

MT. LEURA AND MT. SUGARLOAF
LANDSCAPE MASTER PLAN
AND
MANAGEMENT PLAN
REPORT



PREPARED FOR
MT. LEURA ADVISORY COMMITTEE
TOWN OF CAMPERDOWN



Jointly funded by the
National Trust of Australia (Victoria)
and the Town of Camperdown.

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EXECUTIVE SUMMARY

AIMS

The Landscape Master Plan for Mt Leura and Mt Sugarloaf Reserves prepared by Thomson Hay & Associates aims to enhance the visual, recreational, educational, cultural and environmental qualities of the reserves through sensitive revegetation and the provision of appropriate facilities.

The Master Plan is a graphic representation of the vision statement prepared by the Mt Leura Advisory Committee and presents an "ideal" plan of the reserves in 50 to 80 years time when the vegetation is maturing.

REVEGETATION AND FACILITIES

The layout of the indigenous vegetation portrayed in the Master Plan is based upon research into the floristic structure of the vegetation of Mt Leura and Mt Sugarloaf before European settlement. There are three important themes within the revegetation strategy:

- The use of indigenous species.
- The re-establishment of the indigenous vegetation as close as possible to the structure of that which existed over the reserves prior to settlement.
- The establishment and management of indigenous vegetation in a manner which will ensure that the vegetation community becomes self-sustaining as quickly as possible, therefore minimising management inputs and achieving an environment that is more natural in appearance and condition.

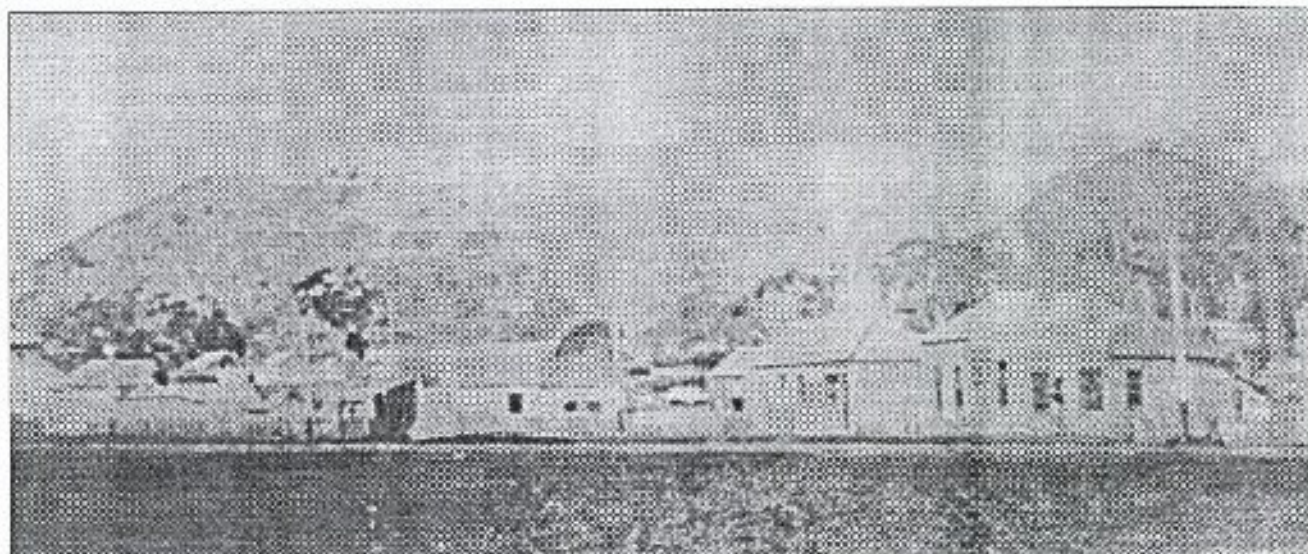
The revegetation strategy proposed for the reserves will see the planting of around 35,000 trees and shrubs over approximately seven years. The community will undertake an annual planting program averaging 5,000 trees per year to achieve this goal. Seedlings will be raised by the community from seed collected in the local area. The seedlings will be planted at a higher density than required to minimise management inputs in the short term.

Processes of forest succession will see the planted vegetation thin out naturally over time.

This process will be assisted by the management authority through periodic and gradual thinning of the trees in order to ensure that the final density of the woodland is maintained on average at 30% projective foliage cover (PFC). This is the estimated average density of the woodlands which are believed to have existed over the reserves at the time of European settlement.

The vegetation communities of the lower slopes will consist of open forests with a PFC of up to 60%. This forest will thin out to an open woodland as altitude increases, to the extent that the upper slopes and ridgelines will be vegetated with woodlands of 10 to 20% PFC.

The provision of an extensive network of walking tracks, of various standards, and the appropriate siting of new car parks will improve access to all parts of the Mt Leura and Mt Sugarloaf reserves, enhancing the opportunity for active and passive recreation.



Mt. Leura and Camperdown in the 1850's. Remnants of the original Manna Gum and Drooping She-oak woodland which once covered Mt. Leura can be seen in this photograph. The aim of the Mt. Leura and Mt. Sugarloaf Master Plan and Management Plan is to re-establish this woodland ecosystem over the next 50 to 100 years.

Facilities such as a visitor information centre, information signs, seating, tables, BBQ's, toilet facilities and picnic shelters, sited at various strategic locations throughout the reserves, provide the necessary facilities to enable visitors to stay within the reserves for extended periods of time.

In order to effectively implement the Landscape Master Plan, there are a number of issues which must be addressed by the Shire of Corangamite and the National Trust in relation to management structures and community ownership of the project.

IMPLEMENTATION

The implementation of the Master Plan will rely upon the long-term dedication of the Camperdown community as there will be many thousands of hours of volunteer work required to see the Master Plan through to fruition.

The project is an extremely worthwhile community project which will provide many benefits to the local and regional environment and the local and national community. There should be many opportunities for government funding for the project at State and Federal levels due to these benefits.

SPECIFIC RECOMMENDATIONS

The Master Plan and Management Plan report recommends the following in relation to these issues:

- ✓ That a Special Committee of Council be established to guide the implementation of the Master Plan and manage the reserves in the long term.
- ✓ That the Special Committee be known as "The Mt. Leura and Mt. Sugarloaf Re-development Committee".
- ✓ That the current Advisory Committee be maintained to play a temporary "steering role" until the Mounts Leura and Sugarloaf Re-development Committee is established.
- ✗ That a "Friends of Mt. Leura" group be instigated as a community based organisation to provide support to the Special Committee of Council in terms of labour for working bees etc.
- ✓ That the Committee should have a membership of 7 people, appointed by Council as specified in the recommendations prepared by the Advisory Committee.

- That an annual administration budget of at least \$5,000.00 be available to the Committee of Management.
- That the Committee seek funding for and appoint a project manager/ranger.
- That a Master Plan be developed for the Showgrounds to resolve site planning issues associated with providing access to the proposed Lower Car Park and visitor facilities for Mt. Leura; facilities sharing between the two recreational resources; and landscape amenity in general. Land tenure issues associated with the Showgrounds should be resolved before this process.
- That the lower slopes of Mt. Leura on the east and south sides be purchased in the long term and revegetated in accordance with the Master Plan to provide continuity to the form of the landscape.
- That a community design competition be held to design a logo for the reserves to be used on all signs, information boards, furniture and fittings etc. ✓
- ✗ That an architect be engaged to design the Visitor Information Centre under the guidelines provided in the Master Plan report.
- That trials be established on the reserves to research appropriate techniques for encouraging the spread of native grasses and grassland species throughout the reserves and controlling introduced grasses.
- The management and control of the reserves shall be subject to a joint investigation by the Council and the National Trust.

PART 1:

INTRODUCTION

1.1 INTRODUCTION

The Mt. Laura and Mt. Sugarloaf Reserves are important parcels of public land within the Camperdown district due to their significant landscape features of Mounts Laura and Sugarloaf, and their recreational, environmental and tourism potential. The reserves are in close proximity to Camperdown and particularly the Showgrounds and the Laura Oval Recreational Reserve.

The Mt Laura Reserve covers an area of 28 acres (11.3 ha). The reserve was a gift from the Manifold Brothers, who transferred the title to the Shire of Hampden in January 1899. The Manifolds selected vast tracts of the Camperdown district, and were significant players in the development of the Camperdown district. When the Town of Camperdown was established in 1953, the reserve became the property of the Town Council. The Mt Laura Reserve has been developed over the years to provide vehicle access to the summit of Mt Laura by way of a sealed access road and car park. The reserve is predominantly covered with Cypress and Pine trees, which due to their age are in a poor state of health and are a significant management problem. Grazing has been excluded from the Mt. Laura Reserve for the past 30 years.

The Mt. Sugarloaf Reserve covers an area of 96 acres (38.8 ha) and includes the once perfect cone of Mt Sugarloaf, the crater between Mounts Sugarloaf and Laura, the former quarry site and several acres of adjoining land. The quarry on the west face of Sugarloaf has spoilt the perfect cone shape when viewed from westerly directions, and the planting which has been undertaken to screen the quarry has further disrupted the natural shape of the cone.

The Mt. Sugarloaf Reserve is owned by the National Trust of Australia (Victoria) and is leased to a local farmer who runs cattle on the land. This lease expires in 1996. The reserve was privately owned until 1972 when the National Trust took

possession following a significant conservation battle during the 1960's to save Mt Sugarloaf from quarrying.

The National Trust's citation for the reserve reads in part *"Sugarloaf was preserved for the Nation as the best example of a scoria cone in the Western District, remarkable for its symmetry of form, its position close to the existing Mount Laura Reserve and its scenic importance to the Town of Camperdown and the people of Victoria....."*

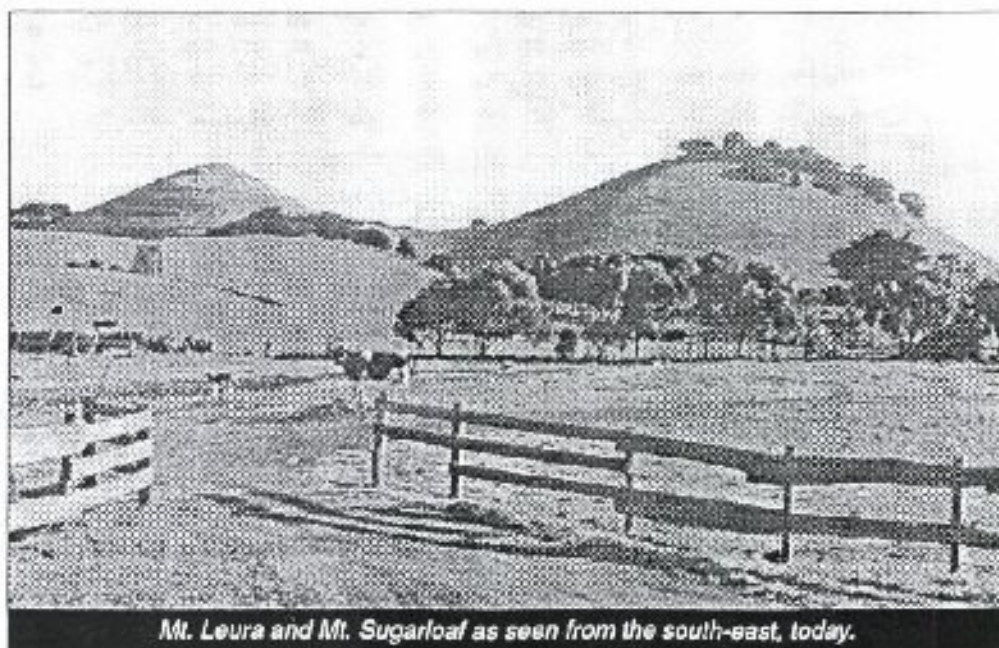
The former quarry site is an area of concern to the Town of Camperdown and the National Trust due to landscape amenity, public safety and erosion issues.

1.2 BACKGROUND TO THE PROJECT

In early 1991, the Town of Camperdown Council set up an Advisory Committee to guide and direct the development of a long-term Management Plan for the Mount Laura Reserve.

The Committee comprised:

- Three Councillors,
- One Town of Camperdown staff member (Senior Parks Officer),
- One representative of the local branch of the National Trust and Historical Society,
- One representative from local environment groups,



Mt. Laura and Mt. Sugarloaf as seen from the south-east, today.

- One farming representative,
- One community representative (Service Clubs),
- One education representative,
- One recreation representative, and
- One representative from Department of Conservation and Natural Resources.

The Committee's original brief was to advise Council on management issues and to develop a Management Plan for the Mount Leura Reserve with regard for its recreational, educational, scientific, tourism, historical and environmental values.

In the view of the Committee, it was desirable to expand the study area to include the adjoining Mount Sugarloaf Reserve, which is owned by the National Trust, so as to enable the combined development of the reserves.

In June 1992, the Advisory Committee prepared and distributed a Study Brief to consultants for the preparation of a Management Study of Mount Leura and Mount Sugarloaf Reserves. In May 1993, Thomson Hay & Associates, Ballarat based Landscape Architects and Land Rehabilitation Consultants were commissioned to undertake the Study.

Thomson Hay & Associates engaged the services of Tim D'Ombrian, a consulting botanist who works with the company regularly, to provide botanical expertise for this project.

1.3 AIMS

The aim of the project is to prepare a Master Plan and Landscape Management Plan for the Mount Leura and Mount Sugarloaf Reserves which seeks to:

- Enhance the scenic, educational and scientific interest by revegetating the reserves with indigenous flora in a manner reflecting the vegetation communities existing on the reserves at the time of European settlement.
- Integrate the landscape master plan and management plan for the Mount Leura and Mount Sugarloaf Reserves so that their care and management is complementary.
- Enhance the recreational and tourism values of the reserves by enhancing facilities and educational interest.

To achieve these aims, the Advisory Committee included in their brief to the consultants the following objectives for the project:

- (1) Research and prepare a list of trees and shrubs which are indigenous to the Mount Leura and Mount Sugarloaf Reserves.
- (2) Prepare a staged development plan for the Mount Leura and Mount Sugarloaf Reserves, based on an appropriate time frame and with the following components:
 - Staged removal of exotic vegetation with provision for retention of some suitable specimens.
 - Replanting of indigenous vegetation with planting density and composition resembling what existed at the time of European settlement.
 - Guidelines to preserve existing indigenous flora.
 - Provision of visitor facilities towards the base of Mt Leura Reserve, including coin-in-slot BBQ's, seating, shelter, interpretation information, rubbish containers, car parking and toilets.
 - Provision of walking tracks, including one which links the reserves, with seating and interpretation signs at strategic points.
 - Measures to stabilise and screen the former quarry site at Mt Sugarloaf.

1.4 METHODOLOGY

The methodology adopted for the master planning component of the project involved the following tasks:

- 1) Meetings and site inspections with the advisory committee to gain a thorough understanding of the site and the aims of the client group.
- 2) Assessment of the study area to gain an understanding of the landscape characteristics, management issues, opportunities and constraints of the site.
- 3) Prepare a site analysis plan and present to advisory committee. Meet with the Advisory Committee to discuss issues raised in the site analysis and preliminary concept proposals.
- 4) Prepare concept plans for the landscape development of the study area.

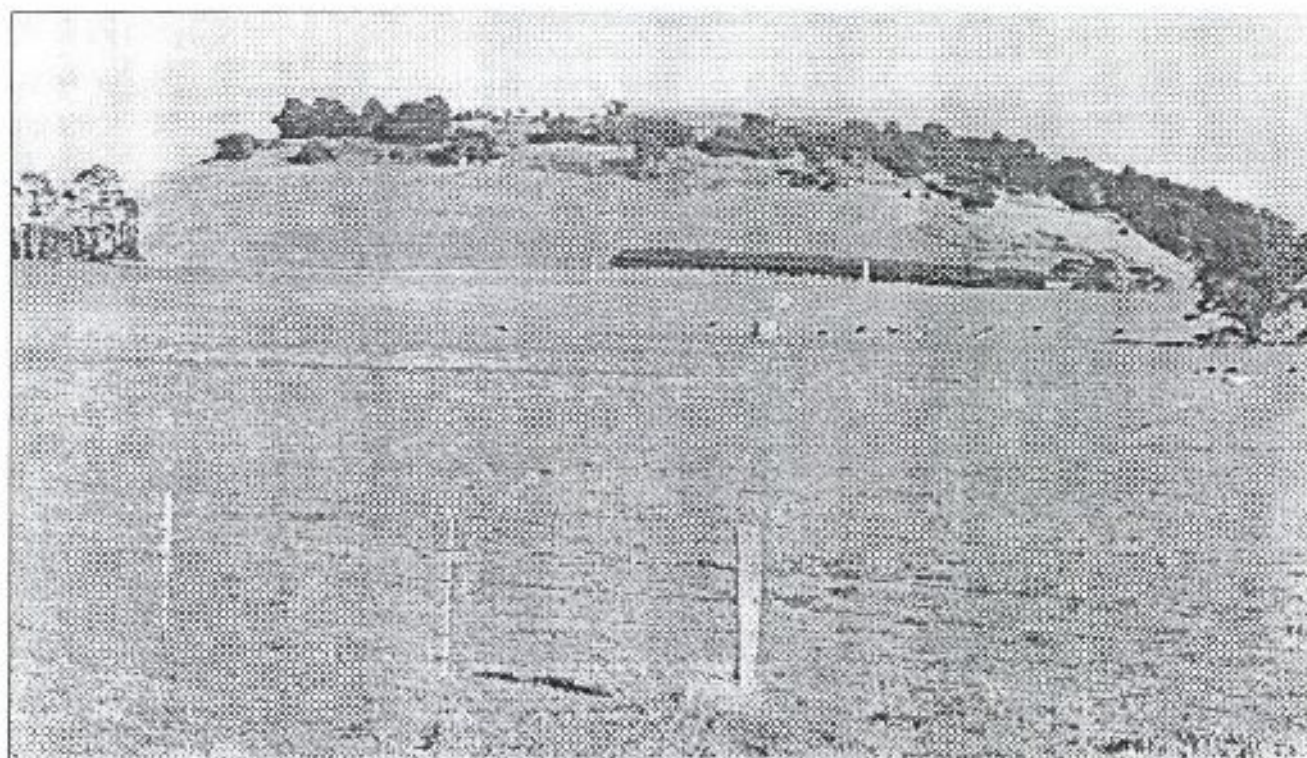
Part 1: Introduction

Mt. Leura and Mt. Sugarloaf Landscape Master Plan and Management Plan

- 5) Present concepts to the management committee for comments. Inspect site with management committee to explain concepts on-site.
- 6) Prepare Draft Master Plan, based upon the most appropriate concept plan. Present to community for comment.
- 7) Prepare draft implementation and management plan report, present to Advisory Committee for comment.
- 5) Assess other volcanic cones in south-western Victoria (eg. Mt. Napier, Mt. Buninyong) for botanical composition and structure.
- 6) Assess the site for variations in aspect, soils, slope, micro-climatic influences etc. which affect the structure and composition of vegetation communities.
- 7) Using all the information gathered from historical research, on-site evidence and trends in vegetation communities within the district, piece together scenarios for pre-settlement vegetation communities for the reserves, based upon slope, aspect, climate and soils.

In developing revegetation strategies for the reserves and resolving management issues, the following process was adopted by the consultants.

- 1) Discuss pre-settlement vegetation issues with Advisory Committee to gather local knowledge and gain an insight into possible sources for further information.
- 2) Research historical sources such as Surveyors notes and plans, newspaper articles, historical photographs etc.
- 3) Assess site for remnants of the original vegetation.
- 4) Inspect and assess surrounding bushland reserves of similar climatic and geological characteristics to establish lists of vegetation likely to have occurred on Mts. Leura and Sugarloaf.



Mt. Leura as seen from the north, today.

PART 2:

HISTORICAL BACKGROUND

2.1 GEOLOGICAL HISTORY

Mt Leura and Mt Sugarloaf are the most dominant formations within the Leura Nested Maar, a broad, roughly circular, flat floored volcanic crater with steep inner walls and a low surrounding rim built of fragments of rock material that were blown out of the crater during eruptions. Camperdown is situated on the north-western edge of the Leura nested Maar. The Maar itself is approximately 1 km wide.

Mt Leura and Mt Sugarloaf, along with the crater which lies between them and several other smaller scoria cones immediately surrounding them, are the result of more recent volcanic activity which resulted in the Nested Volcanoes within the Leura Maar. It is thought that Mounts Leura and Sugarloaf were formed relatively quickly, over about 20 years, as a result of the build up of scoria. Scoria, in general terms, is gravel-sized fragments of lava which have been ejected into the air due to the release of gases during the volcanic eruptions, cooled and fallen back to earth.

It is thought that the Leura Nested Maar was formed about 22,000 years ago, making these volcanic features very recent in geological terms.

2.2 PRE-SETTLEMENT VEGETATION

Early written accounts and pictorial records suggest that at the time of European settlement in 1838, Mounts Leura and Sugarloaf were well timbered, especially towards the base of the scoria cones.

Thomson Hay & Associates' consulting Botanist, Tim D'Ombrian has prepared a list of species of plants which were originally found within the study

area. This list has been researched from the following sources:

- Historical photographs and records.
- Existing specimens of indigenous vegetation occurring on the site.
- Surveys of vegetation of the surrounding district, especially areas of similar geology, landform and climate.

Several scoria cones of the Western District have been examined in order to try to piece together a picture of the vegetation of Mt Leura and Mt Sugarloaf prior to settlement. Of interest are Mt Napier (south of Hamilton), Mt Buninyong (south-east of Ballarat) and Mt Eccles (south-west of Macarthur). All of these volcanic landforms have similar rainfall and similar vegetation types, so it is reasonable to assume that the floristic structure of Mt Leura and Mt Sugarloaf would also have been similar prior to clearance.

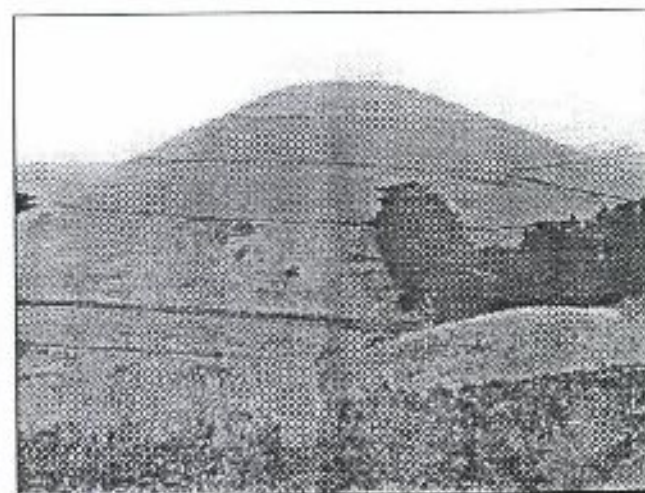
It is thought that Mounts Leura and Sugarloaf would have had a relatively simple floristic structure as is often observed in areas with good soils and high rainfall in south-eastern Australia, consisting of an open woodland dominated by Manna Gum (*Eucalyptus viminalis*), Blackwood (*Acacia melanoxylon*) and Drooping She-oak (*Allocasuarina verticillata*).

Table 1 is a list of species which are known to have occurred within the study area prior to European settlement and some examples exist as remnants today.

In addition to the species listed in Table 1, *Banksia marginata* (Silver Banksia) almost certainly occurred



Summit of Mt. Sugarloaf from Mt. Leura, C1870.



Summit of Mt. Sugarloaf from Mt. Leura, 1994.

TABLE 1: PLANT SPECIES KNOWN TO HAVE OCCURRED ON MT. LEURA AND MT. SUGARLOAF BEFORE SETTLEMENT

<i>Allocasuarina verticillata</i>	Drooping She-oak
<i>Eucalyptus viminalis</i>	Manna Gum
<i>Acacia melanoxylon</i>	Blackwood
<i>Poa</i> spp. including	
<i>Poa latillanensis</i>	
<i>Poa sieberiana</i>	Tussock Grass
<i>Danthonia</i> spp.	Wallaby Grass
<i>Kennedia prostrata</i>	Running Postman
<i>Acaena anserinifolia</i>	Bidgee Widgee
<i>Epilobium cinereum</i>	Variable Willow Herb
<i>Epilobium billardierianum</i>	Robust Willow Herb
<i>Psoralea adscendens</i>	Mountain Psoralea
<i>Pseudognaphalium luteo-album</i>	Jersey Cudweed
<i>Senecio glomeratus</i>	Annual Fireweed
<i>Senecio quadridentatus</i>	Cotton Fireweed
<i>Geranium potentilloides</i>	Cinquefoil
<i>Cynoglossum suaveolens</i>	Sweet Hounds Tongue

over the reserves although the only evidence of this is in a school reader of 1928 describing the view from Mt. Leura with "the sides clothed in fragrant Banksias".

In addition to those species listed in Table 1 above, the species listed in Table 2 are almost certain to have occurred in parts of the study area, at least on the lower slopes of the mounts.

The distribution and density of these species within the reserves is a function of the topography and micro-climatic influences of the site. The most appropriate way to piece together a picture of what the study area looked like at the time of settlement is to examine closely the micro-climatic conditions and topography of the reserves and place the appropriate species, at the appropriate density, within the environmental conditions they are most adapted to. With cross-referencing to historical data, local examples of similar vegetation communities and on-site evidence, it is possible to check these planting scenarios.

TABLE 2: PLANT SPECIES ALMOST CERTAIN TO HAVE OCCURRED ON MT. LEURA AND MT. SUGARLOAF BEFORE SETTLEMENT

<i>Eucalyptus ovata</i>	Swamp Gum	✓
<i>Eucalyptus obliqua</i>	Messmate Stringybark	✓
<i>Acacia stricta</i>	Hop Wattie	?
<i>Acacia verticillata</i>	Prickly Moses	✓
<i>Senecio luteus</i>	Variable Groundsel	
<i>Solanum laciniatum</i>	Kangaroo Apple	
<i>Hymenanthera dentata</i>	Tree Violet	
<i>Bursaria spinosa</i>	Sweet Bursaria	

The "management zones" defined for the management plan have been identified according to slope, aspect, micro-climate and elevation so that specific planting prescriptions can be developed for each management zone. This will assist in the efficient implementation of the master plan and the long term management of the reserves as the establishment and management techniques required for each vegetation community will vary according to the same variabilities upon which the management zones are defined.

2.3 ABORIGINAL HISTORY

The Camperdown district was originally inhabited by the Leehura language groups who named Mt Sugarloaf "Tuunuunbee Heear" or 'moving moving woman'. Mounts Leura and Sugarloaf were used by the Leehura people as lookouts and signalling towers to observe movements of game and neighbouring people. The Mounts were also important landmarks, guiding their semi-nomadic lifestyle.

The last full-blooded member of the Leehura people, Wombeech Puuyuun (Camperdown George) died in Camperdown in 1883.

2.4 EUROPEAN SETTLEMENT

The significance of Mt. Leura and Mt. Sugarloaf as important features of the district did not go unnoticed by the early white settlers to the district. Climbing Mt. Leura was a favourite recreation of both visitors and residents. Prior to 1899, such expeditions involved crossing private land.

The Manifold Brothers, original selectors of Purrumbete, donated the Mt Leura Reserve to the Hampden Shire Council in January 1899, following several attempts to negotiate a land swap in which the Manifold's would provide an access road and land at the summit of Mt Leura in exchange for a road extending through the Manifold's property to the Cobden Road.

The following extracts from an article which appeared in the Camperdown Chronicle on January 27, 1934 entitled "Random Recollections" sheds more light on the management practices and land tenure changes on and around Mt. Leura during the 1870's.

"...Up to 55 years ago (1879) kangaroos were plentiful at Mt. Leura. Lamb rented the paddock from the Manifold Bros. and burnt off the bracken every summer, which also accounted for the destruction of many fine trees on the Mount. Adolphus Clarke was the first to use a reaper and

Part 2: Historical Background

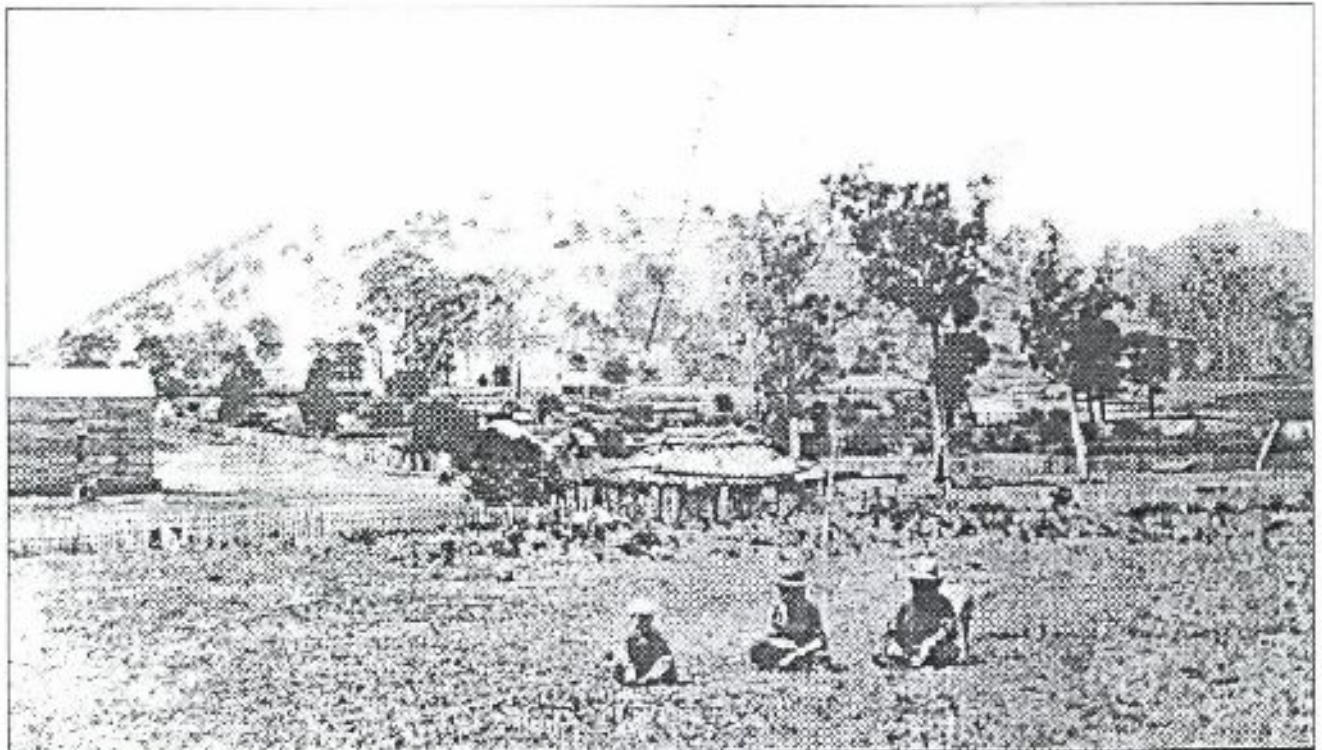
Mt. Leura and Mt. Sugarloaf Landscape Master Plan and Management Plan

binder in the district on a crop where the gravel pits are now (north of Mt. Leura - across the Highway). The position was then known as 'between the first and second cuttings'. The Leura property was over-run with rabbits and of course they were in the crop and we boys could catch them in the stubble, or the burrows were easy digging. The Manifolds sold Mt. Leura to Finlay Bros. of Glenormiston and they let out the place for farms. Fred Wright is the only one left of the early tenants (Fred Wrights great-grandson still owns the N.E. slopes of Mt. Leura). There was very heavy clearing at the start and the tenants had to burn all timber on the ground. I think the terms were rent free until the land was ready for the plough. A few years later, the Manifolds re-purchased the property....."

The Pine and Cypress trees presently existing throughout the Leura Reserve were planted in the 1920's as part of a returned soldiers employment scheme.

Mt. Sugarloaf Reserve was privately owned until 1972 when the National Trust purchased the 96 acres presently held in the reserve. This sale followed a significant conservation battle over the future of a scoria quarry which the land holder at the time had commenced on the west face of Mt. Sugarloaf. This conservation battle was possibly the first example of a community taking direct action to save a natural feature in Australia. About 20 residents of Camperdown sat in front of a bulldozer on the summit of Mt. Sugarloaf as the mine operator threatened to mine from the top of the perfect scoria cone.

The Sugarloaf reserve is now leased to the former land owner and is used for cattle grazing. This lease expires in 1996.



Mt. Leura from Camperdown, C1870. Note the remnants of the large Manna Gums on Mt. Leura and the remnants of the Leihura people in the foreground.

PART 3: EXISTING CONDITIONS (SITE ANALYSIS)

3.1 EXISTING VEGETATION

Exotic and non-indigenous native vegetation dominates the Mt. Leura and Mt. Sugarloaf reserves today. Exotic vegetation of the study area includes plants which have been deliberately planted, and plants which have established on the site from seed brought in by birds, on vehicles, by the wind and by stock.

Appendix One contains lists of the exotic and non-indigenous native species found on Mt. Leura and Mt. Sugarloaf today.

Remnants of indigenous vegetation occurring within the study area are listed in Table 3 below.

Much of the Mt. Leura Reserve contains large areas of remnant grasslands, many of which are in a relatively stable, weed-free state. This is due to the lack of grazing and pasture improvement practices within the Leura Reserve. The Mt. Leura Reserve also contains remnants of Drooping She-oak (*Allocasuarina verticillata*) which was probably the dominant tree species on the northern face of Mt. Leura prior to settlement. Several individuals occur within the reserve and there is a good rate of natural regeneration occurring from these individuals.

TABLE 3: REMNANT VEGETATION OF MT. LEURA AND MT. SUGARLOAF RESERVES.

<i>Acacia melanoxylon</i>	Blackwood
<i>Acaena anserinifolia</i>	Bidgee Widgee
<i>Allocasuarina verticillata</i>	Drooping She-oak
* <i>Cynoglossum suaveolens</i>	Sweet Hounds Tongue
<i>Danthonia</i> spp.	Wallaby Grass
* <i>Epilobium billardierianum</i>	Robust Willow Herb
* <i>Epilobium cinereum</i>	Variable Willow Herb
* <i>Geranium potentilloides</i>	Cinquefoil
<i>Kennedia prostrata</i>	Running Postman
<i>Poa</i> spp. including:	Tussock Grass
<i>Poa labillardieri</i>	
<i>Poa sieberiana</i>	
* <i>Pseudognaphalium luteo-album</i>	Jersey Cudweed
<i>Psoralea adscondens</i>	Mountain Psoralea
* <i>Senecio glomeratus</i>	Annual Fireweed
* <i>Senecio quadridentatus</i>	Cotton Fireweed

* Species indicated thus can be classified as native weeds of pastures etc. In the context of the Mt. Leura and Mt. Sugarloaf revegetation project, these species should be allowed to regenerate, but active propagation and planting will not be undertaken. They are a natural component of the indigenous woodland ecosystem and will find a balance within the re-established woodland over time.

Appropriate management practices will encourage further natural regeneration (see management plan).

3.2 TOPOGRAPHY

Due to the volcanic origins of Mt. Leura and Mt. Sugarloaf the landscape is very steep. An analysis of slopes within the study was undertaken during the site analysis stage of the project as the steepness of the site is one of the major influences in the design and siting of facilities.

The slope analysis identified several key areas which are flat enough and large enough in area to support the facilities proposed by the Advisory Committee. They are:

- The saddle between the eastern rim of the crater (south of the Mt. Leura summit) and the summit of Mt. Sugarloaf.
- The relatively flat-bottomed and wide depression extending in a westerly direction from the western side of the crater towards the Showgrounds.

The site adjacent to the showgrounds is large enough to support a car park, visitor information facilities and amenities and is ideally located in terms of access from Errey Street and the Showgrounds. This area also provides good pedestrian access to the Crater, which is in the heart of the reserves and provides a suitable termination point for a short walk from the main car park and visitor facilities on Mt. Leura.

The saddle to the east of Mt. Sugarloaf is an important area because of its relatively flat terrain and sheltered aspect. This saddle provides excellent views towards Mt. Pomdon and Lake Purrumbete and the southern half of the Leura maar. The crater can be fully appreciated from this saddle, as it changes significantly in scale from this point as opposed to the view from the summit car park.

Several small, relatively flat sites are found on ridge tops extending down from the summit of Mt. Leura. These sites provide opportunities for small scale facilities such as resting/viewing areas and in one case a small car park which provides a suitable point of access to the crater for the disabled.

The existing spiral tracks throughout the Mt. Sugarloaf reserve provide access to an otherwise

inaccessible site due to the steep terrain. These tracks will provide important access for implementation of the revegetation strategy. Many of the tracks have the potential to be surfaced to provide pedestrian and management vehicle access, as their grades are generally suitable for these uses and also for wheelchairs in some cases.

3.3 LANDSCAPE CHARACTER

The landscapes of the Mt. Leura and Mt. Sugarloaf reserves encompass a broad range of volcanic land forms, vegetation of various forms and colours and significant social and cultural influences. The regional landscapes viewed from the higher points within the reserves are also significant landscape assets.

In order to describe the landscape character of the project area, the following section of the report is broken down into categories of views:

- 1) Inward views, from the surrounding district and the Town of Camperdown towards the reserves.
- 2) Outward views, from within the reserves looking over the surrounding district.
- 3) Enclosed views within the reserves.

Each of these view categories has distinct landscape characteristics and it is this diversity of landscape interest that offers the visitor to Mounts Leura and Sugarloaf a stimulating visual experience.

1. Inward Views:

Mt Leura and Mt Sugarloaf reserves have several different landscape characteristics when viewed from the surrounding district.

When approaching Camperdown from the north, the Mt. Leura Reserve is the dominant element and is recognised by the Pines and Cypress plantings on the northern slopes. The cone of Mt. Sugarloaf protrudes above the level of Mt. Leura and the grassy summit provides a contrast to the dark pine and cypress plantings. The random-planting of Pines and Cypress of the reserve give the Mt. Leura reserve an informal appearance and tend to reduce the scale of Mt Leura.

From the west, the view of Mounts Leura and Sugarloaf is dominated by the shape of the scoria cones. Both Mt. Leura and Mt. Sugarloaf appear as steep-sided conical forms from this aspect. The grassy vegetation does not interfere with the shape of the topography, so the landform becomes the dominant element. The lineal plantations of Pine and Cypress tend to accentuate the conical forms of Mt Sugarloaf and Mt Leura, but also disrupt the flow of the landscape.

The former quarry site on the western face of Mt Sugarloaf is a dominant landscape element from the west and south-west. The dark coloured scoria of the scree slope and quarry face contrast with the grassy slopes of the Mt. Sugarloaf summit.

From the east, there is little evidence of the Pine and Cypress plantings, and the form of the scoria cones is fully appreciated. The grassy slopes dominating the south-eastern slopes of the mounts change colour with changing light conditions and shadows, providing additional interest to the landform.



The relatively flat, wide gully east of the Showgrounds. The site for the proposed Lower Car Park, Information Centre and Picnic Facilities.

2. Outward Views

The diversity of views from within the Mt Leura and Mt Sugarloaf Reserves over the surrounding district provide some of the most important landscape features of the reserves, offering significant potential for the development of the site in terms of tourism, education and recreation.

The extent of the "lakes and craters landscape" of the Camperdown district can be fully appreciated from various locations within the reserves. The National and International significance of these volcanic landscapes offers potential in education, science and tourism. Of note are the views from Mt Leura and Mt Sugarloaf towards important landscape features of the district such as:

- Lake Colongulac
- Lake Purrumbete
- Lake Corangamite
- Mt Porndon
- Mt Noorat
- Mt Elephant
- The Otway Ranges to the south
- The Stony Rises south-west of Mt Porndon.

The cultural landscapes of the surrounding district are another significant landscape feature which can be fully appreciated from the Mt Leura and Mt Sugarloaf Reserves. This landscape is the result of the agricultural development of the district and social influences of past and present settlers. It is therefore referred to as a cultural landscape because it reflects the settlement patterns and

social development of the district. The rich grazing landscapes of the Camperdown district are characterised by lineal plantations of Cypress and Pine and the lush green of the predominantly dairying and grazing enterprises.

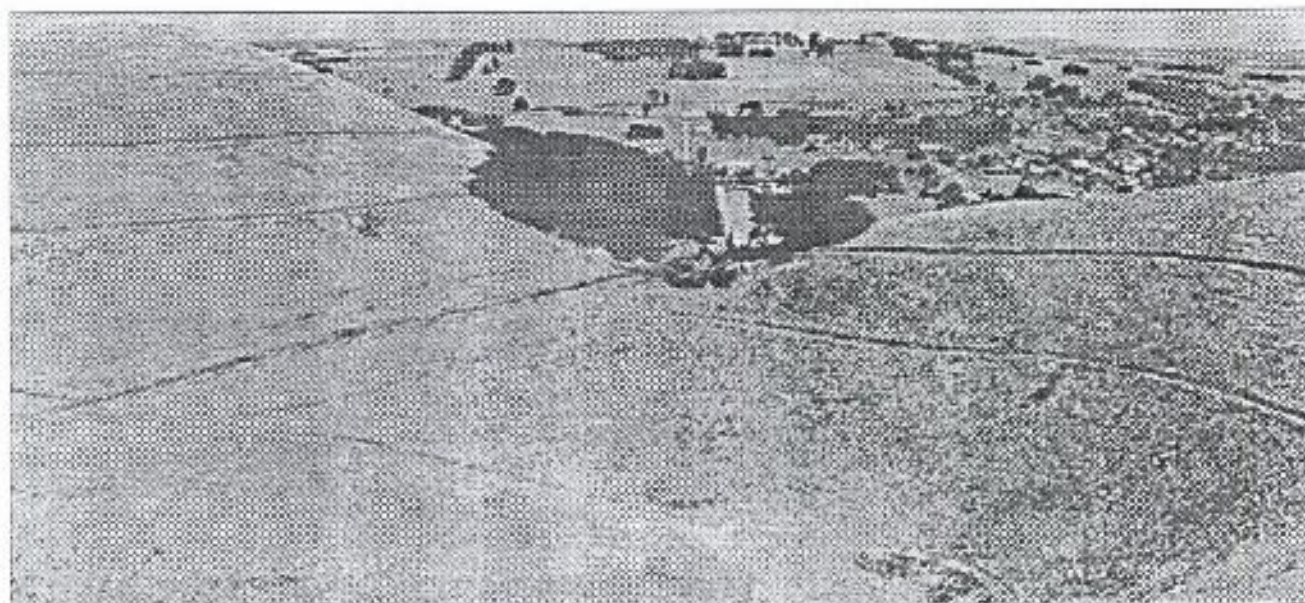
The town of Camperdown is another dominant landscape element from the Mt Leura and Mt Sugarloaf Reserves. The spires of the churches, the tower, street trees, sports ovals and the industrial buildings of the Bonlac factory are dominant elements within the town, reflecting the character and social structure of the town.

3. Contained Views

The dominance of the views outward from the Mt Leura and Mt Sugarloaf Reserves tend to become the main visual experience of visitors to the reserves, especially when they drive to the summit car park and do not experience the rest of the reserve by foot.

However, there are some interesting contained views within the reserve. Of special note are the views within the crater between Mt Leura and Mt Sugarloaf. The depth of the crater and the steepness of the sides provides a dramatic scene and changing light conditions during the day provides added interest.

The car park situated near the summit of Mt Leura is a visually dominant element within the reserve, especially the guard rails and bitumen surface. Cars and other vehicles become very dominant from Mt Sugarloaf and the western rim of the crater when the car park is occupied. The car park is important to the overall use and accessibility of Mt Leura and Mt Sugarloaf so we do not believe that it is feasible to remove this facility. The visual impact of this car park



Looking west from the summit of Mt. Leura, over the crater towards Camperdown.

has been addressed in the Master Plan.

The revegetation of the reserves and the development of visitor facilities and a path network will enhance the visual interest within the reserves by providing additional interest in terms of vegetation and by leading visitors to unseen places of interest by way of the path system.

3.4 LAND USE

The present landscape of the reserves have been influenced significantly by past and present land uses. The early clearance of the original woodland vegetation through ringbarking, felling and regular burning activities has probably been the most significant impact of European land uses.

The Mt Leura Reserve is set aside for public purposes and is mainly used for recreational pursuits on an informal basis.

Mt Sugarloaf reserve is currently used for cattle grazing and is leased to the former owner by the National Trust for this purpose. The lease expires in 1996.

The Sugarloaf Reserve has been subject to pasture improvement works, including the sowing of *Phalaris* and other perennial pastures using crawlers, and a history of regular fertiliser applications. Spiral access tracks throughout the Sugarloaf Reserve were formed to enable access for pasture improvement and rabbit eradication.

The western face of the reserve has been quarried, but all quarrying activities ceased in 1972 when the National trust took possession of the reserve.

3.5 RECREATIONAL ASSESSMENT

A survey of visitor numbers and recreational activities has not been prepared for this study. However, information gathered during the master planning stage and on-site observation suggests that the predominant recreational uses of the Mt Leura Reserve are:

- Casual visits to the upper car park to gain views afforded over the district.
- Walking along the sealed access road, mainly by residents of Campdown as a "fitness trail".
- Walking through the reserves on informal paths formed by use patterns rather than deliberate construction, mainly along ridge-lines.

- Occasional horse-riding activities.
- The lower section of the sealed access road is used for Hill Climb Motor Sport events three to four times a year.

While there is no evidence on-site, feedback from the community suggests that many local residents enjoy climbing Mt. Sugarloaf. Some residents climb Mt. Sugarloaf to keep fit, while others go to the summit specifically for peace and quiet. The excellent views, peacefulness and exposure to the elements make the summit area, and many other locations within the reserve, valuable recreational resources.

The lack of formal facilities at present discourages visitors from remaining within the reserves for extended periods. Some locals spend longer periods of time within the reserves enjoying the seclusion of the mounts and the views.

Present use patterns are centred around the summit car park on Mt. Leura and the main ridge extending from the end of Errey Street (adjacent to the sportsground and showgrounds), to the summit. The summit of Mt Sugarloaf is also a popular destination for the more adventurous visitor with several informal walking paths having been formed across the line of the existing spiralled vehicular tracks, leading to the summit (especially on the north face of Sugarloaf).

It is surprising how many locals have not ventured to the top of Mt Sugarloaf, nor really explored the various "corners" of the reserves.

The Master Plan aims to diversify the range of passive and active recreational activities available to visitors to the reserves to encourage them to stay for a longer period. The interpretation facilities will enhance the recreational opportunities and increase the educational values of the reserve by providing information on the geology, vegetation, natural and cultural history of the site, and recreational activities.

The provision of visitor facilities will encourage higher visitor numbers. It is important therefore, that these facilities are planned to minimise the environmental and visual impact of visitors to the reserves and also ensure that higher visitor numbers do not spoil the enjoyment of the reserves for those seeking seclusion and a place to escape from everyday life.

PART 4:

LANDSCAPE MASTER PLAN

4.1 DESIGN SYNOPSIS

The Landscape Master Plan for Mt Leura and Mt Sugarloaf Reserves prepared by Thomson Hay & Associates aims to enhance the visual, recreational, educational, cultural and environmental qualities of the reserves through sensitive revegetation and the provision of appropriate facilities.

The Master Plan is a graphic representation of the vision statement prepared by the Mt Leura Advisory Committee and presents an "ideal" plan of the reserves in 50 to 80 years when the vegetation is maturing.

The implementation of the Master Plan will rely upon the long-term dedication of the Camperdown community as there will be many thousands of hours of volunteer work required to see the Master Plan through to fruition.

The layout of the indigenous vegetation portrayed in the Master Plan is based upon research into the floristic structure of the vegetation of Mt Leura and Mt Sugarloaf before European settlement. There are three important themes within the revegetation strategy:

- The use of indigenous species.
- The re-establishment of the indigenous vegetation as close as possible to the structure of the vegetation that existed over the reserves prior to settlement.
- The establishment and management of indigenous vegetation in a manner which will ensure that the vegetation community becomes self-sustaining as quickly as possible, therefore minimising management inputs and achieving an environment that is more natural in appearance and condition.

The provision of an extensive network of walking tracks, of various standards, and the appropriate siting of new car parks will improve access to all parts of the Mt Leura and Mt Sugarloaf reserves, enhancing the opportunity for active and passive recreation.

Facilities such as a visitor information centre, information signs, seating, tables, BBQ's, toilet facilities and picnic shelters, sited at various strategic locations throughout the reserves, provides the necessary facilities to enable visitors to stay within the reserves for extended periods of time.

4.2 REVEGETATION STRATEGY

Introduction

The main aim of the project is to recreate the floristic composition and structure of Mt. Leura and Mt. Sugarloaf at the time of European settlement.

This is a difficult task due to the following issues:

- Vegetation communities - whether they are forests or grasslands - are constantly in a state of change. It is not possible therefore to re-create conditions exactly as they were at the time of settlement.
- There are very few records documenting the vegetation communities which occurred on the reserves at the time of settlement. The only evidence available is a few remnants of the original vegetation on the reserves and historical records including paintings, photographs and diary entries.

The revegetation strategy developed for the Mt. Leura and Mt. Sugarloaf Master Plan is therefore based upon the available evidence and professional judgements.

There are several possible approaches to developing the revegetation strategy. Whichever method is adopted, it will be many decades before the pre-settlement conditions are in any way reflected in the landscape.

Perhaps the most significant factor which must be taken into consideration in developing a revegetation strategy for the site is the significant modification to the site as a result of past clearing and agricultural management practices.

Exotic grasses become rank in the absence of grazing, increasing fire hazard and starving indigenous seedlings of water, light and nutrients. The implications of this factor in on-going management of the Mt. Leura and Mt. Sugarloaf reserves is significant.

The revegetation strategy must therefore provide an efficient means of revegetating the site according to the aims described above, while minimising management inputs both in the short and long-term.

There are three options for the type of revegetation strategy which could be adopted for the project:

- a) Plant (or direct seed) the reserves at a very high density using trees and shrubs indigenous to the area and allow natural processes of succession to take over and find a balance. This option would minimise management inputs in relation to the control of exotic grasses, however the short and medium-term visual character of the vegetation would not be consistent with the objectives of the masterplan.
- b) Plant trees and shrubs at their final densities, and implement other weed control techniques until such time as the dominance of exotic grasses is reduced. This could involve planting trees in individual guards and maintaining sheep grazing on the site to suppress weed growth. This option would compromise the recreational values of the project and the growth characteristics of the widely spaced individual trees would be inferior. Short, medium and long-term management inputs would be higher.
- c) Plant a 'best-bet' recipe of species at a higher density than the mature open woodland, then allow the woodland to evolve through natural processes of forest succession and by providing timely management inputs in the form of thinning.

In view of the resources of the local community and the short, medium and long-term visual character of the site, the last option is preferred by the consultants and the client.

Principles of Succession

The preferred revegetation strategy is modelled on the principle of secondary forest succession.

After the disturbance of forests as a result of a catastrophic event such as fire or clearing, the seed of the pre-existing vegetation regenerates at an extremely high density. The species which dominate this regeneration are usually the leguminous species such as the wattles and pea-flowered species, which are often short-lived. These species fix atmospheric nitrogen and play an important role in conditioning the soil and providing shelter for longer lived species which regenerate at a slower rate.

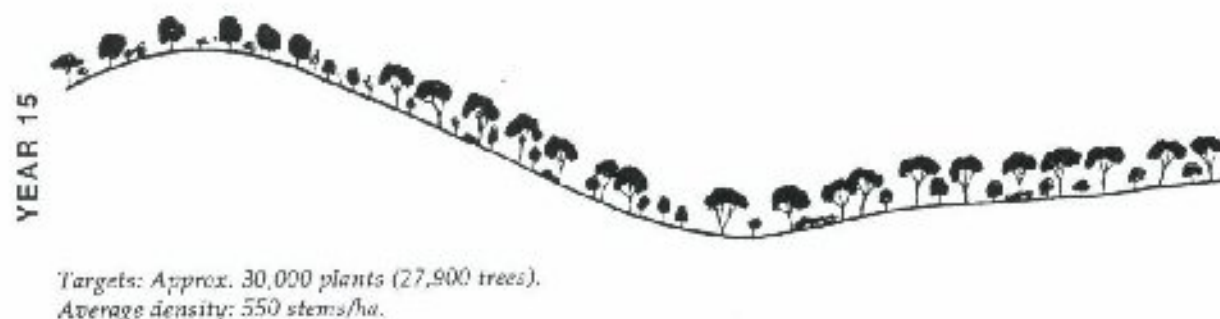
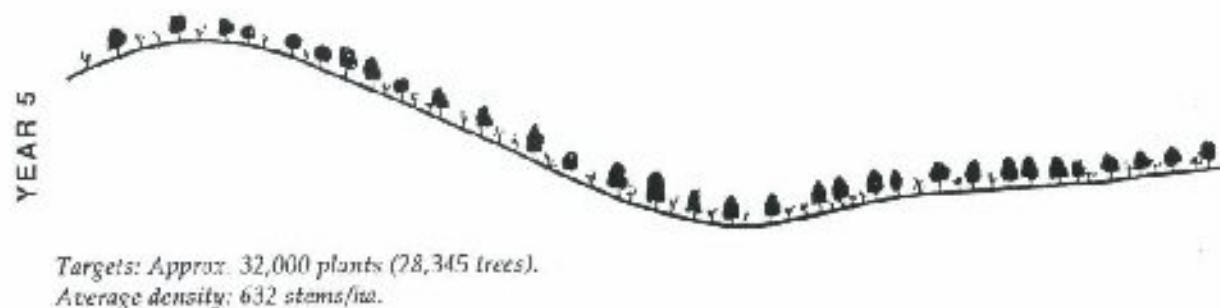
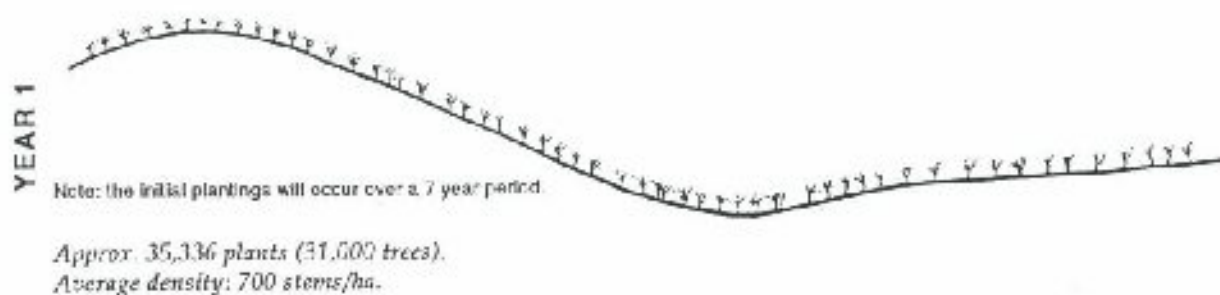
This process will be adopted for the Mt. Laura and Mt. Sugarloaf sites in the following manner:

1. The dominant tree and shrub species will be planted at a density which is sufficient to achieve a closed canopy after approximately 15 years. This will reduce the dominance of the exotic grasses and weeds by starving them of water, light and nutrients. As a result, seedling densities will be considerably higher in the first 1 to 15 years of the revegetation program than the ultimate number of trees at maturity.
2. Over time, two natural processes will thin the revegetated sites without inputs by management:
 - The shorter lived species will die out, after replenishing the soil with seed, which will spread through the site and regenerate when conditions are favourable.
 - The weaker specimens of the trees and shrubs will die out as the stronger specimens rob them of water, light and nutrients or they are killed by other factors such as insects, fungal attacks and diseases, and the harsh environment.
3. Manipulation of this process through timely thinning and other management practices. This will involve the manual felling of a small proportion of the trees in order to meet the medium-term objectives for visual character.
4. Over a very long period of time, a woodland structure will evolve through natural processes. It is likely that periodic low intensity burning would maintain the woodland structure, as was probably the case when the area was inhabited by Koori people.

The main advantage of adopting this process for the Mt. Laura and Mt. Sugarloaf sites is that it will minimise the short-term management inputs required to control the exotic grass growth which will occur after grazing is ceased in the Mt. Sugarloaf Reserve.

Trees grown in close proximity to other trees will be healthier and grow faster than those that are planted in isolated locations. This will further reduce management inputs.

The following illustration presents this concept in graphic form.



Note: Trees are not drawn to scale. This diagram is schematic only.

TABLE 4: SCHEMATIC DIAGRAM SHOWING THE PROCESS OF FOREST SUCCESSION (ASSISTED BY MANUAL THINNING)

Planting Themes

The planting themes contained in this report have been based upon the process of forest succession and the need to minimise management inputs by suppressing the growth of exotic pasture grasses when grazing ceases.

The dominant species of each vegetation community have been selected for each management block according to aspect, slope, elevation and micro-climate.

A target canopy cover (based upon canopy area, not projective foliage cover) at 15 years has been assigned to each of the revegetation areas so as to allow for the calculation of the number of seedlings of each species required in each management block.

The following variables were taken into consideration when calculating the number of seedlings required for the revegetation program:

- The canopy area of individual specimens of each species at 15 years and at maturity.
- The dominance of each species within the vegetation community.

Seedling numbers for each management zone are therefore considerably higher than the target canopy density at maturity. There will be considerable natural thinning of the seedlings as they mature, but some manual thinning of seedlings will be necessary after year 15.

Approximately 80% of the seedlings planted will be thinned (by natural processes and by manual clearing) over the first 60 years of the revegetation program. This equates to a thinning rate of approximately 2.5% per annum. The majority of the manual thinning will occur between years 15 and 20.

The survival co-efficient built into the formula for calculating seedling numbers assumes that some seedlings will die before year 15. The percentage

success rate is based upon Thomson Hay & Associates experience in broad scale revegetation works in similar conditions, and is fairly conservative.

It is important to note that the method of calculating the number of seedlings to be planted is based upon the average area of the canopy of the selected tree and shrub species at year fifteen. This is not the same as the **projective foliage cover** figures quoted in this report when describing woodland and forest densities.

The following definitions should be referred to when reading the following descriptions of woodland structures.

Canopy Area: This refers to the approximate area in square metres of the canopy of a tree in plan form and is calculated by the formula πr^2 . Where 'r' is the radius of the circle defined by the extent of the canopy. This figure does not take into consideration the density of the foliage within the canopy. This figure was used only in relation to the calculation of the number of seedlings required to achieve a sufficient canopy density by year 15 to suppress exotic grass growth.

Projective Foliage Cover: This is the measure of the percentage of shadow cast by a tree, assuming that the sun is directly overhead. It is this figure upon which forest and woodland types are classified.

The following section describes the main vegetation communities proposed in the Master Plan:

Northern Slopes

The northern slopes of the scoria cones are hotter and drier than other parts of the Mounts being exposed to the hot northerly winds during the summer months and full sun throughout the year. The slopes are steep and the well drained, friable soils do not hold moisture for as long as the more gentle slopes lower in the landscape. These climatic and physical influences dictate to a large degree the type of vegetation that can persist in

Year	Notes	Number of stems (trees only)	Avg. Canopy Area for Trees	Avg. Canopy Area (ie. canopy area as a % of total area)	Projective Foliage Cover (Av.)
1	Assuming all trees planted yr. 1	31,000	n/a	n/a	n/a
15	Assuming 10% natural death rate and an average of 75% of projective foliage density.	27900	15 m ²	83%	62%
60	Further natural death and thinning.	4755	35 m ²	33%	25%

TABLE 6: APPROXIMATE TARGET RATES FOR SEEDLING NUMBERS AT YEAR 1, 15 AND 60 AND ESTIMATED AVERAGE PROJECTIVE FOLIAGE DENSITIES.

these conditions. Drooping She-oak (*Allocasuarina verticillata*) is well adapted to hot and dry conditions with its needle-like phyllodes (leaves) shaped to minimise evapotranspiration and heat stress. It is thought that the northern slopes would have been dominated by a She-oak woodland, with Manna Gum (*Eucalyptus viminalis*) woodlands extending up-slope for only a short distance. These She-oak woodlands could be classified as a "Low Open Forest" with a Projective Foliage Cover (PFC) of 30 to 60%. The density of the woodland would have thinned as altitude increased.

Evidence to support this assumption can be found in the early photographs of Mt Leura and Mt Sugarloaf, paintings by Von Guerard and the distribution of remnant Drooping She-oaks.

Northern Slopes (Sheltered)

The north-facing sides of the crater and the northern slopes of Mt Sugarloaf were probably quite different to the northern exposed slopes in terms of the vegetation communities they supported due to the fact that these slopes would have been more sheltered from northerly winds by Mt Leura.

Photographic evidence suggests that these slopes supported Manna Gum woodlands, but the projective foliage cover of these woodlands may have been lower than the southern slopes due to climatic influences - in the range of 10 to 30%. The dominant species of the sheltered northern slopes were probably Manna Gum, Drooping She-oak and Blackwood (*Acacia melanoxylon*).

Southern Slopes

The southern slopes of Mt Leura and Mt Sugarloaf are sheltered from hot summer winds and are not exposed to the hot sun due to their southerly aspect and steep slopes. Due to these climatic influences, the density of the vegetation was likely to be greater than that of the northern, western and south-western slopes, and probably contained a more dominant understorey and tall shrub layer. The dominant canopy species were probably Manna Gum and Blackwood, with a projective foliage cover of around 30 to 40%, consistent with a dense woodland to open forest classification.

Eastern Slopes

The vegetation community which once existed on the eastern slopes of Mt Leura would have consisted of an open forest with a projective foliage cover of 30 to 40%, consisting of Manna Gum, Blackwood and Drooping She-oak. A tall shrub layer was almost certainly present, at varying densities but generally thicker on the lower slopes, thinning out as altitude rises and soil moisture levels reduce.

Western Slopes

The western slopes are very exposed to hot and cold winds. The vegetation community which once existed on these slopes was probably a Manna Gum woodland with scattered groups and individuals of Drooping She-oak and Blackwood. The projective foliage cover was probably in the range of 10 to 30%.

Crater

Early photographs indicate that the crater once supported a woodland of Manna Gum and Blackwood. The projective foliage cover of this woodland was probably in the order of 20 to 30%. As is common in the craters of other Western Plains volcanoes (eg. Mt. Napier, Mt. Eccles and Tower Hill), the floor of the crater itself was probably more densely vegetated with shrubs such as Tree Violet (*Hymenanthera dentata*) and Sweet Bursaria (*Bursaria spinosa*) with a thinner or almost non-existent canopy of Manna Gums and Blackwoods. Swamp Gum (*Eucalyptus ovata*) probably occurred on the lower slopes of the crater.

Gullies and Depressions

The gullies and depressions of the reserves originally contained the most dense vegetation communities due to the additional shelter and moisture afforded by the topography. These depressions probably supported open forests with a projective foliage cover of 30 to 40% and consisted of species such as Manna Gum, Swamp Gum and Blackwood.

Summit (Mt. Sugarloaf)

Due to the climatic characteristics of the summit, it is most probable that Drooping She-oaks dominated the summit of Sugarloaf, with Manna Gums associated with the adjacent management zones thinning out as altitude increases. Early photographs provide evidence of this vegetation on the summit.

TABLE 6: SPECIES TO BE USED FOR 'BACK-BONE' PLANTING THROUGHOUT THE RESERVES.

<i>Acacia melanoxylon</i>	Blackwood
<i>Acacia stricta</i>	Hop Wattle
<i>Acacia verticillata</i>	Prickly Moses
<i>Allocasuarina verticillata</i>	Drooping She-Oak
<i>Bursaria spinosa</i>	Sweet Bursaria
<i>Banksia marginata</i>	Silver Banksia
<i>Eucalyptus ovata</i>	Swamp Gum
<i>Eucalyptus viminalis</i>	Manna Gum
<i>Hymenanthera dentata</i>	Tree Violet

Planting Themes around Lower Visitor Facilities and Main Car Park

To increase the educational potential of the project, and to provide added visual interest, it is proposed that species indigenous to the Camperdown district be used in conjunction with plant material indigenous to the Mt Leura and Mt Sugarloaf Reserves for amenity plantings within the lower car park and visitor facilities. A detailed planting plan would be required to site each species in order to maximise their visual and educational potential.

Planting Strategy for Adjoining Private Land

To avoid 'hard edges' to the planting proposed along the reserve boundaries, it is recommended that a planting program be instigated on neighbouring private land, following negotiations with landholders, as shown on the Master Plan. This planting should be funded and implemented as part of the works within the reserves as the adjoining land holders will be providing the land for such planting. To minimise the area of land removed from grazing, trees should be planted in individual stock proof guards.

A long term aim for the project is to acquire the land on the remaining eastern and southern sides of Mt. Leura and implement a revegetation strategy over these areas to ensure continuity.

Vegetation Establishment - Upperstorey

The upperstorey species of the proposed woodland will be established by planting seedlings which have been grown from locally collected seed in a local community operated nursery. Table 6 is a list of the main 'back-bone' planting proposed for the reserves.

Vegetation Establishment - Understorey

To complete the ecological and visual characteristics of the revegetation program it is essential that a woodland understorey be re-established. A native understorey will also significantly reduce management inputs over time.

The re-establishment of the understorey involves promoting the regeneration of native grasses throughout the reserve and the strategic planting of other grassland plants which are more difficult to establish by direct seeding and natural regeneration, such as the Mountain Psoralea.

TABLE 7: GRASSLAND SPECIES FOR ESTABLISHMENT OVER TIME, AND RECOMMENDED ESTABLISHMENT TECHNIQUES

<i>Acaena anserinifolia</i>	Bidgee Widgee	NR
<i>Cynoglossum suaveolens</i>	Sweet Hounds Tongue	NR
<i>Danthonia sp.</i>	Wallaby Grass	NR, DS, SP
<i>Epilobium billardierianum</i>	Robust Willow Herb	NR
<i>Epilobium cinereum</i>	Variable Willow Herb	NR
<i>Geranium potentillodes</i>	Cinquefoil	NR
<i>Kennedia prostrata</i>	Running Postman	NR, DS, SP
<i>Poa labillardieri</i>	Large Tussock Grass	NR, DS, SP
<i>Poa sieberana</i>	Tussock Grass	NR, DS, SP
<i>Pseudognaphalium luteo-album</i>	Jersey Cudweed	NR
<i>Psoralea adscondens</i>	Mountain Psoralea	SP
<i>Senecio glomeratus</i>	Annual Fireweeds	DS, NR
<i>Senecio quadridentatus</i>	Cotton Fireweed	DS, NR
Notes: NR = Natural Regeneration, DS = Direct Seeding, SP = Seedling Planting.		

Table 7 is a summary of the main techniques proposed for the establishment of grasslands:

- Promotion of natural regeneration of native grasslands (see section 7.3).
- Strategic planting of seedlings of native grassland species at a sparse density (three to four metre spacings) to re-introduce a source of seed for future natural regeneration.
- Direct seeding of native grasslands (further research into appropriate, site specific techniques is required).
- Planting of hard to propagate (and hard to direct seed) native grassland plants within areas of relatively pure native grasslands. The rate of re-introduction of these species will be dictated by the quality of native grasslands into which they are being planted (ie. weed competition must be minimal).

Table 7 is a list of species which should be re-established as understorey to the woodland, and a summary of the appropriate techniques for establishment.

The recommended planting densities and distribution for each species is contained within the summary planting guide in Appendix 2 (Planting Guide) of this report.

4.3 FACILITIES

To encourage visitors to stay within the reserves for a longer period of time, the development of additional facilities such as walking tracks, picnic facilities, shelters, toilets and interpretation facilities are required.

Thomson Hay & Associates have proposed an information and facilities centre and a larger car park at the base of the Mt. Sugarloaf Reserve, adjacent to the showgrounds, which will serve as the main information centre and facilities for both reserves.

Durability, ease of construction and financial considerations have been taken into account when designing the facilities proposed for the reserves. All facilities are designed to compliment the landscape character of the site and to visually blend with each other and the surrounding environment.

There are four main areas within the reserves in which facility centres will be provided:

- The "Upper Car Park" (existing Mt. Laura Car Park);
- Lower Car Park and Picnic Facilities (located to the east of the Showgrounds);
- Saddleback Picnic Area (located on the saddle to the south of the crater, east of Mt. Sugarloaf);
- Hairpin Car Park (a small car park designed to provide disabled access to the crater).

Upper Car Park

Minor modifications to this car park are suggested to give the car parking spaces more definition and break up the expanse of bitumen. Two "traffic islands" have been suggested on the eastern side of the car park filling in two car spaces. These would consist of a 150mm high concrete roll over kerb infilled to the top of kerb level with bitumen topped with scoria. This will provide enough definition to control traffic movements but allow coaches to drive over the kerbs when turning around. Two car spaces on the west side of the car park are recommended to be excavated, edged with concrete roll-over kerbing (coloured black), backfilled with topsoil and planted out with indigenous grasses, small shrubs and one or two Manna Gums and Drooping She-oaks. A one metre wide pedestrian path is recommended along the western side of the car park which would be edged with concrete kerbing and sealed with bitumen and scoria in the same manner as the coach park. This provides a safe and convenient path linking the path from the Saddleback Picnic Area (which enters the car park at the coach parking bay) and the Panorama Trail. The steel safety rail should be painted in "Indian Red" or similar dark heritage colour to improve its appearance.

Nineteen car parking spaces have been provided within the existing area of bitumen seal in the proposed design. A raised coach park has been suggested near the entrance of the car park where coaches can park after dropping off passengers at the other end of the car park and then turning around. There is insufficient space on the ridge to provide a large turning area for coaches. They will therefore have to perform a multi-point turn to exit the car park, which can be accommodated within the car parking layout as designed. A coach would not be able to turn around if the car parking spaces are all full, which is not ideal, but it is likely that the car parking spaces to the northern end of the car park will fill up first, leaving the middle and southern end of the car park free for coaches to manoeuvre. When the lower car park is completed, there should be little need for coaches to use the upper car park. The coach parking space would be delineated in the same manner as the two traffic islands on the eastern side of the car park, i.e. a raised platform (about 150mm higher than present road level) topped with bitumen (with scoria rolled in) and bounded by a concrete roll-over kerb (coloured black).

A gathering point, viewing area, information board and seating area are proposed north of the car park. These facilities will provide information on the formation of Mounts Leura and Sugarloaf, walking tracks and flora and fauna.

The seating area to the east of the main viewing / gathering area is designed to provide shelter from the dominant south-westerlies and this area would be suitable for picnics for groups of up to ten to fifteen people.

A toilet (earth closet or chemical) has been proposed by the consultants in this area as there is evidence on site of the need for such facilities. Demand for this facility may not be great at present, but as the project develops a toilet will be required.

Lower Car Park

The lower car park and associated facilities are intended to be the main focus of activity for the entire reserve and have been designed to encourage visitors to explore Mounts Leura and Sugarloaf and experience the whole of the reserve on foot as the views and experiences are much more diversified and interesting than when experienced by vehicle.

The lower car park is designed to cater for approximately 30 cars and two coaches. The surface is proposed to be sealed and bollards erected around the perimeter to prevent unauthorised vehicle access to the reserve.

There are two options for the alignment of the proposed access road to the lower car park. One is to skirt the lower slopes of Mt. Leura within the reserve boundary. The other is to provide access through the Showgrounds, which would minimise the costs associated with the construction of the road, reduce its visual impact and provide many site planning benefits. If access through the Showgrounds can be negotiated, this is the preferred option. Access through the Showgrounds would require a master planning study of the Showgrounds site to ensure that the Showgrounds remain functional. There is considerable potential to share facilities between the two reserves and the siting of the main access road to the Lower Car Park through the Showgrounds would enhance this potential.

The design of the intersection of the existing summit road and the proposed car park access road will lead visitors to the lower car park and information centre first. This design will be enhanced by signage defining the park entrance and guiding visitors to the car park and visitor facilities. Visitors can then plan their itinerary for their visit to the reserves based upon the information provided in the main information shelter.

Further detailed design investigations and engineering documentation will be required to determine the exact location of the access road and

car park and to provide the Council with specific design documentation to enable construction. Further detailed design works are also required.

People wishing to walk to the summits of Leura and Sugarloaf can depart from the lower car park and walk via the Picnic Trail to the saddle, then connect with the Panorama Trail which surrounds the crater and takes in the summits of Leura and Sugarloaf. Those people less inclined or less able to walk, can drive to the Upper Car park where the summit of Leura can be easily reached.

The proposed BBQ and picnic facilities adjacent to the lower car park provide an ideal base for extended day trips around the reserves. As the vegetation matures and the facilities within the reserve develop, the opportunity for extended visits will increase.

The most important facility to be provided at this location is the proposed visitor information centre. It is recommended that this centre accommodate the following facilities:

- toilet facilities;
- a lecture / seminar space;
- permanent static display spaces; and,
- facilities for audio-visual and multi-media presentations.

It is recommended that an architect be appointed to design the facility centre. The following guidelines have been provided to guide the size and form of the facility centre:

Size:	90m ² floor area excluding toilets, services etc.
Form:	Sympathetic with volcanic cones landform. Striking in appearance but not visually dominating.
Materials:	Generally natural materials, earth tones, corrugated iron could be incorporated to reflect rural character.
Colours:	Generally lighter tones; natural colours reflecting local soils, native grasses and woodland vegetation.

Saddleback Picnic Facilities

The siting of these picnic facilities has been planned to take advantage of the relatively flat nature of the saddle, the central location of the site to Sugarloaf, Leura and the crater, and the views to the south-east and into the crater which are afforded from this site. The site is also well

sheltered from the prevailing south-westerly winds and is easily accessed from the lower car park, the Hairpin Car Park and the Upper Car Park (although grades are steeper from the Upper Car Park)

Facilities proposed for this site include a picnic shelter with gas BBQ's, tables and a viewing platform / shelter located on the small knoll to the south-east of the saddle picnic area. The views from this knoll towards Mt Porndon and Lake Purrumbete are significant.

4.4 CIRCULATION

The proposed circulation system has been designed to encourage visitors to experience the various areas of the reserves more fully, especially by foot.

Proposed modifications to the road system, that is the addition of a major car park at the base of the mountains, are primarily designed to encourage people to experience more of the Mt Leura and Mt Sugarloaf reserves than most presently do. Because most of the area can be seen from the Summit Car Park, and this car park is so close to the summit of Mt Leura, there is little incentive for visitors to walk through the reserves and explore its many qualities.

By changing the focus of visitors first impressions towards an information centre which explains the recreational and educational opportunities of the reserves, visitors will be more likely to stay in the area for a longer period and take advantage of this significant reserve.

Vehicular

The main modifications proposed to the present vehicular circulation system is the construction of a new access road and car park leading visitors to the proposed information centre of the reserves, located on the gently sloping depression east of the showgrounds. The intersection between the end of Errey Street, the Leura summit road and the proposed Lower Car Park access road will be designed to focus the direction of traffic flow towards the Lower Car Park.

A small car park, with spaces for approximately 6 cars and a mini-bus, is proposed at the second hairpin bend of the Leura summit road. This car park is designed to give access to the crater and Saddleback Picnic facilities for the disabled, as the grade of the track leading from this car park to the saddle and then on to the picnic area is suitable for wheel chairs.

The summit road remains unchanged in the Master Plan proposal, however some slight modifications to the summit car park are proposed.

Pedestrian

Perhaps the most important development recommended in the Master Plan, apart from the revegetation strategy, is the provision of an extensive network of walking tracks designed to lead visitors to various points of interest throughout the Mt Leura and Mt Sugarloaf Reserves.

Many of these access tracks utilise the existing spiral access tracks existing over much of the Sugarloaf Reserve. The main routes are:

1. Panorama Trail

Leading from the summit car park this trail runs around the rim of the crater, passing the summits of Mt Leura and Mt Sugarloaf en route. The northern half of this loop trail is recommended as an Class A track (1500mm wide) as parts of the track would be suitable for assisted wheelchairs. The remainder of the track is Class B (1200mm wide) except for the timber steps recommended on the north-east side of Mt Sugarloaf.

2. She-oak Trail

Located on the northern side of Mt Leura, this trail is sited to provide a sheltered alternative to the Panorama Trail and to lead visitors through the proposed She-oak woodlands of the northern slopes of Mt. Leura. The She-oak trail links up with the Town Trail and the Panorama Trail on the north-western rim of the crater. This track is recommended as a Class B track (1200mm wide)

3. Picnic Trail

Leading from the proposed lower car park and information centre, this is the main trail leading visitors to the inner parts of the reserve, namely the crater and the saddleback picnic facilities. Access to the Sugarloaf Summit and the rest of the Panorama Trail is also gained from this track. Picnic Trail is a Class A track (1500mm wide) and also forms part of a management track.

4. Town Trail

This trail leads from the end of Errey Street up the north-west ridge of Mt Leura linking with the Panorama Trail leading to the summit. A pedestrian link from the end of Errey Street to the new lower car park and visitor information centre is proposed, but the exact siting of the track needs to be resolved after the access road and car park are designed.

6. Hairpin Car Park to Saddle

A Class A (1500mm wide) all-person access trail located along an existing track cutting links the Hairpin Car Park to the Saddleback Picnic Facilities and gives disabled persons the opportunity to gain access to the inner reserve, especially the crater and Saddleback Picnic Facilities.

Management and Fire Access Tracks

The existing spiral tracks would be maintained in their current locations for fire and maintenance access. These routes would not be sealed or surfaced, to minimise the impact of tracks within the reserves. They would consist of grassy access routes enabling access for fire fighting and emergency access by four wheel drive vehicles.

A more formal network of maintenance tracks has been proposed in the Master Plan which double as major walking and disabled access routes. Unauthorised vehicle access will be restricted by lock-down bollards or bollard and chain barriers.

Fire access gates have been proposed at various strategic points along the boundary fences. A fire access route around the lower slopes (through some private land) is proposed to maintain complete access for fire fighting from any direction and/or evacuation.

4.5 FURNITURE AND FITTINGS

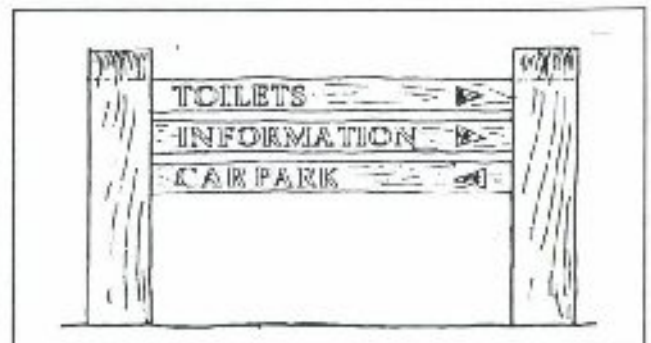
It is important that all furniture and fittings are designed to compliment each other in style, materials, colour and form. This is very important to the overall image of the whole reserve as it creates a sense of harmony and style which enables visitors to relate to the reserve as a whole.

Attention to detail in type-face and lettering size of signage is also vital to convey the sense of style established throughout the reserves.

The drawings in Part Eleven have been provided to assist in the construction of facilities within the reserves.

In general, the following guidelines should be followed when constructing furniture and fittings within the reserves:

- All posts, bollards and upright members of seating etc. (when set in the ground) should be high quality Red Gum.
- All other timber members should be hardwood, kiln dried where warping and splintering must be avoided i.e. sign boards, seats and tables etc.
- All exposed timbers are to be sealed with a suitable timber oil to provide weather resistance for the timber, but allow the timbers to weather-off naturally to a grey colour.
- All lettering should be in the selected standard typeface such as Souvenir (standard Letraset® typeface name), depending upon the technique used for sign writing. This type style must be used for all signs, information boards etc. Letter sizing should be in accordance with the dimensions shown in Part Eleven, or as necessary for legibility at appropriate distances.
- All lettering to sign boards should be recessed at least 5mm by laser cutting, sand blasting or routing techniques as appropriate to achieve smooth, clean curvature to letters and even letter sizes.
- All lettering to routed sign boards should be painted in "Venetian Red" (Standard British Colour name [SBC number 455]) or similar to reflect the colour of the scoria of the cones and the historical importance of the reserves to Camperdown district.
- All directional arrows should be routed into the sign boards and painted as per the lettering technique.
- All information boards should be anodised aluminium boards with "Venetian Red" lettering and illustrations on a "Beige" (BSC name, BSC number 388).
- All exposed timber edges should be chamfered to 45° to a minimum of depth of 5mm unless otherwise shown.
- All bollards, posts and furniture uprights should be set into the ground to the depth specified in the drawings and backfilled with a 8:1 soil : cement mix, well compacted - unless otherwise specified.



All furniture and fittings have been designed to blend with each other, and with their setting.

PART 5:

IMPLEMENTATION

5.1 INTRODUCTION

The implementation of the Landscape Master Plan will rely heavily on the local community as a source of labour and support. The success of the revegetation strategy will depend upon many hours of community input in planting and on-going management.

This section of the report recommends a management structure to efficiently oversee the project and discusses priorities for works programs to ensure that progress is made with the implementation of the master plan.

5.2 PROJECT MANAGEMENT

The implementation of the Master Plan and on-going maintenance will need to be managed by one organisation to ensure continuity. Close community involvement will ensure continued community ownership of the project and therefore continued support.

It is recommended that the Corangamite Shire establish a Special Committee of Council (to be called Mounts Leura and Sugarloaf Re-development Committee) to manage the implementation of the Master Plan and on-going management activities. The Committee would comprise seven members, including one Council representative and a National Trust member. The balance of the membership would comprise community representatives, selected by Council. A "Friends of Mt. Leura and Mt. Sugarloaf" group is also recommended to provide an opportunity for broader involvement of the community in implementing the Master Plan.

The Special Committee will need an annual administrative budget (minimum \$5,000) to ensure that the group has the ability to publicise activities and attract funding from various sources for on-ground works.

Funding for a full-time ranger/project manager would greatly assist in the implementation of the plan and on-going management. In the long term, it may be necessary to fund more ranger positions as the work load associated with the management of the reserves increases and the reserves educational potential is exploited.

In summary, the tasks that the proposed Special Committee will need to undertake include:

- Seek and administer funding.
- Identify work programs from the Master Plan and Management Plan guidelines and prioritise work activities.
- Plan and co-ordinate works programs.
- Undertake, or organise the implementation of regular maintenance and management activities including slashing, fuel reduction burning, herbicide application, path maintenance etc.
- Fund, appoint and manage Ranger staff.
- Investigate and take appropriate action on issues such as insurance, marketing and management.

It is recommended that a logo be developed for the reserve which would be used on all signs, bollards and information panels, brochures etc. to enhance the sense of identity of the reserves. The logo would also be used by the managing authority on stationery, ranger uniforms, etc.

A design competition among the local community (including schools) is seen as an appropriate way to develop the logo as this process will raise awareness of the master plan proposal among the community, provide an opportunity for community participation and is likely to be successful in portraying the qualities of the reserves due to local knowledge. A graphic designer should be engaged to refine the winning logo so that it is suitable for stationery, signs, information boards etc. and can be read in colour and black and white.

5.3 LAND TENURE

The management and control of the Mt. Leura and Mt. Sugarloaf reserves shall be subject to a joint investigation by the Corangamite Shire and the National Trust.

In the long term, it is recommended that the land to the south and east of Mt. Leura, at least down to the base of the slope of the Cones, be purchased and revegetated in accordance with the Master Plan to improve the scenic qualities of the reserves and increase the ecological and educational potential of the reserves.

5.4 FUNDING

There is considerable scope for attracting Federal and State Government funding for the implementation of the Master Plan due to the significance of the site in terms of natural and cultural history, educational opportunities and the community involvement in implementing the plan.

It is recommended that funding applications are submitted on a regular basis to the relevant Government agencies. However, Government funding will most likely only be provided where contributions from the community are at least equal to the funding being sought from government sources.

The potential for on-going government funding is likely to be increased considerably if the local community is able to contribute a significant proportion of the costs associated with implementing the Master Plan. This support can be in the form of cash contributions and/or the provision in kind of services and labour.

The local community should also actively seek to raise funds from within the wider regional community and from the corporate and private sector. There is considerable scope for attracting funding from the corporate sector outside the Camperdown district and also the tourism industry.

The natural landform of the Mt Leura crater provides a unique opportunity as a natural amphitheatre. The community should consider staging a one-off open air concert to raise initial funds for the implementation of the Plan and to raise the awareness of the wider community of the project. With an intensive State-wide (or National) publicity drive, this event would have the potential to earn significant amounts of money and would also publicise the project in a more effective manner than could be achieved by handing out brochures or media advertising. The concert should be held before significant revegetation works commence.

5.5 TIMING

The timing of the implementation of the Master Plan is very important to the long term success of the project. It is important that the community remain enthusiastic about the project and therefore maintain a willingness to become involved. For this reason the Master Plan should be implemented as quickly as funding allows.

However, it is also important that the works implemented by the community as part of the Master Plan be well managed and maintained so that the community remains enthusiastic about the job they are doing.

It is recommended that a revegetation program of 5,000 to 7,000 trees per year is instigated as a starting point (refer to section 5.6 for details of the staging of the revegetation works). It would be possible for a community the size of Camperdown and districts to plant many more trees per year, but the preparation of the next years planting sites and the maintenance of previous years sites is more important. By limiting the number of trees planted each year, the community will be able to focus its attention towards management tasks as well, such as the removal of cypresses, weed control, track maintenance, construction of facilities.

At the recommended rate of revegetation, it will take about eight to ten years to complete the revegetation works, allowing for two to three years where no trees may be planted due to drought or other unforeseen circumstances. Over the life of the revegetation program, the construction of facilities such as walking trails, BBQ facilities, amenities and information centres can be undertaken as funding allows.

In ten to fifteen years, the framework for the project will be complete. From that time on the management tasks will change to the maintenance and thinning of the revegetation works, the re-establishment of native grasslands and the re-introduction of native fauna.

5.6 REVEGETATION WORKS

The implementation of revegetation works should commence as soon as possible to maintain a high level of community interest in the project. It is important that the number of seedlings planted each year is large enough so that the community can see results, but not too large that management tasks fall behind and the community loses interest.

It must be stressed that the management of previous years' plantings is probably more important than planting new seedlings. The project must not be allowed to slip into a degraded, weedy state as the local community, and visitors, will lose interest and fire hazard may increase.

Specific vegetation establishment and management techniques are described in Part 6 of this report.

In terms of priorities for revegetation works, Thomson Hay & Associates believe that it is important to commence revegetation works in high profile areas and areas where weed competition is minimal. By commencing revegetation works on the high profile areas, the local community will become aware of the works and hopefully become keen to be a part of the project.

It is recommended that the revegetation program be implemented by management zones according to the schedule provided in Table 8.

5.7 FACILITIES

The following section of the report recommends priorities for the construction of facilities (discussed in order of priority).

Walking paths, signage and interpretation facilities.

There is considerable scope to develop the reserve's educational potential during the early stages of the revegetation strategy. The construction of visitor information facilities, walking tracks and signage should be implemented as soon as finances are available.

The construction of walking paths and information boards should be developed concurrently as a matter of priority. This will encourage greater use of the reserves as a recreational and educational resource.

The recommended priorities for the construction of the trail system are:

1. Panorama Trail (around rim of crater - taking in summits of Leura and Sugarloaf)
2. Town Trail (Panorama Trail to Errey St.)
3. Picnic Trail (new Lower Car Park to saddleback picnic facilities)
4. Quarry Trail (below disused quarry to the south-west of the shelter structure)

Upgrading of existing summit car park.

The upgrading of the existing car park is also of high priority, as this is a high profile site and upgrading facilities in this area will create much interest, therefore encouraging visitors to explore the other developments occurring within the reserve. BBQ facilities should be developed in conjunction with this stage of the works.

Lower car park and associated facilities.

If funding is available, the completion of the access road, car park, information facilities and visitor facilities should be implemented together.

If funding is not sufficient this project could be divided into two sections, with the construction of the lower car park and access road and the construction of interpretation facilities being highest on the list of priorities. This will encourage visitors to make their first stop at the lower car park where they can gather information about the reserves and plan their visit accordingly.

The information centre and facilities (BBQ's, etc) associated with the lower car park should be implemented as soon as possible after the construction of the car park and information centre.

Hairpin Car Park

This small car park is important as it provides easy access to the crater and will provide excellent access for the construction of future facilities (ie. Saddleback Picnic area) and access for the disabled to the heart of the reserves.

Saddleback Picnic Facilities

The construction of the Saddleback Picnic Facilities will provide additional incentive for visitors to stay longer within the reserves, however there is little point in developing these facilities until the revegetation program is well established throughout the crater area and approaches.

TABLE 8: RECOMMENDED PROGRAM FOR REVEGETATION WORKS, BASED ON MANAGEMENT BLOCKS

<i>Management Block</i>	<i>Number of Trees</i>	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>	<i>Year 5</i>	<i>Year 6</i>	<i>Year 7</i>
One	2,295	2,295						
Two	5,409						5,409	
Three	5,514							5,514
Four	1,445	1,445						
Five	1,187	1,187						
Six	653	653						
Seven	5,190		5,190					
Eight	1,600					1,600		
Nine	1,321			1,321				
Ten	2,104			2,104				
Eleven	964				964			
Twelve	486				486			
Thirteen	3,762				3,762			
Fourteen	466					466		
Fifteen	1,120					1,120		
Sixteen	744		744					
Seventeen	389					389		
Eighteen	550					550		
Nineteen	454					454		
TOTALS	35,653	5,580	5,934	3,425	5,212	4,589	5,409	5,514

PART 6:

INDIGENOUS VEGETATION ESTABLISHMENT

6.1 INTRODUCTION

The establishment of trees and shrubs indigenous to the area forms the backbone to the revegetation strategy. By planting indigenous trees and shrubs at the densities recommended, the exotic grasses over much of the site will be suppressed by the added competition for light, water and nutrients provided by the trees and shrubs. This is important for two reasons, the first is that it will reduce management requirements and the second is that it will create conditions in which indigenous grasses and ground covers will be able to prosper.

6.2 SEED SUPPLY

To ensure that all species re-established on the site are indigenous, it is necessary to establish sources of seed from which all seedlings for the revegetation strategy can be grown. The Management Plan identifies seed sources for future revegetation works. It will be necessary to establish a seed bank where seed collected from local remnant vegetation can be stored, ready for propagation or use in direct seeding strategies.

The following is a list of suitable seed collecting areas identified during this study:

- Stony rises country to the east (south-west of Mt Porndon and Lake Purumbete).
- Old Cobden - Camperdown Railway Line
- Forest blocks South of Camperdown
- Roadsides around Naroghid

In the long term, seed could be collected from trees and shrubs established within the reserves. However, seed should still be collected from the sources listed above as well to maintain genetic diversity.

The establishment of indigenous grasslands will be achieved by adopting appropriate management practices which are designed to control weeds while encouraging indigenous species already present on the site to prosper. The use of fire, as controlled burns at selected times of the year, will be an invaluable tool for managing grasslands. It must be emphasised that controlled burning for grassland management would be undertaken at times of very low fire hazard, over small areas and with many volunteers available to attend the fire. Controlled burning should not therefore be seen as a safety hazard.

6.3 PROPAGATION NOTES FOR KEY TREE AND SHRUB SPECIES

Allocasuarina verticillata (Drooping She-oak)

Seeds are enclosed in woody cones. The raised valves open and release the seed as the cones dry. Older ripe cones are held on the trees all year round and are easily collected.

Seed germinates readily (no dormancy). Seedlings have a nitrogen fixing association with a bacteria in their roots (like acacias). Inoculating the seed with a slurry solution made from soil from under she-oaks is suggested to ensure this association develops, but this is not essential.

Seed should be sown with a slight cover of potting mix.

Acacia spp. (Wattles)

Wattle seed is generally available in late summer (see botanical lists for specific collecting times for each species).

Pods containing seed are easily collected. Seed should be collected when hard and black or brown in colour and when the pods turn brown and begin to split open.

To achieve a uniform germination it is best to treat seed (for example the day before sowing) with boiling water to soften the hard seed coat, otherwise germination is erratic. The most suitable technique is to pour boiling water over the seed and leave it to soak overnight.

Seed should be sown with a light cover of potting mix.

Eucalyptus spp.

Seed is contained in woody capsules. Capsules can be collected when hard and dark coloured (not green - test with a thumb-nail, if soft, the fruits are not ripe).

Capsules should also have clearly visible valves, particularly in Manna Gum which should have a cross shaped pattern on top when ripe.

Valves will open upon drying the fruits and the seed can be shaken free.

Mature seeds are red to dark brown in colour.

Some *Eucalyptus* seed shows some dormancy

however the local species require no treatment. Seed should be surface sown or very lightly covered (to prevent the seed washing away) as Eucalypt germination is light sensitive.

Peas (*Kennedia prostrata*, *Psoralea adscendens* etc.)

Pea seed, like that of Acacias is contained in a pod and should be collected when the pod is dry, firm or dark and the seed inside is brown-black and hard (usually summer - see notes on Acacias).

Seed should be treated as per Acacia seed however an alternative method is to scarify the seed using emery paper (to damage or reduce the hard seed coat which otherwise prevents germination until it is softened and water can penetrate).

Sometimes good results can also be achieved without treating the seed, particularly with species less likely to have a fire-germination strategy (ie. wetter area species such as *Psoralea*).

Seed should be sown with a light cover and care taken not to over water (most Pea's are susceptible to waterlogging).

***Banksia marginata* (Silver Banksia)**

Seed is contained in woody cones which can be collected in late February. At this time valves are beginning to open as the cones dry and much seed can be shaken out easily. Further drying after collection will allow more seed to be obtained.

The black winged seeds are best sown in late winter and will germinate in early autumn (high temperatures are believed to promote a dormancy in the seed).

Seed should be sown with a light cover. Make sure that at least one seed is placed in each tube as much of the bulk collected is the woody packing material that occurs between the seeds in the cone.

Seedlings are fairly slow growing and some can probably be held over for six months without becoming too large for the tubes.

***Hymenanthera dentata* (Tree Violet)**

Tree Violet seed is contained within a pale blue-white berry. The seed has a dormancy, or at the very least is slow to germinate, and various methods are suggested to overcome this.

The fruits can be placed in a plastic bag for 2 to 3 weeks and allowed to ferment before sowing, or alternatively they can be treated with 5% hydrochloric acid for ten minutes.

Tim D'Ombrian has found good success by simply sowing the whole fruits within a few weeks of

collection (collectable around February) or at least by the end of May. A good germination can then be expected in August.

Fruits should be sown with a light cover.

***Bursaria spinosa* (Sweet Bursaria)**

The small fan shaped pods turn brown (from green) when ripe. When dried these open dropping the small flat brown seeds.

Seed should be sown with a light cover at the same time as Tree Violets (May is best) and will germinate in July or August en masse.

It is pointless sowing seed at other times of the year as it only germinates in winter due to a dormancy.

Care should be taken not to allow seedlings to become too wet as damping off (fungus) can occur (treat with a fungicide if necessary).

Leptospermum continentale

Treat as per Eucalyptus sp.

Other Notes on Propagation

- 1) All seed should be treated with an insecticide before storage. A Naphthalene moth ball placed in the closed jar containing the seed for a few days will suffice (handle Naphthalene with care).
- 2) Ideally species should be sown in spring to be ready for autumn planting. If a glasshouse is available it will be possible to sow in autumn and produce seedlings for a spring planting.
- 3) Seed can be sown into punnets and seedlings pricked out at the first seedling leaf stage (often the seed leaves or cotyledons) and potted up into forestry tubes. Forestry tubes (150mm long) are preferable as they allow the root system to develop and increase the chance of survival when planted out.

This method is labour intensive and an alternative is to direct sow the seed into the tubes. If this method is used 1 to 2 Acacia, Banksia, Pea or Casuarina seeds should be sown per tube or a very fine sprinkle of smaller seed species such as Eucalyptus, Leptospermum or the daisies, and covered according to the directions outlined above.

Advantages of this method are the lower labour requirements and less disturbance to the developing seedlings which reduces the incidence of twisted trees. Excess seedlings in each tube have to be 'wooded out' at a convenient point as necessary.

The excess seedlings can be pricked out to increase the number of seedlings produced if thinning is done at the first seedling leaf stage.

- 4) Seedlings are ideal for planting when 10 to 15cm high. Seedlings of this size have the best chance of survival and will do better than larger specimens which can be severely root bound. There should be a balance between the size of the root ball and the size of the seedlings' canopy.

If plantings are being undertaken by young children or inexperienced people, some concessions may need to be made for ease of handling, therefore larger seedlings may be better to use, or at least seedlings with a more well developed root system because they are easier to handle as the roots bind the potting mix into the shape of the tube so that the seedling can be placed within the hole made by the Hamilton Tree Planter more easily, with less soil loss and root disturbance.

- 5) Seed should be stored in the dark, in dry, air tight containers. Glass jars etc. are suitable.
- 6) Sieves are necessary to clean the seed of most species.
- 7) Further detailed advice can be provided on the collection and propagation of ground covers if required (ie. grasses, daisies, lilies etc.)

6.4 PLANTING TIME

The time of the year in which tree and shrub seedlings are planted is critical to ensure successful survival and growth rates in revegetation works.

Seasonal influences dictate plant growth due to factors such as soil and atmospheric temperature, rainfall, soil moisture content and weed competition. In order to achieve high rates of survival and growth among seedlings, it is necessary to plant when these growth conditions are maximised.

Therefore it is recommended that planting of seedlings be undertaken during autumn or early spring.

Advantages of early spring planting are:

- Soil moisture content is at its highest (soils are fully saturated after winter) so moisture availability is high throughout the spring and early summer.
- Plant growth rates are very strong allowing efficient eradication of weeds using systemic herbicides (good weed eradication in early spring conserves soil moisture by reducing the

drying effect that grassy and broad leaved weeds have on the topsoil).

- Soil and air temperatures are warming.
- Rainfall is reliable and regular.
- Fast growth rates in the spring allow seedlings to establish strong root systems which ensure that they can survive through the summer without the need for watering.

Advantages of autumn planting:

- Soil temperature is relatively warm after the summer months, promoting plant growth.
- Rainfall is becoming more regular after the summer period. Regular rainfall is more or less assured during the coming winter months.
- The free draining soils of the site mean that waterlogging during winter will not be a problem.
- Weeds and grasses start growing after the "autumn break", so herbicides will be effective.

To take advantage of suitable soil and climatic conditions, it is important that herbicide applications and planting be undertaken as soon as possible after the autumn break.

Disadvantages of spring planting:

- If the summer is unseasonably dry, seedlings may suffer due to the well drained nature of the soils on this site.

Disadvantages of autumn planting

- Seedlings have to survive a long, cold, windy winter before they can put on a good growth spurt during spring.
- Weed competition in the spring after planting will be a problem because residual herbicides applied in autumn may leach through the soil over a wet winter and therefore not be effective when spring arrives. Follow-up weed control and maintenance activities may therefore be increased in the spring after planting.

6.5 GROUND PREPARATION FOR SEEDLING ESTABLISHMENT

Good ground preparation can mean the difference between success and failure of revegetation works, especially in the project area where high rainfall and fertile soils mean that competition from exotic broadleaf and grassy weeds will be very high.

Ground preparation involves establishing a weed free environment for the seedlings to be planted within. This can be achieved in several ways:

- Herbicide treatments (knockdown and/or residual herbicides)
- Physical weed barriers (mulch, weed mats etc)
- Scalping of topsoil (to remove weed seed store in topsoil)

Given the high rainfall and fertile soils of the Mt Laura and Mt Sugarloaf Reserves, we believe that a technique combining herbicide application and mulching would be the most appropriate for the site.

The recommended technique is as follows.

6.6 PLANTING PRESCRIPTION

Summer

- Collect seed; clean, document and store.
Treat seed for insects and fungal infestations.

Autumn

- Continue seed collection into early autumn.
- Commence weed control program (for next spring plantings):

a) Sites with a History of Grazing and Exotic Pastures:

Burn rank pastures to reduce dry matter content and increase the density of new grass growth.

After the 'autumn break', apply knockdown herbicide (eg. Glyphosate (Roundup®)) to areas to be planted in the spring to reduce the vigour and growth rates of exotic grasses.

b) Areas of Remnant Native Grasses

Spot-spray with knockdown herbicide any exotic grasses within the native grasslands, being very careful not to damage remnant grasses. A "Wick Wiper" applicator may be more suitable in some cases where exotic grasses are scarce.

- Autumn planting works:

Two weeks after the autumn break (when grasses and broad leaved weeds have started to grow) apply a combination knockdown and residual herbicide around each planting site. Plant one week later using a Hamilton Tree Planter.

Winter

- Maintenance of guards, weed control if necessary.
- At the end of winter, mulch seedlings planted during the previous autumn while the residual herbicide is still effective (ie. the area upon the mulch is to be placed is still free of weeds. This will prevent weeds from germinating and becoming established during the spring and preserve moisture in the soil for the seedling over the coming summer months.

Spring

- Spring planting works (these should be completed before mid September):

To provide long-term weed control over the spring and summer months for seedlings to be planted during the spring, it is necessary to apply a knockdown plus a residual herbicide about two weeks prior to planting. The residual herbicide will prevent weeds germinating during the spring and the knockdown herbicide will kill all weeds existing at the time of application. This provides a weed free environment for the seedlings during the critical first summer and autumn after planting. Recommended herbicides are Gesatop® (active ingredient Simazine, a residual herbicide), Touchdown® (knockdown herbicide) plus a Wetting Agent to improve the efficiency of the herbicides. All herbicides must be used at the recommended rates and according to the manufacturers directions.

Seedlings must be planted with a 'Hamilton Tree Planter' where residual herbicides are used to ensure no contact is made between the roots of the seedlings and the herbicide affected topsoil. Do not plant with a shovel.

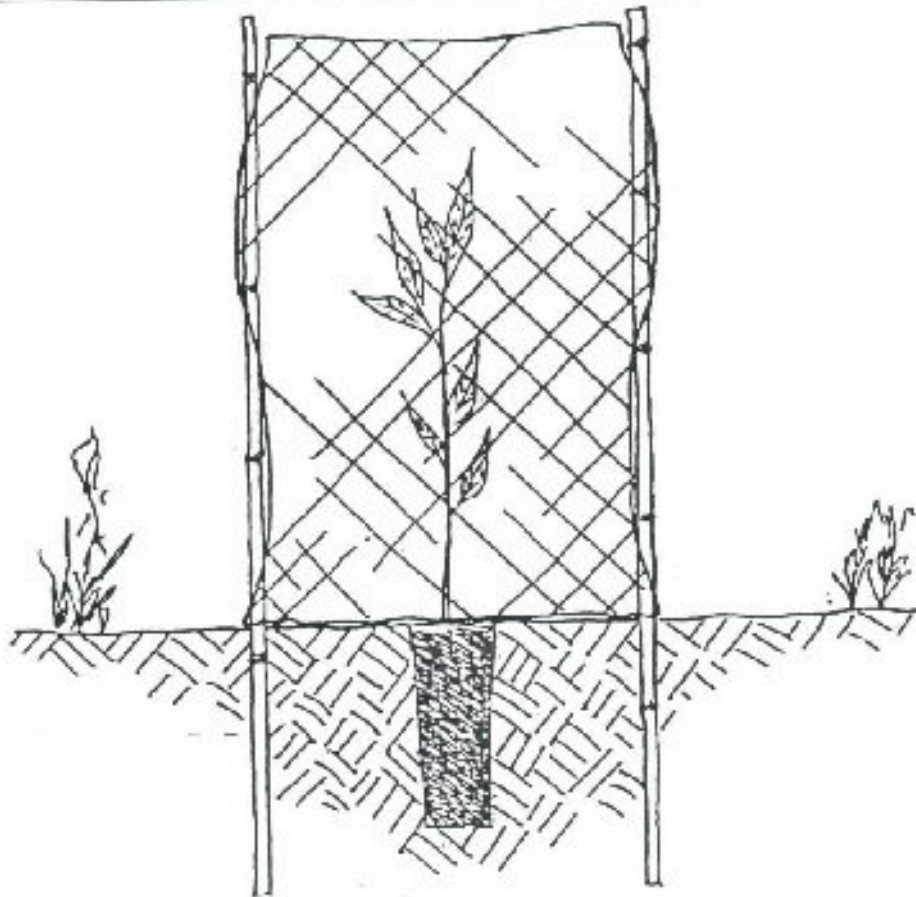
Bury one Agriform® slow release fertiliser tablet approximately 50 mm from the root ball and 50 mm below ground surface at each tree. This provides adequate fertiliser to ensure good initial plant growth. This fertiliser method ensures only the seedling obtains the benefits and not competing grasses and weeds.

Following 12-18 Months

- Monitor weed control and seedling growth and survival. Treat any occurrences of insect attack if serious.

If weed competition is excessive, remove this competition by hand weeding around the trees (least efficient), applying selective herbicides such as atrazine as an overspray (most efficient) or applying a knockdown herbicide using a wick wiper applicator (intermediate in terms of efficiency - high labour input and time consuming).

- Remove tree guards when trees reach approximately one metre in height.
- Store and re-use guards for future revegetation works.
- If necessary a seedling replacement program should be undertaken in the following spring.



Good weed control and protection from rabbits will ensure excellent establishment rates for seedlings.

PART 7: MANAGEMENT PLAN

7.1 MANAGEMENT OBJECTIVES

The management objectives for Mt Leura and Mt Sugarloaf reserves relate to:

- 1). The management of the natural resources of the Mt. Leura and Mt. Sugarloaf reserves, including the land, flora and fauna.
- 2). The management of the reserves in terms of their visual, recreational and cultural importance.

This management plan is divided into two sections according to the topics discussed above.

The aims of managing the natural resources of the reserves are to:

- Preserve and enhance remnant indigenous vegetation within the reserves.
- Utilise the existing remnant vegetation as a major source of seed for the revegetation of the reserves.
- Implement broad scale revegetation works using indigenous vegetation, planted in a form resembling the vegetation communities which existed on Mt Leura and Mt Sugarloaf at the time of white settlement. Seed is to be collected from within the Mt. Leura reserve and from nearby road and rail reserves.
- Manage remnant grasslands appropriately to encourage their natural regeneration and eventual re-colonisation of the entire reserves, utilising controlled burning, direct seeding and seedling planting techniques.
- Manage vehicular and pedestrian access to prevent soil erosion.
- Maintain vegetation cover over the whole reserve to prevent soil erosion and reduce accessions into the regional ground water table.
- Preserve and enhance significant views from the reserves.
- Manage the re-established vegetation communities in a manner which maximises habitat for indigenous wildlife.
- Control pest plants and animals throughout the reserve to maximise the opportunities for indigenous flora and fauna.

- Provide an environment suitable for the re-introduction of native fauna

The aims for the management of recreational, educational and cultural developments within the Mt. Leura and Mt. Sugarloaf reserves are to:

- Provide high quality, informative and easily understood information on the historical, cultural and environmental qualities of the reserves and to ensure that a wide cross-section of the local, national and international community has access to this information.
- Maintain high quality facilities which enable a broad cross-section of the community to gain access to points of cultural, historical and environmental interest.
- Maintain all access roads and tracks in sufficient quality to ensure that their use does not compromise the environmental, cultural and educational qualities of the reserves.

7.2 MANAGEMENT ZONES

To aid in the effective implementation of the Landscape Master Plan and to effectively communicate the prescriptions contained within the Management Plan, Thomson Hay & Associates have divided the Mt. Leura and Mt. Sugarloaf reserves into "management zones".

The management zones were defined following the preparation of the site analysis plan and are based upon aspect, slope and micro-climatic influences.

The management blocks divide the reserve into more manageable areas of land so that the issues relevant to each management block can be effectively tackled, and specific implementation and management programs developed.

The definition of management blocks also assists in the development of accurate revegetation strategies or recipes, as the floristic structure of each management block will vary according to influences such as slope, aspect, elevation and exposure.

There are 12 management zone types identified within this management plan. They are:

- Crater
- Eastern Slopes
- Gullies and Depressions
- Main Car Park and Picnic Grounds
- Northern Slopes (Exposed)
- Northern Slopes (Sheltered)
- Quarry
- Saddleback Picnic Facilities
- Southern Slopes
- Southern Slopes (Transition)
- Summit (Sugarloaf)
- Western Slopes

The management zone types are further divided into smaller "management blocks" which have a numbered reference, 1 to 19. This enables specific recommendations for each management block to be made in plan and written form.

TABLE 9: MANAGEMENT BLOCK TYPES AND AREAS

Block Number & Description		Area	
		ha	acres
1.	Main Car Park and Picnic Grounds	4.00	10.00
2.	Northern Slopes (Exposed)	5.15	12.75
3.	Northern Slopes (Exposed)	5.25	13.00
4.	Western Slopes	3.50	8.75
5.	Crater (Upper)	3.00	7.60
6.	Gullies and Depressions	0.80	2.00
7.	Crater	8.35	20.65
8.	Eastern Slopes	3.00	7.50
9.	Western Slopes	3.20	8.00
10.	Northern Slopes (Sheltered)	5.20	13.00
11.	Quarry	2.20	5.50
12.	Summit (Sugarloaf)	1.20	3.00
13.	Southern Slopes	5.50	14.50
14.	Southern Slopes (Transition)	0.90	2.25
15.	Gullies and Depressions	1.20	3.00
16.	Saddleback Picnic Facilities	1.40	3.50
17.	Southern Slopes	0.60	1.50
18.	Gullies and Depressions	0.60	1.50
19.	Southern Slopes	0.70	1.75
Planting prescriptions (including species and seedling numbers) are provided in Part 12.			

7.3 GRASSLAND MANAGEMENT

The management of grasslands throughout the reserves is probably the most important component of the management plan.

It is an aim of the plan to minimise long-term management inputs, therefore significantly reducing maintenance costs.

In order to achieve this aim, it is necessary to develop grassland management strategies which encourage the replacement of exotic grasses throughout the reserves with native grasses, which require less management.

Within the Mt. Laura reserve, this task will not be as difficult as the reserve has not been grazed for over 30 years. Consequently, some native grasses are present and the soil nutrient levels are lower. This means that exotic grasses are less vigorous within the Mt. Laura reserve.

However, the Mt. Sugarloaf reserve has a long history of pasture improvement and grazing. When stock is excluded from the Mt. Sugarloaf reserves when the lease expires in 1996, the exotic pastures will initially become very dominant. At the same time, native grasses will have the opportunity to grow and set seed due to the lack of grazing and over time they will re-colonise the Mt. Sugarloaf reserve also.

Existing Grasslands - Sugarloaf Reserve

Much of the Mt. Sugarloaf Reserve has been sown to exotic pasture species, dominated by *Phalaris* sp., perennial rye grass and various clovers.

These pastures have a history of fertiliser application (although no fertiliser has been spread for the past 10 years) and their grazing history has also contributed significantly to the nutrient levels of the soil.

It is interesting to observe the quality of the pasture over the Mt. Sugarloaf Reserve, in particular the differences between the steep hill sides and the flats of the ridge tops, gullies and saddles. The flatter areas have a denser pasture of more vigorous characteristics than the pastures on the hill sides which have a lower density and significantly higher dry matter content. Some remnant native grasses occur.

There are two factors that may influence this trend:

- The steeper slopes are not grazed as intensively as the flatter ground, and never used as stock camps.

- Nutrient build up on the flatter soils is higher than the steeper slopes due to run-off characteristics.

This observation is significant when developing revegetation strategies for the Sugarloaf reserve as different management tasks will be required for the steep hill slopes as opposed to the flat country within the reserve.

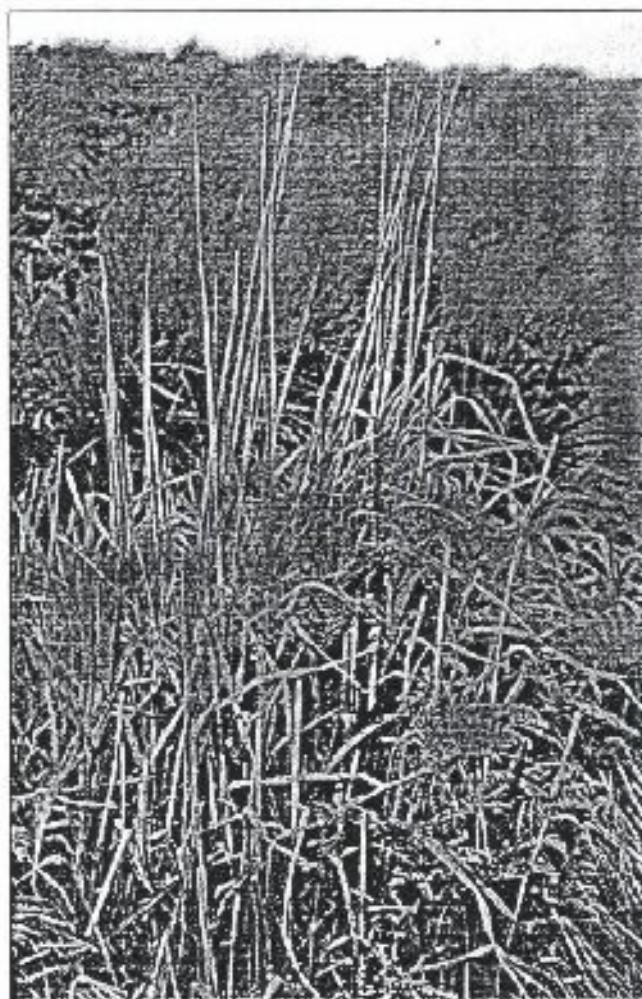
Existing Grasslands - Mt. Leura Reserve

Native grasses occur within the Mt. Leura Reserve as isolated plants and in larger areas of native grassland communities.

During the site analysis stage of the project, the following trends in the distribution of native grasses and grassland plants became evident:

Native grasses and grassland plants are not likely to occur in areas :

- of concentrated pedestrian or vehicular traffic,
- where run-off is increased and/or concentrated (such as roadside drains), and,



Phalaris - a dominant exotic pasture grass which starves seedlings of native trees, shrubs and grasses, preventing and/or slowing their establishment.

- where topsoil depth has been increased due to earthworks.

Native grasses occur in areas:

- where access is limited - in corners of the reserve,
- where topsoil is very thin or non-existent due to earthworks or erosion,
- beneath the drip-line of pine and cypress trees (not adjacent to their trunks).

The three main factors influencing the type and distribution of grasslands are:

- Soil fertility.
- Availability of water.
- Regular disturbance.

This management plan aims to exploit these influences and use them to gradually alter the species composition of the ground flora of the project area.

Management Prescription - Exotic Grasslands

The aim in managing exotic grasslands is to reduce their vigour so as to:

- allow native grasslands to establish,
- reduce fire hazard throughout the reserves, and,
- to improve growth rates of trees and shrubs planted as part of the revegetation works.

The primary strategy for reducing the vigour and therefore dominance of the existing exotic grasslands over Mt. Sugarloaf reserve is to reduce soil nutrient levels. There are three key factors which will assist in this strategy:

- not applying fertilisers,
- reducing the recycling of nutrients within the site, and,
- time.

It is recommended therefore that fertilising be ceased as soon as the lease expires on Mt. Sugarloaf. Grazing should still continue on areas not being revegetated for eighteen months to two years, as long as it is practicable to fence the stock from the regeneration areas.

To reduce the recycling of nutrients, it is often beneficial to cut hay several times over the spring from exotic grasslands and then remove this hay from the site. If this is timed when the grass is

flowering, higher levels of phosphorous can be removed from the site as grasses utilise more phosphorous during flowering. The theory behind this approach is that the removal of the hay is taking nutrients from the soil and removing them from the site completely. However, due to the steep nature of the Mt. Sugarloaf reserve, this is not entirely practicable. An alternative strategy may be to graze the reserves at a higher rate for a short period of time. This will remove some of the nutrients as they will be tied up in the sheep or cattle and removed from the site when the stock is taken off. However, while the stock is present on the site, they will be returning a proportion of these nutrients to the soil through their faeces and urine.

Continual cutting can play a very important role in reducing the dominance of *Phalaris* as this species does not tolerate continual mowing, especially when cut low to the ground. The cut hay can be burnt on site. This weakness should be exploited where feasible on Mt. Sugarloaf reserve if *Phalaris* becomes dominant.

Over time, nutrients are leached through the soil profile or locked up in the soil through chemical and microbial processes. The minimisation of nutrient recycling and the effects of time will effectively reduce the nutrient levels within the soil. The very friable, well drained nature of the soils on the site will contribute to speeding this process up.

The trees and shrubs proposed to be planted as part of the implementation of the landscape master plan will assist in reducing the vigour and therefore the dominance of exotic grasslands by:

- Competing for soil stored nutrients.
- Reducing light to the grass layer.
- Competing for water.

These measures will therefore greatly reduce the dominance of most of the exotic grasses on the reserves at present.

Phalaris is an exception to this. *Phalaris* is a particularly vigorous grass which thrives when not grazed, seeds readily, forms dense thickets, remains green for longer over the summer (therefore can not always be effectively burnt) and is very difficult to control with herbicides (see note above on control techniques).

If competition from exotic grasses is still excessive after three to four years, it will be possible to lightly graze sheep within the regeneration areas until the canopy density increases enough to suppress weed growth.

In summary, the proposed management strategy for exotic grasslands includes the following recommended actions:

- Cease fertiliser applications.
- Cease grazing except in areas not likely to be revegetated within one year.
- Increase stocking rates but graze for shorter periods in those areas where stock is being used to reduce maintenance inputs.
- Apply knock-down and residual herbicides to a diameter of 1 to 1.5 metres around each tree and shrub seedling to be planted. This will ensure fast growth rates of these seedlings, therefore decreasing the time taken for these trees to start suppressing exotic grasses.
- Spot applications of knockdown herbicide (using wick-wipers and/or knapsack sprayers) to particularly vigorous clumps or individual plants of the more vigorous exotic grasses, particularly *Phalaris*.
- Strategic low-intensity burning of exotic grasses in the autumn to reduce the vigour of annual and perennial grasses and promote native grasses to germinate.

Management Prescription - Native Grasslands

The aim of managing existing native grasslands is to:

- Control exotic grasses and broad leaved weeds within the grasslands to ensure the continuing health of the native grassland community.
- Encourage existing native grasslands to spread. This will be achieved by controlling exotic grasses adjacent to the remnant native grasslands giving them the opportunity to spread into areas once dominated by exotic grasses.
- Introduce a framework of native grass seedlings into areas where no remnants exist, by planting seedlings, spreading hay cut from remnant native grasslands or broadcasting seed.
- Spot application of knockdown herbicides to exotic grasses and broad leaved weeds within and adjoining native grasslands. Wick-wipers and knapsack sprayers are suitable applicators for this purpose.

- Burn large areas of native grasslands every 3 to 4 years during the period from autumn to late winter where possible to minimise the opportunity for exotic grasses and broad leaved weeds to become established within these stands and to increase the vigour of the native grassland species.
- Burn areas of exotic grasses with isolated native grassland species every 2 to 3 years in autumn to late winter to reduce the vigour of the exotic grasses and promote the regeneration of native grassland plants.

As the project develops it will be increasingly important to set up grassland management and establishment trials. The services of a botanist specialising in this field should be sought to assist in this work.

7.4 PEST PLANTS AND ANIMALS

(This section prepared by D. Ritchie, DCNR Campdown)

Noxious Weeds

Those species identified are:

Hemlock, Blackberry, Boxthorn

Variegated Thistle, Spear Thistle, Slender Thistle

Shore Thistle, Horehound, Stinkwort

Sweet Briar, Oxalis, Sand Rocket

Skeleton Weed, Paterson's Curse

General Comments:

Hemlock An introduced annual/biennial; with scattered infestations over the Mt. Leura Reserve. This weed constitutes the largest threat from those noxious weeds present. Control will need to be carried out for several years.

Blackberry This weed has been largely eradicated in the past two years. Annual inspections will need to be done and plants sprayed as required. Re-infestation will occur through birds and foxes eating fruit from Blackberry bushes with the seeds passing through the animals digestive system.

Hawthorn An odd small bush occurs across the reserves. Further spread of this plant will be by the same means as mentioned for Blackberry. This weed is not seen as a problem.

Boxthorn Present in small patches this plant will require annual attention. Spread is as per that mentioned for Blackberry.

Oxalis Small scattered infestations throughout the area but of little importance. Easily controlled whilst carrying out programs for Thistles etc.

Thistle All four species, although not in large infestations have the ability to heavily re-infest, in particular Mt. Sugarloaf. Spread is by seed with plants easily controlled by chemical application. Annual control programs will be required.

Horehound A perennial plant with minor infestations over the reserves. Will need attention, possibly on a yearly basis.

Sweet Briar A perennial shrub with only minor infestation over the area. Another plant primarily spread by birds and foxes.

Stinkwort A summer annual, occasionally occurring along the roadside margins of the main access road to Mt. Leura. It is easily controlled.

Sand Rocket A perennial plant found along the roadside margins of the access road to Mt. Leura.

Paterson's Curse A small infestation of this plant is present on Mt. Leura reserve. It will require annual control for several years. Spread is usually via a mechanical means or contaminated produce.

Skeleton Weed A serious weed of northern Victoria, it was located several years ago. Following a control program the plant appears to have been eradicated. An annual inspection will be required to check on its presence. Located on Mt. Leura, its occurrence is due to vehicle contamination.

Vermin

The two species present are rabbits and foxes. Rabbits are represented by odd specimens with any likely influx in numbers easily handled.

Foxes do not present any major threat to flora, although they will be a main source of spread for Blackberries, Hawthorn and Boxthorn. It is highly probable that they will have an impact on the fauna living in the reserves. They are already a problem to adjacent farmlands and Town residents keeping poultry. I am of the opinion that once the remaining pine and cypress trees are removed numbers will be reduced.

Dens are present in the embankments of Mt. Leura along with disused rabbit warrens. If required discrete poisoning or fumigation of dens are effective control methods.

Environmental Weeds

Indigenous/native plant species are a very minor component of the flora present. The majority of the land is covered by pasture species or environmental weeds. Those more common non-pasture species include:

Ox Tongue A broad leaf weed of roadsides and waste areas.

Sow Thistle As per Ox Tongue

Twiggy Mullein Present over most of Mt. Leura.

Cleavers A creeping prostrate plant present in large clumps on Mt. Leura.

Tall Fleabane An annual plant posing the greatest threat of spread and the ability to take over the reserves. Previously restricted to waste lands and road sides, this plant is commencing to spread at an alarming rate in this district.

Cape Weed, Dandelion, Wild Radish and Turnip are broad leaved weeds scattered throughout the area. They are common on access roads, tracks and where cypress trees have been removed.

Control of the above weeds can be achieved in conjunction with programs on Noxious Weeds.

Control Program

February

Rabbit baiting as required. Approximate time required would be two man days, bait poison etc. being inexpensive.

Blackberry Spot spray preferably with Brush-off.

Skeleton Weed Check to see if present. Spot spray with Brush-off. Would effectively take one man day to inspect area and spray plants present (Blackberry, Skeleton Weed)

Stinkwort and Sand Rocket Spot spray with 2,4-D Amine. Time required half a man day.

April

Blackberry Check plants sprayed in Feb. Re-spray if necessary. Time required half a man day.

June, July, August

Boxthorn and Hawthorn Cut down bushes and paint cut stumps with 2,4-D Amine. Burn cut tops. Time required one man day.

Foxes and Rabbits Fumigate if required.

September

Oxalis Spot spray with 2,4-D Amine or Roundup.

Sweet Briar Treat with Tordon Granules.

Hamlock, Thistle spp., Cape Weed, Paterson's Curse, Sow Thistle, Horehound, Ox Tongue, Wild Turnip & Radish, Twiggy Mullein, Tall Fleabane - All these plants can be treated in the one application by spot spraying with 2,4-D Amine or M.C.P.A. 500. One man day would be required to complete this program.

Phalaris may also require controlling in specific areas. If so this can be carried out with Roundup and a Rope Wick.

November

Re-check all work carried out in September, re-spray as necessary.

Work program time frames listed should be the maximum time required to carry out the necessary works. As infestations are controlled less time will be required annually.

Such a program is dependant upon seasonal and stable weather conditions. Extremes can see dramatic changes to both infestations and spraying results

Provided that spraying recommendations are adhered to, problems should not be experienced with kills on non-target flora (town gardens and adjacent lucerne crops).

7.5 MANAGEMENT OF EXISTING EXOTIC TREES

The existing exotic trees over the Mt. Leura and Mt. Sugarloaf reserves are becoming a significant management problem due to their age. The costs associated with the removal of the predominantly Cypress and Pine trees is significant.

The main management issues associated with the existing pine and cypress trees are:

- Pine (and to a lesser extent Cypress) seedlings are germinating throughout the ungrazed portions of the reserves. These seedlings are not compatible with the revegetation strategy and there is a considerable amount of work required in removing these seedlings, especially if they are not controlled when they are young.
- The Pine and Cypress trees are in a state of senescence and are a threat to person and property as they are prone to splitting, limb drop and wind throw.

It is recommended that all the existing Pine and Cypress trees be removed from Mt. Leura Reserve, and only the Pine plantation west of the quarry be retained within the Mt. Sugarloaf Reserve in the short term. This plantation could be removed after 50 to 70 years as the indigenous vegetation will be well established by this time.

The rate of removal of these trees should be determined by the availability of funding. It is recommended that the process of removal be staged over a five to eight year period to ensure that the seedlings established as part of the revegetation program have time to become more dominant in the landscape, therefore minimising the visual impact of the removal of the exotic trees on the landscape.

It is essential that the removal of the Pine and Cypress trees be co-ordinated with the revegetation strategy to ensure that the new works are not damaged by the removal of these trees.

It is therefore recommended that no revegetation works be instigated in Management Blocks 2, 3 & 8 until all Pine and Cypress trees are removed and weed growth after their removal has been controlled.

It is recommended that clearing works start from the southern end of Management Block 8, and the debris from the trees be dragged downslope (perhaps near the tip) to be burnt, subject to negotiations with the landholder. If this is not possible, the debris will have to be winched to a level site in Management Block 2 which will add to

the cost of the clearing works.

The south-eastern half of Management Block 3 could be cleared in a similar manner to Block 8, ie, downslope towards the tip site, if possible. The north-western half of this Block should be cleared to the level site within Block 2 for burning.

All trees within Block 2 could be heaped up and burnt on site.

The Cypress trees on the saddle to the west of the crater and the site of the proposed saddleback picnic area in the Mt. Sugarloaf Reserve could be removed using an excavator due to the fact that there is not remnant grasslands in these areas and the sites are relatively flat. This technique would enable the complete removal of the stump. The debris from these trees could be heaped and burnt in the area of the proposed car park (for the Cypress trees on the west rim of the crater) or on the saddleback picnic area site. These works should be completed before the first stage of the revegetation works commence. The Cypress trees on the west rim of the crater should be the first to be removed.

During all felling works, disturbance of the soil should be minimised to avoid the introduction of weeds. Where disturbance does occur the site should ideally be mulched with chippings of indigenous vegetation. It may be possible to source this material from the SEC or their contractors when they are clearing vegetation along powerlines in the local area (but care must be taken to ensure that the material comes from one of the specified seed collecting area and does not contain exotic or non-indigenous native material). Another option is to cut "hay" from areas of native grassland and spread this over the disturbed site. If neither of these two options is available, the site should be mulched with straw, or any suitable material not containing seeds of exotic grasses.

It is recommended that efforts be made to subsidise the cost of felling the Pine and Cypress trees by selling the timber or offering the timber to the contractors in return for a reduced felling cost.

7.6 MANAGEMENT OF EXOTIC SHRUBS / WOODY WEEDS

Within the Mt. Leura Reserve isolated specimens and clumps of Cape Broom, Cotoneaster, Sweet Pittosporum and Tree Lucerne are evident. These are potentially severe environmental weeds and must be removed from the site prior to revegetation works commencing.

The recommended technique for removing these species is discussed below. It is important that this technique be followed to ensure that these weeds are not inadvertently spread to other areas within the reserves.

- Cut the shrubs off about 5 to 10 cm above ground level and paint the stump with undiluted Roundup® or similar herbicide as per the manufacturers instruction.
- Load all cuttings into an enclosed trailer, or into wool packs or similar and remove completely from the site.
- Do not chip these shrubs on site.
- Time the cutting of the shrubs before seed set at all times to minimise seed spread.
- Inspect the weed infested site for weed seedlings at monthly intervals after the removal of the shrubs. Manually remove each seedling before they reach 20cm in height. If seedlings are germinating very thickly, apply a suitable knock-down herbicide to the seedlings.
- Undertake follow-up inspections and weed control works as necessary at minimum six monthly intervals.

7.7 MANAGEMENT OF RECREATIONAL FACILITIES

It is important that all tracks be maintained to a high standard so that their use is promoted. If the tracks are pot-holed and poorly formed, people will tend to skirt around the paths, therefore widening the track or worse still, creating new tracks. It is fortunate that the site is very well drained and there is a plentiful supply of suitable surfacing materials on hand.

All picnic facilities, toilets and information shelters should be maintained in a clean and tidy condition and any damage through vandalism or wear and tear repaired promptly. This will ensure that damage is kept to a minimum as vandalism of public facilities is often more likely to occur where such facilities are in a poor condition in the first instance.

It is important that the local community be involved in the construction of all facilities as this will create a

sense of ownership of the project. This will also ensure that vandalism is minimised as it is unlikely that people will vandalise facilities that they or their friends have been involved in building.

7.8 FIRE MANAGEMENT

Introduction

This section was prepared by the Advisory Committee in consultation with the Fire Brigades and landholders whose areas and properties adjoin the Reserves.

The following treatments and recommendations are aimed at:

- (i) preventing a fire that commences within the Reserves from endangering adjacent properties.
- (ii) preventing a fire entering the reserves from adjacent properties
- (iii) keeping damage in the Reserves to a minimum should a fire occur.

Because the Reserves are small in area and consist mainly of steep inaccessible slopes, fire prevention measures are restricted to those that can be implemented around the perimeter of the Reserves, generally on private land and at the base of the slopes.

These perimeter works should be supplemented with improvements to water supply, some internal access and localized treatments around possible ignition sources within the reserves.

PERIMETER PROTECTION WORKS

1. Boundary Access

Objective: To provide safe access for fire fighting vehicles along or as near as possible to the Reserve boundary to enable suppression of a fire.

Standard: Minimum width of surface 3-5m; tanker standard; passing points no more than 500m apart; if dead ends are unavoidable then provide a turning area of minimum 25m radius.

Application: Seek landowners co-operation in making use of existing network of farm tracks and laneways on the land adjoining the eastern, southern and western boundaries of the Reserves.

Where applicable assistance should be given to upgrade and link these tracks and to provide gateways in property boundary fences (these gates should be chained and locked but able to be cut open in a fire situation).

2. Boundary Fire Break

Objective: To stop a low intensity fire. For a high intensity fire to provide a safe and effective control line for fire fighting personnel and a base for backburning.

Standard: Minimum fuel gap 20m; maximum height of vegetation 10cm; include boundary access tracks where possible.

Application: Maintain existing fire break at rear of properties backing on to Mt. Laura in Wright Street, Kawana Crt. and Laura Crt. in accordance with the Municipal Fire Prevention Plan (treatments involve the use of herbicides, hand slashing and some grazing).

3. Fuel Management (Agricultural Treatment)

Objective: To reduce fire intensity to controllable levels and reduce spotovers by reducing fuel loads outside the perimeter of the Reserves in a location that enables effective suppression.

Standard: Minimum 50m width.

Application: Seek the co-operation of landowners in continuing the practice of intensive grazing or green cropping of their land adjacent to the Reserve boundaries.

4. Water Supply

Objective: To provide accessible volumes of water at strategic locations to allow effective suppression.

Standard: Water points at minimum 3 to 5 km spacings.

Application: Northern and western boundaries - can be serviced via the town reticulation network and a large farm dam near the south west corner of the Reserve.

Southern and eastern boundaries - unable to be serviced adequately at present. Immediate assistance and approval should be sought to have fire plugs provided on the South West Water Authority main near the intersection of Blackrock Rd. with Browns Rd. and the intersection of Blackrock Rd. with the Princes Highway.

Saddleback Picnic Area - it would be desirable at some future stage, before the Reserves are fully developed, to have a water main and supply point installed in this vicinity.

INTERNAL PROTECTION WORKS

1. Secondary Fire Break

Objective: To stop low intensity fires and to provide a base for backburning.

Standard: Minimum fuel gap 8 - 10 m; to include a track of tanker standard; maximum height of vegetation 10cm.

Application: Mt. Laura lookout road - slash grass verges along road in accordance with Municipal Fire Prevention Plan.

2. Internal Access Tracks

Objective: To provide access by fire fighting vehicles to within 300m of any point in the reserves.

Standard: Minimum clear width of 3-5m; tanker standard; minimum vertical clearance of 3-4m to allow unimpeded vehicle access at 20-30kph; passing points 500m apart maximum; if dead ends are unavoidable provide a turning area of minimum 25m radius.

Application: Panorama Trail - section along ridge of Mt. Laura Picnic Trail and the access / maintenance tracks either side of Mt. Sugarloaf.

3. Internal Ignition Sources

Objective: To prevent the commencement and spread of fire from a potential source of ignition within the Reserves.

Standard: Isolate potential ignition sources by non-flammable fire breaks minimum 3m around perimeter or along edge of potential source.

Application: Make use of gravel pads, slash ground vegetation or maintain green swards around barbecues, shelters, tables, benches, picnic areas and car parks.

Ensure any machinery and plant used in the Reserves is equipped with approved fire protection equipment, is operated in accordance with, and conforms to CFA Regulations (eg. knapsacks, spark arrestors).

4. Fuel Management

Objective: To control ground level fuel loadings within the Reserves so as to reduce possible fire intensity.

Standard: Maximum fine fuel load 8 tonne/ha.

Application: Initially grazing should continue in those parts of Sugarloaf Reserve in which tree planting has not commenced, once planting is underway problem areas may only be controlled by hand slashing and careful application of herbicides.

Once trees are established a selective program of low-intensity burns every 3-4 years may be implemented to reduce fuel loads and to aid in the establishment of native grasses. Low intensity burns should only be carried out in late autumn (not spring) due to the porous nature of the soil in the

Reserves being able to shelter smouldering roots and stumps for long periods of time.

Low intensity burns must only be carried out under the guidance and assistance of Fire Brigade personnel and equipment.

PART 8:

QUARRY MANAGEMENT

8.1 INTRODUCTION

Situated on the western slopes of Sugarloaf, the former scoria quarry site requires special management inputs due to the problems associated with managing this highly disturbed and fragile site.

Several concepts have been developed in the past for stabilising the quarry face, from hydro-mulching to erosion control matting. Tree planting has been undertaken to date and has been successful in stabilising the base of the scree slope and reducing the wind erosion problems facing this exposed site.

The main problem with the quarry site at present is the very unstable upper edge. Erosion of the quarry face is undercutting the topsoil above, which further destabilises the site.

8.2 MANAGEMENT STRATEGY

There are three possible approaches to the management of the quarry site:

- 1) Do nothing - the quarry will continue to be unstable until the whole slope reaches its natural angle of repose - which is likely to be similar to the slope of the current scree slope. This will change the shape of Mt. Sugarloaf by continuing to undercut the summit area. Once this angle of repose is achieved, vegetation will become established and the slope will stabilise with time.
- 2) Undertake significant earthworks to fill in the quarry. This is possibly the only way to stop the creeping of the quarry face up-slope. This would be a very expensive exercise, but technically possible.
- 3) Slow the process of erosion by stabilising the scree slope with grasses, shrubs and trees to slow the rate of erosion of the quarry face. This will not stop the erosion process, but it will slow it down and ensure that the visual impact of the quarry is reduced. A method of stabilising the top edge of the quarry face is the most important factor to consider in this case.

Given the financial constraints of the management

authority, we believe the third option to be the most appropriate. The following recommendations are based on this option.

- Batter off the vertical soil profile at the top of the quarry face to an angle of one in two, so that this new face is less than one metre wide. Install erosion control matting eg. Jutemaster (least expensive, low life-span) coconut fibre matting or Synthetic filter fabric (more expensive but longer lasting). Establish grasses immediately. This will stabilise the top of the quarry face and minimise slumping and mass movements of soil down slope.
- Establish grasses, trees and shrubs on the scree slope. It would be beneficial to mulch and/or topsoil this slope if funds are available as this will speed up the rate of establishment significantly.
- Minimise exposure of the quarry face to wind. The trees and shrubs established on the scree slope will assist, but if funding is available, the more gentle slopes should be covered in Jutemaster erosion matting or similar to provide a mulching and wind protection function.

Without infilling the quarry, or stabilising its face with a structural wall system, it is probably impossible to halt the erosion of the quarry in the long term (ie. 100 to 1,000 years), because until the slope finds its natural angle of stability, it will always erode to some degree. All that can be done practically is slow the process down and minimise the visual impact and safety issues associated with the quarry.

In the mean time, the quarry will serve as an important educational tool, in two ways. One is that it may raise community awareness of the impact of extractive industries in some landscapes, the other is its ability to show the geological structure of the volcanic cones of the district.

An access path is proposed at a safe distance from the quarry face to enable access for viewing the quarry.

A safety fence is recommended around the quarry face, above and below to keep people out of this sensitive area.

PLAN REDUCTIONS

1. SITE ANALYSIS PLAN
2. LANDSCAPE MASTER PLAN
3. PLAN OF MANAGEMENT BLOCKS

SITE DETAILS

1. LOWER CAR PARK, PICNIC FACILITIES AND INFORMATION CENTRE

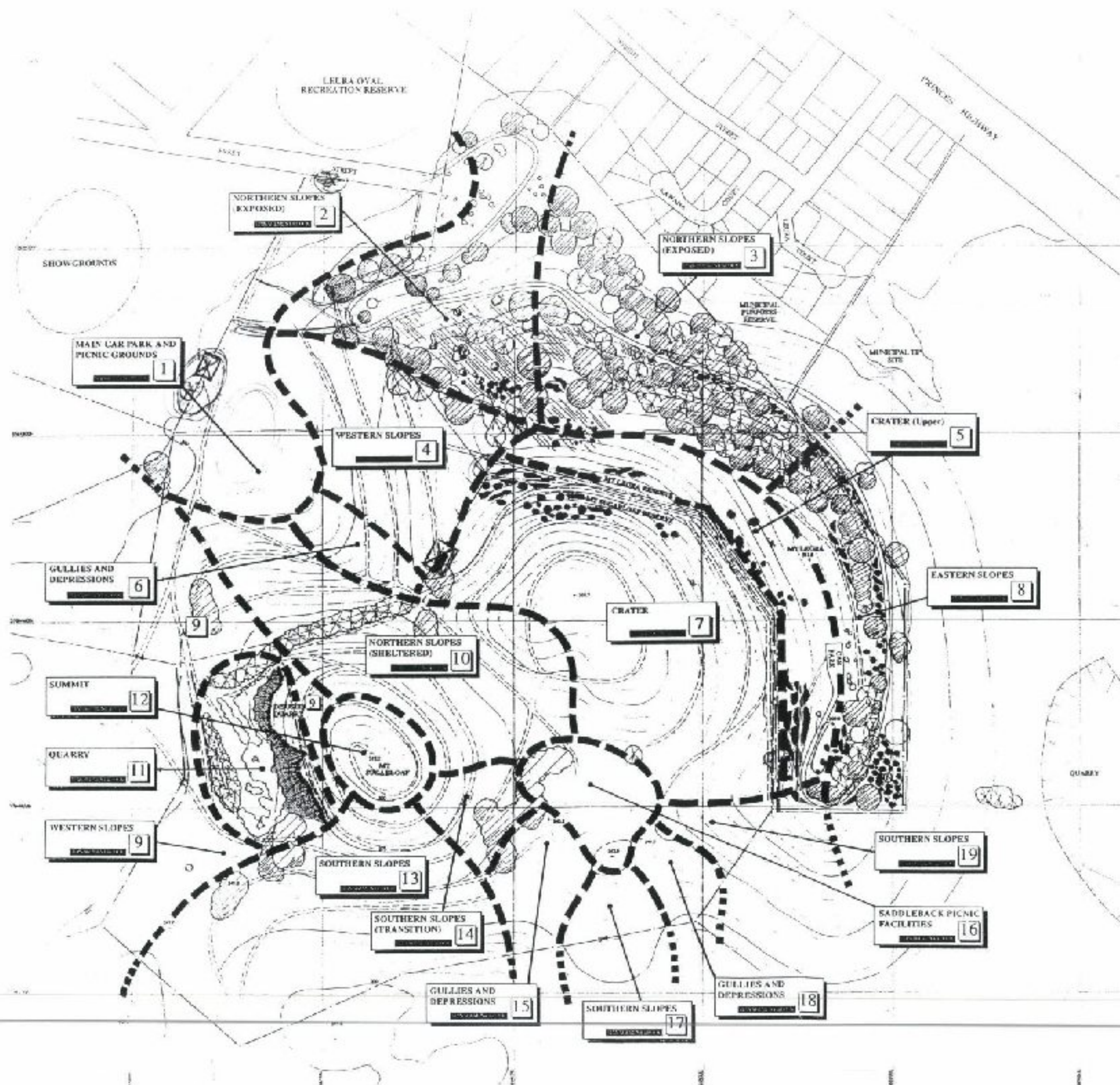
2. HAIRPIN CAR PARK

3. MT. LEURA SUMMIT CAR PARK & INTERPRETATION FACILITIES

4. UPPER CAR PARK

5. SADDLEBACK PICNIC FACILITIES

6. TIMBER VIEWING DECK- SADDLEBACK PICNIC AREA



LEGEND

- Reserve Boundary and External Fencing
- Common Reserve Boundary
- Mt Leura and Mt Sugarloaf Reserves
- Town / State Boundary
- Contours @ 5m Intervals
- Existing Fencelines
- Existing Vehicle Access Tracks
- Disturbed Quarry
- Existing Soil Stabilisation Vegetation (Native)
- Existing Allocasuarina verticillata (Weeping Sheoak)
- Pinus radiata (Monterey Pine)
- Casuarina macrantha (Monterey Cypress)
- Native Grassland (Poa sp)
- Phalaris Infestation

LANDSCAPE MANAGEMENT PLAN

for
Mount Leura and
Mount Sugarloaf
Reserves

(Mount Leura
Advisory Committee)



Date: February 1994



Scale: 1:1,500



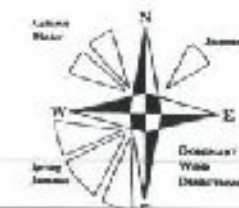
LEGEND

- Reserve Boundary & External Fence Line
- Common Reserve Boundary Mt Leura and Mt Sugarloaf Reserves
- Existing Fence Line
- Information Site & Trig. Point
- Low Slope Area with Multi-use Recreational Potential
- Disused Quarry
- Vehicle Access Track
- Existing Pedestrian Movement Patterns
- Logical Approach to Reach Mt. Sugarloaf Summit from Carpark
- Area Containing Remnant Stand of *Allocasuarina verticillata* (Weeping She-oak)
- Soil Stabilisation Vegetation (Native)
- Pinus radiata* (Monterey Pine)
- Casuarina macrocarpa* (Monterey Cypress)
- Priority Revegetation Site
- Views of Significance
- Undesirable View
- Extent of Distant Visibility in Quarry
- Town and Shire Boundary
- Contours @ 5 m Intervals

- Native Grassland (*Poa* sp.)
- Phalaris infestation
- Trees to be Removed (Short Term Strategy)

To Be Read in Association with the Master Plan Report

LANDSCAPE SITE ANALYSIS PLAN for **Mount Leura and Mount Sugarloaf Reserves** (Mount Leura Advisory Committee)



Date: May 1993



Scale: 1:1,500

900 mm wide path to
Saddleback picnic facilities.

Shelter
vegetation.

View to Mt Porndon and
Lake Purrumbete.



TYPICAL SECTION

Timber deck fitting
to hillside.
(See site detail 5)

Bench seating.

Detailed information board.

TIMBER VIEWING DECK

SITE DETAIL

6

Date : August
1994

Thomson Hay
& Associates

Not To Scale

Landscape
Architects



CONSTRUCTION DETAILS

1. STANDARD BOLLARDS (BARRIERS AND TOTEMS)

2. STANDARD BOLLARD AND SIGN DETAILS

3. MAIN ENTRANCE SIGN

4. STANDARD MESSAGE BOARDS

5. DETAILED INFORMATION BOARDS

6. BOLLARD & CHAIN VEHICLE BARRIER

7. POST & RAIL PEDESTRIAN BARRIER

8. PICNIC TABLES

9. PICNIC BENCHES

10. BENCH SEATS

11. TIMBER SEATS

12. PEDESTRIAN PATH DETAILS

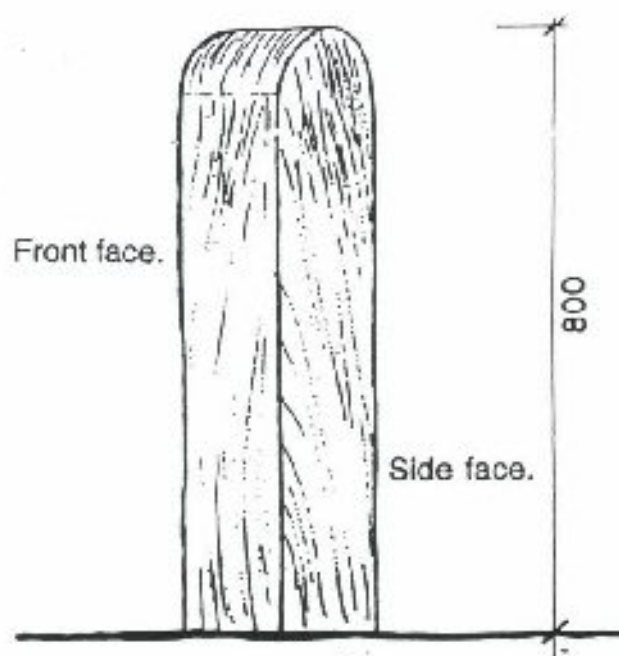
13. PEDESTRIAN STEPS

14. STANDARD RUBBISH BIN

15. TUBESTOCK PLANTING DETAIL

16. GAS BARBECUE

17. PICNIC SHELTER



Standard red gum bollard with compacted soil / cement footing to 750 mm depth.

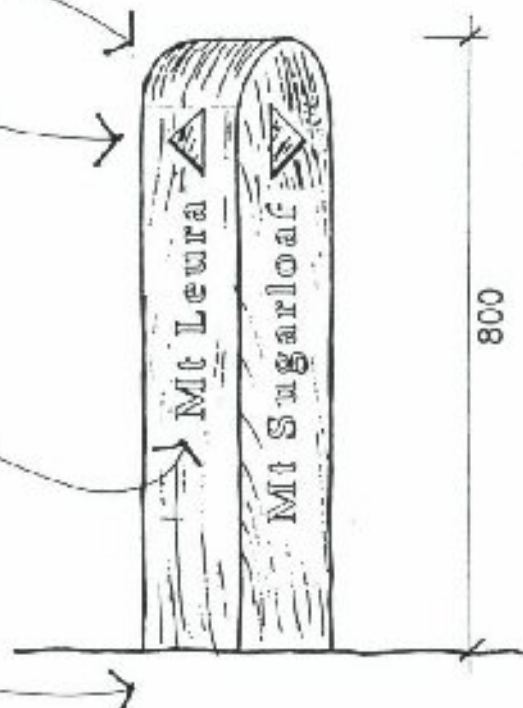
DELINEATION BOLLARD AND BARRIER

175 x 175 standard red gum bollard.

Symbols positioned 90 mm below top of post with 300 mm minimum clearance between base of post and lettering.

Standard symbols and 40 mm high lettering to read from bottom to top.

Compacted soil / cement footings to 750 mm depth.



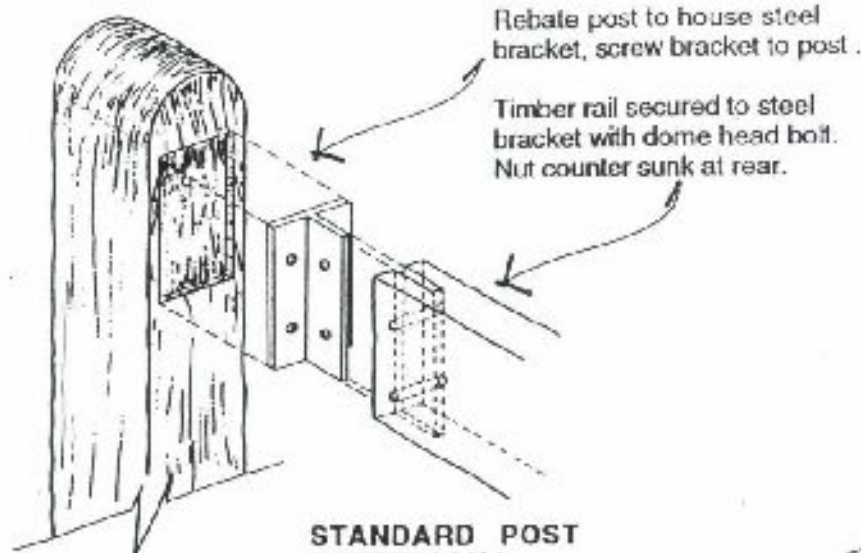
DIRECTIONAL BOLLARD

STANDARD BOLLARDS (Barriers & Totems)

CONSTRUCTION DETAIL

Mt Leura and Mt Sugarloaf Management Plan

POST AND RAIL JOINTS

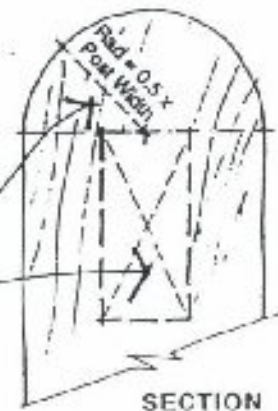


STANDARD POST DIMENSIONS

175 x 175mm red gum post with domed top as shown. To be used as standard posts for all bollards, signs, etc. and some furniture.

Radius of domed top equal to $1/2$ post width.

All timber rails attached to standard posts to be positioned below top of post by dimension equal to radius.



Pins to prevent theft of furniture by sawing off at ground level.

200 x 14 mm steel pins set into timber equal distance above and below ground level. 25 mm inset at ground level.

Compacted soil / cement footing.

THEFT PROOFING PIN INSERTS

STANDARD BOLLARD & SIGN DETAILS

CONSTRUCTION DETAIL

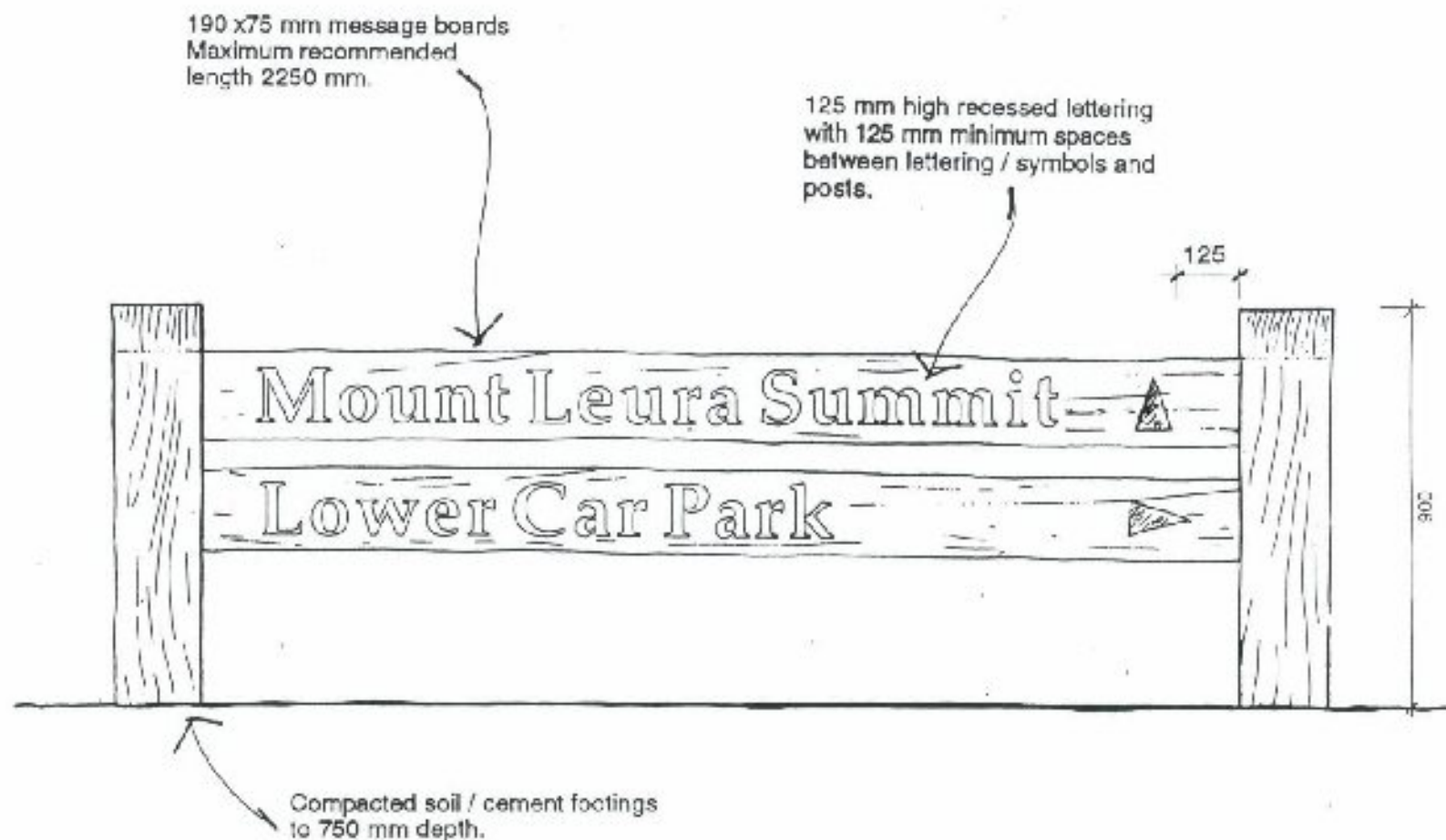
Mt Leura and Mt Sugarloaf Management Plan

MAIN ENTRANCE SIGN

Mt Leura and Mt Sugarloaf Management Plan

CONSTRUCTION DETAIL

3



120 x 120 mm red gum posts.

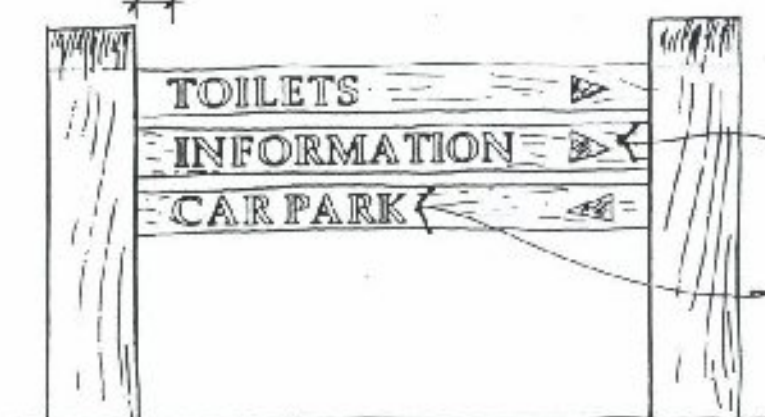
60 mm high standard lettering with 75 mm minimum spaces between lettering / symbols and posts.



90 x 45 mm message board.
Maximum recommended length 850 mm.

Compacted soil / cement footings to 600 mm depth.

75



Standard dimension red gum posts.

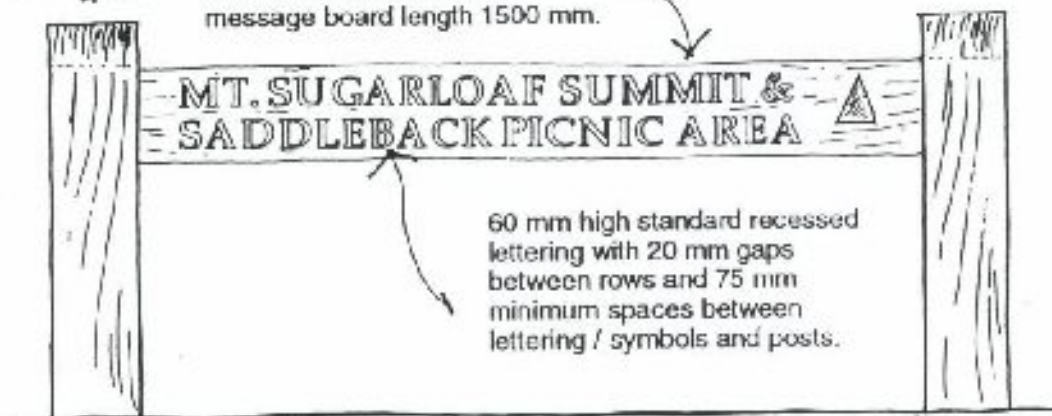
90 x 45 mm message boards
Maximum recommended length 1250 mm. Max. 25 mm spaces between boards.

60 mm high standard lettering with 75 mm minimum spaces between lettering / symbols and posts.

Compacted soil / cement footings to 750 mm depth.

Standard dimension red gum posts

190 x 45 mm message board.
Maximum recommended message board length 1500 mm.



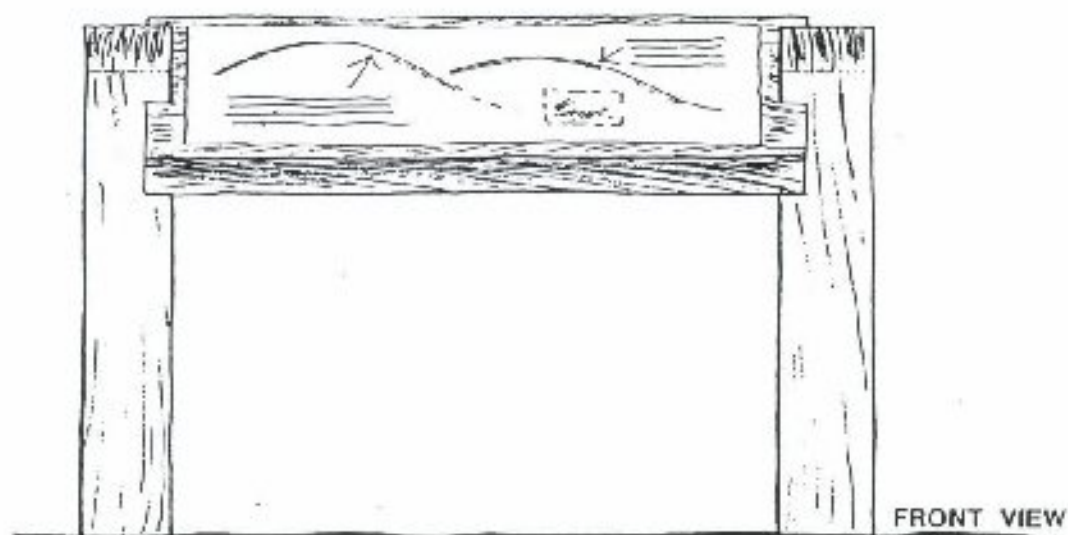
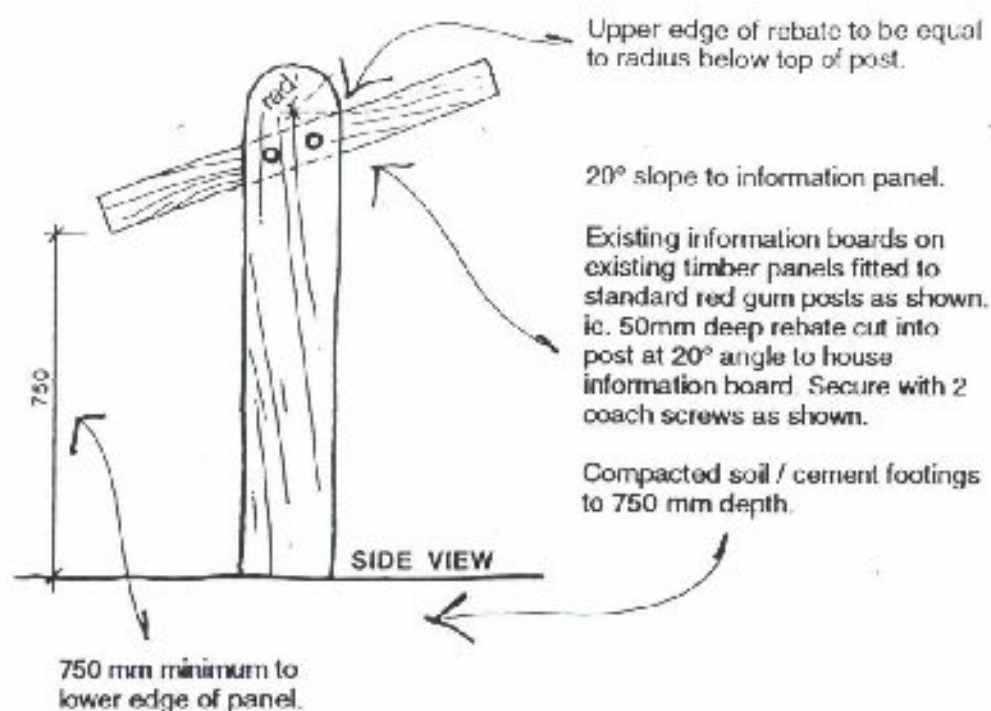
60 mm high standard recessed lettering with 20 mm gaps between rows and 75 mm minimum spaces between lettering / symbols and posts.

Compacted soil / cement footings to 750 mm depth.

STANDARD MESSAGE BOARDS

CONSTRUCTION DETAIL

Mt Leura and Mt Sugarloaf Management Plan

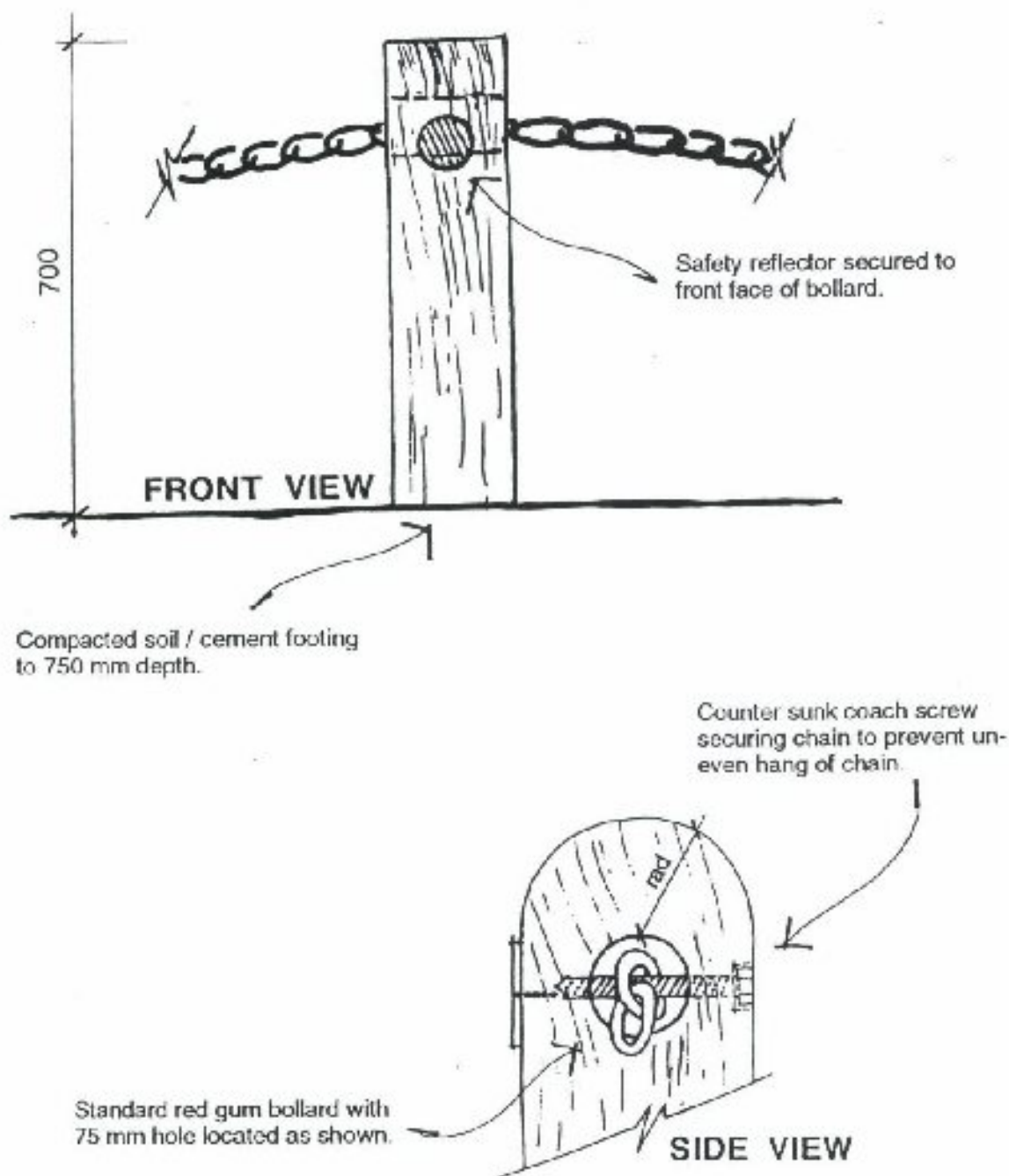


DETAILED INFORMATION BOARDS

Mt Leura and Mt Sugarloaf Management Plan

CONSTRUCTION DETAIL

5



BOLLARD & CHAIN VEHICLE BARRIER

Mt Leura and Mt Sugarloaf Management Plan

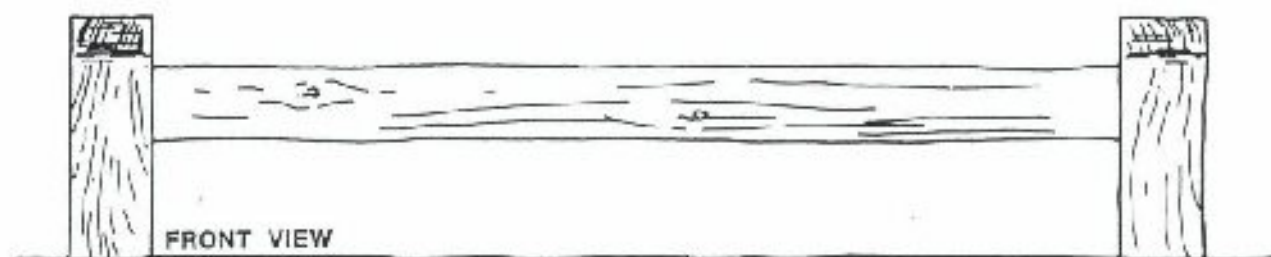
CONSTRUCTION DETAIL

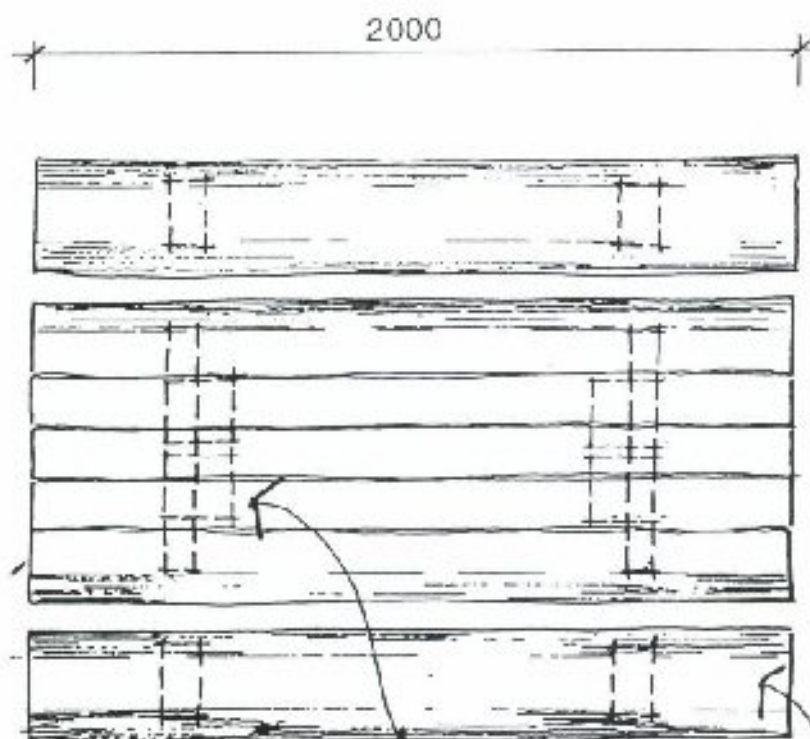
6



150 x 75 mm red gum rail attached to standard posts using standard post and rail joint method. Max. 2000mm between posts.

Compacted soil / cement footings to 500 mm depth.





PLAN VIEW

3 no. 120 x 42 mm hardwood planks and 2 no. 190 x 42 mm hardwood planks with bevelled edges secured to 75 x 45 mm hardwood cleat (700mm long) from below with counter sunk coach screws. Provide 10mm gaps between table top planks so that the total width of the table top is 780mm.

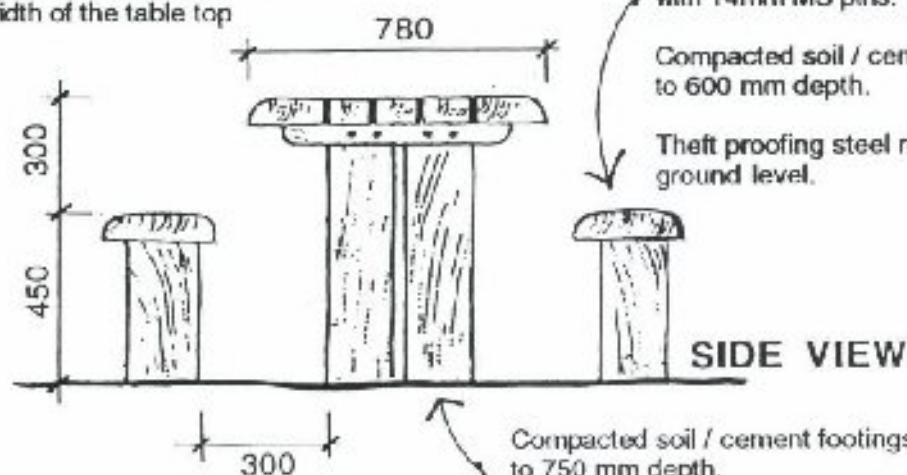
2 no. standard red gum posts at each end of table. Provide 30 mm gaps between supports.

Cleat secured to supports (rebated to house cleat as shown) with coach screws.

300 x 100mm hardwood seating slabs 2000mm long secured to 200 x 125mm red gum supports with 14mm MS pins.

Compacted soil / cement footings to 600 mm depth.

Theft proofing steel rod inserts at ground level.



SIDE VIEW

Compacted soil / cement footings to 750 mm depth.

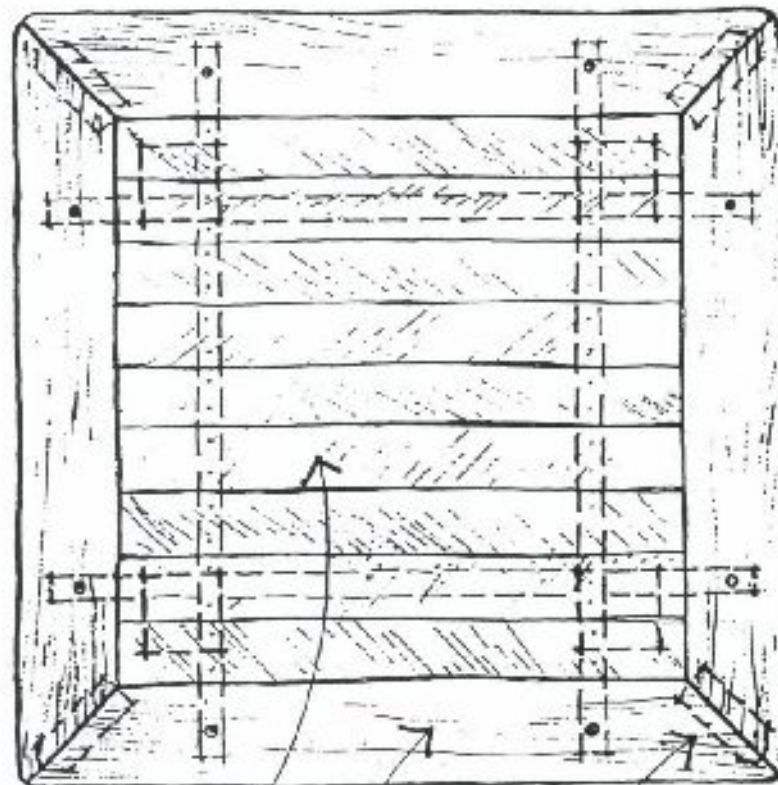
Theft proofing steel rod inserts at ground level.

PICNIC TABLES

Mt Leura and Mt Sugarloaf Management Plan

CONSTRUCTION DETAIL

1500



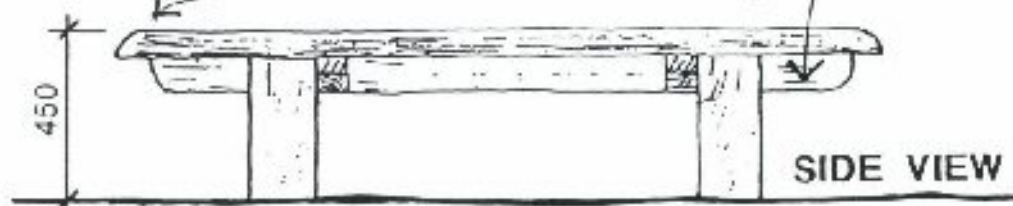
PLAN VIEW

120 x 32 x 1120mm hardwood planks at even spacings nailed to hardwood joists.

190 x 42 x 1500mm hardwood edge boards (with rounded edges as shown) secured to joists with dome head bolts.

Corner strengthened with 220 x 100 x 4 mm steel flat screwed from below. Provide rebate for steel plate.

75 x 45 mm joists coach screwed to 150 x 150 mm red gum supports.



SIDE VIEW

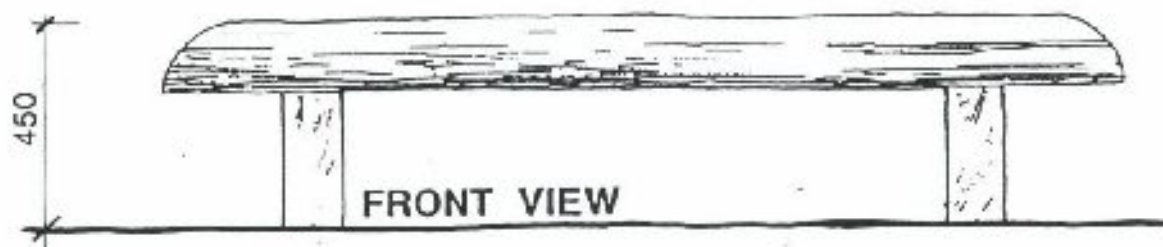
Thelf proofing steel rod inserts at ground level.

Compacted soil / cement footings to 750 mm depth.

PICNIC BENCHES

CONSTRUCTION DETAIL

Mt Leura and Mt Sugarloaf Management Plan



350 x 150mm red gum slab
pinned to 200 x 125mm red gum
supports with 14 mm steel rod.
Max total length 2000mm.

Compacted soil / cement footings
to 600 mm depth.



BENCH SEATS

Mt Leura and Mt Sugarloaf Management Plan

CONSTRUCTION DETAIL

10

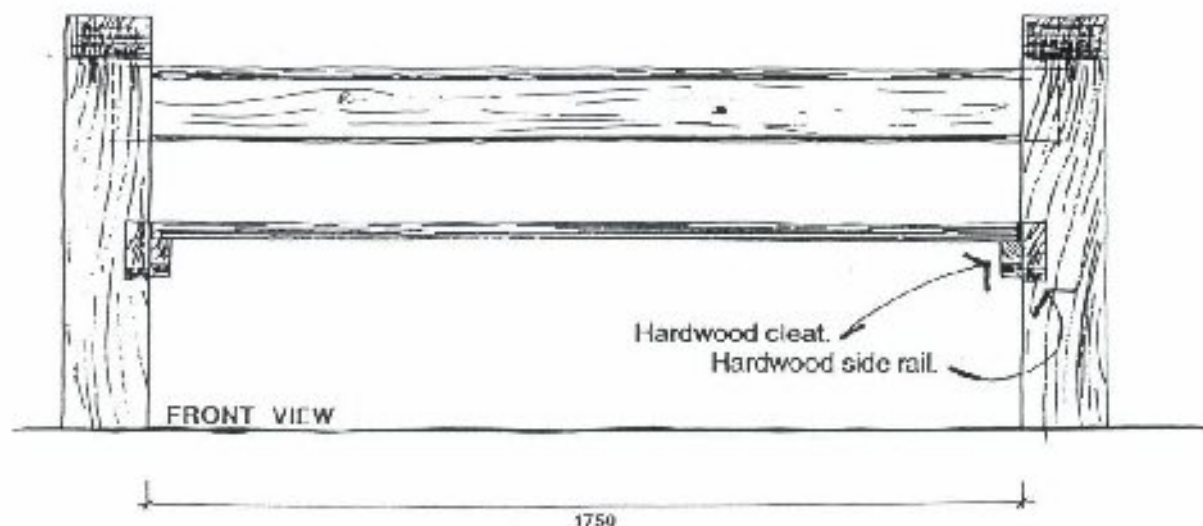
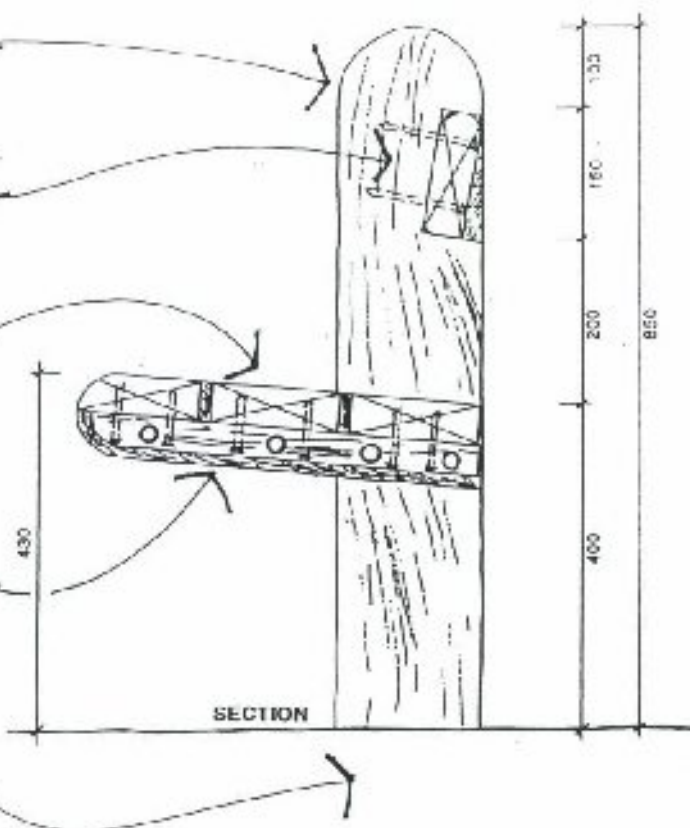
Standard red gum supports with theft proofing steel rod inserts at ground level.

150 x 50 mm back rest 1900mm long angled at 10° from vertical and housed into rebate to rear of post as shown. Secure back rest to post with coach screws, countersunk into backrest.

150 x 50 hardwood seating rails 1750mm long with 25 mm gaps between rails (total seat width 500mm). Coach screw rails to 475 x 75 x 50 mm hardwood cleat from below.

100 x 50mm hardwood side rails rebated into red gum uprights at 5° angle from horizontal. Fasten cleats to side rails with dome head coach bolts.

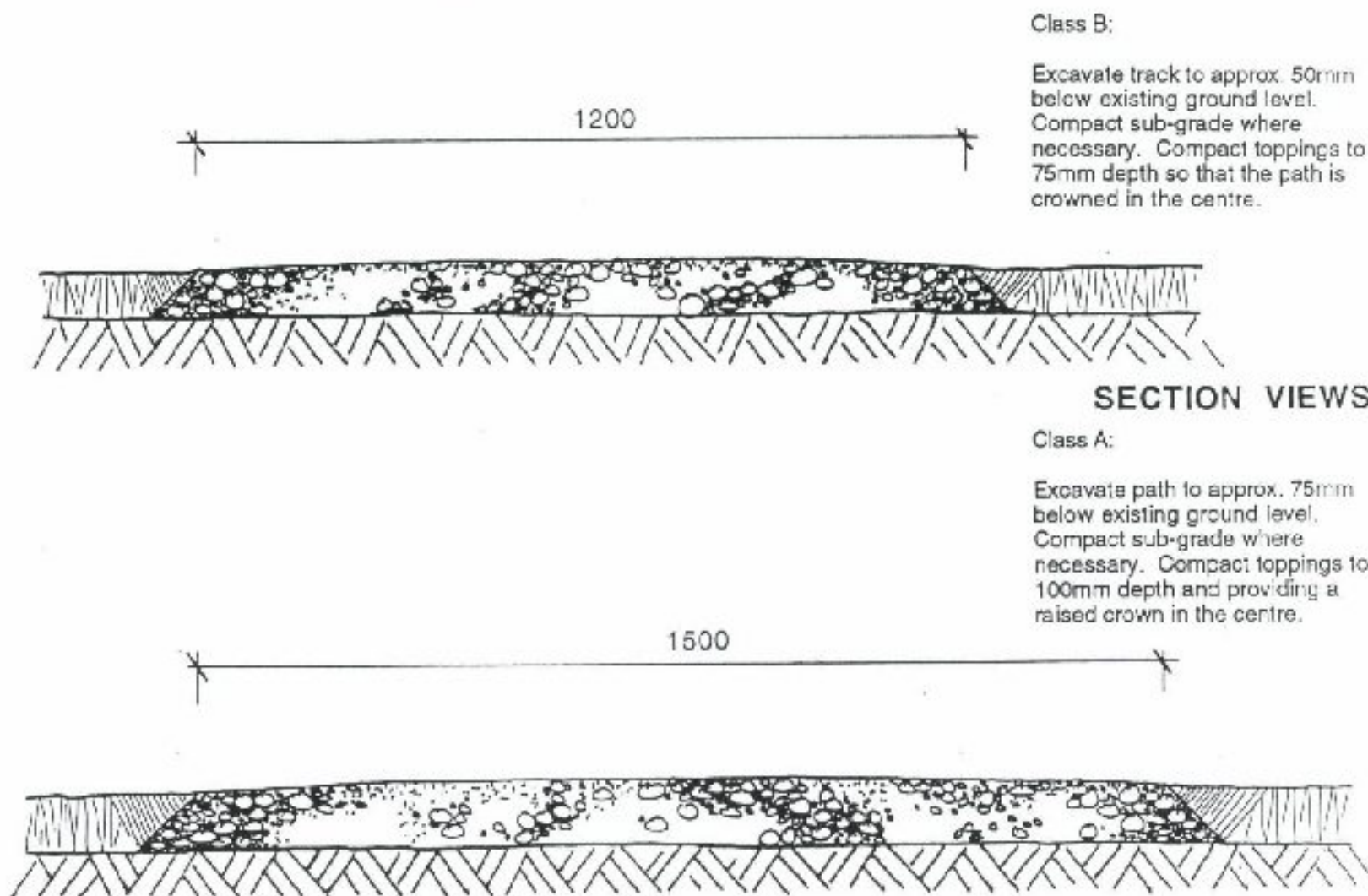
Compacted soil / cement footings to 750 mm depth.



TIMBER SEAT

CONSTRUCTION DETAIL

Mt Leura and Mt Sugarloaf Management Plan



1200 mm step width as per Class B walking tracks.

175 x 35 mm risers (1200mm long) skew nailed from behind and backfilled with scoria path material.

200 x 45 mm stringer set an average 25 mm above ground level.

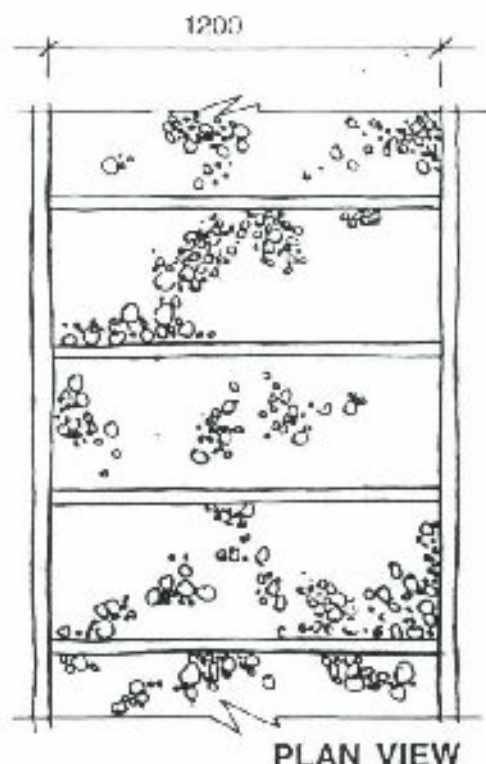
Average tread length 450 mm. Provide 2% drainage grade.

Maximum tread length 1200 mm with 8 % grade.

SECTION

Average grade for pedestrian step alignment to Mt Sugarloaf.

22-25°

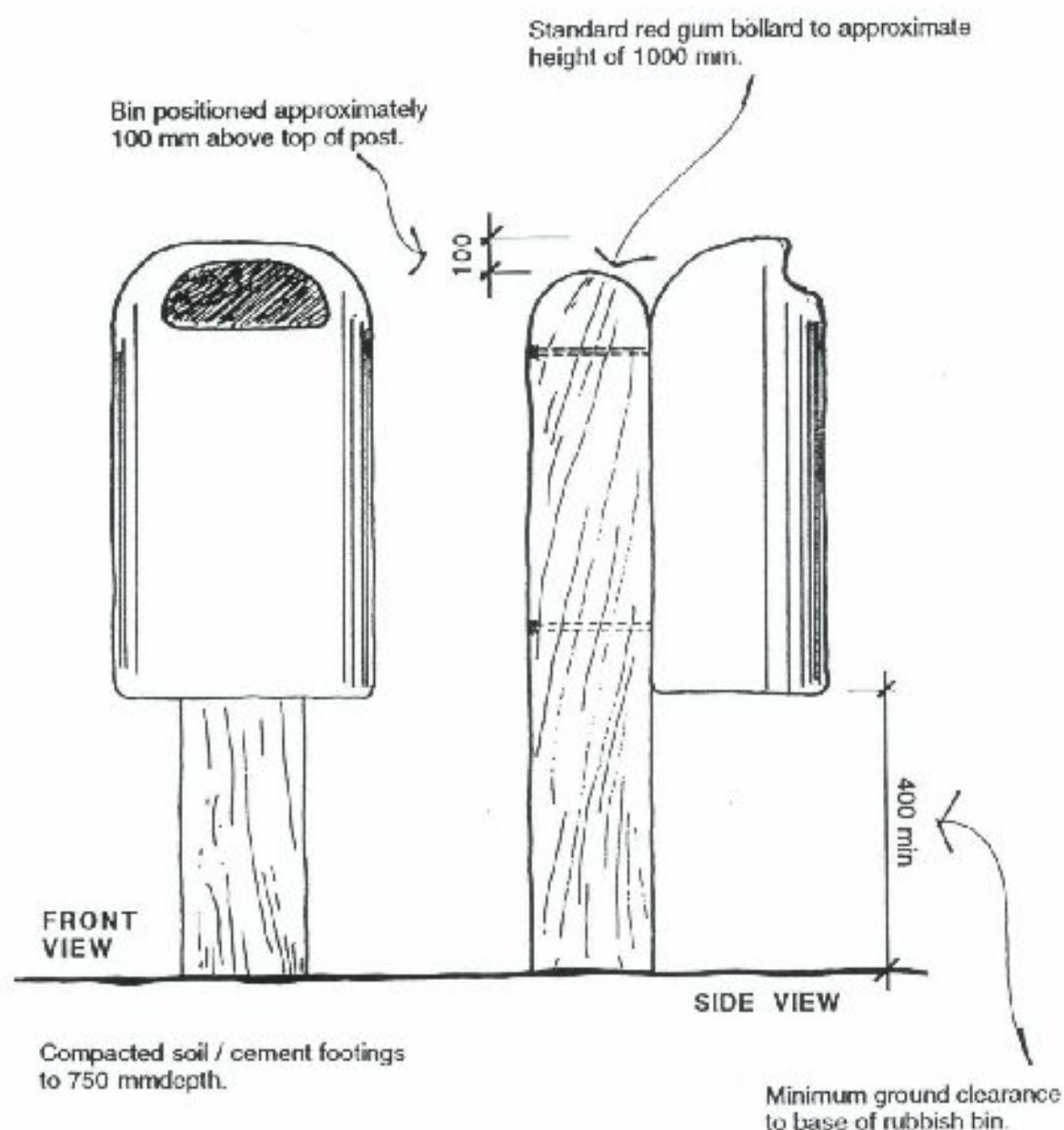


PEDESTRIAN STEPS

CONSTRUCTION DETAIL

Mt Leura and Mt Sugarloaf Management Plan

13

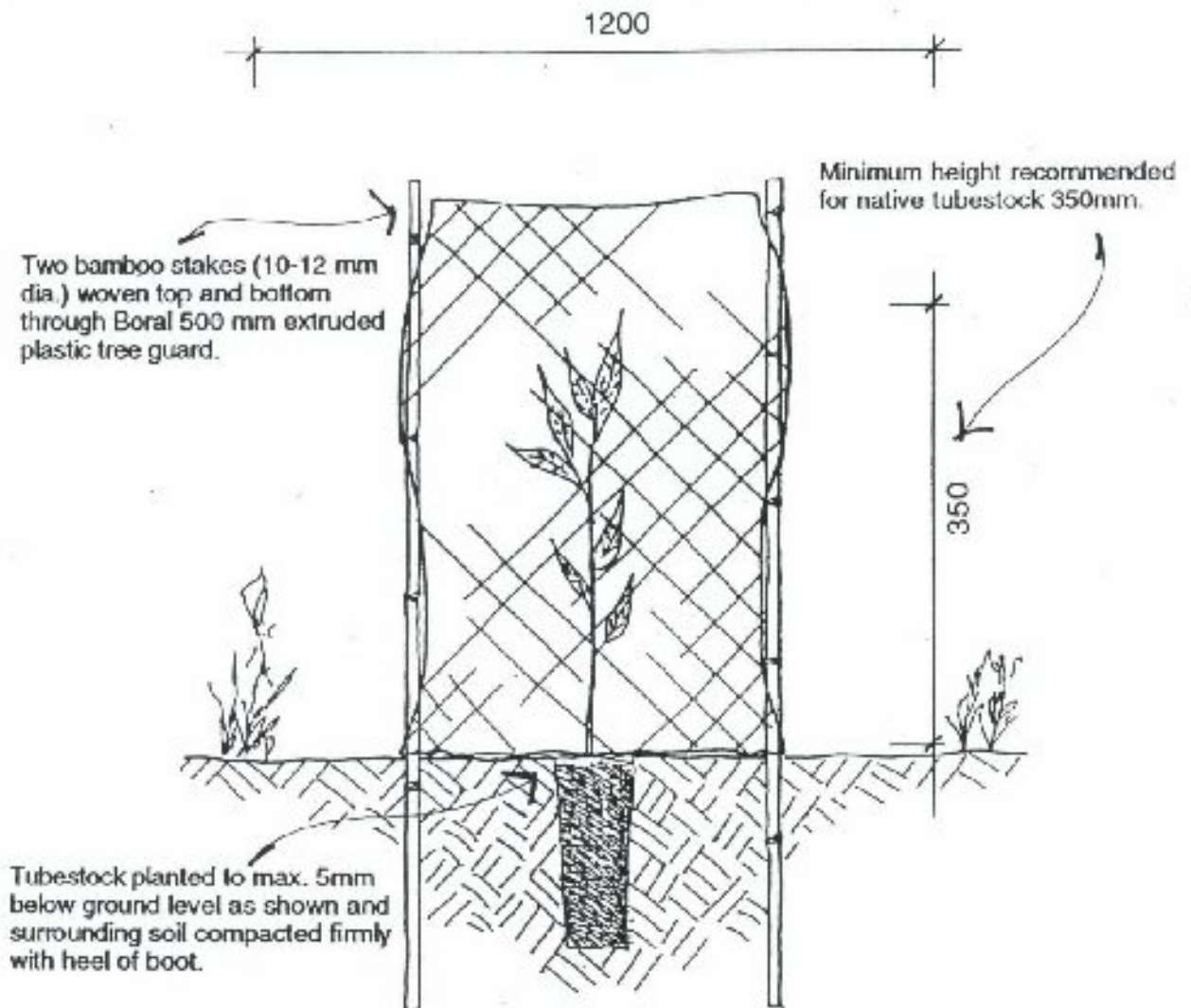


STANDARD RUBBISH BIN

Mt Leura and Mt Sugarloaf Management Plan

CONSTRUCTION DETAIL

Weed free zone of min. 600mm radius from seedling established two weeks prior to planting using residual and knockdown herbicides.

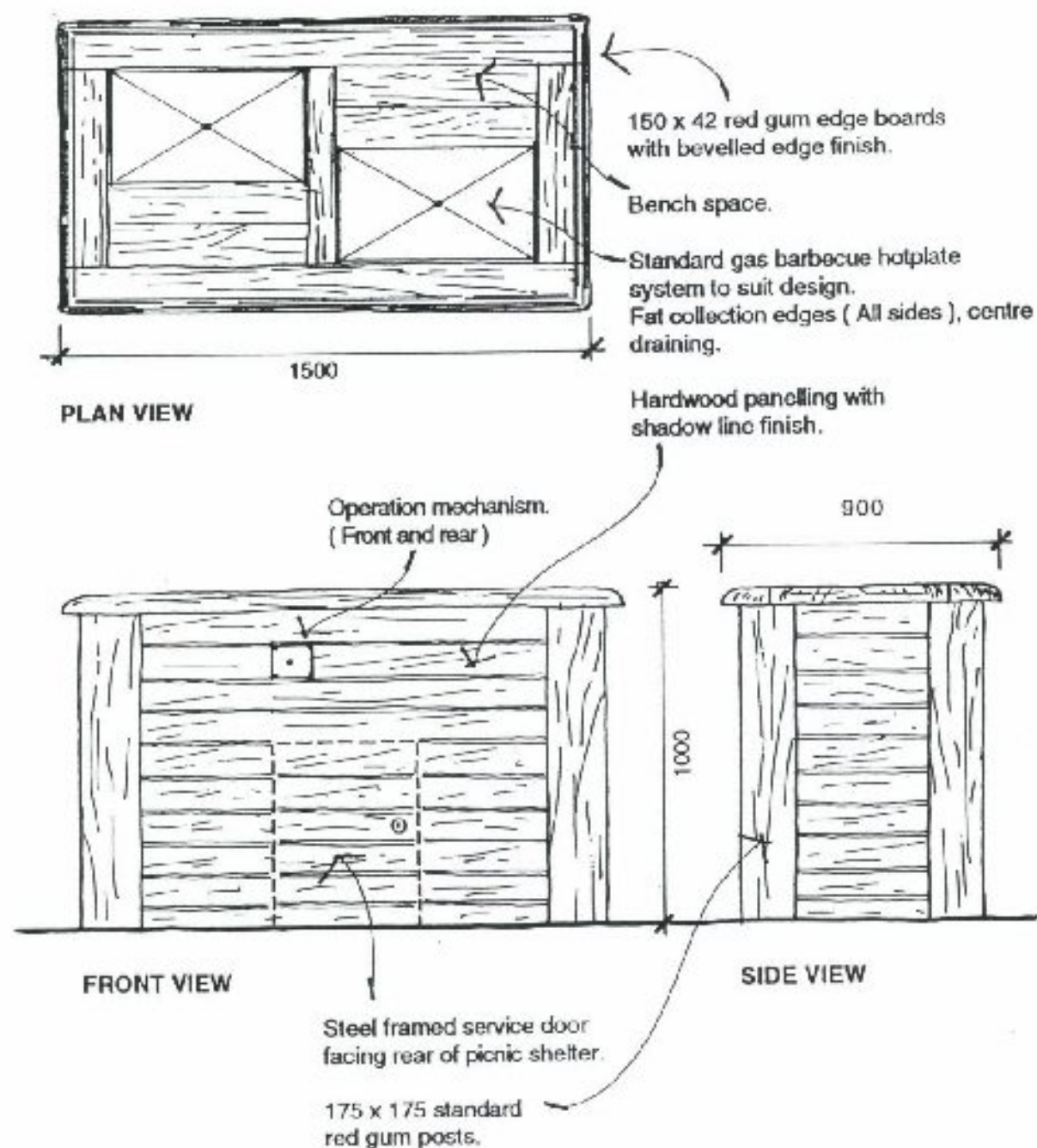


TUBESTOCK PLANTING DETAIL

Mt Leura and Mt Sugarloaf Management Plan

CONSTRUCTION DETAIL

15



GAS BARBECUE

Mt Leura and Mt Sugarloaf Management Plan

CONSTRUCTION DETAIL

16

MANAGEMENT BLOCK PRESCRIPTIONS

Management Block Number: *One*

Area (Hectares): *4.00*

Land Management Zone Type: *Main Carpark and Picnic Grounds*

Description:

- This management block contains one of the largest areas of relatively flat land within the Mt. Leura and Mt. Sugarloaf reserves, and is therefore the site for the proposed new car park and information facilities.
- The area is currently grazed and is in a stable condition.

Proposed Works:

- Construction of a new access road and car park, visitor information centre and facilities including picnic tables, BBQ's, tracks, shelters and toilets.
- Revegetation with indigenous woodland species dominated by Manna Gum, Swamp Gum, Blackwood and Drooping She-oak. Target PFC: 25 to 30%.
- Amenity planting around car park and facilities, utilising vegetation indigenous to the Camperdown area.

Existing Management Issues:

- The area is currently grazed and does not exhibit any special management considerations at the present time.

Expected Management Issues:

- When grazing ceases, exotic grasses will become rank, competing with newly planted seedlings and becoming a fire hazard.
- Erosion hazards associated with the

construction of the new road and car park are expected to be low due to the siting of the proposed developments and the soil conditions of the site. However, all efforts must be made to minimise erosion by wind and water during construction.

- The concentration of vehicular and pedestrian traffic within this management block could impact upon revegetation works if tracks are not maintained and/or constructed to a high standard.

Management Prescription:

- Continue grazing this block until the autumn/winter prior to planting. Do not apply any fertilisers.
- Regularly monitor the site for Pine and Cypress seedlings and manually remove when 10 to 20cm high (or sooner).
- Before planting, apply knockdown and residual herbicides to planting sites as recommended in Section 6.
- Control grasses immediately around seedlings for at least 18 months using knockdown herbicide applied with a wick-wiper.
- When trees and shrubs become established, they will suppress exotic grass growth and create conditions more suitable for native grasses.
- Maintain facilities in good condition to encourage their proper use by the community.

Average Planting Spacings 4 x 4 metres.

SPECIES LIST AND PLANTING GUIDE					
Species	Dominance in Mix.	Per Hectare		Total No. Planted This Block	Notes
		Ultimate No. at Maturity	No. of Seedlings Planted		
Acacia melanoxylon	20%	20	131	526	Plant all over
Acacia stricta	1%	7	15	59	Lower slopes, around carpark
Acacia verticillata	3%	20	44	176	Lower slopes, around carpark
Allocasuarina verticillata	20%	20	143	571	Plant all over
Banksia marginata	2%	6	21	83	Mainly around prop. car park
Dursaria spinosa	2%	6	21	83	Mainly around prop. car park
Eucalyptus ovata	15%	8	57	230	Lower slopes only
Eucalyptus viminalis	37%	19	142	567	Plant all over
TOTALS	100%	106	574	2,295	

Management Block Number: Two

Area (Hectares): 5.15

Land Management Zone Type: Northern Slopes (Exposed)

Description:

- This management block covers the northern slopes of Mt. Leura and is entirely within the Mt. Leura Reserve. The block is currently dominated by old Pine and Cypress plantations which are in a state of decline. This block also exhibits some excellent remnants of the original vegetation of the reserves, namely Drooping She-oak and several native grassland species.

Proposed Works:

- Staged removal of Pine and Cypress plantings over five to ten years as funding permits.
- Construction of small carpark, walking tracks (Picnic Trail, Town Trail), seating etc.
- Establishment of indigenous woodland species dominated by Drooping She-oak, with Manna Gum as an associated species on the lower slopes. Target PFC: 30 to 60% (60% lower slopes, thinning to 30% for the upper slopes)

Existing Management Issues:

- Native grasslands within this block are evident, and will require special management to suppress weed species.
- The old Pine and Cypress trees are becoming brittle and dangerous.
- Low branches of the Cypress trees are contributing to soil erosion problems and weed infestation.

- Several environmental weeds (eg. Briar Rose, Cotoneaster, Broom and Pittosporum) are common within the management block.

Expected Management Issues:

- Any disturbance of the topsoil as a result of the tree felling works could create additional weed problems.
- Pine and to a lesser extent Cypress seedlings will regenerate rapidly once the competition for light, water and nutrients from their parents has been removed.

Management Prescription:

- Minimise disturbance when removing existing pine and cypress trees.
- Manage existing native grasslands in accordance with the guidelines provided in Part 7.
- Control all noxious and environmental weeds in accordance with the guidelines provided in Part 7.
- Protect existing remnant Drooping She-oaks and their seedlings during all tree felling works.

Average Planting Spacings 3 x 3 metres.

SPECIES LIST AND PLANTING GUIDE

Species	Dominance in Mix.	Per Hectare		Total No. Planted This Block	Notes
		Ultimate No. at Maturity	No. of Seedlings Planted		
Acacia melanoxylon	4%	6	39	203	Lower slopes, thinning with altitude
Acacia stricta	1%	10	22	113	Lower slopes only
Acacia verticillata	1%	10	22	113	Lower slopes only
Allocasuarina verticillata	80%	120	857	4,415	Plant all over, especially higher
Banksia marginata	1%	5	16	80	Lower slopes only
Bursaria spinosa	2%	9	31	161	Lower slopes only
Eucalyptus ovata	1%	2	6	30	Lower slopes only
Eucalyptus viminalis	10%	8	57	296	Lower slopes, thinning with altitude
TOTALS	100%	170	1050	6,409	

Management Block Number: *Three*

Area (Hectares): *5.25*

Land Management Zone Type: *Northern Slopes (Exposed)*

Description:

- This management block covers the northern slopes of Mt. Leura and is entirely within the Mt. Leura Reserve. The block is currently dominated by old Pine and Cypress plantations which are in a state of decline. This block also exhibits some excellent remnants of the original vegetation of the reserves, namely Drooping She-oak and several native grassland species.

Proposed Works:

- Staged removal of Pine and Cypress plantings over five to ten years as funding permits.
- Construction of walking tracks (She-Oak Trail) and associated seating and facilities.
- Establishment of indigenous woodland species dominated by Drooping She-oak, with Manna Gum as an associated species on the lower slopes. Target PFC: 30% to 60%.

Existing Management Issues:

- Native grasslands within this block are evident, and will require special management to suppress weed species.
- The old Pine and Cypress trees are becoming brittle and dangerous.
- Low branches of the Cypress trees are contributing to soil erosion problems by scarring the topsoil when the branches blow in the wind. This bare patch is also an ideal location for weeds to become established

- Several environmental weeds (eg. Briar Rose, Cotoneaster, Broom and Pittosporum) are common within the management block.

Expected Management Issues:

- Any disturbance of the topsoil as a result of the tree felling works could create additional weed problems.
- Pine and to a lesser extent Cypress seedlings will regenerate rapidly once the competition for light, water and nutrients from their parents has been removed.

Management Prescription:

- Minimise disturbance when removing existing pine and cypress trees.
- Manage existing native grasslands in accordance with the guidelines provided in Part 7.
- Control all noxious and environmental weeds in accordance with the guidelines provided in Part 7.
- Protect existing remnant Drooping She-oaks and their seedlings during all tree felling works.

Average Planting Spacings *3 x 3 metres.*

Lower

SPECIES LIST AND PLANTING GUIDE					
Species	Dominance in Mix.	Per Hectare		Total No. Planted This Block	Notes
		Ultimate No. at Maturity	No. of Seedlings Planted		
Acacia melanoxylon	4%	6	39	207	Lower slopes, thinning with attack
Acacia stricta	1%	10	22	115	Lower slopes only
Acacia verticillata	1%	10	22	115	Lower slopes only
Allocasuarina verticillata	80%	120	857	4,498	Plant all over, especially higher
Banksia marginata	1%	5	16	82	Lower slopes only
Bursaria spinosa	2%	8	31	164	Lower slopes only
Eucalyptus ovata	1%	2	6	30	Lower slopes only
Eucalyptus viminalis	10%	8	57	302	Lower slopes, thinning with attack
TOTALS	100%	169	1050	5,514	

Management Block Number: *Four*

Area (Hectares): *3.5*

Land Management Zone Type: *Western Slopes*

Description:

- This management block is situated to the east of the proposed lower car park and picnic facilities.
- The block is currently grazed and some Pine and Cypress trees have been planted along the northern boundary of the block, within the Mt. Laura Reserve.

Proposed Works:

- Remove Pine and Cypress plantations.
- Construct / upgrade access tracks (Panorama Trail, All-person saddleback accesstrack) and associated seating and facilities.
- Revegetate with indigenous woodland dominated by Drooping She-oak and Manna Gum. Target PFC: 10 to 30%.

Existing Management Issues:

- The majority of this management block is within the Sugarloaf Reserve and is currently grazed. A small component of the block is within the Laura Reserve and is not grazed. It is in a relatively stable condition.

Expected Management Issues:

- When grazing ceases, exotic grasses will become rank, competing with newly planted seedlings and becoming a fire hazard.
- After the removal of the Pine and Cypress trees and the cessation of grazing, Pine and Cypress seedlings will germinate around the sites of the existing plantations.

Management Prescription:

- Continue grazing this block until the autumn / winter prior to planting. Do not apply any fertilisers.
- Remove Pine and Cypress carefully, minimising ground disturbance.
- Regularly monitor the site for Pine and Cypress seedlings and hand pull when 10 to 20cm high.
- Before planting, apply knockdown and residual herbicides to planting sites as recommended in section Part 6.
- Control grasses immediately around seedlings for at least 18 months using knockdown herbicide applied with a wick-wiper.
- When trees and shrubs become established, they will suppress exotic grass growth and create conditions more suitable for native grasses.

Average Planting Spacings 5 x 5 metres.

SPECIES LIST AND PLANTING GUIDE

<i>Species</i>	<i>Dominance in Mix.</i>	<i>Per Hectare</i>		<i>Total No. Planted This Block</i>	<i>Notes</i>
		<i>Ultimate No. at Maturity</i>	<i>No. of Seedlings Planted</i>		
<i>Acacia melanoxylon</i>	4%	3	20	69	Lower slopes, thinning with altitude
<i>Acacia stricta</i>	0%	0	0	0	
<i>Acacia verticillata</i>	1%	5	11	38	Lower slopes only
<i>Allocasuarina verticillata</i>	40%	31	214	750	Plant all over; denser with altitude
<i>Banksia marginata</i>	1%	2	8	27	Lower slopes only
<i>Bursaria spinosa</i>	1%	2	8	27	Lower slopes only
<i>Eucalyptus ovata</i>	0%	0	0	0	
<i>Eucalyptus viminalis</i>	53%	21	152	533	Lower slopes, thinning with altitude
TOTALS	100%	64	413	1,445	

Management Block Number: Five

Area (Hectares): 3.00

Land Management Zone Type: Crater (Upper)

Description:

- Block Five is situated within the Mt. Leura reserve, where grazing has not occurred for approximately 80 years. As a result, some excellent stands of remnant native grasslands occur, which are in excellent condition. Some remnant Drooping She-oak specimens also occur in this location.

Proposed Works:

- Revegetate with a woodland community dominated by Manna Gum, She-Oak and Blackwood. Target PFC: 20 to 30%.
- Up-grade upper carpark.
- Construct walking tracks (Panorama trail), seating, interpretation facilities etc.

Existing Management Issues:

- Along the southern boundary of the Mt. Leura Reserve is a thick stand of Twigg Mullen (*Verbascum virgatum*). This is a garden escapee which must be eradicated prior to revegetation works proceeding.
- Within the Mt. Sugarloaf reserve, several Apple trees (*Malus* sp) occur. These should be removed while access is easy and to prevent this species spreading throughout the revegetation works when grazing ceases.

- Pine (*Pinus radiata*) seedlings are germinating throughout the west-facing slopes of the crater (below car park) following the removal of an old pine plantation from along the fence line separating the Mt. Leura Reserve and the Mt. Sugarloaf Reserve.

Expected Management Issues:

- When grazing ceases, the exotic grasses within the Mt. Sugarloaf portion of this management block will become rank, competing with newly planted seedlings and becoming a fire hazard.
- Pine, Apple and Twigg Mullen are all potential woody weeds within the whole of Block Five when grazing ceases.

Management Prescription:

- Remove all pine seedlings, Apple trees and Twigg Mullen bushes as a priority
- Continue grazing the Mt. Sugarloaf portion of this Block until the autumn / winter prior to planting. Do not apply any fertilisers.
- Native grasslands within the Mt. Leura portion of Block 5 should be managed in accordance with the recommendations in Part 7.3 - Native Grassland Management.

Average Planting Spacings 5 x 5 metres.

SPECIES LIST AND PLANTING GUIDE					
Species	Dominance in Mix.	Per Hectare		Total No. Planted This Block	Notes
		Ultimate No. at Maturity	No. of Seedlings Planted		
<i>Acacia melanoxylon</i>	20%	15	99	297	
<i>Acacia stricta</i>	0%	0	0	0	
<i>Acacia verticillata</i>	0%	0	0	0	
<i>Allocasuarina verticillata</i>	23%	17	123	369	Plant all over
<i>Banksia marginata</i>	1%	2	8	23	Small isolated clumps
<i>Bursaria spinosa</i>	1%	2	8	23	Small isolated clumps
<i>Eucalyptus ovata</i>	0%	0	0	0	
<i>Eucalyptus viminalis</i>	55%	22	158	474	Plant all over
TOTALS	100%	56	386	1,167	Note: maintain views from summit

Management Block Number: *Eight*

Area (Hectares): *3.00*

Land Management Zone Type: *Eastern Slopes*

Description:

- Block Eight is situated to the east of the main car park on the summit of Mt. Leura. The area is dominated by Pine and Cypress trees, with some native grasslands occurring throughout (the best stands occurring in the south-east corner of the block).
- Some plantings of non-indigenous natives has occurred east of the car park which are generally poor specimens as they are not suited to the site.

Proposed Works:

- Remove existing Pine and Cypress Trees.
- Revegetate with a woodland dominated by Manna Gum and Blackwood. Target PFC: 30 to 40%.
- Modify existing upper carpark (also in Block 5).
- Construct picnic area adjacent to upper carpark.

Existing Management Issues:

- The existing Pine and Cypress trees are ageing and becoming a management problem.
- Some soil erosion problems are evident along the cutting of the main summit road.

Expected Management Issues:

- The removal of Pine and Cypress trees will result in a rapid regeneration of Pine seedlings Cypress seedlings.

- The disturbance as a result of the removal of the existing Pine and Cypress trees is likely to result in additional weed problems.
- The non-indigenous natives established about 15 years ago east of the car park could become a management issue as they are likely to regenerate through much of Block 8.

Management Prescription:

- Minimise disturbance when felling existing Pine and Cypress trees.
- Observe strict vehicle hygiene guidelines (ie. ensure machinery is free of weed seed) for machinery associated with felling operation.
- Monitor closely the growth of Pine and Cypress seedlings. Manually remove seedlings when 10 to 20cm high or sooner if possible.
- Native grasslands within Block 8 should be managed in accordance with the recommendations in Part 7.3 - Native Grassland Management.
- Gradually, over a period of four to six years, remove the non-indigenous natives east of the car park and dispose of off site.

Average Planting Spacings 4.3 x 4.3 metres

SPECIES LIST AND PLANTING GUIDE

Species	Dominance in Mix.	Per Hectare		Total No. Planted This Block	Notes
		Ultimate No. at Maturity	No. of Seedlings Planted		
Acacia melanoxylon	38%	39	250	749	Plant all over
Acacia stricta	0%	0	0	0	
Acacia verticillata	0%	0	0	0	
Allocasuarina verticillata	2%	2	14	43	Upper slopes
Banksia marginata	6%	17	62	187	Lower and mid slopes
Bursaria spinosa	0%	0	0	0	
Eucalyptus ovata	6%	3	23	69	Lower slopes
Eucalyptus viminalis	48%	26	184	552	Plant all over
TOTALS	100%	87	533	1,600	

Management Block Number: *Nine*
Area (Hectares): *3.20*
Land Management Zone Type: *Western Slopes*

Description:

- This management block is situated along the western boundary of the Mt. Sugarloaf Reserve, below the summit of Mt. Sugarloaf. It surrounds the former quarry site.
- The block is currently grazed and some Pine and Cypress trees have been planted within the block.

Proposed Works:

- Remove Pine and Cypress plantations.
- Revegetate with indigenous woodland dominated by Drooping She-oak and Manna Gum. Target PFC: 30%.
- Construct walking tracks (Quarry Trail) and associated interpretive facilities, seating, signage etc.
- Implement erosion control guidelines.

Existing Management Issues:

- Concentrated cattle movements have caused some minor erosion problems.

Expected Management Issues:

- When grazing ceases, exotic grasses will become rank, competing with newly planted seedlings and becoming a fire hazard.
- After the removal of the Pine and Cypress trees and the cessation of grazing, Pine and perhaps Cypress seedlings will germinate around the sites of the existing plantations.

Management Prescription:

- Continue grazing this block until the autumn / winter prior to planting. Do not apply any fertilisers.
- Remove Pine and Cypress carefully, minimising ground disturbance.
- Regularly monitor the site for Pine and Cypress seedlings and manually remove when 10 to 20cm high or sooner if possible.
- Before planting, apply knockdown and residual herbicides to planting sites as recommended in 6.3 Planting Prescriptions.
- Control grasses immediately around seedlings for at least 18 months using knockdown herbicide applied with a wick-wiper or overspray using a specified residual herbicide.
- When trees and shrubs become established, they will suppress exotic grass growth and create conditions more suitable for native grasses.

Average Planting Spacings 5 x 5 metres.

SPECIES LIST AND PLANTING GUIDE					
Species	Dominance in Mix.	Per Hectare		Total No. Planted This Block	Notes
		Ultimate No. at Maturity	No. of Seedlings Planted		
Acacia melanoxylon	4%	3	20	63	Lower and mid slopes
Acacia stricta	0%	0	0	0	
Acacia verticillata	1%	5	11	35	Lower slopes - small clumps
Allocasuarina verticillata	40%	31	214	685	Upper and mid slopes
Banksia marginata	1%	2	8	25	Lower and mid slopes
Bursaria spinosa	1%	2	8	25	Lower and mid slopes
Eucalyptus ovata	0%	0	0	0	
Eucalyptus viminalis	53%	21	152	487	Plant all over
TOTALS	100%	64	403	1,321	

Management Block Number: *Ten*

Area (Hectares): *5.20*

Land Management Zone Type: *Northern Slopes (Sheltered)*

Description:

- The northern slopes (sheltered) occur on the northern slopes of Mt. Sugarloaf, extending into the crater. Being relatively sheltered from the hot northerly winds by Mt. Leura, this block would have supported a different vegetation community to the northern slopes of Mt. Leura.
- The block is currently grazed. A pine plantation and a clump of Cypress trees have been planted.

Proposed Works:

- Construction of walking tracks (Panorama Trail, Picnic Trail) and associated seating and signage.
- Revegetate with a woodland community dominated by Manna Gum, Drooping She-oak, Blackwood and Swamp Gum. Target PFC: 10 to 30%.

Existing Management Issues:

- The block is in a relatively stable condition at present.
- Some erosion is occurring on the cutting of the access track, which should stabilise when grazing is ceased.

Expected Management Issues:

- When grazing ceases, exotic grasses will become rank, competing with newly planted seedlings and becoming a fire hazard.

- After the removal of the Pine and Cypress trees and the cessation of grazing, Pine and perhaps Cypress seedlings will germinate around the sites of the existing plantations.

Management Prescription:

- Continue grazing this block until the autumn / winter prior to planting. Do not apply any fertilisers.
- Remove Pine and Cypress carefully, minimising ground disturbance.
- Regularly monitor the site for Pine and Cypress seedlings and manually remove when 10 to 20cm high or sooner.
- Before planting, apply knockdown and residual herbicides to planting sites as recommended in Part 6.
- Control grasses immediately around seedlings for at least 18 months using knockdown herbicide applied with a wick-wiper.
- When trees and shrubs become established, they will suppress exotic grass growth and create conditions more suitable for native grasses.

Average Planting Spacings: 5 x 5 metres.

SPECIES LIST AND PLANTING GUIDE

<i>Species</i>	<i>Dominance in Mix.</i>	<i>Per Hectare</i>		<i>Total No. Planted This Block</i>	<i>Notes</i>
		<i>Ultimate No. at Maturity</i>	<i>No. of Seedlings Planted</i>		
Acacia melanoxylon	10%	7	49	256	Lower and mid slopes
Acacia stricta	0%	0	0	0	
Acacia verticillata	0%	0	0	0	
Allocasuarina verticillata	35%	27	187	975	Upper and mid slopes
Banksia marginata	1%	2	8	41	Lower slopes
Bursaria spinosa	1%	2	8	41	Lower slopes
Eucalyptus ovata	5%	2	14	75	Lower slopes
Eucalyptus viminalis	48%	19	138	717	Plant all over
TOTALS	100%	59	404	2,104	

Management Block Number: *Eleven*

Area (Hectares): *2.20*

Land Management Zone Type: *Quarry*

Description:

- This is a special management block due to the problems associated with managing this highly disturbed and fragile site.
- The block is situated on the western slopes of Sugarloaf and encompasses the former scoria quarry site.

Proposed Works:

- Strategic revegetation with indigenous grasses, shrubs and trees designed to stabilise the scree slope, therefore assisting in the stabilisation of the quarry face. Species will be selected from species indigenous to the Camperdown district also to take advantage of the erosion preventing qualities of some of these species.
- Installation of appropriate fencing for public safety purposes.
- Provision of a defined pedestrian access route and viewing area with interpretational facilities to allow the safe use of the quarry as an educational resource.
- Re-direction of run-off away from quarry face.
- Gradual removal of Pine plantations to the north of the quarry once indigenous woodland species have achieved a sufficient height to screen the quarry.

Existing Management Issues:

- The quarry face is exposed to the prevailing winds which constantly dry out the soil, exacerbating wind erosion problems.
- Run-off is de-stabilising the quarry face.
- It is difficult to establish vegetation on the scree slope and quarry face due to the harsh climatic and soil conditions.

Expected Management Issues:

- The changes proposed in the Master Plan will not contribute to further management issues within the quarry management block.

Management Prescription:

- Revegetate the slopes of Mt. Sugarloaf with indigenous vegetation to assist in binding the soil, therefore slowing down the progression of the cutting up-slope.
- Establish native tussock grasses and pioneering indigenous shrubs (eg. *Acacia* sp.) on the scree slopes to stabilise this slope. The installation of an erosion control matting / mulch matting (wool or coconut fibre) would assist in establishing grasses over the site, but the cost may be prohibitive.
- See Part 8 for further details.

Average Planting Spacings 4.5 x 4.5 metres.

SPECIES LIST AND PLANTING GUIDE

<i>Species</i>	<i>Dominance in Mix.</i>	<i>Per Hectare</i>		<i>Total No. Planted This Block</i>	<i>Notes</i>
		<i>Ultimate No. at Maturity</i>	<i>No. of Seedlings Planted</i>		
<i>Acacia melanoxylon</i>	30%	23	148	325	Lower and mid slopes
<i>Acacia stricta</i>	2%	10	22	48	Lower and mid slopes
<i>Acacia verticillata</i>	2%	10	22	48	Lower and mid slopes
<i>Allocasuarina verticillata</i>	15%	12	80	177	Upper and mid slopes
<i>Banksia marginata</i>	2%	5	16	34	Lower and mid slopes
<i>Bursaria spinosa</i>	2%	5	16	34	Lower and mid slopes
<i>Eucalyptus ovata</i>	15%	6	43	95	Lower slopes
<i>Eucalyptus viminalis</i>	32%	22	92	202	Plant all over
TOTALS	100%	93	439	964	

Management Block Number: *Twelve*

Area (Hectares): *1.20*

Land Management Zone Type: *Summit (Sugarloaf)*

Description:

- The summit of Mt. Sugarloaf has been separated as a management block due to the harsh climatic conditions the site experiences, being exposed to strong winds from all directions. Surrounded by four different vegetation communities on the slopes of Mt. Sugarloaf, the summit is an important area as a transitional zone between these vegetation communities.

Proposed Works:

- Revegetation with indigenous woodland, dominated by Drooping She-oak, with Manna Gums extending from the adjoining vegetation communities thinning out as altitude rises. Target PFC: 10%.
- Construction of access tracks (Panorama Trail), steps and seating.

Existing Management Issues:

- The summit of Mt. Sugarloaf is currently grazed and is in a relatively stable condition.

Expected Management Issues:

- A concentration of pedestrian traffic as a result of the provision of tracks and seating may result in erosion hazards if this traffic is not kept to the paths and maintenance of tracks is not sustained.

Management Prescription:

- Continue grazing this block until the autumn / winter prior to planting. Do not apply any fertilisers.
- Before planting, apply knockdown and residual herbicides to planting sites as recommended in Part 6.
- Control grasses immediately around seedlings for at least 18 months using knockdown herbicide applied with a wick-wiper or overspray with an appropriate residual herbicide.
- When trees and shrubs become established, they will suppress exotic grass growth and create conditions more suitable for native grasses.
- Maintain tracks and associated facilities in good condition, particularly in relation to drainage to avoid off-site erosion problems.

Average Planting Spacings 5 x 5 metres.

SPECIES LIST AND PLANTING GUIDE					
Species	Dominance in Mix.	Per Hectare		Total No. Planted This Block	Notes
		Ultimate No. at Maturity	No. of Seedlings Planted		
Acacia melanoxylon	0%	0	0	0	Plant all over
Acacia stricta	0%	0	0	0	
Acacia verticillata	0%	0	0	0	
Allocasuarina verticillata	80%	52	357	428	
Banksia marginata	0%	0	0	0	
Bursaria spinosa	0%	0	0	0	Plant all over
Eucalyptus ovata	0%	0	0	0	
Eucalyptus viminalis	20%	6	48	57	
TOTALS	100%	58	405	466	

Management Block Number: *Thirteen*

Area (Hectares): *5.80*

Land Management Zone Type: *Southern Slopes*

Description:

- This management block is located south of Mt. Sugarloaf on the southern boundary of the Mt. Sugarloaf Reserve. The block is currently grazed and some Cypress trees have been planted.

Proposed Works:

- Revegetate with indigenous woodland species dominated by Blackwood, Manna Gum and Swamp Gum. Target PFG: 30 to 40%.

Existing Management Issues:

- The block is currently grazed and is in a relatively stable condition.

Expected Management Issues:

- When grazing ceases, exotic grasses will become rank, competing with newly planted seedlings and becoming a fire hazard.

Management Prescription:

- Continue grazing this block until the autumn / winter prior to planting. Do not apply any fertilisers.
- Before planting, apply knockdown and residual herbicides to planting sites as recommended in Part 6.
- Control grasses immediately around seedlings for at least 18 months using knockdown herbicide applied with a wick-wiper.
- When trees and shrubs become established, they will suppress exotic grass growth and create conditions more suitable for native grasses.

Average Planting Spacings 4 x 4 metres.

SPECIES LIST AND PLANTING GUIDE					
Species	Dominance in Mix.	Per Hectare		Total No. Planted This Block	Notes
		Ultimate No. at Maturity	No. of Seedlings Planted		
Acacia melanoxylon	40%	52	328	1,905	Plant all over, thicker on lower slopes
Acacia stricta	0%	0	0	0	
Acacia verticillata	0%	0	0	0	
Allocasuarina verticillata	0%	0	0	0	Some on upper slopes for blending
Banksia marginata	2%	7	26	151	Lower and mid slopes
Bursaria spinosa	2%	7	26	151	Lower and mid slopes
Eucalyptus ovata	26%	17	126	722	Lower slopes
Eucalyptus viminalis	30%	10	144	833	Plant all over
TOTALS	100%	103	649	3,762	

Management Block Number: *Fourteen*

Area (Hectares): *0.90*

Land Management Zone Type: *Southern Slopes (Transition)*

Description:

- This is a small management block on the side of Mt. Sugarloaf which has a south-easterly aspect. It is currently grazed and a plantation of Cypress trees is located on the eastern side of the block.

Proposed Works:

- Revegetate with indigenous woodland species dominated by Manna Gum and Blackwood, with some Swamp Gum on the lower slopes. Target PFC: 25 to 30%.
- Construction of walking tracks (Panorama Trail) and associated facilities including signage and seating.

Existing Management Issues:

- The block is currently grazed and is in a relatively stable condition.
- Existing cypress trees are in a state of decline and need to be removed

Expected Management Issues:

- When grazing ceases, exotic grasses will become rank, competing with newly planted seedlings and becoming a fire hazard.
- After the removal of the Cypress trees and the cessation of grazing, Cypress seedlings may germinate around the sites of the existing plantations.

Management Prescription:

- Continue grazing this block until the autumn / winter prior to planting. Do not apply any fertilisers.
- Before planting, apply knockdown and residual herbicides to planting sites as recommended in Part 6.
- Control grasses immediately around seedlings for at least 18 months using knockdown herbicide applied with a wick-wiper or overspray with an appropriate residual herbicide.
- When trees and shrubs become established, they will suppress exotic grass growth and create conditions more suitable for native grasses.

Average Planting Spacings 4.3 x 4.3 metres.

SPECIES LIST AND PLANTING GUIDE					
Species	Dominance in Mix.	Per Hectare		Total No. Planted This Block	Notes
		Ultimate No. at Maturity	No. of Seedlings Planted		
Acacia melanoxylon ✓	30%	31	197	177	Lower and mid slopes
Acacia stricta ✓	0%	0	0	0	
Acacia verticillata ✓	0%	0	0	0	
Allocasuarina verticillata ✓	8%	8	57	51	Plant all over
Banksia marginata ✓	2%	5	21	19	Lower and mid slopes
Bursaria spinosa ✓	2%	5	21	19	Lower and mid slopes
Eucalyptus ovata ✓	18%	11	69	62	Lower slopes
Eucalyptus viminalis ✓	40%	21	153	138	Plant all over
TOTALS	100%	81	518	466	

Management Block Number: *Fifteen*

Area (Hectares): *1.20*

Land Management Zone Type: *Gullies and Depressions*

Description:

- Block 15 is situated on a south facing slope south-west of the proposed saddleback picnic facilities. It is currently grazed and devoid of any remnant trees or shrubs. Some native grasses may remain within the block, but these are currently suppressed by grazing.

Proposed Works:

- Revegetation with indigenous woodland / open forest species, dominated by Manna Gum, Blackwood and Swamp Gum. Target PFC: 30 to 40%.

Existing Management Issues:

- The area is currently grazed and is in a stable condition.
- Existing cypress trees are in a state of decline and should be removed.

Expected Management Issues:

- When grazing ceases, exotic grasses will become rank, competing with newly planted seedlings and becoming a fire hazard.
- After the removal of the Cypress trees and the cessation of grazing, Cypress seedlings may germinate around the sites of the existing plantations.

Management Prescription:

- Continue grazing this block until the autumn / winter prior to planting. Do not apply any fertilisers.
- Before planting, apply knockdown and residual herbicides to planting sites as recommended in Part 6.
- Control grasses immediately around seedlings for at least 18 months using knockdown herbicide applied with a wick-wiper or overspray with an appropriate residual herbicide.
- When trees and shrubs become established, they will suppress exotic grass growth and create conditions more suitable for native grasses.

Average Planting Spacings 3.2 x 3.2 metres.

SPECIES LIST AND PLANTING GUIDE					
Species	Dominance in Mix.	Per Hectare		Total No. Planted This Block	Notes
		Ultimate No. at Maturity	No. of Seedlings Planted		
Acacia melanoxylon	50%	91	575	690	Plant all over
Acacia stricta	0%	0	0	0	
Acacia verticillata	0%	0	0	0	
Allocasuarina verticillata	0%	0	0	0	
Banksia marginata	1%	5	18	22	Lower and mid slopes
Bursaria spinosa	1%	5	18	22	Lower and mid slopes
Eucalyptus ovata	20%	19	134	161	Lower slopes
Eucalyptus viminalis	28%	27	188	225	Plant all over
TOTALS	100%	147	933	1,120	

Management Block Number: Sixteen

Area (Hectares): 1.40

Land Management Zone Type: Saddleback Picnic Facilities

Description:

- This management block is situated on the saddle between Mt. Leura and Mt. Sugarloaf and on the southern rim of the crater. The block is currently grazed. A Cypress plantation occurs in the western corner of the block.

Proposed Works:

- Construction of picnic facilities including tables, seating, BBQ, viewing platform / shelter, interpretation facilities, walking tracks and signage.
- Revegetation with indigenous woodland species, dominated by Manna Gum, Drooping She-oak and Blackwood. Target PFC: 10 to 20%.

Existing Management Issues:

- The area is currently grazed and is in a relatively stable condition.
- Existing cypress trees are in a state of decline and should be removed.

Expected Management Issues:

- When grazing ceases, exotic grasses will become rank, competing with newly planted seedlings and becoming a fire hazard.
- High pedestrian use may place pressures on adjacent revegetation works if tracks are not used and / or maintained. This could also lead to erosion problems.

- After the removal of the Cypress trees and the cessation of grazing, Cypress seedlings may germinate around the sites of the existing plantations.

Management Prescription:

- Continue grazing this block until the autumn / winter prior to planting. Do not apply any fertilisers.
- Before planting, apply knockdown and residual herbicides to planting sites as recommended in Part 5.
- Control grasses immediately around seedlings for at least 18 months using knockdown herbicide applied with a wick-wiper or overspray with an appropriate residual herbicide.
- When trees and shrubs become established, they will suppress exotic grass growth and create conditions more suitable for native grasses.
- Maintain facilities in good condition to encourage their proper use.
- Ensure tracks are located along desire lines to prevent damage to adjacent revegetation works.

Average Planting Spacings 4.3 x 4.3 metres.

SPECIES LIST AND PLANTING GUIDE					
Species	Dominance in Mix.	Per Hectare		Total No. Planted This Block	Notes
		Ultimate No. at Maturity	No. of Seedlings Planted		
Acacia melanoxylon	15%	15	99	138	Plant all over
Acacia stricta	1%	7	15	21	Small clumps SW of picnic area
Acacia verticillata	1%	7	15	21	Small clumps SW of picnic area
Allocasuarina verticillata	20%	20	143	200	Plant all over
Banksia marginata	2%	5	21	29	Scattered individuals/small clumps
Bursaria spinosa	1%	3	10	15	Scattered individuals/small clumps
Eucalyptus ovata	0%	0	0	0	
Eucalyptus viminalis	60%	32	230	322	Plant all over
TOTALS	100%	86	533	744	

Management Block Number: *Seventeen*

Area (Hectares): *0.60*

Land Management Zone Type: *Southern Slopes*

Description:

- This management block is located south of the proposed saddleback picnic area on the southern boundary of the Mt. Sugarloaf Reserve. The block is currently grazed.

Proposed Works:

- Revegetate with indigenous woodland species dominated by Blackwood, Manna Gum and Swamp Gum. Target PFC: 30 to 40%.

Existing Management Issues:

- The block is currently grazed and is in a relatively stable condition.

Expected Management Issues:

- When grazing ceases, exotic grasses will become rank, competing with newly planted seedlings and becoming a fire hazard.

Management Prescription:

- Continue grazing this block until the autumn / winter prior to planting. Do not apply any fertilisers.
- Before planting, apply knockdown and residual herbicides to planting sites as recommended in Part 6.
- Control grasses immediately around seedlings for at least 18 months using knockdown herbicide applied with a wick-wiper.
- When trees and shrubs become established, they will suppress exotic grass growth and create conditions more suitable for native grasses.

Average Planting Spacings *4 x 4 metres.*

SPECIES LIST AND PLANTING GUIDE					
Species	Dominance in Mix.	Per Hectare		Total No. Planted This Block	Notes
		Ultimate No. at Maturity	No. of Seedlings Planted		
Acacia melanoxylon	40%	52	328	197	Plant all over
Acacia stricta	0%	0	0	0	
Acacia verticillata	0%	0	0	0	
Allocasuarina verticillata	0%	0	0	0	
Banksia marginata	2%	7	26	16	Lower end mid slopes
Bursaria spinosa	2%	7	26	16	Lower end mid slopes
Eucalyptus ovata	22%	14	105	63	Lower end mid slopes
Eucalyptus viminalis	34%	22	163	98	Plant all over
TOTALS	100%	102	648	389	

Management Block Number: *Eighteen*

Area (Hectares): *0.60*

Land Management Zone Type: *Gullies and Depressions*

Description:

- Block 18 is situated on a south-east facing slope east of the proposed saddleback picnic facilities. It is currently grazed.

Average Planting Spacings 3.2 x 3.2 metres.

Proposed Works:

- Revegetation with indigenous woodland species, dominated by Manna Gum, Blackwood and Swamp Gum. Target PFC: 30 to 40%.

Existing Management Issues:

- The area is currently grazed and is in a stable condition.

Expected Management Issues:

- When grazing ceases, exotic grasses will become rank, competing with newly planted seedlings and becoming a fire hazard.

Management Prescription:

- Continue grazing this block until the autumn / winter prior to planting. Do not apply any fertilisers.
- Control grasses immediately around seedlings for at least 18 months using knockdown herbicide applied with a wick-wiper or overspray with an appropriate residual herbicide.
- When trees and shrubs become established, they will suppress exotic grass growth and create conditions more suitable for native grasses.

SPECIES LIST AND PLANTING GUIDE

<i>Species</i>	<i>Dominance in Mix.</i>	<i>Per Hectare</i>		<i>Total No. Planted This Block</i>	<i>Notes</i>
		<i>Ultimate No. at Maturity</i>	<i>No. of Seedlings Planted</i>		
<i>Acacia melanoxylon</i>	50%	91	575	345	Plant all over
<i>Acacia stricta</i>	0%	0	0	0	
<i>Acacia verticillata</i>	0%	0	0	0	
<i>Allocasuarina verticillata</i>	0%	0	0	0	
<i>Danksia marginata</i>	1%	5	18	11	Lower and mid slopes
<i>Bursaria spinosa</i>	1%	5	18	11	Lower and mid slopes
<i>Eucalyptus ovata</i>	20%	19	134	80	Lower slopes
<i>Eucalyptus viminalis</i>	28%	27	188	113	Plant all over
TOTALS	100%	147	933	560	

Management Block Number: *Nineteen*

Area (Hectares): *6.70*

Land Management Zone Type: *Southern Slopes*

Description:

- This management block is located south of the ridge extending from the southern end of the Mt. Laura summit to the proposed saddleback picnic facilities area, on the southern boundary of the Sugarloaf Reserve. The block is currently grazed.

Proposed Works:

- Revegetate with indigenous woodland species dominated by Blackwood, Manna Gum and Swamp Gum. Target PFC: 30 to 40%.

Existing Management Issues:

- The block is currently grazed and is in a relatively stable condition.

Expected Management Issues:

- When grazing ceases, exotic grasses will become rank, competing with newly planted seedlings and becoming a fire hazard.

Management Prescription:

- Continue grazing this block until the autumn / winter prior to planting. Do not apply any fertilisers.
- Before planting, apply knockdown and residual herbicides to planting sites as recommended in Part 6.
- Control grasses immediately around seedlings for at least 18 months using knockdown herbicide applied with a wick-wiper or overspray with an appropriate residual herbicide.
- When trees and shrubs become established, they will suppress exotic grass growth and create conditions more suitable for native grasses.

Average Planting Spacings *4 x 4 metres.*

SPECIES LIST AND PLANTING GUIDE					
Species	Dominance in Mix.	Per Hectare		Total No. Planted This Block	Notes
		Ultimate No. at Maturity	No. of Seedlings Planted		
Acacia melanoxylon	40%	52	328	230	Plant all over
Acacia stricta	0%	0	0	0	
Acacia verticillata	0%	0	0	0	
Allocasuarina verticillata	0%	0	0	0	
Banksia marginata	2%	7	26	18	Lower and mid slopes
Bursaria spinosa	2%	7	26	18	Lower and mid slopes
Eucalyptus ovata	26%	17	125	87	Lower slopes
Eucalyptus viminalis	30%	19	144	101	Plant all over
TOTALS	100%	102	649	<u>454</u>	

BOTANICAL SURVEY AND PLANT LISTS
MT LEURA AND MT SUGARLOAF RESERVES
CAMPERDOWN

PREPARED AS PART OF THE
MT LEURA AND MT SUGARLOAF MANAGEMENT PLAN

BY

Tim D'Ombra
Associate/Consultant Botanist

Thomson Hay & Associates
Landscape Architects.

AUGUST 1994

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- A: *Existing remnant vegetation of Mt Leura and Mt Sugarloaf.*
- B: *Weeds of Mt Leura and Mt Sugarloaf.*
- C: *Plants indigenous to the Camperdown area.*
- D: *Original Vegetation of the Study Area.*
- E: *A list of further species that occur in the region*
(could be considered for revegetation on the Mounts)

A. EXISTING REMNANT VEGETATION OF MT. LEURA AND MT. SUGARLOAF

BOTANICAL NAME	COMMON NAME	NOTES
<i>Allocasuarina verticillata</i>	Drooping She-oak	Remnant stand on top of Mt. Leura and on northern slope.
<i>Acacia melanoxylon</i>	Blackwood	Mt. Leura
<i>Kennedia prostrata</i>	Running Postman	Below carpark - Mt. Leura
<i>Acaena anserinifolia</i> ⁺	Bidgee Widgee	
<i>Epilobium cinereum</i> ⁺	Variable Willow-Herb	
<i>Epilobium billardierranum</i> ⁺	Robust Willow-Herb	
<i>Pseudognaphalium luteo-album</i> ⁺	Jersey Cudweed	
<i>Senecio glomeratus</i> ⁺	Annual Fireweed	
<i>Senecio quadridentatus</i> ⁺	Cotton Fireweed	
<i>Poa labillardieri</i>	Tussock Grass	Remnants on both mounts. Most notable on north face and west face (internal) of Mt. Leura.
<i>Poa sieberana</i>	<i>Carex</i> Tussock Grass	
<i>Psoralea adscendens</i>	Mountain Psoralea	Quarry area
<i>Danthonia spp.</i>	Wallaby Grass	
<i>Geranium potentilloides</i>	Cinquefoil	
<i>Cynoglossum suaveolens</i>	Sweet Hounds Tongue	

+ Common native "weeds" of pastures.

B. WEEDS OF MT. LEURA AND MT. SUGARLOAF
(Not including deliberate exotic and native species plantings)

PINACEAE

Pinus radiata

Monterey Pine

POACEAE

Avena sativa

Oat

Holcus lanatus

Yorkshire Fog Grass

Agrostis sp.

Bent Grass

Phalaris aquatica

Canary Grass

Phalaris minor

Lesser Canary Grass

Cynodon dactylon

Couch Grass

Dactylis glomerata

Cocksfoot

Lagurus ovatus

Hare's Tail

Poa annua

Annual Meadow Grass

APIACEAE

Conium maculatum

Hemlock

ASTERACEAE

Arctotheca calendula

Cape Weed

Sonchus oleraceus

Sow Thistle

Carduus pycnocephalus

Slender Thistle

Tragopogon porrifolius

Salsify

Cirsium vulgare

Spear Thistle

Conyza bonariensis

Tall Fleabane

BRASSICACEAE

Brassica rapa

White Turnip

BORAGINACEAE

Myosotis sylvatica

Wood Forget-Me-Not

Echium fastuosum

Pride of Madeira

CAPRIFOLIACEAE

Sambucus nigra

Common Elderberry

CHENOPODIACEAE

Chenopodium album

Fat Hen

CARYOPHYLLACEAE

Cerastium glomeratum

Mouse ear Chickweed

FABACEAE

Medicago polymorpha

Burr Medic

Vicia sativa

Common Vetch

Chamaecytisus proliferus

Tree Lucerne

Trifolium spp.

Clovers

FUMARIACEAE

Fumaria sp.

Fumitory

GENTIANACEAE

Centaurium erythraea

Common Centuary

LAMIACEAE

Marrubium vulgare

Horehound

OXALIDACEAE

Oxalis spp.

Oxalis

PAPAVERACEAE

Papaver hybridum

Rough Poppy

PLANTAGINACEAE

Plantago lanceolata

Ribwort Plantain

PITTOSPORACEAE

Pittosporum undulatum

Sweet Pittosporum

POLYGONACEAE

Polygonum aviculare

Prostrate Knotweed

Rumex acetosella

Sheep Sorrel

ROSACEAE

Cotoneaster spp.

Cotoneaster

Rubus spp.

Blackberry

Malus X domestica

Apple

SOLANACEAE

Lycium ferocissimum

African Boxthorn

Solanum nigrum

Black Nightshade

SCROPHULARIACEAE

Verbascum virgatum

Twiggy Mullein

VIOLACEAE

Viola spp.

Violet

Deliberate plantings include the following species:

Eucalyptus ficifolia

Red Flowering Gum

Hakea spp.

Hakea

Cupressus macrocarpa

Monterey Cypress

Pinus radiata

Monterey Pine

Myoporum viscosum

Sticky Boobialla

The above list is not exhaustive but identifies some of the more common weeds of the site.

C. PLANTS INDIGENOUS TO THE CAMPERDOWN AREA

Location Key:

1. Remnant Trees on Farmland
2. Old Cobden - Camperdown Railway Line
3. Forest Blocks South of Camperdown
4. Roadsides around Naroghid
5. Stony Rises country to the east (south-west of Mt Porndon and Lake Purrumbeet).

Trees and Shrubs

BOTANICAL NAME	COMMON NAME	LOCATION	SEED COLLECTING TIME
MYRTACEAE			
<i>Eucalyptus viminalis</i>	Manna Gum	1, 2, 3, 4, 5	July - January
<i>Eucalyptus ovata</i>	Swamp Gum	1, 2, 3, 4, 5	December - February
<i>Eucalyptus obliqua</i>	Messmate	1, 2, 3	December - February
<i>Eucalyptus camaldulensis</i>	River Red Gum	1	March - September
<i>Leptospermum continentale</i>	Prickly Ti-Tree	2, 3	all year
MIMOSACEAE			
<i>Acacia verticillata</i>	Prickly Moses	2, 3 and December - Early	January
<i>Acacia stricta</i>	Hop Wattle	2, 3, 4	Early January
<i>Acacia melanoxylon</i>	Blackwood	1, 2, 3, 4, 5	February. Very common on local roadsides
<i>Acacia dealbata</i>	Silver Wattle	4 (note 1 eg. only found)	January
<i>Acacia pycnantha</i>	Golden Wattle	3 (water supply block)	January
FABACEAE			
<i>Indigofera australis</i>	Austral Indigo	2, 3 (near water supply block)	Early January
<i>Daviesia latifolia</i>	Hop Bitter Pea	2, 3	Early January
PITTOSPORACEAE			
<i>Bursaria spinosa</i>	Sweet Bursaria	2, 3, 5	April
SANTALACEAE			
<i>Exocarpus cupressiformis</i>	Cherry Ballart	3, 5	February - difficult to propagate - semi parasitic
ASTERACEAE			
<i>Senecio laetuis</i>	Variable Groundsel	5	Jan-Feb
<i>Helichrysum scorpioides</i>	Button Everlasting	2, 3	Late December - early January
<i>Helichrysum dendroideum</i>	Tree Everlasting	2, 3	Late Feb
<i>Cassinia aculeata</i>	Dogwood	2, 3	late January - early February
<i>Olearia argophylla</i>	Musk Daisy Bush	3	Late December - early January
VIOLACEAE			
<i>Hymenanthera dentata</i>	Tree Violet	5	late January - early February

SOLANACEAE

<i>Solanum laciniatum</i>	Kangaroo Apple	5	Feb-March predominantly
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Groundlayer Species

POACEAE

<i>Themeda triandra</i>	Kangaroo Grass	2	late February
<i>Poa morrisii</i>	Tussock Grass	2	January - February
<i>Poa labillardieri</i>	Tussock Grass	2	January - February
<i>Poa</i> spp.	Tussock Grass	2, 3	January - February
<i>Danthonia</i> spp.	Wallaby Grass	2, 3	January

LILIACEAE

<i>Wurmbea dioica</i>	Early Nancy	2
<i>Dianella revoluta</i>	Black-anther Flax-lily	2

CYPERACEAE

<i>Eleocharis acuta</i>	Common Spike-Rush	2
<i>Lepidosperma longitudinale</i>	Pithy Sword-Sedge	2

ORCHIDACEAE

<i>Microtis unifolia</i>	Common Onion orchid	2
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XANTHORRHOEACEAE

<i>Lomandra longifolia</i>	Spiny-Headed Mat Rush	2	Late Summer
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BRUNONIACEAE

<i>Brunonia australis</i>	Brunonia	2	January
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CAMPANULACEAE

<i>Wahlenbergia communis</i>	Blue Bell	2	Late January - early February
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Also Present:

<i>Pteridium esculentum</i>	Bracken
<i>Plantago</i> sp.	Plantain
<i>Acaena anserinifolia</i>	Bidgee Widgee

D. ORIGINAL FLORA OF THE STUDY AREA

A Manna Gum woodland with a Tussock Grass understorey.

The following species were certainly present:

<i>Allocasuarina verticillata</i>	Drooping She-Oak
<i>Acacia melanoxylon</i>	Blackwood
<i>Eucalyptus viminalis</i>	Manna Gum
<i>Poa</i> sp. including:	Tussock Grass
<i>Poa labillardieri</i>	
<i>Poa sieberana</i>	
<i>Danthonia</i> sp.	Wallaby Grass
<i>Kennedia prostrata</i>	Running Postman
<i>Acaena anserinifolia</i>	Bidgee Widgee
<i>Epilobium cinereum</i>	Variable Willow Herb
<i>Epilobium billardierranum</i>	Robust Willow Herb
<i>Pseudognaphalium luteo-album</i>	Jersey Cudweed
<i>Psoralea adscendens</i>	Mountain Psoralea
<i>Senecio glomeratus</i>	Annual Fireweeds
<i>Senecio quadridentatus</i>	Cotton Fireweed
<i>Geranium potentillodes</i>	Cinquefoil
<i>Cynoglossum suaveolens</i>	Sweet Hounds Tongue

Of the plants occurring around Camperdown (list C) the following species are most likely to have occurred on Mounts Sugarloaf and Mount Leura.

<i>Eucalyptus ovata</i>	Swamp Gum
<i>Eucalyptus obliqua</i>	Messmate Stringybark
<i>Eucalyptus viminalis</i>	Manna Gum (dominant species)
<i>Allocasuarina verticillata</i>	Drooping She-oak
<i>Acacia stricta</i>	Hop Wattle
<i>Senecio laetus</i>	Variable Groundsel
<i>Solanum laciniatum</i>	Kangaroo Apple
<i>Hymenanthera dentata</i>	Tree Violet
<i>Bursaria spinosa</i>	Sweet Bursaria

Any of the other plants listed in C. may have occurred on the mounts and could be considered for planting. The Mounts would have had a relatively simple floristic structure as is often observed in areas with good soils and high rainfall. A range of herbs may have been present between the tussocks.

Banksia marginata (Silver Banksia) was described on Mt. Leura in the 1890's on the lower slopes in Donald MacDonald Victorian Reading Books Eighth Book 1928 in "From a Western Hilltop". No other evidence exists to suggest Banksia's were present, however their inclusion in the revegetation works would add considerably to the site aesthetically and ecologically.

E. A LIST OF FURTHER SPECIES THAT OCCUR IN THE REGION.
SOME OF THESE COULD BE CONSIDERED FOR PLANTING ON THE MOUNTS.
(not observed in the immediate Camperdown area)

BOTANICAL NAME	COMMON NAME	NOTES & LOCATIONS (BEAUCLEHOLE'S CODES)
Trees and Shrubs:		
<i>Coprosma quadrifida</i>	Prickly Coprosma	C, E, I, moist well drained soils
<i>Goodenia ovata</i>	Hop Goodenia	C, E, I, damp soils
<i>Goodia lotifolia</i>	Golden Tip	D, E, I, well drained soils
<i>Gynatrix pulchella</i>	Hemp Bush	C, D, E, I, Well drained and rocky soils
<i>Hakea ulicina</i>	Furze Hakea	E, I, well drained dry to moist soils
<i>Leptospermum lanigerum</i>	Woolly Tea Tree	C, D, E, I, moist soils
<i>Leptospermum scoparium</i>	Manuka Tea Tree	C, D, E, moist soils
<i>Myoporum parvifolium</i>	Creeping Boobialla	Camperdown: see Willis. Closest current occurrence to Camperdown is not known.
<i>Notolaena ligustrina</i>	Privet Mock Olive	C, E, I, well drained, moist, loamy soils
<i>Olearia erubescens</i>	Moth Daisy Bush	E, I, 27c, 30b, 29 a & b, dry and damp soils.
<i>Parahebe derwertiana</i>	Derwent Speedwell	C, I, moist well drained soils
<i>Pultanea stricta</i>	Rigid Daisy Bush	D, E, I, moist sandy soils
Groundcovers:		
<i>Ajuga australis</i>	Austal Bulge	Well drained soils
<i>Asperula conferta</i>	Common Woodruff	Well drained soils
<i>Calocephalus citreus</i>	Lemon Beauty-heads	Well drained soils
<i>Calocephalus lacteus</i>	Milky Beauty-heads	Well drained soils
<i>Clematis aristata</i>	Australian Clematis	Well drained soils
<i>Clematis microphylla</i>	Small-leaved Clematis	Well drained soils
<i>Dichondra repens</i>	Kidney Weed	Well drained soils
<i>Drosera peltata</i>	Pale Sundew	Adaptable
<i>Eryngium ovatum</i>	Blue Devil	Moist well drained soils
<i>Geranium retrorsum</i>	Grassland Crane's-bill	Moist soils, prefers shade
<i>Gnaphalium gymnocephalum</i>	Creeping Cudweed	
<i>Gonocarpus tetragynus</i>	Common Raspwort	Moist to dry well drained soils
<i>Goodenia lanata</i>	Goodenia	
<i>Hydrocotyle pterocarpa</i>	Wing Pennywort	15c, 12a, 28c
<i>Leptorhynchos linearis</i>	Shiny Buttons	29 a & b, well drained soils
<i>Lobelia alata</i>	Angled Lobelia	Moist soils
<i>Microseris scapigera</i>	Yam-daisy	Well drained soils
<i>Olearia erubescens</i>	Daisy-bush	Well drained soils
<i>Olearia lirata</i>	Snow Daisy-bush	Well drained soils
<i>Olearia ramulosa</i>	Twiggy Daisy-bush	Well drained soils
<i>Ptilotus erubescens</i>	Hairy Tails	2.5 km NE of Camperdown PO
<i>Ptilotus macrocephalus</i>	Feather Heads	Well drained soils
<i>Ptilotus spathulatus</i>	Pussy Tails	Well drained soils
<i>Pimelea curviflora</i>	Curved Rice-flower	Moist well drained sites
<i>Poranthera micrphylla</i>	Small Poranthera	Well drained soils
<i>Prunella vulgaris</i>	Self-heal	Moist soils
<i>Senecio minimus</i>	Shrubby Fireweed	Moist well drained soils
<i>Stackhousia monogyna</i>	Creamy Stackhousia	Moist well drained sites
<i>Stylidium graminifolium</i>	Grass Trigger-plant	Moist well drained sites
<i>Urtica incisa</i>	Scrub Nettle	Moist Sites
<i>Viola hederacea</i>	Ivy-leaf Violet	Moist to wet soils

Monocots

<i>Austrofestuca hookeriana</i>	Hooker Fescue	25b, moist soils, tolerates drying out.
<i>Danthonia ericantha</i>	Hill Wallaby Grass	Exposed sites, well drained soil
<i>Danthonia spp.</i>	Wallaby Grass	
<i>Deyeuxia quadriseta</i> + Others	Reed Bent-grass	Well drained soils
<i>Dichelachne crinita</i>	Long-hair Plume-grass	Well drained soils
<i>Dichelachne micrantha</i>	Short-hair Plume-grass	Well drained soils
<i>Echinopogon ovatus</i>	Common Hedgehog-grass	Moist well drained soils
<i>Eragrostis brownii</i>	Common Love-grass	adaptable
<i>Hypoxis glabella</i>	Yellow-star	Between lakes
<i>Microlaena stipoides</i>	Weeping Grass	Moist well drained soils
<i>Pentapogon quadrifidus</i>	Five-awned Spear-grass	Adaptable
<i>Poa tenera</i>	Slender Tussock-grass	Adaptable
<i>Stipa spp</i>	Spear Grass	Well drained sites, will tolerate drying-out

Letters refer to the codes in "THE DISTRIBUTION OF VASCULAR PLANTS IN THE CORANGAMITE REGION" By AC Beuglehole.

MT. LEURA MANAGEMENT PLAN

PLANTING GUIDELINES

<i>Species</i>	<i>General Planting</i>	<i>Clump Planting</i>	<i>Number per clump</i>	<i>Maximum Spacing (m)</i>	<i>Minimum Spacing (m)</i>	<i>Establishment Technique</i>	<i>Notes</i>
<i>Acacia melanoxylon</i>	yes				3	SP	lower slopes and gullies
<i>Acacia stricta</i>		yes	2 to 8	5	1	SP	lower slopes only
<i>Acacia verticillata</i>		yes	2 to 10	5	1	SP	
<i>Allocasuarina verticillata</i>	yes					SP	drier and upper slopes
<i>Banksia marginata</i>		yes	1 to 5	10	2	SP	lower slopes generally
<i>Bursaria spinosa</i>		yes	1 to 5	10	2	SP	sheltered sites
<i>Eucalyptus ovata</i>	yes				5	SP	lower slopes
<i>Eucalyptus viminalis</i>	yes				5	SP	lower slopes
<i>Poa labillardieri</i>	yes					NR/DS/SP	All sites
<i>Poa sieberana</i>	yes					NR/DS/SP	All sites
<i>Danthonia sp.</i>	yes					NR/DS/SP	All sites

NR = Natural Regeneration, DS = Direct Seeding, SP = Seedling Planting.

**Mt. Leura & Mt. Sugarloaf
Landscape Master Plan & Management Plan**

IMPLEMENTATION PLAN

**(REVISED VERSION)
FEBRUARY 1998**

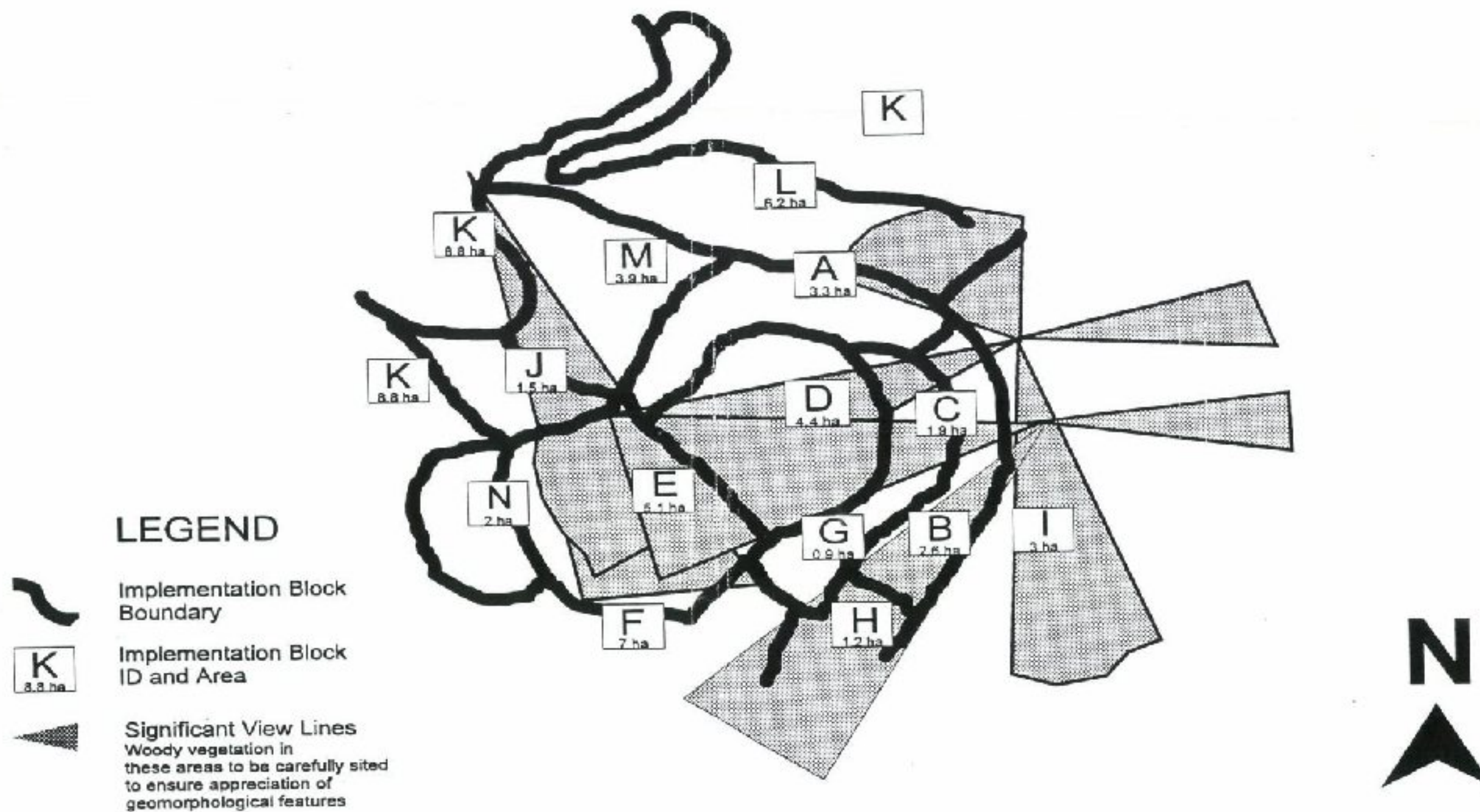
PREPARED BY

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AND

RANDALL ROBINSON

Mt Leura and Mt Sugarloaf Significant Viewlines



Mt. Leura & Mt. Sugarloaf Landscape Master Plan & Management Plan

IMPLEMENTATION PLAN

INTRODUCTION

At a meeting in Camperdown between the Mt. Leura & Mt. Sugarloaf Development Committee and representatives of the National Trust and the Geological Society of Victoria, it was resolved that a representative of the Development Committee (Don Thomson) meet with Randall Robinson (consultant to the Trust) to develop an implementation plan that would prescribe a means of meeting the objective of revegetation of the Mt. Sugarloaf and Leura Reserves while allowing the maintenance of strategic views of significant geological features of the reserves using techniques and process's which would reduce weed growth and fire risk, recognise existing remnant flora as a base to build on and be able to be implemented progressively to match local resources. This Implementation Plan is a supplementary report to the Mt. Leura & Mt. Sugarloaf Landscape Master Plan & Management Plan 1994.

In recognition of the heritage values attached to the cultural landscape and the geological features, revegetation of the entire reserve and density of woody species has been modified from what may have been the pre contact landscape.

The revegetation techniques to be adopted are those generally proven successful by the Victorian and New South Wales 'Save the Bush' revegetation programs. These are recognised as different to the program proposed by the local residents which focussed primarily on planting woody species. It is recognised that this will require the local community to develop techniques in grassland revegetation and growing on native grass and herb species and that the National Trust through its 'Save the Bush' program will assist with Training.

IMPLICATIONS

- The success of the implementation of the plan in terms of the maintenance of views towards significant geomorphological features will be dependant upon the ability of the Development Committee to ensure its site manager understands the aims and objectives of the project and can work with the team to ensure that views are established during planting operations and retained in later years.
- Significant resources will normally be required to enable rapid and efficient establishment of native grasslands. In recognition of this the establishment program may need to be progressively modified to match local resources and energy.
- The focus of the nursery established at the Camperdown College may need to shift to the growing of grassland species in "viro-cells" as fewer tree seedlings may be required in some areas as planting may occur closer to the proposed final densities.
- Pre-planting weed control in existing areas of native grass should be undertaken carefully so as not to destroy the native species. Trees should only be planted where exotic grasses are present so that the pre-planting weed control can be used to control the exotic grasses as well.
- Grazing will be a necessary management tool until sufficient resources can be directed to commencement of revegetation works and follow-up maintenance. Grazing of sheep among trees which are at least three years old will be possible under close observation and at low stocking rates. This will mean fencing off works areas, which has a significant risk factor associated with it in terms of potential damage to works by stock should electric fences fail. The erection of non-electric post and wire fencing is prohibitive on the site due to the steepness of the slopes.

NOTES ON VIEW LINES SHOWN ON MAP

The areas shaded on the Implementation Plan 'Significant Viewlines' map shows the areas in which the establishment of 'woody' vegetation (trees, shrubs) needs to be undertaken in a sensitive manner to maintain view lines to important geological features of the site. This does not imply that these areas are necessarily left open and devoid of all woody vegetation.

View line areas have been established as key sight lines from various vantage points within the Reserves. Due to the long-term goal to establish an open grassy woodland throughout the site, general views will be available from many places throughout the reserves in the long term. Within the areas shaded, the sight lines need to be maintained to allow the appreciation of the geological features.

The following guidelines have been provided to give direction to the Development Committee and volunteers implementing this plan to allow visual considerations to be taken into account during establishment and management works.

1. Species Selection

The use of trees (and to a lesser degree shrubs) with open canopy characteristics will allow the viewer to appreciate the form of the land behind the tree. Manna Gums (*Eucalyptus viminalis*) and Drooping She-oaks (*Allocasuarina verticillata*) grow with a sparse canopy on this site. Where shrubs are used, they should be planted in small clumps and arranged so as not to block views.

2. Arrangement of Woody Vegetation

Woody vegetation planted in the shaded areas should be arranged with close consideration to the mature height of the tree/shrub and the placement of the trees so as to avoid 'stacking' or overlapping of trees down the slope.

3. Establishment Technique

Woody vegetation established in the shaded areas should be planted at the proposed final density plus 20% to allow for losses. The establishment of native grassland in these areas therefore becomes a high priority as long-term management of these areas will be enhanced by establishing a weed-free environment in which to plant the woody vegetation.

REVIEW PERIOD

It is suggested that the project be reviewed every five years by representatives of the National Trust, Geological Society and Development Committee.

ASSISTANCE FROM THE NATIONAL TRUST

The Development Committee would be appreciative of assistance from the National Trust in the form of:

- Facilitating the training of volunteers in native vegetation establishment and management.
- Assistance with the sourcing of funds and other resources through the National Trusts network of contacts.
- Support for funding applications for on-ground works.
- General promotional and media support for the project.

LEGISLATIVE REQUIREMENTS

It is suggested that the site may need to be registered as a plantation to allow the thinning of trees in areas where vegetation is to be established at a higher density than the final target density (Open Woodland Community). This will enable thinning to occur without a planning permit being required under the Planning and Environment Act 1987 (Amendment S17 - Native Vegetation Clearance Controls) and meet the requirements under the Forests Act 1958.

Management block: A	North Slopes of Crater	Area: 3.3 Ha
Revegetation aim:	To establish an open woodland consisting of native grassland species with trees planted to maintain strategic view lines into the crater and to Mt. Sugarloaf and to enable the shape and scale of the crater to be interpreted.	
Key species:	<p>Grassland: dominated by <i>Poa</i> and <i>Danthonia</i> spp.</p> <p>Shrubs: Some small clumps of <i>Bursaria</i> and <i>Banksia</i>.</p> <p>Trees: <i>Allocasuarina verticillata</i> and <i>Eucalyptus viminalis</i> with some <i>Acacia melanoxylon</i> at lower altitudes and planted in small clumps.</p>	
Establishment technique:	<p>Trees to be planted at 70 stems per hectare (proposed final spacings +20% to allow for losses (one every 150m²)).</p> <p>Grasslands to be established by encouraging spread of existing remnants and the planting of grassland species as "viro-cells".</p>	
Visual considerations:	Trees with sparse canopies planted strategically to allow views through / under / over the canopy in some places and clear views from specific vantage points. This will allow views into the crater and to Mt. Sugarloaf to be experienced as the viewer walks around the rim, but the view is not necessarily clear in all places, to provide some added interest and a sense of scale to the crater.	
Priority:	High. The existing grassland areas are in good condition so the opportunity to extend this grassland is high.	
Specific management requirements:	All grazing to be removed as a high priority (Sugarloaf component). Strategic control of weeds (eg. phalaris). Trees should only be planted in areas where weeds have been spot-sprayed - do not spot-spray for trees where native grasses exist .	
Approx no. trees to be planted:	<i>Allocasuarina verticillata:</i> <i>Eucalyptus viminalis:</i> <i>Acacia melanoxylon:</i> <i>Bursaria spinosa:</i> <i>Banksia marginata:</i> TOTAL	55% 25% 10% 5% 5% 230
Approx. final tree no's:	185	

Management block: B	East Slopes of Crater	Area: 2.6 Ha																		
Revegetation aim:	To establish an open woodland consisting of native grassland species with trees placed carefully to maintain view lines into the crater, Mt. Sugarloaf and the significant volcanic features to the south of the Sugarloaf Reserve (on private land) from strategic points around the crater (eg. carpark).																			
Key species:	<p>Grassland: dominated by <i>Poa</i> and <i>Danthonia</i> spp.</p> <p>Shrubs: Some small clumps of <i>Bursaria</i> and <i>Banksia</i>.</p> <p>Trees: <i>Allocasuarina verticillata</i> and <i>Eucalyptus viminalis</i>, <i>Acacia melanoxylon</i> (lower in landscape and in small clumps).</p>																			
Establishment technique:	<p>Trees to be planted at 70 stems per hectare (one very 150m²).</p> <p>Grasslands to be established by encouraging spread of existing remnants and the planting of grassland species as "viro-cells".</p>																			
Visual considerations:	Trees with sparse canopies planted strategically to allow views through / under / over the canopy in some places and clear views from specific vantage points (eg. carpark, carpark viewing area and Mt. Leura summit area) towards significant geological features. This will allow views into the crater and to Mt. Sugarloaf to be experienced as the viewer walks around the rim, but the view is not necessarily clear in all places, to provide added interest and a sense of scale to the crater.																			
Priority:	Very High. The existing grassland areas are in good condition so the opportunity to extend this grassland is high.																			
Specific management requirements:	Strategic control of weeds (eg. phalaris). Trees should only be planted in areas where weeds have been spot-sprayed.																			
Approx no. trees to be planted:	<table> <tr> <td><i>Allocasuarina verticillata</i>:</td><td>55%</td><td>100</td></tr> <tr> <td><i>Eucalyptus viminalis</i>:</td><td>25%</td><td>45</td></tr> <tr> <td><i>Acacia melanoxylon</i>:</td><td>10%</td><td>18</td></tr> <tr> <td><i>Bursaria spinosa</i>:</td><td>5%</td><td>9</td></tr> <tr> <td><i>Banksia marginata</i>:</td><td>5%</td><td>9</td></tr> <tr> <td>TOTAL</td><td></td><td>181</td></tr> </table>		<i>Allocasuarina verticillata</i> :	55%	100	<i>Eucalyptus viminalis</i> :	25%	45	<i>Acacia melanoxylon</i> :	10%	18	<i>Bursaria spinosa</i> :	5%	9	<i>Banksia marginata</i> :	5%	9	TOTAL		181
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<i>Acacia melanoxylon</i> :	10%	18																		
<i>Bursaria spinosa</i> :	5%	9																		
<i>Banksia marginata</i> :	5%	9																		
TOTAL		181																		
Approx. final tree no.s:	147																			

Management block: C	Lower Eastern Slopes of Crater	Area: 1.9 Ha																		
Revegetation aim:	To establish an open woodland consisting of native grassland species with trees placed carefully to maintain view lines into the crater and to Mt. Sugarloaf.																			
Key species:	<p>Grassland: dominated by <i>Poa</i> and <i>Danthonia</i> spp.</p> <p>Shrubs: Some small clumps of <i>Bursaria</i> and <i>Banksia</i>.</p> <p>Trees: <i>Allocasuarina verticillata</i> and <i>Eucalyptus viminalis</i>, <i>Acacia melanoxylon</i> (lower in landscape and in small clumps).</p>																			
Establishment technique:	<p>Trees to be planted at 70 stems per hectare (one very 150m²).</p> <p>Grasslands to be established by encouraging spread of existing remnants and the planting of grassland species as "viro-cells".</p>																			
Visual Considerations	Trees with sparse canopies will be planted strategically to enable an appreciation of the ground plane.																			
Priority	Moderate.																			
Specific management requirements:	Grazing to be continued until planting and grassland establishment works commence. A good weed control strategy will be vital after grazing ceases.																			
Approx no. trees to be planted.	<table> <tr> <td><i>Allocasuarina verticillata:</i></td><td>20%</td><td>26</td></tr> <tr> <td><i>Eucalyptus viminalis:</i></td><td>40%</td><td>53</td></tr> <tr> <td><i>Acacia melanoxylon:</i></td><td>20%</td><td>26</td></tr> <tr> <td><i>Bursaria spinosa:</i></td><td>10%</td><td>13</td></tr> <tr> <td><i>Banksia marginata:</i></td><td>10%</td><td>13</td></tr> <tr> <td>TOTAL</td><td></td><td>131</td></tr> </table>		<i>Allocasuarina verticillata:</i>	20%	26	<i>Eucalyptus viminalis:</i>	40%	53	<i>Acacia melanoxylon:</i>	20%	26	<i>Bursaria spinosa:</i>	10%	13	<i>Banksia marginata:</i>	10%	13	TOTAL		131
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<i>Bursaria spinosa:</i>	10%	13																		
<i>Banksia marginata:</i>	10%	13																		
TOTAL		131																		
Approx. final tree no.s	110																			

Management block: D	Crater Floor	Area: 4.4 Ha	
Revegetation aim:	To establish an open woodland consisting of native grassland species and trees placed carefully to maintain views into and within the crater so as to enable the shape and scale of the crater to be appreciated.. Clumps of open shrubs (eg. <i>Bursaria spinosa</i> etc) planted to provide scale to the crater and break up the dominance of the rock dumps.		
Key species:	Grassland: dominated by <i>Poa</i> and <i>Danthonia</i> spp. Shrubs: <i>Bursaria spinosa</i> , <i>Hymenanthera</i> sp. <i>Banksia marginata</i> . Trees: <i>Allocasuarina verticillata</i> and <i>Eucalyptus viminalis</i> (a few).		
Establishment technique:	Trees and shrubs to be planted at 102 stems per Ha. Grasslands to be established by planting of grassland species as "viro-cells".		
Visual considerations:	Views into the crater to be maintained to the extent that the ground line will be appreciable from all of the defined viewing points and generally in all other areas of the rim of the crater.		
Priority:	Low.		
Specific management requirements:	Grazing to be continued until planting and grassland establishment works commence. A good weed control strategy will be vital after grazing ceases.		
Approx no. trees to be planted:	<i>Allocasuarina verticillata:</i>	11%	45
	<i>Eucalyptus viminalis:</i>	11%	45
	<i>Acacia melanoxylon:</i>	26%	112
	<i>Bursaria spinosa:</i>	23%	96
	<i>Banksia marginata:</i>	29%	124
	TOTAL		422
Approx. final tree no.s:	342		

Management block: E	Northern Slopes of Sugarloaf	Area: 5.1 Ha																		
Revegetation aim:	To establish trees with an open canopy and native grasslands over the upper slopes of Mt. Sugarloaf to allow the shape of the cone to be interpreted when viewed from the main viewing areas around the rim of the crater and from distant views from the plains.																			
Key species:	<p>Grassland: dominated by <i>Poa</i> and <i>Danthonia</i> spp.</p> <p>Shrubs: none.</p> <p>Trees: <i>Allocasuarina verticillata</i> with some <i>Eucalyptus viminalis</i> and <i>Acacia melanoxylon</i> at lower altitudes</p>																			
Establishment technique:	<p>Trees to be planted at 70 stems per ha.</p> <p>Grasslands to be established by planting of grassland species as "viro-cells" and encouraging remnants to spread.</p>																			
Visual considerations:	Views from the rim of the crater will be maintained in a general context, specific view lines from defined viewing points maintained as open vistas. Placement of trees on the slopes of Sugarloaf will be designed to enable views over the top of the canopy when standing on the summit (ie. only one or two trees in "Management Block 12 - the summit").																			
Priority:	Moderate to high. There are some remnant native grasses in this area, so the opportunity to establish grasslands by encouraging natural regeneration is good, but sufficient resources need to be directed to the management of the native grasslands.																			
Specific management requirements:	Grazing to be continued until revegetation works commence. Good weed control will be vital after grazing ceases.																			
Approx no. trees to be planted:	<table> <tr> <td><i>Allocasuarina verticillata:</i></td><td>60%</td><td>214</td></tr> <tr> <td><i>Eucalyptus viminalis:</i></td><td>20%</td><td>71</td></tr> <tr> <td><i>Acacia melanoxylon:</i></td><td>20%</td><td>71</td></tr> <tr> <td><i>Bursaria spinosa:</i></td><td>0%</td><td>0</td></tr> <tr> <td><i>Banksia marginata:</i></td><td>0%</td><td>0</td></tr> <tr> <td>TOTAL</td><td></td><td>356</td></tr> </table>		<i>Allocasuarina verticillata:</i>	60%	214	<i>Eucalyptus viminalis:</i>	20%	71	<i>Acacia melanoxylon:</i>	20%	71	<i>Bursaria spinosa:</i>	0%	0	<i>Banksia marginata:</i>	0%	0	TOTAL		356
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<i>Acacia melanoxylon:</i>	20%	71																		
<i>Bursaria spinosa:</i>	0%	0																		
<i>Banksia marginata:</i>	0%	0																		
TOTAL		356																		
Approx. final tree no.s:	280																			

Management block: F	Southern Slopes of Sugarloaf Area: 7 Ha
Revegetation aim:	To establish an open woodland as per the Landscape Master Plan and Management Plan. Native grasslands eventually established through appropriate management techniques and planting of grassland species.
Key species:	Grassland: dominated by <i>Poa</i> and <i>Danthonia</i> spp. Shrubs: <i>Bursaria spinosa</i> , <i>Hymenanthera</i> sp. <i>Banksia marginata</i> . Trees: <i>Allocasuarina verticillata</i> , <i>Acacia melanoxylon</i> , <i>Eucalyptus viminalis</i>
Establishment technique:	Trees to be planted at densities recommended in the Management Plan and thinned as required. Grasslands to be established by planting of grassland species as "viro-cells".
Visual considerations:	Views will be available over the top of the canopy of the woodland from Mt. Sugarloaf to the significant volcanic landscapes to the south.
Priority:	Moderate. Good opportunity to get the community involved in planting and to start seeing some results.
Specific management requirements:	Grazing to be continued until tree establishment works commence. Good weed control will be essential.
Approx no. trees to be planted:	As per Management Plan.
Approx. final tree no.s:	As per Management Plan.

Management block: G	"Picnic" Saddle	Area: 0.9 Ha
Revegetation aim:	To establish a nursery or "seed orchard" for grassland species. This is a flat, easily accessible area which will provide an excellent site for growing on native grasses etc. from which seed can be collected for revegetation works in other areas. A few scattered clumps and individual trees can be planted away from the immediate nursery area.	
Key species:	Grassland: dominated by <i>Poa</i> and <i>Danthonia</i> spp. Trees: <i>Allocasuarina verticillata</i> , <i>Eucalyptus viminalis</i>	
Establishment technique:	As per specific seed orchard establishment guidelines (to be prepared).	
Visual considerations:	The area is low enough in the landscape that trees can be planted without blocking views of the volcanic landscapes to the south when viewed from the crater rim. Any trees planted in this area in the longer term will not interfere with views.	
Priority:	High. The establishment of a seed orchard for native grasses is necessary for all revegetation works within the crater / Sugarloaf areas.	
Specific management requirements:	As per seed orchard establishment guidelines (to be developed).	
Approx no. trees to be planted:	As per management plan. Planting will be delayed until the seed orchard is no longer in use. Some planting around the seed orchard can occur in the mean time.	
Approx. final tree no.s:	As above	

Management block: H	Southern Slopes of Leura Area: 1.2 Ha
Revegetation aim:	To establish an open woodland which allows views from the proposed viewing deck to Mt. Porndon & Lake Purrumbete and the volcanic landscapes to the south.
Key species:	<p>Grassland: dominated by <i>Poa</i> and <i>Danthonia</i> spp.</p> <p>Shrubs: <i>Bursaria spinosa</i>, <i>Hymenanthera</i> sp., <i>Banksia marginata</i>, on lower areas.</p> <p>Trees: <i>Allocasuarina verticillata</i>, <i>Acacia melanoxylon</i> (on lower areas), <i>Eucalyptus viminalis</i></p>
Establishment technique:	<p>Trees to be planted at final densities plus 15% within key viewsheds or at densities recommended in the Management Plan and thinned as required in other areas. (ie. 117 sph in viewshed areas, 648sph in others).</p> <p>Grasslands to be established by planting of grassland species as "viro-cells".</p>
Visual considerations:	Specific view lines to be determined on site to maintain views from viewing deck to Mt. Porndon & Lake Purrumbete. The area is low enough in the landscape not to interfere with views from the rim of the crater.
Priority:	Moderate. Good opportunity to get the community involved in planting and to start seeing some results.
Specific management requirements:	Grazing to be continued until tree establishment works commence. Good weed control will be essential.
Approx. no. trees to be planted:	Generally as per Management Plan, except in view lines.
Approx. final tree no.s:	As per Management Plan.

Management block: I	Eastern Slopes of Leura Area: 3 Ha
Revegetation aim:	To establish an open woodland as per the Landscape Master Plan and Management Plan. Native grasslands eventually established.
Key species:	Grassland: dominated by <i>Poa</i> and <i>Danthonia</i> spp. Shrubs: <i>Bursaria spinosa</i> , <i>Hymenanthera</i> sp. <i>Banksia marginata</i> . Trees: <i>Allocasuarina verticillata</i> , <i>Acacia melanoxylon</i> , <i>Eucalyptus viminalis</i>
Establishment technique:	Trees to be planted at densities recommended in the Management Plan (533 sph) and thinned as required. Grasslands to be established by planting of grassland species as "viro-cells".
Visual considerations:	Views will be available over the top of the canopy of the woodland from Mt. Leura viewing sites to the volcanic landscapes to the east. Some specific on-site manipulation may be required to ensure maintenance of views both during and after planting.
Priority:	Low. Clearance of exotic trees required prior to works commencing.
Specific management requirements:	Spot-spraying of weeds to commence immediately and continue throughout.
Approx no. trees to be planted:	As per Management Plan.
Approx. final tree no.s:	As per Management Plan.

Management block: J	Northern Slopes of Sugarloaf	Area: 1.5 Ha																					
Revegetation aim:	To establish an open woodland as per the Landscape Master Plan and Management Plan. Native grasslands eventually established.																						
Key species:	<p>Grassland: dominated by <i>Poa</i> and <i>Danthonia</i> spp.</p> <p>Shrubs: <i>Bursaria spinosa</i>, <i>Hymenanthera</i> sp. <i>Banksia marginata</i>.</p> <p>Trees: <i>Allocasuarina verticillata</i>, <i>Acacia melanoxylon</i>, <i>Eucalyptus viminalis</i></p>																						
Establishment technique:	<p>Trees to be planted at 70 stems per Ha.</p> <p>Grasslands to be established by planting of grassland species as "viro-cells".</p>																						
Visual considerations:	Intermittent views to Mt. Sugarloaf from the proposed carpark to be maintained. This will require the careful placement of shrubs and trees within the landscape to enable views towards the summit of Sugarloaf from key vantage points.																						
Priority:	Moderate. Good opportunity to get the community involved in planting and to start seeing some results.																						
Specific management requirements:	Grazing to be continued until revegetation works commence. Good weed control will be essential.																						
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<i>Bursaria spinosa</i> :	5%	5																					
<i>Banksia marginata</i> :	5%	5																					
TOTAL		105																					
Approx. final tree no.s:	85																						

Management block: K	Lower Northern Slopes of Leura	Area: 8.8 Ha
Revegetation aim:	To establish an open woodland, dominated by Eucalypts at lower altitudes, gradually being replaced by She-oaks as altitude increases. In the proposed carpark / information area, the siting of trees and shrubs is to be in accordance with the Master Plan for that area, allowing for the roads, tracks and buildings proposed.	
Key species:	<p>Grassland: dominated by <i>Poa</i> and <i>Danthonia</i> spp.</p> <p>Shrubs: <i>Bursaria spinosa</i>, <i>Hymenanthera</i> sp. <i>Banksia marginata</i> on lower slopes.</p> <p>Trees: <i>Allocasuarina verticillata</i>, <i>Acacia melanoxylon</i>, <i>Eucalyptus viminalis</i>. <i>Acacia</i> and <i>Eucalyptus</i> on lower slopes.</p>	
Establishment technique:	<p>As per Management Plan.</p> <p>Grasslands to be established by planting of grassland species as "viro-cells".</p>	
Visual considerations:	<p>View considerations are minor as this block is located on the lower slopes so tree height will not interfere with views from within the reserves.</p> <p>Views towards the reserves from the surrounding district will be maintained and enhanced by this planting.</p>	
Priority:	High. Good opportunity to get the community involved in planting and to start seeing some results.	
Specific management requirements:	<p>If good weed control can be achieved, planting could start earlier than proposed in the Management Plan (tree establishment was proposed to be delayed until weed flush following the removal of the cypress trees had been controlled. In the proposed carpark area, grazing should continue until resources are available to commence planting and ensure on-going management.</p>	
Approx no. trees to be planted:	As per Management Plan.	
Approx. final tree no.s	As per Management Plan.	

Management block: L	Mid-Northern Slopes of Leura Area: 6.2 Ha
Revegetation aim:	To establish an open woodland, dominated by Drooping She-Oaks.
Key species:	Grassland: dominated by <i>Poa</i> and <i>Danthonia</i> spp. Shrubs: very few (some <i>Bursaria</i> & <i>Banksia</i>) Trees: <i>Allocasuarina verticillata</i> .
Establishment technique:	As per Management Plan. Grasslands to be established by planting of grassland species as "viro-cells".
Visual considerations:	The main view consideration is to allow some strategic view lines from the rim of the crater and from seating points along the She-Oak trail. This will involve manipulating the placement of trees during planting and thinning later if necessary in these areas.
Priority:	Low. The removal of the Pines and Cypressess is necessary before revegetation works can commence.
Specific management requirements:	On-going weed control (especially after the removal of the exotic trees) will be essential. Until the trees are removed, only woody weeds such as the isolated Broom and <i>Pittosporum</i> plants should be controlled as the ground disturbance associated with tree removal may undo other weed control attempts. Erosion control may be necessary in places following tree removal.
Approx no. trees to be planted:	As per Management Plan.
Approx. final tree no.s	As per Management Plan.

Management block: M	Western Slopes of Leura	Area: 3.9 Ha
Revegetation aim:	To establish an open woodland as per the Landscape Master Plan and Management Plan. Native grasslands eventually established.	
Key species:	<p>Grassland: dominated by <i>Poa</i> and <i>Danthonia</i> spp.</p> <p>Shrubs: <i>Bursaria spinosa</i>, <i>Hymenanthera</i> sp. <i>Banksia marginata</i>.</p> <p>Trees: <i>Allocasuarina verticillata</i>, <i>Acacia melanoxylon</i>, <i>Eucalyptus viminalis</i></p>	
Establishment technique:	<p>Trees to be planted at densities recommended in the Management Plan (413 sph) and thinned as required.</p> <p>Grasslands to be established by planting of grassland species as "viro-cells".</p>	
Visual considerations:	General views will be available over the top of the canopy of the woodland from the rim of the crater towards Camperdown township. Some strategic thinning and attention to placement of trees at planting will be required to enable views from specific vantage points (eg. do not plant Blackwoods in front of defined viewing areas).	
Priority:	High. Good opportunity to get the community involved in planting and to start seeing some results.	
Specific management requirements:	Grazing to be continued until revegetation works commence. Good weed control will be essential.	
Approx. no. trees to be planted:	As per Management Plan.	
Approx. final tree no.s:	As per Management Plan.	

Management block: N	Quarry	Area: 2 Ha
Revegetation aim:	To establish an open woodland as per the Landscape Master Plan and Management Plan. Specific erosion control measures required throughout quarry area. Native grasslands eventually established.	
Key species:	<p>Grassland: dominated by <i>Poa</i> and <i>Danthonia</i> spp.</p> <p>Shrubs: <i>Bursaria spinosa</i>, <i>Hymenanthera</i> sp. <i>Banksia marginata</i> (lower slopes).</p> <p>Trees: <i>Allocasuarina verticillata</i>, <i>Acacia melanoxylon</i>, <i>Eucalyptus viminalis</i> (lower slopes).</p>	
Establishment technique:	<p>Trees to be planted at densities recommended in the Management Plan (439 sp/h) and thinned as required.</p> <p>Grasslands to be established by planting of grassland species as "viro-cells".</p>	
Visual considerations:	General views will be available over the top of the canopy of the woodland from the summit of Sugarloaf.	
Priority:	High. Good opportunity to get the community involved in planting and to start seeing some results.	
Specific management requirements:	See management plan - erosion control measures.	
Approx. no. trees to be planted.	As per Management Plan.	
Approx. final tree no.s	As per Management Plan.	

