut grass removed over the late spring early summer months as required to eliminate rank growth which could become a fire risk in summer.

Comment: Long dry grass is probably the greatest fire risk over the summer period. It is important that grass on all unplanted road margins is mown. Grass mowing at high fire risk times is also a fire risk due to the possibility of sparks from machinery igniting the grass.

1.4 Fire resistant planting shall be used in the 10m fire barrier zone to reduce the area of potentially flammable grass, ie

- Forest Zone - Native shrubs and small trees especially the more succulent leaved natives (see appendix 4);
- Parkland Zone in Elizabeth Park; and Botanical/Horticultural Zone in Victoria Park - succulents - (*Carpobrotus sp.), Gazania vars, Osteospermun* ,ivy geranium, *Santolina* etc (See appendix 4).

1.5 The following steps shall be undertaken to reduce fire risk to all buildings in the parks.

- All flammable vegetation within 10m of buildings shall be removed leaving only widely spaced larger trees.
- Clean all needles and leaves from roofs, eaves and rain gutters.
- Trim tree limbs within 10 feet of the chimney and trim all dead limbs hanging over buildings.
- Cover the chimney outlet or vent with a spark arrester.

The key word when deciding what vegetation to remove is *flammable.*

1.6 Placement of the overhead wires at the end of Bowenvale Avenue underground to permit access by helicopters fighting fires, shall be investigated.

Comment: Extra water availability for fighting fires is of benefit however this has to be offset against the cost of putting wires under ground and fitted into Southpower's underground wiring programme.

8.0 BUILDINGS AND EQUIPMENT

There are six significant park buildings in the Park area. These include three service buildings, a rangers house, a stone kiosk and one public toilet block, all of which are situated in Victoria Park.

Currently the distinction between private structures and area, and public open space is not clearly differentiated.

All of the buildings except the Rangers house are in good condition. The condition of the

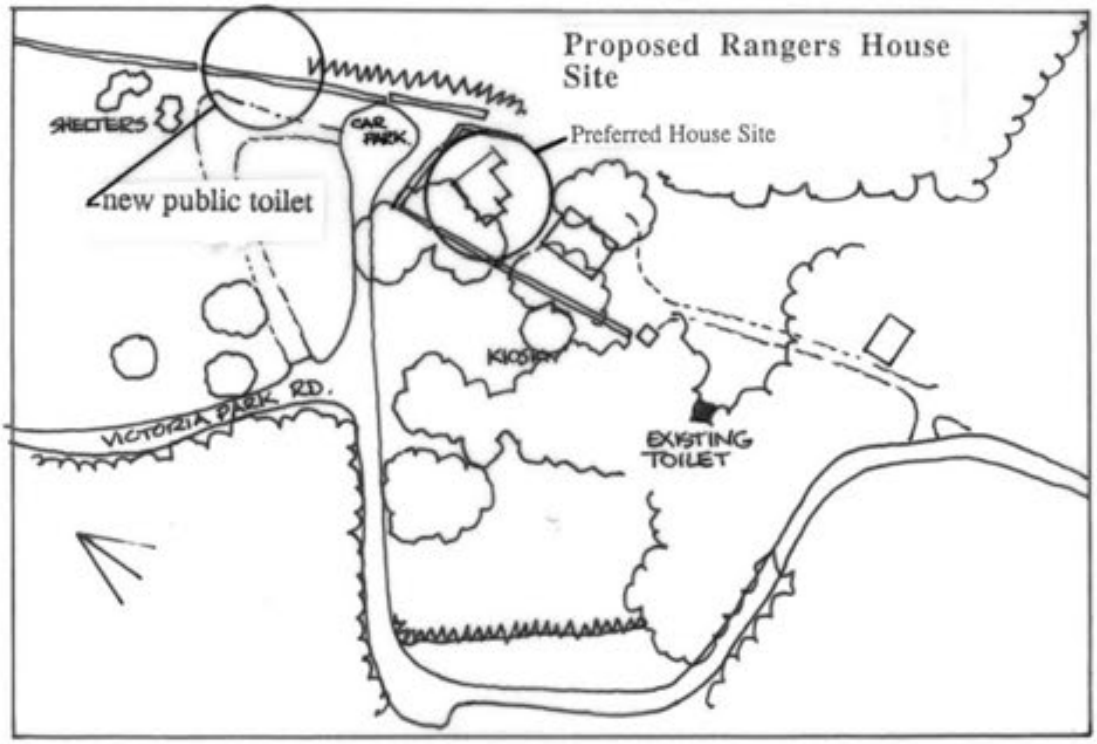
toilet block is acceptable but it is very poorly located in relation to the main use areas. The old stone kiosk is totally under utilized.

The Rangers house is now around one hundred years old. It needs to be replaced as it is no longer adequate to fulfil its current role and is a fire hazard.

Objective: 1 To upgrade and facilitate efficient and complementary siting of buildings in the management plan area and organisation of the parks work area.

Policy: 1.1 A new Rangers house shall be built and sited as shown in the diagram .

Policy 1.2 A new public toilet shall be built and sited as shown in the diagram below.



Comment: The current Rangers accommodation is substandard and uneconomical to upgrade. It is also unsafe being a potentially high fire risk with egress problems.

On site Ranger presence is vital to the parks well-being given the equipment and buildings situated in Victoria Park and the risk of

vandalism, and fire during the summer months.

1.3 The area around the service sheds shall be reorganised to clearly differentiate between public and private space.

1.4 The staff work and equipment storage area shall be screened from public view with shrubby plant material.

1.5 The need for a new toilet block in Bowenvale Valley shall be investigated.

Objective: 2 To facilitate better use and maintenance of existing and new buildings and equipment.

Policy: 2.1 The old stone kiosk shall be upgraded and refurbished to function as a lookout and passive information station including wall mounted displays and a central model of the surrounding parkland.

Comment: This building is totally under-utilised. Many visitors take the trouble to walk the 100m from the car park up to the building and must be disappointed to find it is empty, dark and featureless.

2.2 A maintenance schedule shall be set up for all buildings and play equipment in the park.

9.0 RECREATION

Open space and nature related values are the key values inherent in recreation on the Port Hills. The Port Hills Recreation Opportunity Spectrum Classification system takes these factors into account. It should be noted that the ROS system does not determine quality (ie RO5 is not better than RO1). The reserves covered by the management plan fall into the following ROS classes.

RO2
Victoria Park (in part)
Elizabeth Park

RO3
Victoria Park (in part)
Thomson Park
Douglas Scenic Reserve

RO4
Bowenvale Valley
Scott Reserve

The RO4 category is the most susceptible to change in the plan area (from a recreation viewpoint) and therefore requires protection of its natural values. Pastoral farming and resource management are the only non recreation uses needed to maintain RO4 settings.

Overall the plan area can be included in two broadly based areas of recreational opportunity identified by the old Canterbury United Council.

a) Victoria Park Corridor - Sign of the Kiwi and Sugarloaf to Sign of the Takahe including Victoria Park RO2/RO3

The Victoria Park Corridor carries the greatest amount of traffic of any roadway on the Port Hills. Over a 24 hour period on a Sunday, recreation generated traffic on this stretch of road amounts to 52% of the total vehicle count. Victoria Park is also the second most important visitor destination on the Port Hills (after the Sign of the Kiwi), as well as being visited by 25% of visitors to the Port Hills as part of their journey.

b) Bowenvale Track to Castle Rock (Middle Summit Road including Scott Reserve) RO4

This area has been identified as offering a more remote type of recreation opportunity that is dependant on a 'natural' setting.

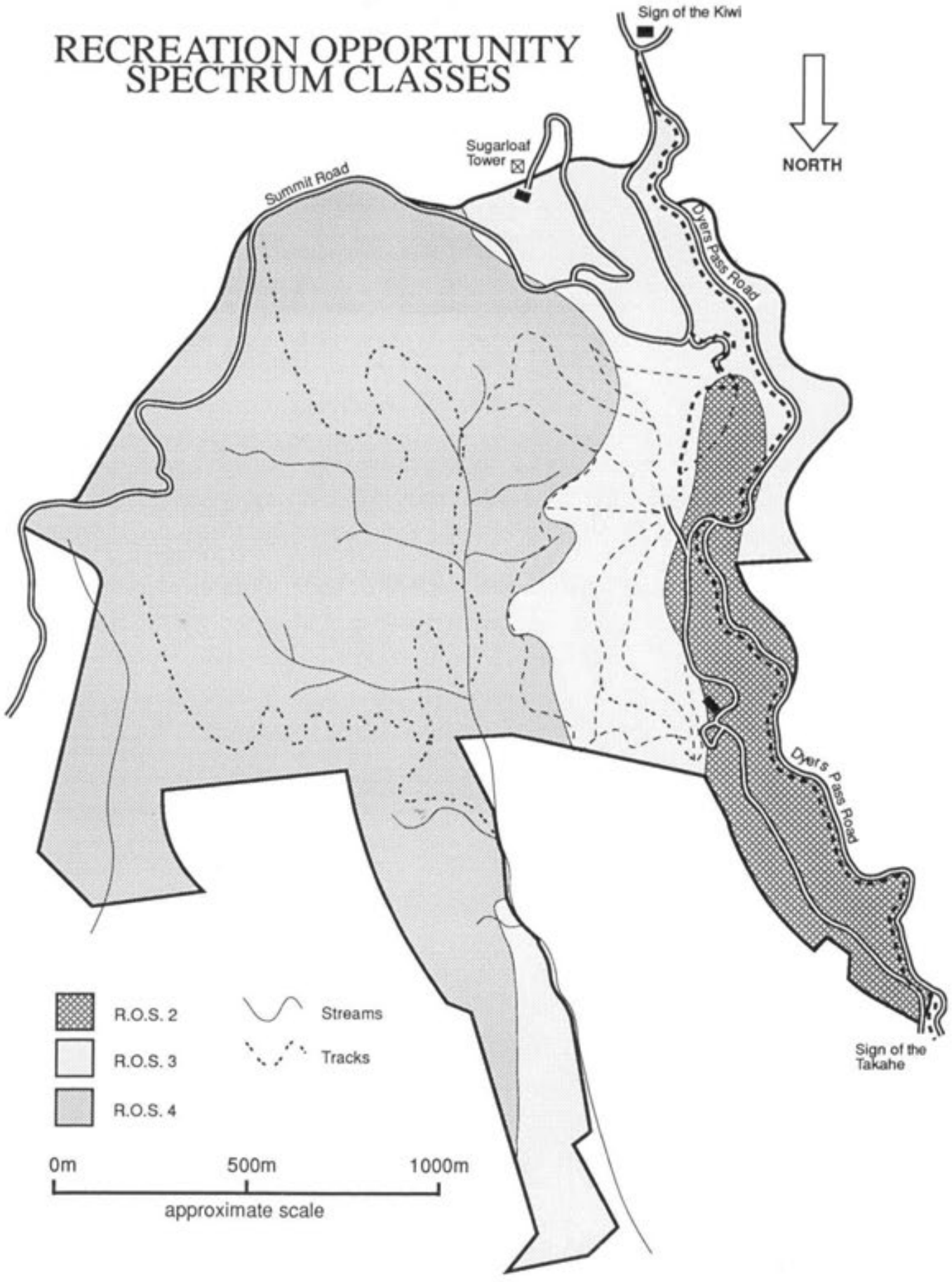
Overlaying the above system is the pedestrian circulation system of the management plan area which connects the different ROS classes of the parks. Transition between ROS classes is often gradual.

Vehicle circulation through and around the parks is also an important part of many people's recreation experience of the parks.

9.1 CIRCULATION NON MOTORISED

There is considerable demand for paths and tracks for walking, cycling/mountain biking, jogging and horse riding in the parks. These pursuits are often not compatible and some of them cause more damage to tracks than others depending on intensity of use.

Objective: 1 To provide a variety of routes for the use of different recreational groups; with walking being the dominant track use in the parks.


RECREATION OPPORTUNITY SPECTRUM CLASSES
Sign of the Kiwi
NORTH
Sugarloaf Tower
Summit Road
Dyers Pass Road
Dyers Pass Road
Sign of the Takahe
R.O.S. 2
R.O.S. 3
R.O.S. 4
Streams
Tracks
0m
500m
1000m
approximate scale

Policy:

1.1 The old Dyers Pass Road shall be extended to the Sign of the Kiwi (upon permission of the private land owner) as an exclusive route for mountain bikes /cycles.

Comment: A route is needed for mountain bikes down the Cashmere Spur to provide an alternative to mountain bike use of the main Victoria Park pedestrian routes and the Takahe - Kiwi walkway. An official route may also dissuade some people from using the Bowenvale tracks.

1.2 A trial loop track in Upper East Side Block shall be marked for the use of mountain bikes with access from Victoria Park Road and the Summit Road.

Comment: The above two tracks combined will allow a predominantly off road circular route up and down the Cashmere Spur. A trial period may be needed to evaluate the usefulness of the Upper East Side Block route.

1.3 Mountain bikes /cycles shall be allowed access to Huntsbury Spur track through Bowenvale, from the Summit Road.

1.4 Mountain bikes /cycles shall be prohibited from all other parts of the management plan area except for Victoria Park Road and a section of the proposed pony trail running parallel to the Summit Road between Victoria Park and Huntsbury track.

1.5 A route for a mountain bike trail shall be developed which links the Summit Road with Bowenvale Avenue. See map opposite for pro posed route.

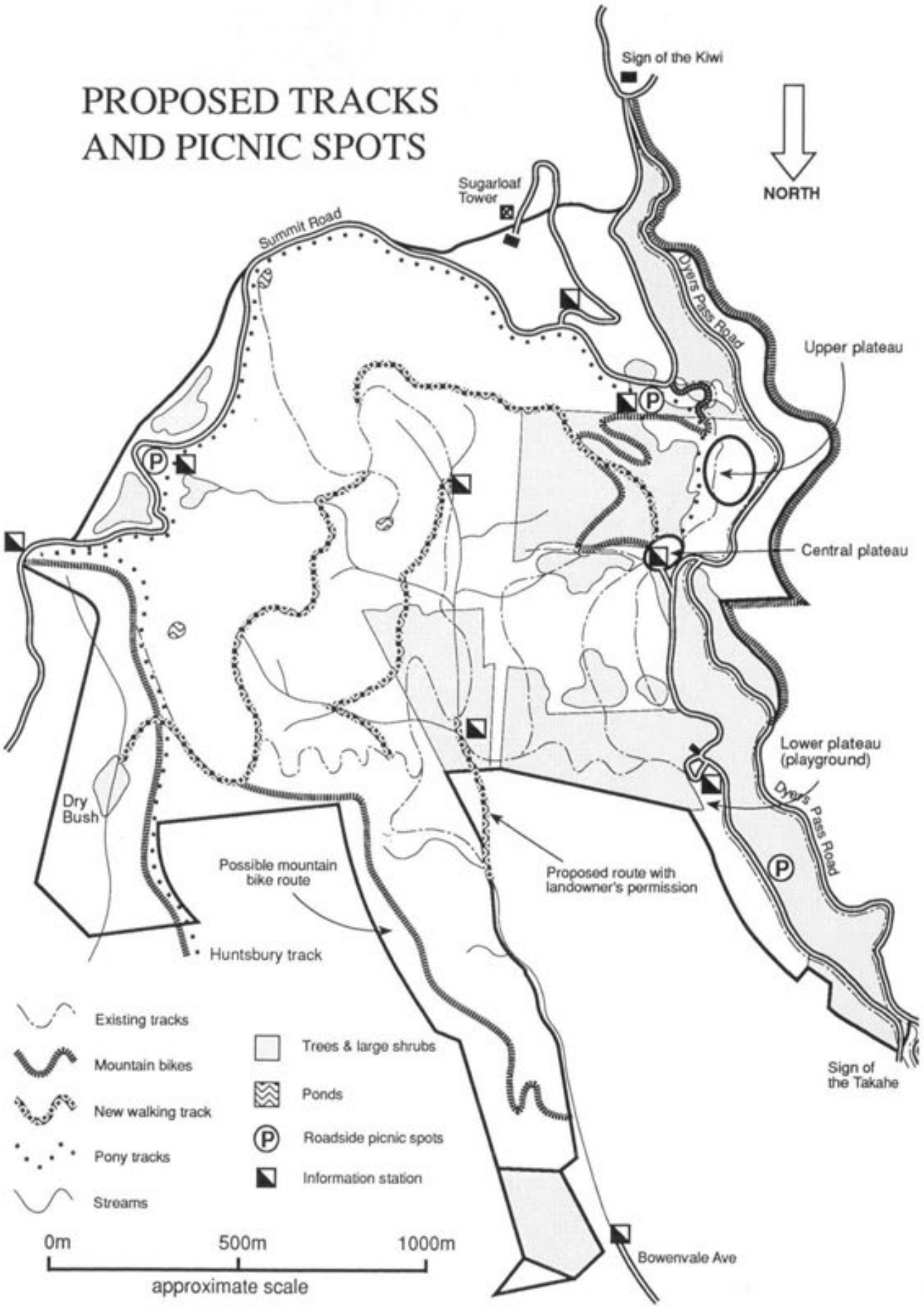
1.6 A new ridge line pony trail shall be developed from the central plateau to, the Summit Road then run parallel to the Summit road to meet up with the Huntsbury track.

Comment: Cross country pony riding is a traditional recreational use of the hill areas and especially Victoria Park. An off road track through Victoria, Thomson and Bowenvale Parks would provide a safe long distance ride for the many young people who participate in this recreational activity.

1.7 The feasibility of using existing tracks for pony/horse trails in Victoria and Elizabeth Parks shall be investigated.

1.8 The existing park walkway system shall be improved by the addition of:

A track running approximately along the 300m contour through the grasslands joining the top of Upper East Side Block with Dry Bush, and


PROPOSED TRACKS AND PICNIC SPOTS
Sign of the Kiwi
NORTH
Sugarloaf Tower
Summit Road
Dyers Pass Road
Upper plateau
Central plateau
Lower plateau (playground)
Dry Bush
Possible mountain bike route
Proposed route with landowner's permission
Huntsbury track
Sign of the Takahe
Bowenvale Ave
Existing tracks
Mountain bikes
New walking track
Pony tracks
Streams
Trees & large shrubs
Ponds
Roadside picnic spots
Information station
0m
500m
1000m
approximate scale

returning along the 200m contour (approximately) linking the wooded gullies and cutting across the present vertical configuration of the tracks.

Information signboards at key sites along the track network (see map).

Clearer signposting of track layout, directions and destinations.

Clear marking of the park boundaries with signs at all major park entrances.

Public access created along the Bowenvale Stream through private land to Bowenvale Park, either by purchase of the land or permission of the owner.

Comment: The small privately owned wedge of land situated across the Bowenvale Valley effectively cuts off the easiest route into the bulk of the Park area. The existence of a formed track parallel to the stream encourages the public to use this route even though it is on private land. Purchase of this land by Council would be the ideal solution to the problems created by the existing situation.

1.9 Narrowing a section of Victoria Park Road, introduction of a speed hump and creation of a formed footpath with associated planting shall be investigated as a means of improving pedestrian safety and access between the kiosk/car park area and the Mediterranean plant collection.

Comment: Pedestrian access from the car park area to the main plant display area is unfortunately via Victoria Park Road. Visibility on the road is reduced by two blind corners approximately 70m apart. Pedestrianisation of this area will improve the area's recreation and visual quality significantly.

9.2 CIRCULATION MOTORISED

Driving up the Victoria Park corridor and along the Summit Road is an important component of the public's recreation experience of the management plan area. This experience includes appreciation of the panoramic views, road side stops, varied roadside vegetation types and roadside memorials.

Objective: 1 To provide a varied and informative recreation experience for motorised users of authorised vehicle routes in the plan area.

Policy: 1.1 Public motorised access shall continue to be maintained to the Sugarloaf

public car park and along the private section of Victoria Park Road.

1.2 Widening of the access road to the Sugarloaf carpark for bus traffic shall be investigated

Comment: Bus access to Sugarloaf carpark is desirable to allow appreciation of views and a starting point for round Sugarloaf walks.

1.3 Private vehicles shall be permitted to use the access roads to the upper plateau and central plateau in Victoria Park for any organised events, displays, fairs etc that may be held at these sites at the discretion of the Parks Manager or Parks Manager's representative.

1.4 The rest of the management plan area shall be off limits to all unauthorised motorised vehicles.

Comment: Authorised motorised vehicles include Council and Council work related vehicles, fire fighting and emergency services, the vehicles of lessees involved in legitimate farm operations and vehicles connected with the Sugarloaf transmitter station on their leased area only.

1.5 Any cars dumped in the park area shall be removed by Council in accordance with Councils Abandoned Vehicle Procedures.

1.6 Roadside picnic sites with associated parking space shall be developed in Elizabeth Park, below Thomson Park car park and in Bowenvale between the two sections of Scott Reserve.

1.7 Information 'boards' shall be placed by prominant roadside stopping places to inform the public of significant park features.

9.3 VICTORIA PARK CORRIDOR RO2 /RO3

The RO2 classed parks (eg Elizabeth and parts of Victoria Park), have a modified outdoor environment with strong human influence and built features that is close to modified nature and urban influences. RO3 is further away from urban influences (eg Thomson Park, parts of Victoria Park, and Douglas Scenic Reserve) with less obtrusive manmade facilities in a rural landscape with exotic/indigenous vegetation.

Objective: 1 To provide for essential buildings and facilities that complement the more intensive recreation use activities of the RO2 area, but are still compatible with the wider park setting. To limit use in the RO3 area to

activities of a less intensive nature with allowance for low key built facilities. See ROS plan page 91.

Policy: 1.1 Controlled public access shall be made available to the three major Victoria Park plateaus for major public gatherings and displays with due regard given to the site limitations ie car parking, lack of toilet facilities.

Comment: The lower plateau especially has potential for summer time type activities. The upper plateau while offering a large area and spectacular views is limited by access problems and distance from the city.

1.2 The lower Victoria Park plateau shall be available for group picnics and community activities in addition to general passive recreation uses.

1.3 Coin operated gas or electric BBQ's shall be installed near the picnic shelters in Victoria Park.

Comment: These facilities have a very low associated fire risk and would be placed in a high profile area where they are likely to be well used.

1.4 The playground in Victoria Park shall be upgraded and the possibility of incorporating a tree house and army obstacle course type equipment appropriate for children shall be investigated.

1.5 All playground equipment shall be undersurfaced with an approved undersurfacing material to improve playground safety.

1.6 Three botanical nature trails shall be created in the RO2/RO3 area.

a) Through the Mediterranean climate region display on the western side of Victoria Park.

b) A short loop from the kiosk past the *Cupressus torulosa* stand and 19th Battalion Memorial to the rock outcrop and back to the kiosk.

c) A longer loop from the kiosk past the 19th Battalion Memorial down the eastern slope through the exotic conifer plantings and back to the kiosk.

1.7 Overnight/ weekend camping shall be allowed in the RO2 area for large groups of people at the discretion of the Parks Manager.

Comment: The most suitable area for group camps is the large open area of the Upper Plateau. This area is relatively isolated from the Summit Road and Dyers Pass Road but has provision for vehicle access. The only major disadvantage is lack of permanent toilets, but

this can be overcome with the use of Portaloos etc. Piped water is available on site. The Upper Plateau forms an ideal starting point for various Port Hills walks. The most suitable groups for this type of camping experience would be members of various youth groups such as Scouts and Guides. The Parks Manager's discretion is required to ensure that camping applicants are suitable and the resource is not overused.

1.8 Consent shall only be granted to erect sculptures or monuments in the RO2 zone in the following areas; Elizabeth Park, the Lower Plateau area, and the 19th Battalion Memorial Site where the following crite ria is fulfilled:

a) the siting should be such as to enhance the immediate environ ment and not be detrimental to the park functions

b) the design character and form should display high aesthetic quality

c) **monuments** shall have direct historical relevance to the Port Hills or relevance to the specific site for cultural or environmental reasons

9.4 RO4 AND RO3 AREAS

(BOWENVALE PARK, SCOTT RESERVE, DOUGLAS SCENIC RESERVE, THOMSON PARK AND PART VICTORIA PARK)

The RO4 area has an extensive area of open space relatively distant from the urban area (and in many valleys out of view of the city). The landscape is rural with large areas of remnant native vegetation (tussocks and shrubs). Recreation in this area is of a transient nature with more limited social interaction and generally smaller groups than the RO3 area. Formed tracks, styles and signage is generally unobtrusive.

Regeneration of native forest in the valleys will create a greater sense of isolation for park users of this zone by screening views of other park users and major built facilities.

Objective: 1 To encourage low key passive types of recreation activities in the R03/ 4 areas with low key built facilities such as toilets restricted to the R03 area.

Policy: 1.1 Three botanical nature trails shall be created through the R04 area.

a) Along the proposed 300m contour track and returning along the 200m contour to illustrate a range of vegetation types including cutover

revegetated pine forest, tussock grassland and indigenous forest.

b) A loop from the Summit Road to Dry Bush and back.

c) Up Hidden Valley to the east of the Bowenvale pine plantation past the proposed Port Hills native tree arboretum.

Nature trails shall use marked short posts approximately 600mm above ground level to mark points of interest and an associated illustrated guide.

Policy: 1.2 A small picnic area shall be developed in the lower Bowenvale Valley.

Policy: 1.3 Overnight/ weekend camping shall be allowed in the RO3/4 areas for small numbers of people from organised youth groups at specified sites at the discretion of the Parks Manager.

10.0 FIVE YEAR CAPITAL DEVELOPMENT PROGRAM

Obviously Council does not have the finance or physical resourses to implement all of the above policies immediately. Therefore a selection of significant policies have been grouped into catagories and prioritised within groups.

Note: Implementation of priorities is dependant on budgetary provision. In addition many policies will require futher detailed technical/ design imput before they can be implemented.

Policy Key; (S4A 1.2 p69 = Section 4A, Policy 1.2, page 69)

Vegetation	Comments
Planting & Monitoring	
1. Grassland transects (S4A 1.7 p70)	Monitor grazing levels (5 transects required)
2. Experimental planting (S4A 1.3 p69; S4B 1.3 p74)	Planting in grassland without fencing
3. Plant Dry Bush fenced area	Partially planted as part of a 1990 project
4. Bush Head Gully	6.7 ha to be planted, $7500/ha planted

Vegetation	Comments
Fencing & Planting	
1. Upper East Side Block (S4B 1.18-22 p82)	Phased revegetation of 18 ha.
2. Extend Bush Head Fencing (S4B 1.12 p79)	2.3 ha, 0.6 km fencing @ $10/m ($6000). Planting 1 ha $7500
3. Extend Dry Bush (S4B 1.6 p76)	16 ha, 0.25 km fencing @ $10/m = $2500. Staged planting of 5 ha @ $7500/ ha over 5 years.
4. Hidden Valley (S4B 1.8-9 p77)	2 km of fencing, $20,000
5. Lower Bowenvale Valley (S4B 1.4 p75)	1.5 km of fencing $15,000
Replacement Plantings	
1. Scott Reserve felling & plantings (S4B 1.11 p79)	Removal of young exotics & replace with kanuka etc
2. Edge felling &replanting Bowenvale pine plantation (S4B 1.10 p78)	
3. Soil conservation plantings, Bowenvale (S4C 1.3 p85)	
4. Dyers Pass Rd &firebreak (S7 1.2 p92)	Long term replacement program

Buildings & Structures	Comment
1. New Rangers house, Victoria Park (S8 1.1 p94)	$120,000
2. New toilets, Victoria Park (S8 1.2 p94)	$80,000
3. Toilet, Bowenvale Valley (S8 1.5 p95)	$80,000 Note siting problems

Recreation	Comment
1. Mountain bike track (Summit Rd-Bowenvale Ave), (S9.1, 1.5 p98)	Required urgently to reduce track user conflicts
2. Summit Pony/ Mountain bike track (S9.1, 1.4, 6 p98)	
3. 300m contour walking track (S9.1, 1.8 p98)	
4. BBQ's, Victoria Park (S9.3, 1.3 p102)	

Information/ Interpretation	Comment
1. Signpost major tracks (S9.1, 1.8 p100)	
2. Nature trails (S9.3, 1.6 p102 & S9.4, 1.1 p103)	
3. Information Stations (S9.1, 1.8 p100)	

Botanical Services Related Policies	Comment
1. Parkland Plantings (S4C p84-87)	These plantings are intended to complement the plantings in the Christchurch Botanic Gardens.
2. Botanical Plantings, Victoria Park (S4D p88-90)	

Appendix 1

Conifer species in Skellerup Park, 1990.

(from Sykes, 1990)

The total number of planted conifer species seen in Skellerup Park was 20. In the following list the first 7 names are of the most common species but only the first 3 were seen regenerating in or around Skellerup Park:-

Commonly planted and regenerating

Pinus contorta - contorta pine
Pinus pinaster - maritime pine
Pinus nigra subsp. laricio - Corsican pme

Commonly planted but not regenerating

Pinus radiata - radiata pine
Pinus halepensis - Aleppo pine
Pseudotsuga menziesii - Douglas fir
Cedrus atlantica - Alantic cedar

Uncommonly planted

Cedrus deodara - deodar
Pinus pinea - umbrella pine
Larix decidua - European larch
Picea abies - Norway spruce
Abies plnsapo - Spanish fir
Abies procera - noble fir
Cupressus arizonica - Arizona cypress
Cupressus macrocarpa - macrocarpa
Cupressus lusitanica - lusitanica cypress
Cupressus torulosa - Himalayan cypress
Chamaecyparis lawsoniana - Lawson's cypress
Thuja plicata - plicata thuya
Juniperus recurva - coffin juniper

List of broad-leaved woody plants amongst the conifer plantations of Skellerup Park

Eucalyptus obliqua
Eucalyptus ovata
Racosperma melanoxylon (syn. *Acacia melanoxylon),* blackwood

Arbutus unedo, strawberry tree, a few plants only.

Baccharis halimifolia, baccharis, 2 plants seen. This potentially noxious weed was supposedly eradicated from the Port Hills some years ago. It mainly grew just below Evans Pass.

Coprosma robusta, scattered through plantation

Cytisus scoparius, broom, abundant in light and open forest as well as around the margin in some places

Hebe species, occasional in open places

Olearia paniculata, a few plants where open amongst trees
Pseudopanax arboreus, Five finger, one or two plants seen

Ribes sanguineum, flowering currant, very common in places, otherwise scattered

Teline monspessulana, Montpellier broom, a few patches seen

Ulex europaeus, gorse, fairly common in a few places around the plantation margins.

Appendix 2

Management Plan Plant Species List (excluding Dry Bush)

Key

"Forest" refers to the pine plantation, "Bush" to the patches of native podocarp-hardwood forest, "Scrub" to areas of harakeke, scrub, scattered trees and gully tussock sedgelands (part B in text, section 8.3.2), "Grassland" to both the tussock grassland with shrubs and the adventive sward or turf grasslands (A in text, section 8.3.3), and "Rock" to the ledges, crevices, bluffs and boulderfields. Occurrences are quantified for each vegetation category as follows: "-" = not observed, "1" = rare, "2" = occasional, "3" = common, "4" = locally dominant, "5" = dominant. * = naturalised; not native.

VASCULAR PLANTS

Species	Forest	Bush	Scrub	Grassland	Rock
Acaena novae-zelandiae piripiri, biddibid	-	-	2	3	-
*Achillea millefolium** yarrow	-	-	-	2	1
Aciphylla subflabellata spaniard	-	-	-	2	1
Agropyron repens * couch, twitch	-	-	-	2	-
*Agrostis capillaris** browntop	-	-	3	3	-
*Aira caryophyllea** silvery hair grass	-	-	-	-	1
Alectryon excelsum titoki	-	1	-	-	-
Anogramma leptophylla annual fern, jersey fern	-	-	-	-	1
*Anthoxanthum odoratum** sweet vernal	-	-	-	3	1
Aphanes inexspectata * parsley piert	-	-	-	-	1
Arthropodium candidum star lily, grass lily	-	-	-	-	1
Asplenium bulbiferum gracillimum hen and chickens fern	1	2	-	-	-
Asplenium flabellifolium necklace fern	2	-	-	-	2
Asplenium hookerianum	-	-	-	-	1

Species	Forest	Bush	Scrub	Grassland	Rock
Asplenium terrestre	-	-	-	-	2
Astelia fragrans bush lily, kakaha	-	1	-	-	-
Blechnum fluviatile kiwakiwa	1	-	-	-	-
Blechnum penna-marina little hard fern	2	-	-	-	-
Brachyglotis sciadophila climbing groundsel	-	1	-	-	-
*Bromus diandrus** ripgut brome	-	-	-	-	2
*Bromus mollis** soft brome	-	-	-	3	-
*Buddleja **	-	-	-	-	1
*Callitriche stagnalis ** water starwort	-	-	-	1	-
Calystegia tuguriorum NZ bindweed, pohue	-	-	2	2	-
Cardamine debilis NZ bittercress	2	-	-	-	-
*Carduus pycnocephalus** slender winged thistle	-	-	-	2	-
Carex colensoi NZ sedge	-	-	-	2	-
Carex forsteri NZ sedge	1	-	-	-	-
Carex resectans NZ sedge	1	-	-	-	-
Carex solandri NZ sedge	-	1	-	-	-
Carex virgata tussock sedge	-	-	4	-	-
Carmichaelia arborea NZ broom	-	-	4	3	2
*Cerastium fontanum** mouse-ear chickweed	-	-	-	2	2
*Cerastium glomeratum** annual mouse-ear chickweed	-	-	-	1	1
Cheilanthes distans woolly cloak fern	-	-	-	-	2
Cheilanthes humilis rock fern	-	-	-	-	2
*Cirsium vulgare** spear thistle, scotch thistle	-	-	-	2	-
*Claytonia perfoliata ** minors lettuce	-	3	-	-	-

Species	Forest	Bush	Scrub	Grassland	Rock
Clematis foetida yellow clematis	-	1	-	-	-
Colobanthus strictus	-	-	-	-	1
Conium maculatum * hemlock	-	-	-	1	-
Conyza albida * fleabane	-	-	-	-	2
Coprosma areolata	-	1	-	-	-
Coprosma crassifolia mikimiki	1	2	3	1	2
Coprosma linariifolia yellow-wood	-	1	-	-	-
Coprosma lucida karamu	-	-	-	-	1
Coprosma propinqua mikimiki	-	2	3	-	1
Coprosma propinqua x robusta hybrid karamu	1	1	-	-	-
Coprosma rhamnoides mikimiki	-	1	-	-	-
Coprosma robusta karamu	-	3	3	-	2
Coprosma rotundifolia	-	1	-	-	-
Coprosma sp. 't' mikimiki	-	-	1	-	-
Coprosma virescens mikimiki	-	-	1	-	-
Cordyline australis cabbage tree, ti kouka	-	-	3	-	1
Coriaria arborea tree tutu	-	-	1	-	-
*Cotula australis** soldier's button	1	-	-	2	-
Crassula sieberiana	-	-	-	-	3
*Crepis capillaris** hawksbeard	-	-	2	2	-
*Cynosurus cristatus** crested dogstail	-	-	2	3	-
*Cynosurus echinatus** rough dogstail	-	-	2	2	1
*Cytisus scoparius** broom	-	-	1	1	-
Dacrycarpus dacrydioides kahikatea	-	1	-	-	-

Species	Forest	Bush	Scrub	Grassland	Rock
Dactylis glomerata * cocksfoot	-	-	3	4	1
Dichelachne crinita plume grass	-	-	1	2	2
Dichondra cf brevifolia	-	-	-	1	-
Dichondra repens	-	-	2	2	-
*Digitalis purpurea** foxglove	-	-	-	1	-
Discaria toumatou matagouri, tumatakuru	-	-	2	1	3
*Dryopteris filix-mas** male fern	3	-	-	-	-
Elymus rectisetus (NZ races) blue wheat grass	-	-	1	2	2
*Elymus rectisetus** *(Aust.* race) Australian wheat grass	1	-	-	3	-
Epilobium atriplicifolium willowherb	-	-	-	1	-
Erodium cicutarium * storksbill	-	-	-	2	-
*Erodium moschatum** musky storksbill	-	-	-	1	2
*Euonymus europaeus** spindleberry	2	-	2	-	-
Festuca novae-zelandiae fescue tussock, hard tussock	-	-	-	2	2
Festuca rubra commutata * chewings fescue	-	-	-	2	2
*Foeniculum vulgare** fennel	-	-	-	1	1
Fuchsia x colensoi shrubby fuchsia, hybrid fuchsia	2	-	2	-	-
Fuchsia excorticata fuchsia, kotukutuku	-	1	-	-	-
*Galium aparine** cleavers	-	-	2	2	-
Geranium microphyllum	-	-	-	-	1
Geranium molle * dovesfoot cranesbill	-	-	-	2	-
Geranium sessiliflorum	-	-	-	-	1
Gnaphalium audax cudweed	2	-	-	2	-
Griselinia littoralis broadleaf, papauma	-	3	2	-	2

Species	Forest	Bush	Scrub	Grassland	Rock
Hebe salicifolia koromiko	-	-	1	-	-
Helichrysum filicaule	-	-	-	1	1
Histiopteris incisa water fern, matata	1	-	-	-	-
Hoheria angustifolia narrow-leaved lacebark	-	1	-	-	-
*Holcus lanatus** Yorkshire fog	-	-	2	3	-
Hydrocotyle elongata pennywort	-	1	-	-	-
Hydrocotyle moschata pennywort	2	-	-	-	1
Hydrocotyle sp. ('montana') pennywort	-	-	-	1	-
Hypericum gramineum	-	-	-	-	1
Hypochoeris radicata * catsear	-	-	-	3	2
Hypolepis ambigua	2	-	-	-	-
Ileostylus micranthus mistletoe	-	2	-	-	-
Juncus australis NZ rush, wiwi	-	-	1	2	-
Juncus distegus NZ rush, wiwi	1	-	-	3	-
*Juncus effusus** soft rush	-	-	-	1	-
Juncus gregiflorus NZ rush, wiwi	-	-	2	3	-
Korthalsella lindsayi dwarf mistletoe	-	1	-	-	-
Kunzea ericoides kanuka	-	-	2	-	-
Lachnagrostis richardii windgrass	-	-	-	-	2
Lagenifera pumila	-	-	-	1	-
*Lepidium desvauxii** bushy peppercress	-	-	-	1	-
Leptinella minor	-	-	-	1	-
Libertia ixioides mikoikoi, NZ iris	-	-	-	-	3
Lophomyrtus obcordata	-	1	-	-	-

Species	Forest	Bush	Scrub	Grassland	Rock
Luzula banksiana orina NZ woodrush	-	-	-	-	3
*Marrubium vulgare** horehound	-	-	-	1	2
Melicope simplex poataniwha	-	2	-	-	2
Melicytus alpinus porcupine shrub	-	-	1	-	1
Melicytus micranthus small-leaved mahoe	-	1	-	-	-
Melicytus ramiflorus mahoe	1	4	3	-	2
Microtis unifolia onion orchid	-	-	-	1	-
*Montia fontana chondrosperma** dwarf montia	-	-	-	1	-
Muehlenbeckia australis pohuehue	2	2	1	-	1
Muehlenbeckia complexa scrub pohuehue	-	-	3	2	3
Myoporum laetum ngaio	-	1	-	-	-
Myrsine australis mapou	-	3	2	-	-
Mysine divaricatum weeping mapou	-	1	-	-	-
Nasella trichotoma * nasella tussock	1	-	-	-	-
Olearia paniculata akiraho	1	-	2	-	-
Oxalis exilis yellow oxalis	1	-	-	2	2
Oxalis rubens yellow oxalis	-	-	-	-	1
Parsonsia capsularis NZ jasmine, akakaikiore	-	1	-	-	-
Parsonsia heterophylla NZ jasmine, akakaikiore	-	1	-	-	-
Passiflora tetrandra NZ passion vine, kohia	-	1	-	-	-
Pellaea rotundifolia	-	1	-	-	-
Pennantia corymbosa kaikomako	-	1	-	-	-
Phormium tenax harakeke, NZ flax	-	-	5	2	1
Phymatosorus diversifolius hounds tongue fern, kowaowao	-	1	-	-	-

Species	Forest	Bush	Scrub	Grassland	Rock
*Pinus radiata** Monterey pine	5	-	1	1	1
Pittosporum eugenioides lemonwood, tarata	-	1	-	-	-
Pittosporum tenuifolium kohuhu	1	3	3	-	2
Plagianthus regius manatu, lowland ribbonwood	-	3	1	-	-
Poa annua * annual poa	-	-	-	-	1
Poa cita silver tussock	-	-	4	5	1
Poa matthewsii Matthew's poa	-	-	-	1	-
*Poa pratensis** meadow poa	-	-	-	2	-
Podocarpus totara lowland totara	-	1	-	-	-
Polycarpon tetraphyllum * allseed	-	-	-	-	1
Polystichum richardii	-	2	2	-	3
Polystichum vestitum prickly shield fern	-	1	-	-	-
Populus sp. * poplar	-	-	1	-	-
Prumnopitys taxifolia matai	-	1	-	-	-
Pseudopanax arboreus fivefinger	1	2	2	-	1
Pteridium esculentum bracken	-	-	3	2	4
Pterostylis graminea greenhood orchid	-	-	-	1	-
Ranunculus reflexus bush buttercup	-	-	-	-	1
*Ranunculus repens** creeping buttercup	-	-	-	1	-
*Ribes sanguineum** flowering currant	2	-	3	1	2
*Rosa rubiginosa** sweet brier	-	-	1	-	-
Rubus cissoides bush lawyer, tataramoa	-	1	-	-	-
*Rubus procerus** blackberry	-	-	1	-	-
Rubus schmidelioides bush lawyer, tataramoa	-	1	1	-	-

Species	Forest	Bush	Scrub	Grassland	Rock
Rubus squarrosus leafless lawyer	-	-	1	-	-
*Rumex acetosella** sheeps sorrell	-	-	-	2	2
*Rumex crispus** curled dock	-	-	2	-	-
*Rumex pulcher** fiddle dock	-	-	-	2	-
Rytidosperma clavatum danthonia	-	-	-	2	-
*Rytidosperma racemosum** danthonia	1	-	-	-	2
Rytidosperma unarede danthonia	-	-	-	1	-
*Sambucus nigra** elderberry	2	-	3	-	2
Scandia geniculata climbing aniseed	-	-	1	-	-
Scirpus nodosus	-	-	-	1	-
*Sedum acre** stonecrop	-	-	-	-	2
Senecio glaucophyllus basinudus NZ groundsel	-	-	-	-	1
Senecio glomeratus NZ groundsel	-	-	-	2	1
Senecio quadridentatus NZ groundsel	-	-	-	1	1
Senecio wairauensis NZ groundsel	-	-	-	1	-
Silene gallica * catchfly	-	-	-	1	2
Silybum marianum * variegated thistle	-	-	-	2	-
*Sisymbrium officinale** hedge mustard	-	-	2	2	-
*Solanum chenopodioides** velvety nightshade	-	-	-	-	1
Solanum laciniatum poroporo	2	2	3	-	-
Solanum nigrum * black nightshade	1	-	-	-	-
*Solenogyne gunnii** rayless daisy	-	-	-	2	-
*Sonchus asper** prickly puha, prickly sowthistle	-	-	-	-	1
*Sonchus oleraceus** puha, sowthistle	1	-	-	1	2

Species	Forest	Bush	Scrub	Grassland	Rock
Sophora microphylla kowhai	-	1	2	-	-
Sophora prostrata prostrate kowhai	-	-	1	1	4
Stellaria decipiens NZ chickweed	-	1	-	-	-
*Stellaria media** chickweed	-	-	-	1	1
Streblus heterophyllus turepo, small-leaved milk tree	-	1	-	-	-
*Stuartina muelleri** spoon-leaved cudweed	-	-	-	-	2
*Taraxacum officinale** dandelion	-	-	1	-	-
Teline monspessulana * Montpelier broom	-	-	2	-	-
Trifolium dubium * suckling clover	-	-	-	2	-
*Trifolium glomeratum** clustered clover	-	-	-	2	-
Trifolium repens * white clover	-	-	-	2	-
*Trifolium striatum** striated clover	-	-	-	1	-
*Trifolium subterraneum** subterranean clover	-	-	-	1	-
Tupeia antarctica mistletoe	-	1	-	-	-
*Ulex europaeus** gorse	1	-	2	1	-
Uncinia leptostachya hooked sedge	-	1	-	-	-
Urtica ferox ongaonga, tree nettle	-	2	1	-	1
*Verbascum thapsus** woolly mullein	-	-	-	1	2
*Veronica arvensis** field speedwell	-	-	-	1	-
*Vicia sativa** vetch	-	-	1	2	1
*Vulpia bromoides** squirrel-tail fescue	-	-	-	1	1
Wahlenbergia gracilis harebell	-	-	-	3	1

CRYPTOGAMIC PLANTS (M = moss, H = hepatic, liverwort, L = lichen, F = fungus)

Species	Forest	Bush	Scrub	Grassland	Rock
Bartramia papillata M	-	-	-	-	2
Breutelia affinis M	-	-	-	-	2
Bryum argenteum M	-	-	-	-	2
Caloplaca spp. L	-	-	-	-	2
Candelariella vitellina L	-	-	-	-	1
Cladonia spp. L	-	-	-	2	-
Frullania sp. H	-	-	-	-	2
Grimmia elongata M	-	-	-	-	2
Grimmia pulvinaris M	-	-	-	-	2
Hypnum cupressiforme M	-	-	-	-	1
Ileodictyon cibarium F basket fungus	-	2	-	2	-
Lecanora atra L	-	-	-	-	3
Lecanora blanda L	-	-	-	-	2
Lembophyllum divulsum M	-	-	2	-	1
Lophocolea sp. H	-	-	-	-	1
Lunularia cruciata H	1	-	-	-	-
Neofuscelia spp. L	-	-	-	-	3
Parmelia spp. L	-	-	-	-	3
Parmotrema spp. L	-	-	-	-	3
Pertusaria sp. L	-	-	-	-	3
Physcia caesia L	-	-	-	-	2
Polytrichum juniperinum M wire moss	-	-	-	-	2
Pseudocyphellaria crocata L	-	-	-	-	2

Species	Forest	Bush	Scrub	Grassland	Rock
Pseudocyphellaria delisea L	-	-	-	-	2
Ramalina sp. L	-	-	3	-	-
Rhizocarpon geographicum L map lichen	-	-	-	-	2
Rhynchostegium laxatum M	2	-	-	-	-
Rinodina thiomela L	-	-	-	-	2
Suillus .? luteus F sticky bun fungus	2	-	-	-	-
Targionia sp. H	-	-	-	-	1
Teloschistes chrysophthalmus L	-	-	1	-	1
Teloschistes velifer L	-	-	2	-	2
Thuidium furfurosum M	-	-	-	-	1
Trentepohlia iolithus Alga	-	-	-	-	1
Triquetrella papillata M	-	-	-	-	1
Usnea sp. L	-	-	-	-	1
Xanthoparmelia mougeotina L	-	-	-	-	2
Xanthoparmelia spp. L	-	-	-	-	2
Xanthoria .?ligulata L	-	-	-	-	1

Appendix 3

Indigenous Plants Recorded From Dry Bush 1870-1975

Forest Trees

Alectryon excelsum
Aristotelia serrata
Carpodetus serratus
Fuchsia excorticata
Griselinia littoralis
Leptospermum scoparium
Mysine australis
Paratrophis mircrophylla
Pittosporum eugenioides
Dacrycarpus dacrydioides
Podocarpus ferrugineus
Podocarpus spicatus
Podocarpus totara
Pseudopanax arboreus
Pseudopanax crassifolius
Pseudopanax simplex
Sophora tetraptera

Shrubs And Small Trees

Carmichaelia australis (?)
Carmichaelia juncea (?)
Carmichaelia violacea
Coprosma areolata
Coprosma crassifolia
Coprosma lucida
Coprosma parviflora
Coprosma propinqua
Coprosma spathulata(?)
Coprosma rhamnoides
Coprosma robusta
Coprosma rotundifolia
Coprosma virescens
Cordyline australis
Coriaria arborea
Corokia cotoneaster
Discaria toumatou
Fuchsia colensoi
Haloragis erecta
Hebe colensoi (?)
Hebe salicifolia
Helichrysum aggregatus
Hoheria angustifolia
Hoheria populnea
Kunzea ericoides
Macropiper excelsum
Melicope simplex
Melicytus micranthus
Melicytus ramiflorus
Myoporum laetum
Myrsine divaricata
Myrtus obcordata
Olearia arborescens
Olearia paniculata
Pennantia corymbosa
Pittosporum colensoi
Pittosporum tenuifolium
Plagianthus betulinus
Pseudowintera axillaris
Sophora microphylla
Teucridium parvifolium
Urtica ferox

Parasites

Loranthus micranthus
Korthalsella lindsayi
Tupeia antarctica

Lianes

Clematis paniculata
Clematis foetida
Clematis afoliata
Convolvulus tuguriorum
Metrosideros fulgens
Muehlenbeckia australis
Muehlenbeckia complexa
Parsonia capsularis var rosea
parsonia heterophylla
Rubus australis (?)
Rubus cissoides
Rubus schmidelioides
Rubus squarrosus
Passiflora tetrandra

Herbaceous Plants

Acaena anserinifolia
Acaena novae-zelandeae
Aciphylla suflabellata
Angelica montana
Astelia fragrans
Cardamine debilis
Carex diandra
Carex forsteri
Carex solandri
Carex ternaria (?)
Carex virgata
Colobanthus sp
Dichondra repens
Epilobium alsinoides subsp atriplicifolium
Epilobium macropus
Epilobium nummularifolium
Epilobium pallidiflorum
Epilobium rotundifolium
Ceranium dissectum (?)
Geranium microphyllum
Geum urbanum
Hydrocotyle moschata
Hydrocotyle novae-zealandiae
Hydrocotyle distegus
Hydrcotyle effusus
Hydrocotyle sp
Libertia ixioides
Luzula banksiana var orina
Montia fontana
Oxalis corniculata
Pelargonium inodorum
Phormium tenax
Poa cita
Poa sp
Pterostylis graminea var rubricaulis
Ranunculus pinguis (?)
Scandia geniculata
Senecio glomeratus
Senecio quadridentata
Senecio sciadophilus
Senecio wairauensis
Solanum laciniatum
Stipa arundinacia
Tillaea sieberiana
Uncinia leptostachya
Uncinia sp
Wahlenbergia gracilis

Ferns

Asplenium bulbiferum
Asplenium flaccidum
Asplenium flabellifolium
Asplenium hookerianum
Blechnum 'capense'
Blechnum fluviatilis
Blechnum penna-marina
Ctenitis decomposita
Pellaea rotundifolia
Polystichum richardii
Polystichum vestitum
Pteridium aquilinum
Phymatodes diversifolia
Pyrrosia serpens

Mosses

Bryum truncorum
Campylopsis introflexus
Camtochaete ramulosa
Ceratodon purpureus
Cratoneuropsis relaxa
Dicranum (?Dicranoloma) dicarpum
Funaria hygrometrica
Homalia pulchella
Leucobryum candidum
Macromitrium erosulum
Polytricum sp.

Lichens

Sticta latiflorus
Sticta filicina

Fungi

Agaricus campestris
Geaster fimbriatus
Lycoperdon novae-zealandiae
Polyporus sp

Appendix 4

Fire Resistant Native & Exotic Plants

Native Plants

Carmichaelia spps
Coprosma robusta
Cordyline australis
Corokia spps
Fuchsia excorticata
Griselinia littorialis
Hebe salicifolia
Melicytus ramiflorus
Myoporum laetum
Phormium tenax
Pittosporum eugenioides
Pittosporum tenuifolium
Pseudopanax arboreus

Exotic Plants

Acacia baileyana
Acacia dealbata
Acacia melanoxylon
Acacia pravissima
Acacia prominens
Acacia salignus
Achillea
Agave
Aloe
Atriplex canescens
Atriplex semibaccata
Banksia marginata
Brachychiton populneus
Campsis grandiflora
Campsis radicans
Carprobrotis edulis
Convolvulus cneorum
Cistus spps
Eucalyptus alpina
Eucalyptus lehmanii
Eucalyptus maculata
Eucalyptus pauciflora
Gazinia spps
Hakea salcifolia
Hakea suaveolens
Hedera spp
Heteromeles
Langunaria Pattersonii
Melia azedarach 'Australasica'
Mesembryanthemum spps
Myoporum insulare
Nerium oleana
Pelargonium vars
Osteospermum fruiticosm
Santolina spp
Schinus molle
Schinus terebinthifolius
Teucrium chamaedrys
Vinca spp
Yucca filamentosa

Appendix 5

Indigenous Plants Suitable For Planting In The Plan Area

The following list includes a number of native species indigenous to the area which are suitable for planting in the Bowenvale Valley. Please note that all plants will establish more readily if water is applied over the first few years, they are provided with shelter and they are kept clear of competing grass

Wet & Damp Shady Sites, Seepages

Cordyline australis	cabbage tree
Dacrycarpus dacrydioides	kahikatea
Phormium tenax	flax
Plagianthus regius	manatu

Sheltered Gully Sites

Alectron excelsum	titoki*
Aristotelia serrata	wineberry
Carpodetus serratus	putaputaweta
Coprosma robusta	karamu
Cordyline australis	cabbage tree
Elaeocarpus hookerianus	pokaka
Fuchsia x colensoi	shrubby fuchsia
Fuchsia excorticata	native fuchsia*
Griselinia lucida	shining broadleaf
Griselinia littoralis	broadleaf
Hedycarya arborea	pigeonwood
Lophomyrtus obcordata	rohutu
Macropiper excelsum	kawakawa*
Melicytus ramiflorus	mahoe
Myrsine australis	mapou
Pittosporum eugeniodes	lemonwood
Pittosporum tenuifolium	kohuhu
Podocarpus totara	totara
Prumnopitys taxifolia	matai
Pseudopanax arboreus	fivefinger

Drier Sites

Dodonaea viscosa	ake ake
Hoheria angustifolia	narrow leaf
	lacebark
Kunzea ericoides	kanuka
Myoporum laetum	ngaio
Sophora microphylla	kowhai

Dry Exposed Sites

Kunzea ericoides	kanuka
Olearia paniculata	akiraho
Helichrysum aggregatum	shrub helichrysum
Sophora prostrata	prostrate kowhai
Corokia cotoneaster	corokia

* = frost tender

To appear natural plantings should be of mixed species planted on ecologically suitable sites. Generally, forested areas have shrub species on their margins. On the Port Hills aspect and shelter have a dominant influence on species establishment and thus composition

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