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(After)

***LINEAR NETWORK OF COMMUNAL SPACES
(L.I.N.C.S.)
PLAN***

The LINC S Concept

**Guidelines to assist the management of linear reserves in the Ballarat
Region**

**A resource inventory of the conservation value of road, rail and stream
reserves**

LINC S resource information kit (optional supplement)

An initiative of the

Ballarat Region Conservation Strategy

LINC S Committee

City of Ballarat

DRAFT : For Public Comment until 18 August 1995

May 1995

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Refer also to the detailed case study on the Yarrowee River Corridor prepared by consultants Thomson, Hay & Associates for the LINC'S committee

- Yarrowee River Corridor Environmental & Recreational Assessment Report (October 1993)
- Yarrowee River Corridor Landscape Master Plan & Land Management Plan (April 1995)

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PREFACE

Purpose:

This document has been produced to assist the management of linear reserves. The report deals with the road, rail and stream reserves of the Ballarat region.

It is a guide to management issues and practices which will aid the efforts of government agencies, municipalities and the community in protecting and enhancing these areas, so important in a region subject to massive past over clearing.

It should be seen and utilised as a planning guide for the development of linear reserves across the region.

Important key documents are noted throughout the report and should be considered in conjunction with it. An attempt has been made not to duplicate existing information but rather that the LINC'S Plan builds on this information.

The Plan documents all studies done on linear reserves and available data in the form of a resource inventory. All major existing and potential reserves are listed together with conservation value.

Information on reserves closer to Ballarat is also presented in map form such that corridors (wildlife and recreation) can be identified, missing links highlighted and priorities for corridor development or rehabilitation discussed. This work is ongoing and the information presented in this report will be built on by the LINC'S committee.

The LINC'S committee is the effective mechanism by which all authorities with a management interest in linear reserves can work with the community (residents and groups) to improve and enhance reserves through on ground action.

A detailed case study of the Yarrowee River, Ballarat's most important urban corridor, has also been undertaken. This study is a practical example of the LINC'S approach. The Yarrowee River Corridor Plan is available as a separate document.

A summary of major points and recommendations is provided in Chapter 6.

*** This draft LINC'S Plan is available for public comment until 18 August 1995.**

Further copies of the draft LINC'S Plan are available from the City of Ballarat, Strategic Planning Department.

It is anticipated that the Ballarat & Environs (1:30,000) LINC'S map specially commissioned for the project (produced by the State Data Centre) will be available separately as a wall map.

Tour guides for a number of reserves including the Yarrowee River (Flora and Fauna, history walks) and the Ballarat - Skipton Rail trail will also be produced.

The LINCS Committee comprises representatives from The City of Ballarat, Department of Conservation & Natural Resources, Central Highlands Water, local conservation groups and residents.

Meetings are held on average every second month at the Ballarat Economic Development Board, 13 Doveton Street North, Ballarat.

The LINCS Committee brief is to implement the LINCS Plan. Projects targeted by the committee include the rehabilitation and revegetation of the Yarrowee River, Ballarat-Skipton Rail Trail and other linear reserves.

The LINCS Committee is open and further community membership and participation in projects is encouraged

Contact:	TIM D'OMBRAIN (38-1477)	ADAM PARROTT (33-8647)
	LINCS Secretary	LINCS Chairman
	City of Ballarat	City of Ballarat
	Environmental Consultant	Parks & Gardens Department.

Preparation of the LINCS Plan

This LINCS Plan was prepared by Tim D'Ombra (formerly BRCS Sustainable Development Officer (SDO) and currently Environmental Consultant to the City of Ballarat) in consultation with the LINCS Committee.

Thomson Hay & Associates were commissioned by the committee to prepare the Yarrowee River Corridor case study.

Management issues were identified by the LINCS issues working party. Identification of key linear reserves was undertaken by the Mapping and Resources LINCS working party in conjunction with the SDO. Publicity for the LINCS project and launch of the Plan is handled by the LINCS publicity working party.

Acknowledgments

The Author would like to acknowledge the assistance of Adam Parrott, Susan Cully, Hedley Thomson, Don Thomson, Gavin Jamieson, David Hay, Meredith Alexander, Neville Oddie, Ian Castle and David Grant who kindly commented on the first draft, and the LINCS Committee in the preparation of this report.

The following organisations kindly made material available for the report: Ballarat University School of Biological and Chemical Sciences, Department of Conservation and Natural Resources, Victorian Roadsides Conservation Committee, Vic Roads, Indigenous Flora and Fauna Association, City of Ballarat, Central Highlands Water, Environmental Protection Authority and LandCare Victoria

This report is dedicated to Susan Cully whose efforts are proof that an individual can make a considerable difference.

KEY PLANNING DOCUMENTS TO BE CONSIDERED IN CONJUNCTION WITH THE LINCS PLAN

- *Ballarat Region Conservation Strategy* (December 1991) Ballarat Regional Board

Flora & Fauna Management

- *Flora and Fauna Guarantee Strategy: Conservation of Victoria's Bio diversity* (1992) Department of Conservation and Environment
- *Draft Conservation Program for Native Grasslands and Grassy Woodlands in Victoria* (1992). Department of Conservation and Environment.
- Bennett, Andrew F (1990). *Habitat Corridors, their role in Wildlife Management and Conservation*. Arthur Rylah Institute for Environmental Research, DCNR
- *Urban Nature Conservation in the Greater Ballarat Area* (1989) Ballarat University
- *Planning guide: Protecting Wetlands. A planning guide to preparing and administering wetland controls* (1992). Office of the Environment, Department of Conservation and Environment
- *Wetlands Conservation Program for Victoria* (1988). Victorian Government

Pollution, Run-off, Erosion and Stream side Management

- *Construction Techniques for Sediment Pollution Control* (May 1991). Environmental Protection Authority (publication No. 275)
- *Environmental Guidelines for River Management Works* (1990). For the Standing Committee on rivers and catchments. Department of Conservation and Environment.
- *Action Plan for Water Pollution Control in the Mordialloc Creek, Dandenong Valley & Western Port Catchments* (1994). State Government of Victoria.

Roadsides

- *Roadside Management Guide* (1990). Vic Roads
- Spittle, Jeanette (1992). *Gisborne Roadside Management Plan. Part 1-Policies and guidelines and Part 2-Operators Manual*. VRCC/Shire of Gisborne
- Local Roadside Assessment Studies and reports
- Petris, Stephen & Spittle, Jeanette (1994). *Roadside Management Guidelines for Fire Prevention Planners*. Country Fire Authority

Rail lines

- *Rail Trails Victoria. Planning, design & management of multi-use recreational trails*. (1994) Office of the Environment, DCNR.

1. INTRODUCTION

1.1 Aims and Objectives

LINCS Vision

The LINCS vision is one of green spokes radiating out from the central urban hub of Ballarat. A network of linear parks along our waterways, roadsides and former rail lines to provide recreational opportunities and important habitat corridors for wildlife.

The vision cannot be achieved overnight. An enormous amount of effort would be required to rehabilitate all our degraded waterways and alienated roadsides. The important point is that the vision involves an inherent change in our attitude to these areas. This is not just on the part of the various management authorities but of the community at large.

Rivers are not drains but valuable ecosystems. Roadsides are not just a place to park the grader, store road making materials or place Powercor poles and other services, but important remnants of vegetation communities once much more common across the region. Our disused rail lines, such as the Ballarat-Skipton line, have the best examples of poorly represented vegetation types like Banksia/Casuarina woodlands and have enormous recreational potential and conservation value.

LINCS aims to:

- raise awareness in the value of these areas through the production of this study and associated publicity events.
- provide a plan or model for the development and management of linear reserves .
- attract funding for linear reserve revegetation and rehabilitation works.
- coordinate on-ground works and action.
- put the plan into practice.

Aims and Objectives of the Plan

1. To produce a useable and accessible planning document for the management of linear reserves.
2. To identify all conceivable management issues liable to confront persons involved in the protection and development of a linear reserve system and to present solutions to potential and existing problems.

3. To provide information to assist the management, maintenance, rehabilitation or revegetation of linear reserves.
4. To present the Yarrowee River as an example of a detailed and carefully planned approach to managing a linear reserve.

The Yarrowee River was identified as the most complex (in terms of ownership and location) linear reserve of the region and the most accessible and therefore important to the public of Ballarat. Indeed the Yarrowee River has enormous potential due to its location.

5. To explore and enhance the recreational potential of linear reserves and in particular the Yarrowee River. To provide diverse recreational opportunities and encourage the construction of a network of walking and cycling paths. To identify and accommodate community needs.
6. To foster and encourage public participation in the management of linear reserves.
7. To provide the blueprint for all future on-ground works on linear reserves and the sympathetic management on adjacent land.
8. To simplify land tenure in regard to the management of linear reserves and to make recommendations where appropriate for the purchase of land to complete reserves and who should manage particular linear reserves.
9. To document existing and potential linear reserves and to produce a quality map of the Ballarat Region detailing reserves, recreation and other aspects. To encourage the continuity and connection of reserves to forest blocks and other natural features such as lakes and wetlands.
10. To protect, conserve and enhance the cultural, historic, and natural landscape values of linear reserves.

1.2 The Values of Linear Reserves

Linear reserves are of particular significance in the Ballarat Region as much of the original vegetation has been lost through massive past over-clearing. The native forest and woodland vegetation of the state has been reduced from 75% to 33% of the total area. The largest losses have been in Western Victoria (Ballarat 76% cleared). This loss was most dramatic from 1972-1987 (*BRCS*).

In addition, less than 3% of Victoria's native grassland areas remain.

In the Ballarat Region, the only examples of many former vegetation communities are often on linear reserves. The treed landscape of the Ordovician derived soils around

Ballarat is much reduced, and the Basalt plains grasslands to the south and south west of Ballarat, is now found predominantly only on roadsides, cemeteries and old rail reserves.

Some linear reserve values

- Linear reserves are important, providing a living historical record of Ballarat pre European settlement. This information is valuable to government agencies, mining companies and land owners involved in the restoration of plant communities and as an educational resource.
- Linear reserves provide the natural character and aesthetic appeal of our region and its farmland.
- Linear reserves are important sources of seed allowing farmers, LandCare groups, councils and the community to restore the original vegetation using locally adapted species and varieties.
- Treed linear reserves can act as windbreaks and stock shelter belts. They provide important habitat for birds, mammals, reptiles and amphibians - bio diversity.
- Linear reserves allow the movement of wildlife between forested areas.
- Intact linear reserves can help control erosion, salinity, soil loss and other land degradation problems.
- Reserves provide a wonderful recreation resource for bushwalking, picnicking, cycling and car touring (scenic quality) and nature observation. In the case of stream reserves, they can provide canoeing, fishing and swimming.

Groups such as Scouts, Guides, Orienteers and bushwalking clubs use existing reserves and will benefit from an expanding network of paths, along with the general community.

Linear reserves are of particular significance or value within the Ballarat urban area. Linear reserves provide recreational potential, natural relief and wildlife habitat in an otherwise modified or man-made landscape.

The 1989 study by Ballarat University (M Westbrooke, G Ambrose, S Kentish, P Prevett and N Taws) entitled "Urban Nature Conservation in the Greater Ballarat Area" - A resource inventory - discussed in detail the urban nature resources, including linear reserves, of the Ballarat urban area. This is a key reference and should be considered in conjunction with this report.

The Urban Nature study includes the following recommendations in relation to linear reserves:

On the Potential of Stream side reserves:

"In particular crown land along the Yarrowee River and part of the Canadian and Buninyong Creeks. Restoration of these sites together with improvement in stream quality should be seen as a high priority".

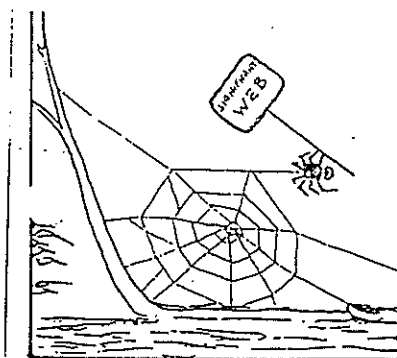
On the Continuity of Corridors:

"At present, forest blocks are fragmented and there is a need to develop corridors between them. The major recommendations in this regard are the stream side reserves (above) and the Buninyong - Haddon link".

"The Midland Highway, together with Bell's Road running from Sebastopol to Smythes Creek, has a very wide road reserve and provides a good opportunity to develop a vegetation corridor through the southern part of the Ballarat area, linking blocks of Crown land at Haddon and the Buninyong/Mt. Helen area. This corridor would also link with the Yarrowee River reserve".

Figure 1. Other areas of Victoria are also promoting the idea of green corridors.
(Source VNPA Inc. Newsletter. Vol. 12, No. 1. February 1993)

GREEN WEB NETWORK



The DCNR has begun a program aimed at linking habitat and parks across the state. This program builds on a concept developed by the Victorian Farmers' Federation and Neil Lawrence from the Dundas - Black Range landholder group in western Victoria:

"Farmers, roadside managers, government extension officers, conservation groups, native plant enthusiasts, community service clubs and other people active in land care can grow corridors of trees, shrubs and other understorey plants to form a network across countryside and town - a green web."

A Green Web network will make community expertise and local knowledge about corridors accessible to DCNR, while also providing a way for local groups to comment on corridor planning in their area. By setting up communication channels and defining common aims, a combined government and community effort may at last see a Green Web of corridors linked across Victoria.

The VNPA is playing a consultative role in the DCNR initiative. If you would like more information about Green Web or if you know of any likely corridors which could contribute to a statewide web, use contact Charlie Sherwin at the VNPA office.

Charlie Sherwin

1.3 The Study Area

The Study Area includes all of the City of Ballarat and a part of the Golden Plains and Moorabool Shires (*Fig.2*) This area corresponds approximately to the Ballarat Region Conservation Strategy boundary as detailed in *Figure 3*.

Due to the desire to connect linear reserves to the major forest blocks of the region, a broad and flexible "boundary" has been adopted.

For practical purposes the entire length of the Ballarat-Skipton Rail Trail shall be deemed to be included.

The LINC's committee's 1:100,000 map shows the major forest blocks of the broader region, whilst the 1:30,000 specially commissioned State Data Centre map shows reserves closer to Ballarat and the logical connections to these blocks.

Geology and Soils

Granite soils are scattered and relatively uncommon. Key locations include Mt. Egerton, Yendon, Mt. Misery, Mt. Bolton and Mt. Beckworth.

The majority of the land around Ballarat has Ordovician soils, north to Creswick and south of Ballarat in a wide fan until the basalt plain is reached, roughly bordered by Chepstowe, Pittong, Linton, Cape Clear, Rokewood Junction, Rokewood, Grenville and Elaine. This is the forested country typical of the Enfield and Creswick Forests. Most remnant vegetation (forest blocks) are found on these infertile soils derived from Ordovician sediments.

The country north of Creswick and east of Ballarat has red volcanic soils stretching almost to Daylesford and as far south as Mt Buninyong-Clarendon.

The grey basaltic soils of the plains extend from Rokewood to Cressy, Skipton and beyond.

The basalt derived soils are fertile and are the basis for much agricultural activity predominantly grazing on the grey basaltic soils and potato growing on the red volcanic soils.

Natural features of the Ballarat Region

Mountains:	Mt Buninyong	Mt Egerton	Mt Warrenheip
	Mt Emu	Mt Bolton	Mt Misery
	Mt Beckworth	Mt Erip	

Figure 2 New Municipal Boundaries.

BALLARAT - GEELONG



Key Forested Areas:

Creswick Regional Park
 Canadian Forest
 Wombat State Forest

Enfield State Park
 Lal Lal State Forest
 Union Jack Reserve

Forests of the region generally are comprised of:

Eucalyptus obliqua (Messmate), *E. baxteri* sp aff. (Brown Stringy bark), *E. macrorhyncha* (Red Stringy bark), *E. dives* (Broad-leaf Peppermint), *E. aromaphloia* (Scent-Bark), in an open forest formation on the Ordovician derived soils.

Wetter sites have *E. radiata* (Narrow-leaf Peppermint), *E. ovata* (Swamp Gum), *E. yarraensis* (Yarra Gum), *E. rubida* (Candlebark), *E. viminalis* (Manna Gum) and in some areas *E. melliodora* (Yellow Box).

Southern flowing streams are hugged by River Red Gums on the Grey Basalt although these are replaced by the above species at elevations greater than approximately 260 metres despite the streams having cut down to the basalt layer. Red Gums do not occur on the Ordovician soils but are also present to the North and West of Ballarat again on basalt (eg Burrumbeet Creek, Lake Burrumbeet, Miners Rest, a single tree on Glue-Pot Road, and the Mt Emu Creek system)

Smooth barked Manna gums (*E. viminalis*) are more common on the red volcanic soils. Rough-barked Manna gums (*E. viminalis* ssp *cygnetensis*) occur on Ordovician soils often occurring with, and easily confused with, the similar or indistinct in appearance Creswick Apple-box (*E. aromaphloia*)

Snow Gums (*E. pauciflora*) are scattered across the region occurring in small groups primarily on roadsides on a range of soils. Non Alpine Snow Gums are relatively rare and may soon be listed under the Flora and Fauna Guarantee Act.

A single stand of Red Ironbark (*E. tricarpa*) occurs on Ordovician soil at Mt Erip mixed with Messmate and Red Strigybark.

Blackwoods (*Acacia melanoxylon*), Black Wattles (*A. mearnsii*) and various species of Cassinias are common throughout much of the region.

The forest blocks on poorer nutrient level soils (Enfield, Creswick Forests) have an understorey of predominantly Peas and Heaths with Tussock grasses and Sedges also common.

Lakes:

Lake Wendouree
 Lake Burrumbeet
 Lake Wongan

Lake Learmonth
 Lake Goldsmith
 Black Lake

Hepburn Lagoon

Wetlands: Flaxmill Swamp Bittern Lagoon
Horse Lagoon Winter Swamp
Dereel Lagoon Miners Rest Swamp
(a total of 50 wetlands greater than 1 ha in area occur in the region.)

Reservoirs: Lal Lal White Swan Gong Gong Beales
Kirks Wilson Moorabool Cosgrove
Pincotts Dean Newlyn

River Systems: Yarrowee River (Barwon River Basin)
Mt Emu Creek (Hopkins River Basin)
Creswick Creek & Birch's Creek (Loddon River Basin)
Woody Yaloak River (Corangamite Basin)
Moorabool River (Moorabool River Basin)

Grasslands: Leigh basalt plains (Rokewood - Cressy - Skipton)
Urban Ballarat - Buninyong Cemetery, The Dredge Reserve, Dowling
Forest Cemetery at Miners Rest

Shrub lands/

Heath lands: Part of Enfield State Forest.

Gardens and Parks (urban) and other reserves:

Ballarat Botanic Gardens (Lake Wendouree), Victoria Park, Lake
Esmond,
Buninyong Gardens, Ballarat West Town Common, Black Hill Reserve,
Eureka Stockade park, Nerrina Historic Reserve, Nerrina Bushland
Reserve, Lal Lal Falls Scenic Reserve, Lal Lal - Bungal Historic Area,
Moorshead Park, Linton Flora and Fauna Reserve, Pryor Park, Chisholm
St Reserve, Brown Hill Reserve, Marty Bush Reserve, Sparrow Ground.
Other open space includes Ballarat, Buninyong, Midlands and Mt. Xavier
Golf Courses, cemeteries and sporting reserves.

Figure 3.

Ballarat Region Base map.

(Source: Ballarat Region Conservation Strategy)

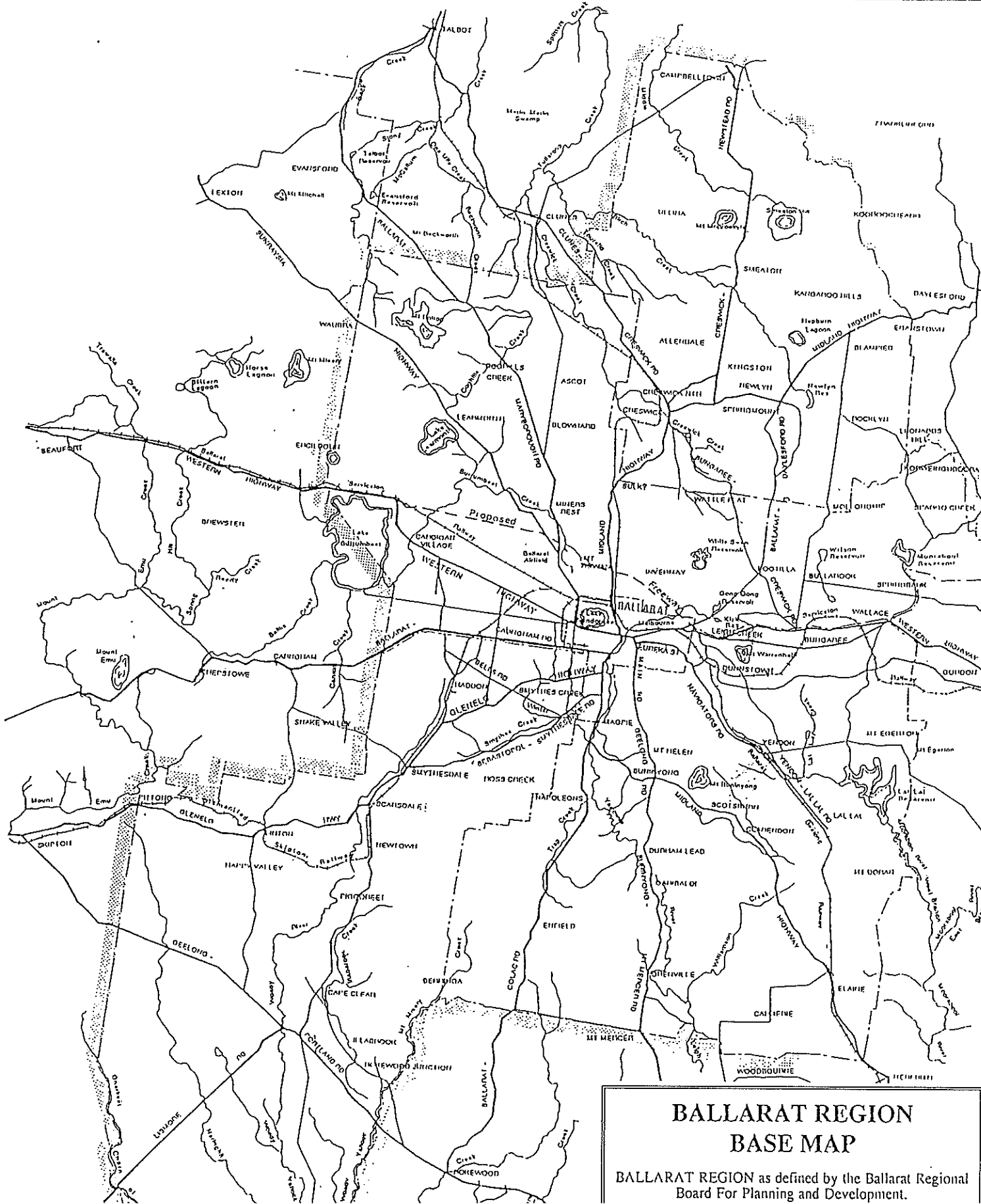


Figure 4.

Soil Types

(Source: Ballarat Region Conservation Strategy)

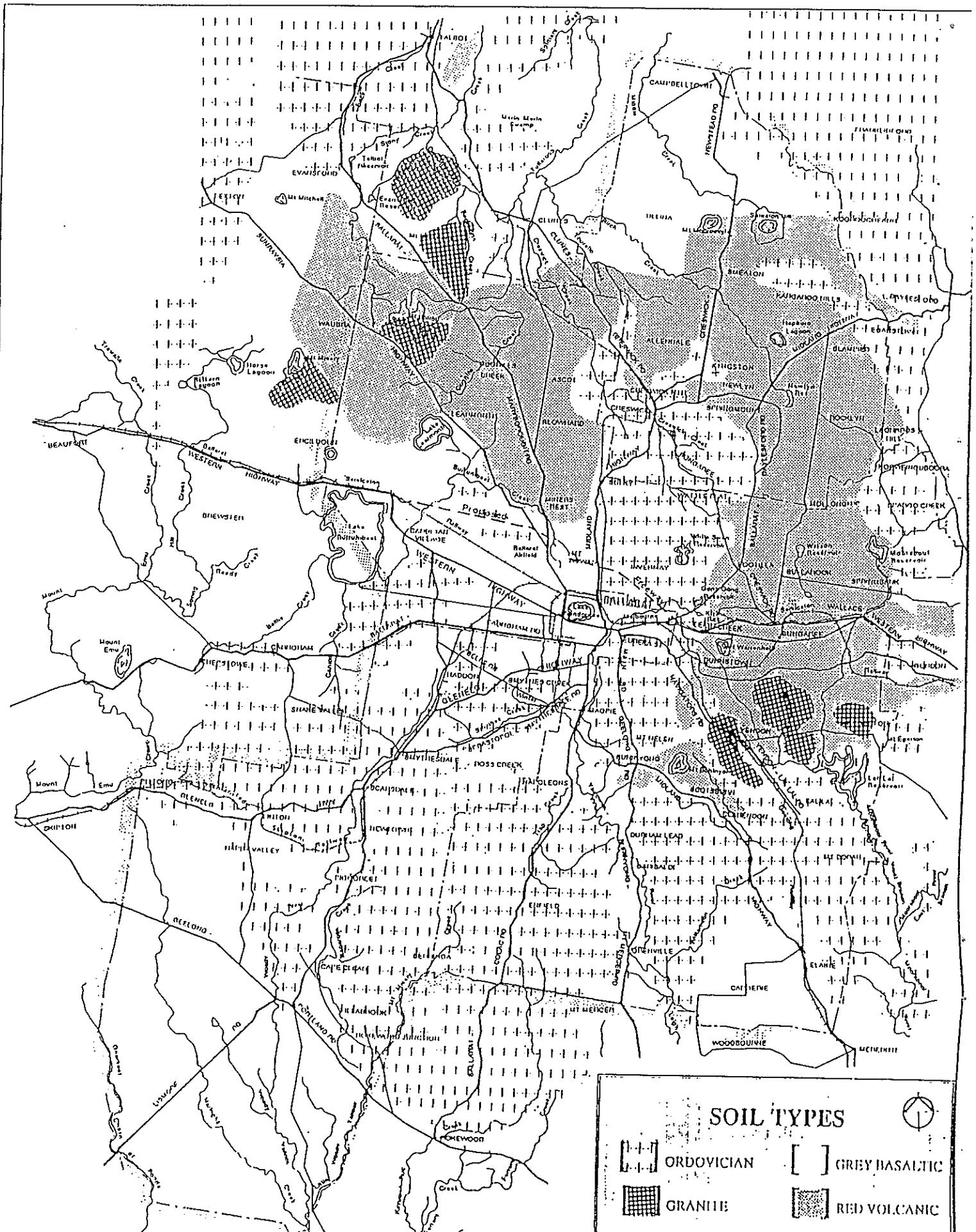


Figure 5.

Native Tree Cover

(Source: Ballarat Region Conservation Strategy)

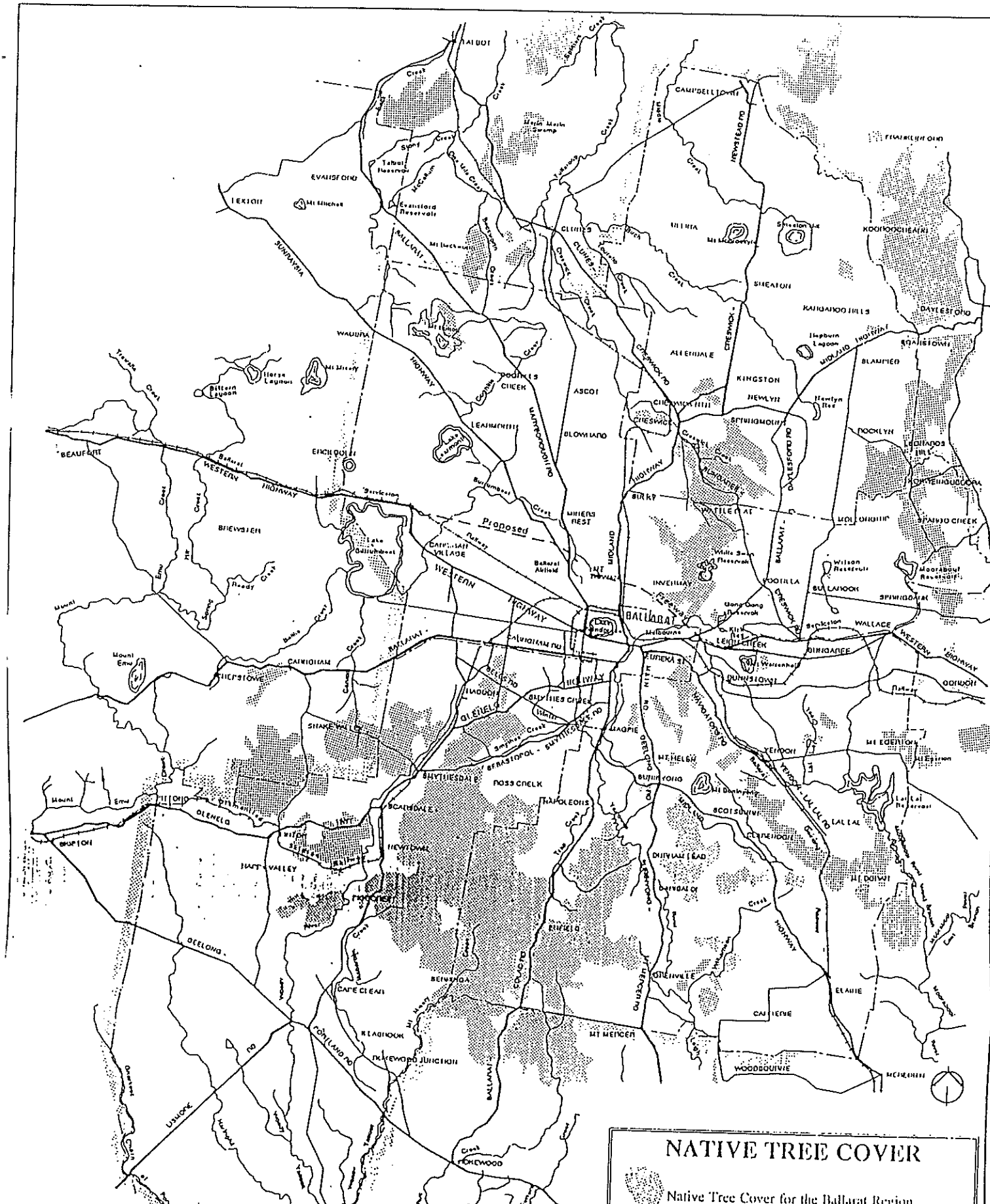
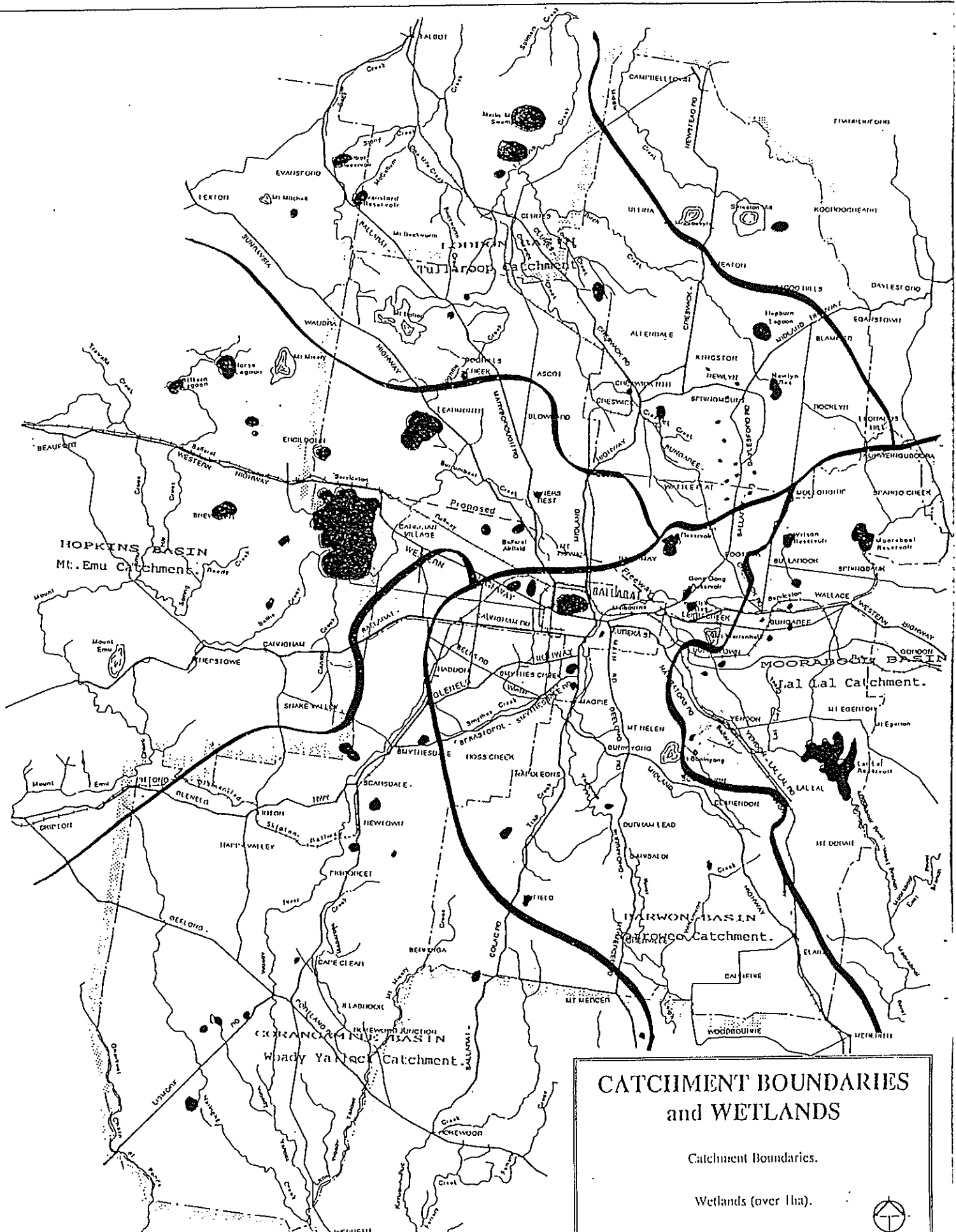


Figure 6.

Catchment Boundaries and Wetlands

(Source: Ballarat Region Conservation Strategy)



Further Information: Supplement Section A

References:

- Ballarat Region Conservation Strategy* (December 1991) Ballarat Regional Board
Porteous, Stuart (1992) *LINCS Linear Network Of Communal Spaces Concept Outline*
Ballarat Region Conservation Strategy Implementation Committee, Ballarat Regional Board [Appendix 2]
Creating Our Future. A community plan for Ballarat (1994) City of Ballarat
Wilson, Sayer, Core Pty Ltd (1988) *City of Ballarat Streetscapes Study*
Report on the Ballarat Area (1980) Land Conservation Council, Victoria

2. GENERAL GUIDELINES

To assist the Management of the Linear Reserves of the Ballarat Region

2.1 Introduction

The aim of these guidelines is to assist effective management of the linear reserve resources of the region considering and balancing all the needs of the community, costs of management, fire risk, conservation, and recreational values.

LINEAR RESERVE

VALUES

High Conservation Value (Flora or Fauna)
Fauna habitat
Important corridor, linkage to forest block
Recreational resource
Historical importance
Scenic interest
Aesthetic values
Tourism & Eco Tourism
Low maintenance requirement if unalienated
Windbreak or shelterbelt for stock
Erosion control
Salinity control
Nutrient run off (stream buffer zone)
Educational resource
Seed collection
Micro climate frost control

POTENTIAL THREATS

Grazing (stock & rabbits)
Road widening or maintenance works
Fire break construction
Tree clearance for services
Firewood collection
Vandalism
Invasion by pasture grasses, environmental & noxious weeds
Salinity
Erosion
Pollution
Nutrient run off
incompatible adjacent land uses
Sale of land, lack of continuity of reserve
Slashing & mowing
Spraying
Ploughing & cropping
Lack of fencing or signage
Poor work practices (materials storage, weed transport, machinery parking etc)
Zoning & planning constraints
Litter
Damage to root systems of vegetation

STAKE HOLDERS

Department of Conservation & Natural Resources
Councils
Vic Roads
Farmers/Landowners
Telecom, Optus etc
Powercor
Public Transport Corporation
Country Fire Authority
Water Authorities:-
Southern Water
Central Highlands Water
LandCare & Community Groups
Government Departments

PRIORITIES

Protection of conservation & recreational values
Protection of services (roadway, rail, power, telephone, water and sewage etc)
Cost effective long term management of the reserve
Control of vermin & noxious weeds
Ensure continuity of reserves
Weed eradication & revegetation
Control of land degradation problems
Fire management

2.2 Vegetation Management (including weed and fire management and revegetation techniques)

Vegetation Management

Native vegetation requires fire to maintain diversity, promote seedling regeneration, release and cycle nutrients and to provide space for new germinants to establish. This is particularly evident in native grasslands which are adapted to regular burning.

The Kooris burnt the bush and grasslands on a regular basis to encourage the regeneration of food plants and to trap wildlife.

Native grasslands lose diversity over time if they aren't burnt. *Themeda triandra*, or Kangaroo grass, tends to dominate smothering herbs growing in the inter tussock spaces.

Many of our linear reserves have continued to be managed by fire. In fact, those still managed by fire tend to be the more floristically diverse and valuable.

Over time however, less and less roadsides and rail lines have been burnt and other options such as herbicides, rotary hoeing, grading and slashing have been adopted with often hazardous results to these remnant ecosystems. V/Line, for example, used to burn rail sides every year up to the 1970's. A dramatic loss in valuable grasslands has occurred since with the switch to herbicides. The local CFA brigades have traditionally burnt roadsides to maintain a firebreak, often assisting the remnant vegetation by default.

Burning is, however, not a straight forward management tool to promote diversity in native vegetation and reduce the potential biomass for wildfires. The timing of the burn is critical. A well timed burn may promote summer growing (ie less fire risk - greener in summer) native grasses over introduced weed grass species that pose a substantial fire risk. (*Phalaris* is the obvious example.) A poorly timed burn (say after most introduced grasses have seeded, but *Themeda* seed has yet to ripen) may have an adverse effect. A cool burn is preferable to a hot burn. A burning cycle of 2-5 years should keep litter levels in check and assist native species.

There are no hard and fast rules. Some native grasslands are dominated by winter growing species. Recently there has been some discussion that a spring burn, rather than summer, could be a more effective measure in combating weed grasses such as *Anthoxanthum odoratum* (Sweet Vernal grass). (*M. Trengrove pers. com.*)

The generally held opinion is that it is better to do something (ie burn a section) than nothing, as the alternative is for our precious native grasslands to gradually lose diversity and therefore their inherent value. Some Botanists feel that burning at any time disadvantages the introduced grasses others believe inappropriate timing or intensity of the burn may even encourage weed grasses.

Seeding Times of Common Native Grasses of the Region

<i>Agrostis avenacea</i>	Common Blown-grass	Late December - Early January
<i>Chionchloa pallida</i>	Red-Anther Wallaby grass	Late January - February - March
<i>Chloris truncata</i>	Windmill grass	February - Early March
<i>Danthonia spp.</i>	Wallaby Grasses (15 species)	Mid-December - Late January
<i>Dichelachne crinita</i>	Long-hair plume grass	Mid-December - January
<i>Dichelachne micrantha</i>	Short-hair plume grass	Mid-January - February
<i>Elymus scabrus</i>	Common wheat-grass	Late December - Mid-January
<i>Microlaena stipoides</i>	Weeping grass	Mid-December - Mid-January
<i>Pentapogon quadrifidus</i>	Five-awned Spear grass	Mid-January
<i>Poa labillardieri</i>	Tall Tussock grass	Mid-late December
<i>Poa morrisii</i>	Tussock grass	Early January
<i>Poa sieberana</i>	Tussock grass	Early-mid January
<i>Stipa spp</i>	Spear grass	
including:		
<i>Stipa semibarbata</i>	Fibrous Spear-grass	Mid-January - Late January
<i>Stipa rudis</i>	Spear grass (14 other species)	Late November - Mid-December
<i>Themeda triandra</i>	Kangaroo Grass	Mid-December - Mid-January
		February

It is clear that burning is by far the best management option (for grasslands and forests). A controlled burn or fuel reduction burn quickly removes the build up of combustible material and lessens the potential risk of wildfire.

Herbicide application can decimate native vegetation in particular natural grasslands allowing introduced weed species to gain a stronghold then to dominate. Once a roadside is covered in *Phalaris* an ongoing intensive management program is required. The amount of combustible material is enormous and contrasts sharply with the relatively sparse form of most native grasses.

The native grasses are generally greener for longer over summer and therefore never pose the same fire risk. Slashing is not as bad as spraying or ploughing, but still can lead to a gradual loss of native grasslands. Introduced grasses usually have their maximum growth around August/September/October. Kangaroo grass has maximum growth from November to January and growth can be even later in wetter years. For example in 1994 seed was not ripe till March due to the wet Summer. In 1995 seed was ripe mid January because of the dry Summer. The seed yield was correspondingly poor.

Seeding times of Major Grass Weeds of the Region

<i>Aira caryophylla</i>	Silvery-hair grass	October - December
<i>Agrostis capillaris</i>	Brown top bent	January - March
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	November - December
<i>Avena fatua</i>	Wild Oat	November - January
<i>Briza maxima</i>	Large Quaking grass	October - December
<i>Briza minor</i>	Lesser Quaking grass	September - December
<i>Bromus diandrus</i>	Great Brome	November - December
<i>Dactylis glomerata</i>	Cocksfoot	December - February
<i>Holcus lanatus</i>	Yorkshire Frog	November - December
<i>Paspalum dilatatum</i>	Paspalum	January - July
<i>Phalaris aquatica</i>	Canary Grass	Late December - February
<i>Vulpia bromoides</i>	Squirrel-tail Fescue	October - February
<i>Vulpia myuros</i>	Rat's-tail Fescue	September - January

Slashing or burning in September or October should prevent or disrupt flowering/seeding of most introduced grasses as well as retarding their growth whilst preferentially advantaging Kangaroo grass and other (C4) native grasses. Care must be taken not to cause soil movement in wheel tracks when sites are excessively wet.

(C4 plants have a special type of photosynthetic pathway which is an adaptation to high light/temperature environments and results in a greater water efficiency over the simpler C3 pathway)

In short, the best management practice for existing native grasslands is to leave them alone. An occasional or regular burn is fine and quite desirable, allowing where possible the dominant grasses to set seed before burning, or burn well before new growth and flowering.

Linear reserves should be maintained in a natural state where possible and not disturbed. Disturbance leads to weed invasion and management problems. A well vegetated forest, woodland or grassland along a linear reserve is an asset. It represents the most cost-effective management option. Maintaining the reserve in this state requires very little input and it poses the lowest fire threat and weed control problems. If a site has been disturbed appropriate rehabilitation is required

Burning is usually not a management option for stream sides due to the difficulties of access, slope etc. Stream sides generally would not have burnt regularly under a natural system as these areas were often fire shadows and the species not adapted to fire (ferns etc). Burning small patches of weed infestation may be an option along stream sides.

Grazing of linear reserves should not be considered as a management option where there has been no history of grazing and the site has high conservation values as these values will quickly be lost. Grazing of areas with conservation value should be phased out over

time, or at the very least, limited over time to allow the native species (predominantly grasses) to set seed.

Grazing is really only a management option for sites with no existing conservation values to control weed and grass fuel levels. There may be exceptions to this rule in wet meadows where appropriate grazing can enhance values for some wading birds (for example the Latham's Snipe and Cattle Egrets).

The removal of grazing pressure will generally tip the balance back toward native grasses. Kangaroo grass, for example, has reappeared in paddocks where it has not been seen for decades through the removal of grazing pressure. Grazing is not a desirable management technique for linear reserves in good (natural) condition.

Grazing of roadsides and other areas occurs at a considerable cost to the community through the damage to remnant vegetation and compromises future management possibilities. The CSIRO has costed the droving of roadsides in terms of damage to remnant vegetation, weed transport and other problems.

Areas with noxious weeds such as Gorse and Broom may need monitoring to ensure these do not spread with the cessation of grazing. Generally, these shrubs are less likely to encroach if there is a good stand of native grass or shrubs in an undisturbed state.

Grazing of important high conservation areas because of drought and lack of stock feed is short sighted and inadvisable. Concentrated grazing causes untold damage to these areas which should not be made available under any circumstances. They are more valuable than a flock of sheep as they hold the floral and genetic diversity which may provide the key to future revegetation, land management problems or materials for crop selection or developments.

To help raise awareness of the local flora, aid identification and assist protection and the recognition and control of weeds, it is recommended that two inexpensive pocket guides be produced for the Ballarat Region covering:

- 1/ Common Indigenous Trees, Shrubs and Grasses
- 2/ Local Weeds

Guides have been successfully produced along these lines for other areas such as Bendigo, Keilor Plains and the Mornington Peninsula where several Councils worked together. (Fig. 7)

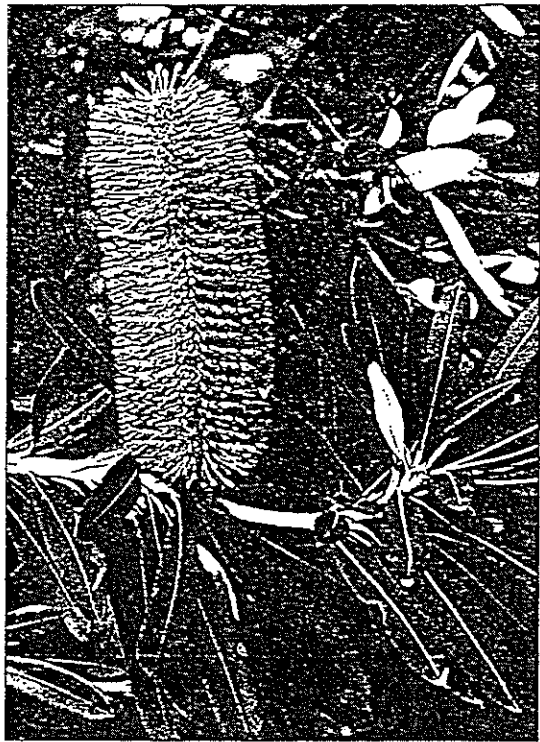
"Mornington Peninsula Local Plants"

58 pages

contents- Explanation of Indigenous Plants

- Why use them
- Where to obtain them
- Good species descriptions and pictures for identification
- Species requirements, conditions etc

Figure 7. Mornington Peninsula Plant Guides.



MORNINGTON PENINSULA LOCAL PLANTS

City of Frankston
Shire of Flinders
Shire of Hastings
Shire of Mornington
Melbourne Water

MORNINGTON

PENINSULA



PEST PLANTS

City of Frankston
Shire of Hastings
Shire of Mornington

"Mornington Peninsula Pest Plants"

33 pages

contents- adopts a similar format with clear colour pictures

- species characteristics

- explains pest plants and covers control measures.

These guides have been made available free to Peninsula residents

Further Information: Supplement, Section A part 9.

Revegetation Techniques

Sections of linear reserve in poor condition require regular maintenance slashing, burning or spraying to control weeds and fuel levels. The high labour costs of these management practices can be saved if the section is revegetated to a more natural state. In most instances, direct seeding is the most effective technique. Tube stock planting is best utilised where vegetation needs to be strategically located for reasons of access or maintaining site distances. Tube stock can also be used to add species difficult to direct seed or rarer representatives of the original community (seed not available in quantity). Tube stock planting is also a good means by which the local community can be involved and work together toward a common goal. Native grasses can be established by direct seeding or the use of virocells (small plants or pre-germinated seed).

Returning areas to native grasses, trees and shrubs is a sure way to reduce costs over time. Vic Roads are currently planting up many of our highways. The calculations indicate it is far more cost-effective to invest in planting now than the continuous slashing, spraying and weed control measures currently undertaken.

Councils and other management authorities with limited resources ought to maintain native species as a very real means of keeping future maintenance costs in check. An active program of re-establishment of native grasses, shrubs and trees, particularly through direct seeding, is an effective means of lessening fire risks or suppressing weeds, reducing long-term costs and generally improving the aesthetic appeal of an area.

Former natural grasslands areas should be returned to grassland and direct seeded with local grass seed collected nearby rather than treed. Former woodlands and forests should be seeded with a mix of suitable tree, shrub and grass species.

Areas of natural grassland on reserves (basalt plains in particular) should be kept as such and not planted with trees. Comparisons with nearby remnants will indicate the density of trees if any (grassy woodland) and the suitable species for re-establishment.

Direct seeding machines are available in the region (for example - Creswick Nursery & LandCare Centre and ATCV). Where possible seed should be collected from as close to the revegetation site as practicable. To enable suitable species to be used, at least 12-18

months lead time (or one summer) is required. The Seed Bank (refer section 2.9) may be able to fill in gaps or cover poor yields of particular species in any given year.

Trees, shrubs and grasses are generally best re-established by direct seeding. Other species such as ground covers, or grassland species such as daisies, lilies and other herbs, as well as rarer species are best added later as seedlings due to the difficulty in collecting anything like the sort of quantities of seed required for the direct seeding methods. Plug propagation or "Speedlings" are an increasingly popular and cost effective method of establishing species not able to be direct seeded due to site constraints or seed availability problems.

The major elements, the trees and large shrubs, should be sown first as these provide the microclimate for the other species. In fact, many desirable species may colonise the site if the right conditions and overstorey species are in place. Grasses however, should be included in the mix especially in areas where soil stabilisation is critical such as on steep batters. If adequate quantities of native grass seed are not available a sterile Rye grass or other non invasive species could be substituted rather than continuing use of a known problem grass such as *Phalaris*.

Fertilisers should generally not be used as this "tips the balance" in favour of weed species which take full advantage of higher nutrient levels. The exception is on poor nutrient/clay sites where Eucalyptus and other seedlings will take advantage of higher nutrient levels without great risk of weed/grass invasion.

Sites with fertile soils are usually more difficult to revegetate and seedlings can quickly be swamped with weeds and pasture grasses. Fertiliser use on pasture or fertile sites will simply exacerbate the problems in establishing trees and shrubs. Competition from weeds/grasses is a major problem when direct seeding sites with fertile soils. Reducing soil fertility over time may lessen the potential weed problems of a site.

Some introduced grasses, notably Brown top bent (*Agrostis capillaris*) are well adapted to low fertility soils and pose a significant threat to revegetation projects. This particular grass is currently invading farmland at an alarming rate and is proving very difficult to control and having a considerable economic impact on farming activities. This further emphasises the value in leaving linear reserves in a natural or undisturbed state such that they do not assist the colonisation or spread of undesirable species.

Existing vegetation and future works should have as little disturbance as possible (ie earthworks, compaction etc.) as this encourages weed invasion. *[A weed can be defined simply as a plant growing where it is not wanted. Weeds generally thrive on disturbance and have high seed production and good dispersal methods]* Scalping of the topsoil from degraded or weed infested sites and the complete removal of this material to a suitable disposal site is a key requirement for successful direct seeding. Seed is stored in the top few centimetres of soil. Removal of this layer can prevent future cost and management headaches. Similarly spoil from road grading and other works should be directed toward

the centre of the road and collected rather than into spoon drains or onto roadside vegetation. Woody weeds should not be chipped but removed to a suitable dump site.

It should be stressed scalping should not occur on any site with some existing conservation value. Where earthworks are to occur, for example a road widening or freeway construction, ground cover species can be removed and replanted at a suitable site rather than dozed under (see Section 3 - Road Reserves).

Woody weeds can be controlled by spraying or cutting of stumps and painting with herbicide. The latter is a particularly useful technique where damage to existing remnant vegetation or planted seedlings from spray drift must be avoided.

Areas of rail or roadside can be revegetated in a relatively straight forward manner. The section should be identified, scalped (the top 10 cm of soil and vegetation so that weed seed is removed from the site) or burnt depending on how degraded the site is.

A burning regime may "tip the balance" toward the native species remaining in the site and disadvantage weeds. If coupled with selective weed removal (Bradley method) some success can be achieved. Hopelessly degraded sites with no remnant species are best scalped and direct seeded with the appropriate species in Autumn or early winter (or Spring in some cases on wet sites or sites prone to inundation). Early November is considered the best time to plant Seedlings. A late planting encourages roots to search for water (Warrambine field day)

Ease of access to road and rail sides means that a direct seeding machine can often be utilised. Stream sides are far more difficult to successfully revegetate for a number of reasons:

1. Difficult to access with machinery as the stream is often cut into a valley.
2. Flooding and active erosion can destroy revegetated areas.
3. Constant disturbance of soil (and the revegetation work) due to varying water levels encourages weeds which thrive on the fertile river soils.

The most appropriate technique for re-establishing native vegetation on fertile soils (such as the Riparian vegetation) is to use a nursery crop of a "desirable weed".

Rivers and streams are naturally sites of disturbance and there is a range of native plants which occupied this niche. The "native weeds" have generally been displaced by introduced and more difficult to control species. Some species suitable for a nursery crop may include:

Senecio spp. Fireweeds and Groundsels

Cassinia arcuata Chinese Scrub

Poa labillardieri Tussock-grass

Seed of these species should be included in the mix. These species will provide shelter for the tree and shrub seedlings, but grow quickly to help prevent invasion by introduced weeds. As the trees and larger shrubs establish, the native weeds will become less dominant but remain as an element of the flora at the site. Only species that originally occurred at the site should be considered.

The table in Chapter 5 contains species known to occur along the Woody Yaloak, Leigh and Moorabool Rivers and tributaries.

Follow up work is essential to ensure the success of any revegetation activity. Work necessary will include further weed control, further seeding or seedling establishment and importantly, monitoring. Work in this area should be well documented so that any success can be emulated at other sites.

We need to work towards finding the most effective formula and techniques for re-establishing riparian vegetation as this is possibly the greatest challenge in linear reserve management as well as fine tuning techniques used elsewhere.

Access problems may dictate that it is impractical to remove woody weeds to a dump site and spraying or cutting and burning on site are alternatives.

River valleys offer a real challenge to effective weed control and the use of continuous weed mats can prevent weed regrowth and allow native plant establishment as well as restrict erosion problems in the interim caused in part by the removal of the weed layer.

Further Information: Supplement, Section A parts 12,13.

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2.3 Litter and Pollution Management

Litter

Litter problems and linear reserves management are inextricably linked. Litter is a significant and visible problem on all our linear reserves. Illegal dumping is common and items dumped include everything from chemical drums, car bodies, shopping trolleys, sofas to the rubbish thrown from passing cars or washed down drains and into waterways.

The edge effect on our linear reserves means that they are not only prone to weed invasion and misuse but also the accumulation of litter.

Litter is the key factor which most influences the aesthetics of our linear reserves. Keeping reserves clean actually helps raise respect for them in the community eye and less future littering occurs. If it looks like a tip people will treat it like one!

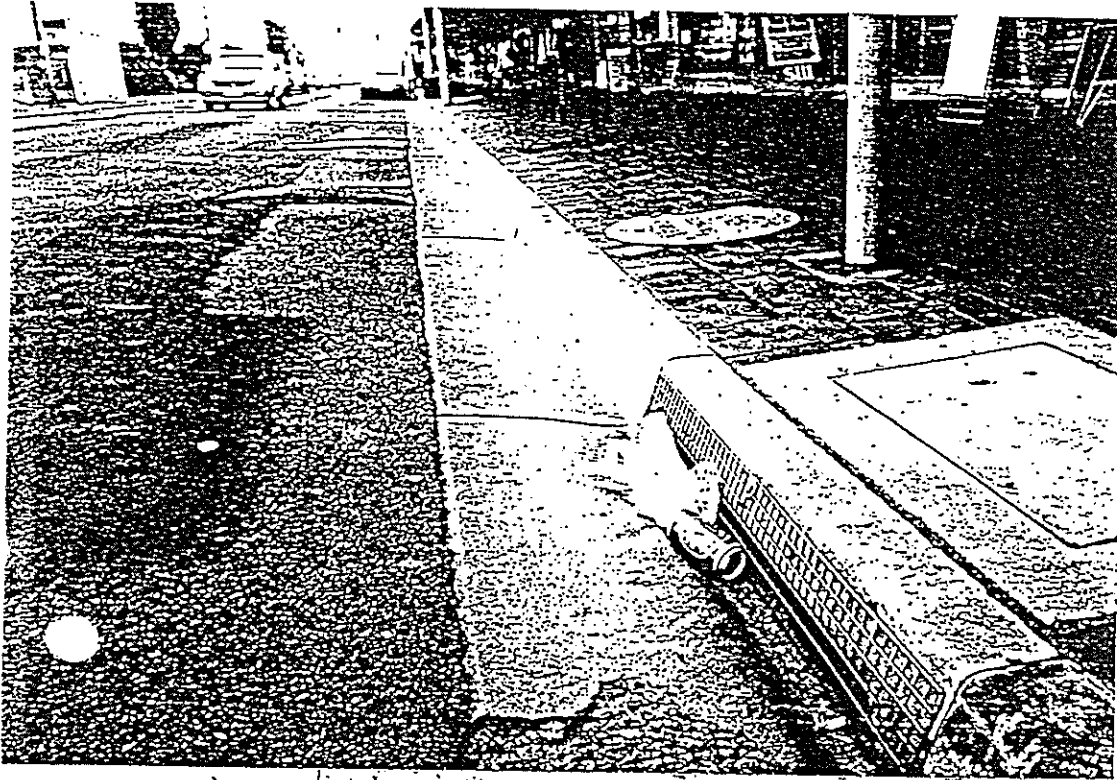
Road and rail sides should be kept clear of rubbish as a prime management objective. It is easy and effective for a truck or trailer to travel along a section of roadside whilst the council workers or community volunteers collect the rubbish.

Stream sides are more difficult and litter particularly plastic is flushed into streams from drains with each rainfall event. The only way to combat this is to attack the source through:

1. Education and awareness through anti litter promotions.
A good example is the "Drains to the bay theme" which is used very successfully in primary schools through a catchy cartoon video produced by Melbourne Water. The video shows the path of litter from being dropped in a street to a popular beach. How many adults in the community fully recognise where drains go?
School, council and community education programs are required.
Marking of all drains to show the river system they lead to will also increase awareness
2. A program of installing grates or litter trapping devices in drain side entry pits and other sources of litter. (Figure 8)
This requires a parallel cleaning program in urban streets, but it is much easier to clean drain grates than 60 kms of river frontage. No longer is it acceptable to the majority of the community for the "out of sight, out of mind, flush it down the drain" attitude.
3. Regular clean up days along road, rail and stream reserves, not just one a year in conjunction with Clean Up Australia Day, but a program of activities.
4. Greater enforcement of the litter act. All Council officers should be licensed to fine offenders.

Figure 8. Side Entry Pit Litter Traps (Source. EPA)

KERBSIDE LITTER SCREENS



Regular street sweeping is needed.

Nepean Hwy.
Chelsea



Fine mesh screens along the lower edge could trap cig. butts



Provision for overflow depending on location.

- 5 Alter street sweeping practices such that lightweight items are not washed or blown into drains, particularly near fast food outlets.
6. Installation and maintenance of litter booms on urban waterways
7. More efficient refuse handling and a greater level of recycling, particularly of plastics.

The Merri Creek pilot study - Litter Control in Urban Waterways, tested a number of litter trapping devices, surveyed the litter trapped and tracked litter through the system. The conclusions are presented here to assist work in the Ballarat Region:

Figure 9. Merri Creek Pilot Study

(Source - "Litter Control in Urban Waters Merri Creek - A pilot study")

* <u>Litter Trapping</u>	
"The use of litter traps has limitations and does not provide the complete answer to the problem of litter in urban waterways.	
There is a place for individual site-specific litter traps on some tributaries which generate a large amount of litter. These would serve an important role in waterway litter reduction.	
The following summarises the findings on each litter trap tested:	
Trap Description	Concluding Remarks
Reinforced Mesh Panel	Inappropriate for use on large outfalls. Possible use on small outfalls (not tested).
PVC Floats and Cable	Effective in trapping floating plastic items. Good durability. Recommended for open waterways.
Treated Pine Posts	Effective at litter trapping. Excellent durability, resistant to vandalism. Recommended for use in open channels which normally have a low flow.
Ringlock Fence Coil	Reasonable litter trapping capabilities. Difficult to clean. Prone to theft and vandalism.
Hanging Fence Panels	Reasonable litter trapping capability for trapping

floating litter in open waterway under low to medium flow conditions. Durable.

Litter Boom

Excellent litter trapping capability on open waterways.

May require access by boat for servicing.

In general litter traps need to be placed in accessible locations so they can be more easily maintained. These generally will be sites frequented by the public. The traps may become an eyesore, but this can have the benefit of acting as a reminder to the public of the wide dispersion and impact of deposited litter.

The cost of constructing and maintaining litter traps throughout a catchment would be extremely costly. However, their selective placement on stormwater drain outfalls known to generate large amounts of litter may be warranted.

An additional benefit of litter traps can be to monitor trends in waterway litter thereby providing an insight into the effectiveness of any litter reduction and prevention campaigns.

* Litter Survey Results

From the analysis of the litter caught in the traps, 66% was classified under the general plastics heading. Clearly by their very nature of being strong and durable, plastics pose a problem requiring specific actions. Further categorisation of the litter into some 56 classes revealed that 59% of the trapped litter was made up of just five litter item types:

- (i) plastic bags;
- (ii) plastic sheeting and film;
- (iii) plastic confectionery and crisp wrappers;
- (iv) take-away food containers; and
- (v) free distribution items.

Analysis of the likely sources identified pedestrians and motorists as being the prime sources of the litter items. Visual observations further identify several litter sources:

- (i) take-away food operations;
- (ii) shopping centres;
- (iii) poorly operated commercial and domestic refuse collection vehicles; and
- (iv) badly maintained business operations.

* Litter Tracking

The litter tracking program showed potential for gaining further understanding of litter movements in the drainage system. In this study only 12% of the tagged litter items were recovered by the litter traps. The high proportion of tagged items were either not collected by the traps or retained in the drainage system upstream. The information obtained by litter tracking in the study was insufficient to make definite conclusions. Further litter tracking studies are needed to verify which of these explanations is correct.

* Recommended Approaches to Litter Reduction

The results of this study verifies that large amounts of litter enters waterways via stormwater drains. Considerable effort needs to be directed into the development and promotion of campaigns which reduce litter at its source. This should be directed at litter generated by:

- (i) motorists;
- (ii) pedestrians;
- (iii) households;
- (iv) commerce and industry;
- (v) specific types of products (in particular plastic disposable consumer items)."

Pollution

Land and water pollution adversely affects linear reserves. Water borne pollutants are washed from city streets, factories, houses and farms quickly finding their way into waterways and onto reserves. Pollutant sources and products include:

- Automotive oils and products
- Fertilisers
- Farm chemicals (herbicides and pesticides)
- Septic tank effluent
- Illegal discharges or the dumping of chemicals
- Dairy shed and piggery wastes
- Chemical spills (transport)
- Residues from contaminated sites (eg old petrol stations, old tips).
- Landfill seepage

All these sources lower water quality. Some are toxic to stream life or can raise nutrient levels leading to algal blooms or increased weed competition to native plants. All are generally hazardous to the environment.

Aside from EPA prosecution and the installation of triple interceptor traps etc where appropriate, the best mechanism to combat pollution is via education.

As a general principle a reduced reliance on herbicides, pesticides and fertilisers on farms should be encouraged and viable alternatives promoted. It is a matter of balance, nutrients are an absolute waste if they find their way into waterways, but are desirable on farmland. Farms or businesses can be redesigned to limit off-site wastes (the cleaner production concept). Piggeries, for example, have traditionally been major pollution sources through the discharge of nutrients in effluent. Berrybank Farm (a local piggery), has turned this around and reuses this nutrient resource on-site to generate electricity and produce a fertiliser product and also recycles 90% of the water used. This has made the farm more efficient and cost effective.

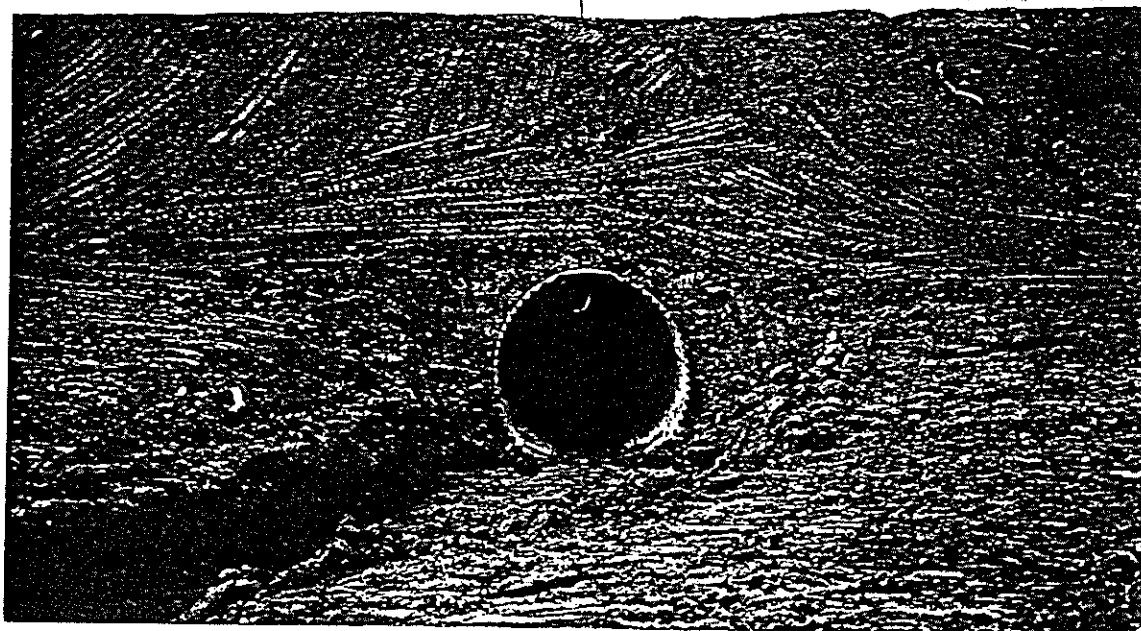
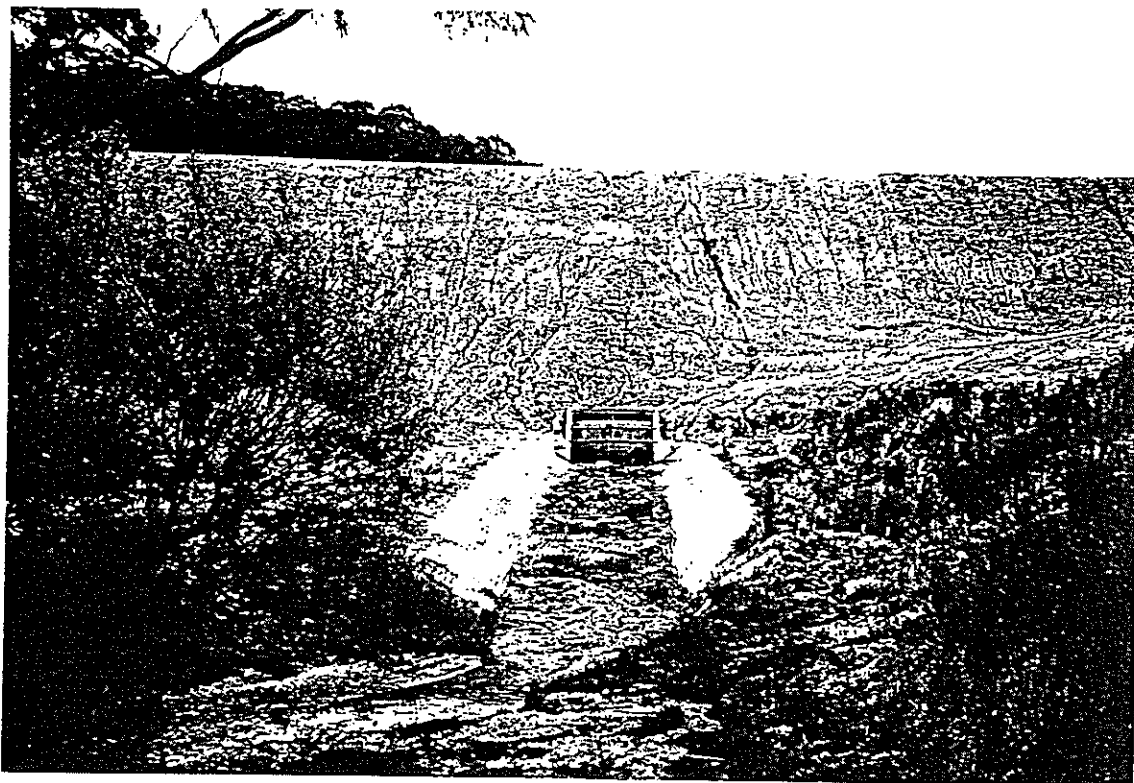
Sustainable land use must be attained in all cases. We as a community cannot afford to allow prime farmland to become degraded (eroded, saline, weed infested, infertile etc.). The cost of restoration is too great. The effects are not contained within the farm and damage to streams and natural environments also results from poor farming practices.

Farming, mining or manufacturing activities must be as sustainable as possible - the exploitative approach can no longer be tolerated. Pollution, land degradation, salinity and other problems are an immense and long term cost to the community.

Short term profit traded for long term productivity is not acceptable. Ultimately, sustainability means profitability and security. It is the clean, efficient, well run businesses, farms and industries that succeed in the long term.

The community has shown increasingly a lack of acceptance of pollution. Guidelines must be enforced, offences reported and awareness of alternative cleaner methods raised.

Figure 10. Erosion and run off problems from unvegetated batters on the Bypass causing turbidity problems in the Yarrowee River.



Road works and other earth works can cause extreme turbidity in waterways. Activities should follow a strict code of practice such that these problems are limited as much as possible (*Refer Chapter 3*).

Ballarat's new tip is located at Smythesdale in a sand quarry. The choice of the site is somewhat surprising given the potential for leaching, however a clay capping will be used. This site is not next to one but to three key linear reserves. These are the Woody Yaloak River, the region's least spoilt river, the Ballarat-Skipton Rail Trail and the Glenelg Highway. Careful management and monitoring will be essential to ensure the values of these important reserves are not compromised. Leaching of material, run-off and turbidity, transport of litter by wind and water, dust and vehicle movements and the provision of a large access road all threaten the integrity of these reserves

There are many other pollution issues facing linear reserves in the Ballarat region. A recent initiative by the EPA in the Dandenong area provides an excellent model for tackling the range of pollution issues facing our catchments.

A coordinated Action Plan for pollution control in the Mordialloc Creek, Dandenong Valley and Western Port catchments was published in June 1994. It was prepared for a working party of EPA, Melbourne Water, DCNR and Department of Planning and Development by the EPA. The Action Plan is subject to annual review. It identifies tasks and responsibilities for implementing a wide range of government strategies and policies.

This joint approach plus many of the issues, problems, and solutions detailed in the plan have relevance to urban streams like the Yarrowee River and the other waterways of the Ballarat Region. It is strongly recommended that a similar coordinated approach is adopted in Ballarat under the LINCIS umbrella to effectively tackle the pollution issues.

The Action Plan covers in-stream control methods, monitoring procedures, options for public education and involvement.

A strategy has been developed to address pollution from a wide range of sources including farmland, construction sites, roads, landfills, sewage treatment plants and industries.

A summary of the strategy is included in **Appendix 11** as well some extracts from the Plan of particular relevance to Ballarat covering the issues of street sweeping, erosion along roads, landfills, stream buffer zones and revegetation, the installation of pollution traps, retarding basins and wetlands

In addition The EPA publication "Construction Techniques for Sediment Pollution Control (May 1991)" (publication No. 275) provides some excellent technical information. This publication should be a standard reference for all civil engineers, land managers, planners and officers involved in construction or waterways management. (*Refer Chapter 5*)

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2.4 Vandalism

Linear reserves are the subject of considerable misuse, often without an awareness by the persons involved of the damage caused. Wood is cut illegally from roadsides for firewood. Fallen branches, old dead trees with hollows are essential for wildlife protection and nesting. Reserves should be signposted at access points indicating the removal of any plant material is prohibited including fallen timber

Vehicles are driven on reserves flattening vegetation and compacting the soil. Tyres spread weed seeds. Seedlings (either planted or natural regeneration) are damaged and larger vegetation attacked by vandals.

Placement of signage indicating both the significance or importance of the vegetation and details of a contact person (Council Bylaws Officer), to report acts of vandalism or misuse to, is a significant step.

Normal maintenance procedures such as SEC line clearance, Telecom and other services, road works, should be conducted in such a manner to minimise accidental, unnecessary or incidental damage to reserves. A code of practice for works is discussed in the chapter on road reserves.

2.5 Tree Pruning and Tree Clearance

Trees are removed or pruned on roadsides or rail sides to maintain sight distances, keep the roadway and table drains clear, to prevent interference with power lines and for safety reasons (storm damage etc.).

Generally, only seedlings need to be completely removed due to the ongoing nature of maintenance programs. Large trees may require pruning of some branches from time to time but not removal.

There are one hundred thousand SEC poles in the Ballarat Service region. Most of these are on road reserves and therefore the activities by Powercor to maintain adequate clearance space around lines have a direct and significant impact on the management of reserves.

The SEC Code of Practice indicates all trees under 2.5m in height should be left. A more efficient approach is to also consider the species involved.

Generally all Eucalypts should be removed from immediately under power lines in the Ballarat Region (including seedlings under 2.5 metres) as given time all Eucalypt species will potentially cause interference with the lines. Existing stands of trees should be assessed by a suitably qualified person before any work is carried out. Rare or significant Eucalypt species such as Snow Gum (*Eucalyptus pauciflora*) or Yarra Gum (*Eucalyptus yarraensis*), may require special attention or consideration, including the alternative options of undergrounding or aerial bundled cable (ABC) to ensure these trees are protected.

New work should be located on cleared land (eg private land adjacent to the roadside) rather than on a treed roadside. If locating the work on the roadside is the only option then the line should be placed underground.

Most of the other tree and taller shrub species of the region pose little threat to Powercor lines. (*Appendix 10*)

Stands or individual Casuarinas (*Allocasuarina verticillata*, Drooping She-oak, *Allocasuarina littoralis*, Black She-oak) and Silver Banksias (*Banksia marginata*) should be retained and encouraged as these will generally never reach the line clearance space and are far slower growing than most Eucalypts and will pose less problems than the Eucalypts that may replace them if cleared. These plant communities are rare and should be protected at all costs.

Acacias should also be retained and encouraged for similar reasons. The occasional old Blackwood (*Acacia melanoxylon*) or Black Wattle (*Acacia mearnsii*) on fertile sites may need trimming. All other species of Wattle pose no threat and generally help to crowd out the potentially taller Eucalypts and should be retained under powerlines for this purpose.

The ground flora should not be disturbed any more than necessary during tree lopping operations and the cut material carted off site. Care should be taken not to damage smaller shrub and ground cover species unnecessarily.

Trees and shrubs should be pruned using the 3 cut method.

References:

Code of Practice for Tree Clearing (1991). State Electricity Commission.

Vegetation Management Manual (1987). SEC

Your Guide to Planting near Powerlines (1993). SEC.

2.6 Grazing Licences

Traditionally roadsides, disused rail or road reserves and stream crown land water frontage reserves have been subject to grazing under an annual licensing system. The Victorian State Government recently reviewed the licence system and replaced it with a longer term licence or lease arrangement. For most unused road reserves this poses no threat as these are alienated (already incorporated in paddocks). However, many stream frontages, rail and roadsides may suffer if subject to longer term grazing licences.

Areas of medium/high conservation value should not be grazed. Stream sides should be fenced from stock. Access should be provided only at points on the stream not all the bed and banks. This will prevent damage to bank vegetation, water disturbance and turbidity, soil compaction, erosion and bank destabilisation problems.

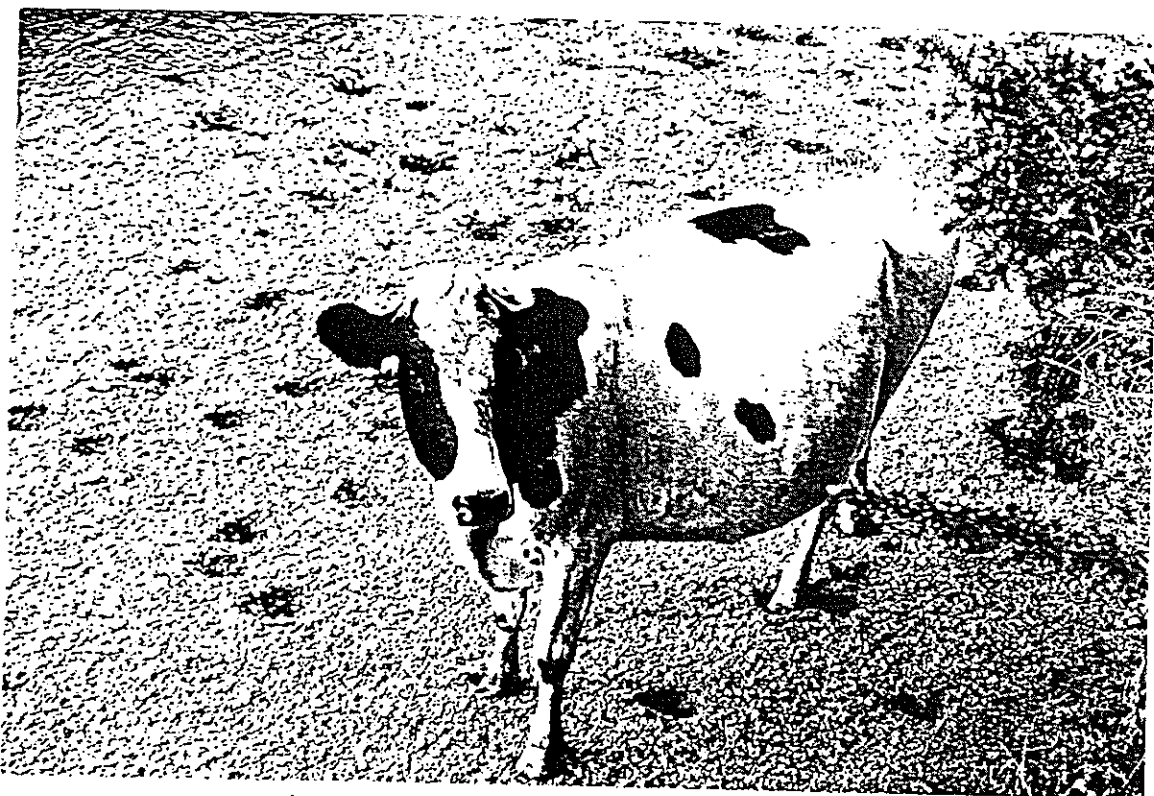
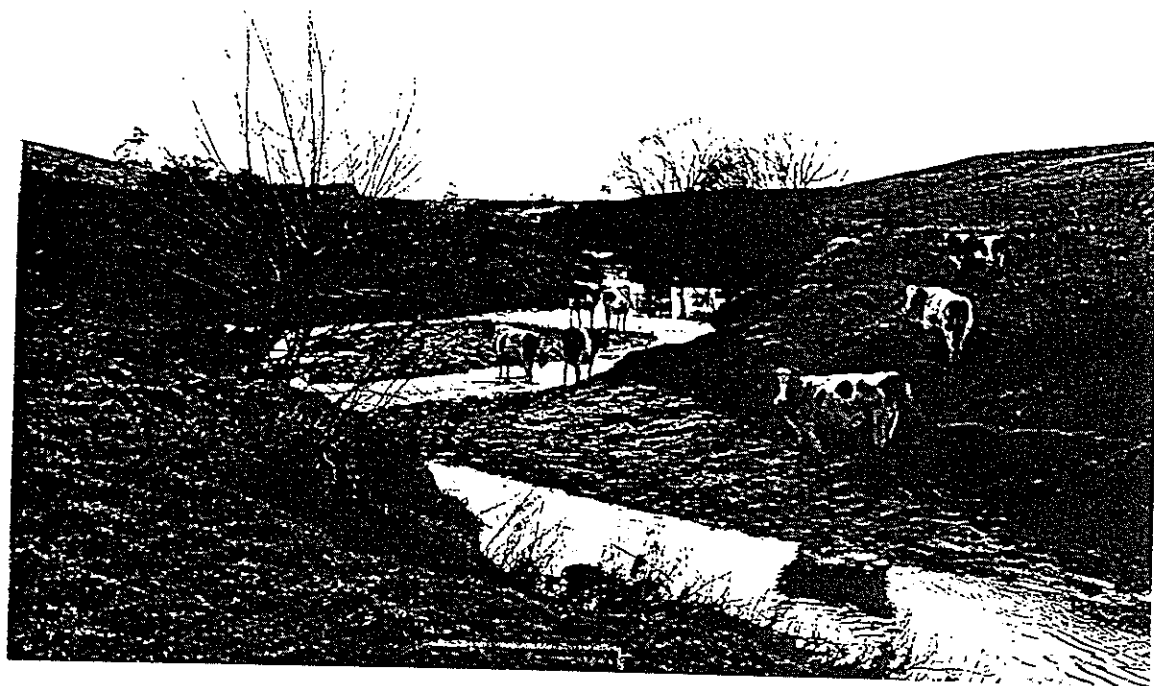
In some cases, grazing can be used as an effective management tool on linear reserves to control fire risk, however, the above factors must be considered.

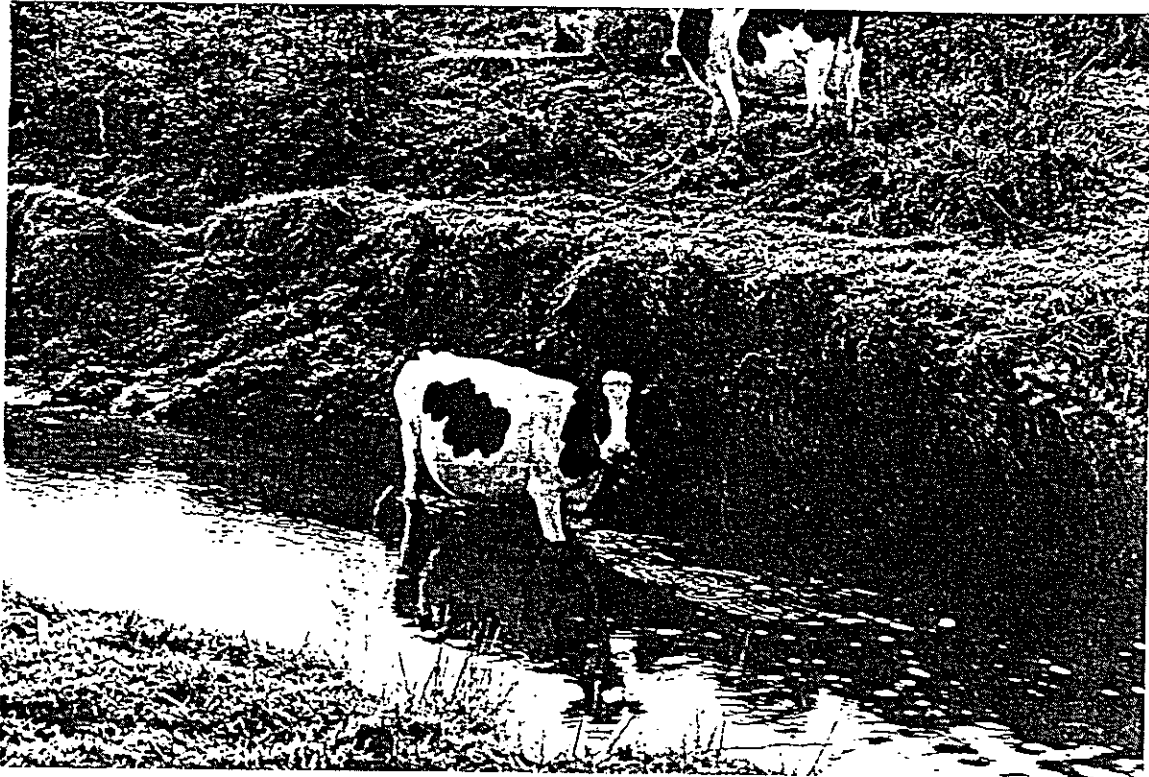
Streams should be fenced, eroded or problem sites excluded from grazing and revegetated and all areas of high conservation value avoided altogether. Saline sites will rehabilitate more easily without grazing pressure. Kangaroo Grass (*Themeda triandra*) will tolerate quite high salt levels but not the addition of grazing pressure. It is an especially useful species for re-establishing a cover on eroding sites where the site is fenced from stock.

The other issue is that fencing for grazing prevents access along linear reserves for walkers or reserve maintenance. Consideration should be given for the inclusion of styles on linear reserves that are an important part of a recreational corridor. Fencing design should not limit through access by wildlife.

It should be noted that land is licensed for grazing use and this does not exclude other uses such as recreation or give "ownership" of the land.

Figures 11 and 12 Cattle access problems on the Yarrowee River.





Many farmers have shown a great enthusiasm for linear reserve improvement works, for example revegetation of stream sides and other erosion control measures, fencing off important remnant vegetation etc, whilst still maintaining grazing options.

2.7 Protection of Linear Reserves

The effective protection and enhancement of linear reserves must involve:

1. A greater awareness of the values of reserves within both the community and managing authorities. Measures should include a complete flora survey of all linear reserves under control and public education activities.
2. Signage of significant linear reserves and fencing of particularly vulnerable or significant sections, for example those containing Victorian rare or endangered species (VROTS). Fencing is a better option than signage as it ensures a greater degree of protection from accidental damage.
3. Training of both management and on-ground crews in the recognition of key indicator species (eg Kangaroo or Tussock grass), the various signs and markers employed to highlight significant sites and maintenance and works practices that will not threaten sites.
4. Sympathetic management practices. Generally regular burning is preferable to slashing which is in turn preferable to spraying. Ineffective and inappropriate ploughed fire breaks should be avoided.
5. A program of woody weed control and rehabilitation of degraded reserves. This must be done in conjunction with revegetation works ie species replacement or substitution. There is little point in spraying weeds unless more desirable species are planted or direct sown onto the site. Weeds thrive on disturbance and will quickly re-establish and dominate unless desirable species are introduced to the site to compete with them. The replacement will not be complete initially but follow up works should see the balance tipped toward the desirable plants. Wise choice of species is important. Species considered should be:- local (except in cases of extreme site modification such as high salinity where alternatives may have to be considered) and have similar characteristics to the weeds they will replace (eg. height, shape, density and the protection offered to birds and other wildlife). Gradual replacement is best as existing habitat is maintained and works are more manageable. It is better to concentrate efforts and resources on a small section of reserve rather than attempt too great an area at once. Follow up works and maintenance are of critical importance to the success of any rehabilitation/revegetation project.
6. Control of littering, pollution and illegal dumping on reserves via
 - raising a greater awareness in the community of the values of linear reserves
 - regular clean up activities involving the community
 - the installation of 'no dumping' signs (giving the Council By-Laws officer as the contact person to report acts of dumping or vandalism to).

7. Control of feral animals.

A regular program to control rabbit, fox and cat numbers in corridors.

Information on rabbit control measures is included in the supplement.

The brochure *Cats in Australia* (1993), produced by the Australian National Parks and Wildlife Service, Endangered Species Unit is also included in the Supplement as it provides accurate concise information on the problem.

2.8 Public Use:-Access, Recreation, Education and Eco tourism

Providing community access to linear reserves is important. A continuous and obvious path should be provided on reserves with the exception of some roadsides where the formal carriageway provides the suitable path.

Major roads may require construction of a separate path to allow safe use of the linear reserve. Rail and stream reserves require special paths to be constructed along them. In the case of disused rail lines, the formation provides an excellent basis for a path. Existing lines generally have continuous access tracks for line maintenance.

Wherever possible, linear reserve paths or trails should be linked to urban areas, formal sports facilities such as ovals, major roads or public transport access points and to the major forest blocks of the region.

Consideration should be made for access to linear paths by all groups including wheelchair access where possible (rail trails are a good example) and access for prams etc.

In some cases, the reserve may provide only a basic track for walkers whilst other reserves can include a shared pathway for walkers, cyclists and horse riders. Trail bikes should be discouraged by the use of fences with styles, or in the case of shared pathways, using cavalettis, bollards or similar structures not easily vandalised or removed to prevent or discourage trail bike access. Brochures can be prepared for key linear reserves and include maps outlining convenient access points and other details.

Tracks should be kept in good repair such that they provide little hazard to users. Free of weeds such as Blackberry, litter and pollution.

It is important that reserves can be accessed at a number of convenient locations by the public and that these points are clearly marked on maps and signs. Consideration should be given for the provision of facilities along popular sections of corridors such as rubbish bins, seats, picnic tables and public toilets. Designated camping areas may be appropriate on longer reserves such as the Ballarat Skipton Rail Trail or Great Diving Trail.

Many reserves have Eco tourism potential. There is a growing interest in this area and reserves which include rare species or significant remnant vegetation, have high scenic or historic values can attract Eco tourism if suitably promoted. Some sections of our rivers, eg Devils Kitchen on the Woody Yaloak, the Ballarat-Skipton Rail Trail and significant roadsides on the Basalt plains in the south of the region are obvious examples of reserves with Eco tourism potential.

Reserve brochures should include the following information:

- a map of the linear reserve
- access points
- adjacent formal recreational facilities
- natural features close to the reserve and distances
- areas of historic or cultural interest (mines, buildings, ruins etc.)
- facts and figures on the reserve construction dates, management history
- flora and fauna lists including flowering times, "What you can see"
- overnight accommodation close to the reserve
- suitable camping sites, fresh water access, location of toilets, shelters, seats, rest areas, observation areas, eating establishments
- track condition descriptions
- safety issues

Informal recreation uses include walking, relaxing, picnicking, jogging, bike riding, horse riding, walking pets, canoeing, fishing, fitness trail, bird watching, nature study, painting, sketching and kite flying.

Recreational use must be balanced in a way not to reduce the conservation value of reserves.

Interesting sections of linear reserves can be developed as education areas for the benefit of local schools and the general community, eg Canadian Creek (Mt Clear Primary School), Yarrowee Flora Reserve. Educational materials can be produced for each area either within the tour guide or separately for various age groups. The list of topics is endless covering nature, history, management problems, as is the range of associated activities which can be offered at each site.

A number of reserves can be incorporated together in a tour guide in which tours with a range of different distances and themes (history, nature etc.) can be described.

The Great Dividing Trail is an obvious example of the pathway system and information that can be produced.

The Great Dividing Trail is a regional community tourism initiative aimed at creating a high quality, integrated walking track network to connect Ballarat, Daylesford, Bacchus Marsh and Castlemaine with smaller centres of the region. It provides a range of trail

options to access natural and cultural features over a wide area of rural Victoria on either side of the Divide.

.It has the potential to increase employment and tourism opportunities in a manner which respects and involves the local communities as well as the natural environment

The Trail Committee meets on a regular basis and organises a selection of trail walks and activities.

The LINC'S Committee will produce guides for the Ballarat-Skipton Rail Trail and the Yarrowee River. The Cycling Sights, Ballarat & District guide prepared by Hazen Waller through the Australian Trust of Conservation Volunteers (ATCV) Pedal to Work project, provides a range of cycling tours in and around Ballarat grouped under various themes.

References:-

- Draft National Eco tourism Strategy* (1993). Commonwealth Department of Tourism.
Eco tourism. A natural strength for Victoria (1993). Department of Conservation and Environment.
Victoria for Bikes. Cycling Strategies for Victoria (October 1994). State Bicycle Committee.
Learning to Care for Our Environment. Victoria's Environmental Education Strategy (1992). Victorian Environmental Education Council.
Report on the Ballarat Area (1980). CH. 15 pages 141-161 inc., Map 10 - Outdoor Recreation. Land Conservation Council, Victoria

2.9 Seed Collection


Linear reserves in the Ballarat Region are often the last fragments or examples of once common vegetation types. As a consequence, these areas are extremely important as sources of local seed for revegetation works.

The local varieties of plants are adapted to the local conditions and generally do much better than varieties of the same species from locations further afield or out of the region. A careful balance is necessary to ensure that over collection or damage to remnants does not occur.

As more and more revegetation work occurs on farms through LandCare or on roadsides by Vic Roads, councils or the community, the pressure on the surviving remnants will increase.

In Melbourne there are already problems of over collection from remnants. The small local seed supply of the rarer remnants is in great demand for competing revegetation projects.

Figure 13. Ballarat Region Seed Bank




BALLARAT REGIONAL SEED BANK

located at the
Creswick Nursery & Landcare Centre


The Ballarat Regional Seed Bank is designed to encourage the re-establishment of local provenance vegetation back into our local areas

One of the advantages of growing plants from local seed is that they will be best suited to local conditions

You can donate, barter, sell or store seed from your local area in this non-profit community based bank





Seed from local areas can be used in direct seeding programs




For seed to be deposited in the seed bank please attach the following information:

- *Name of species (If you are unsure of plant identification, include a specimen of fruit and foliage)*
- *Location, marked on map if possible*
- *Site characteristics eg. rocky crest, poorly drained depression*
- *Soil type eg. red volcanic soil, dark cracking clay*
- *Any noticeable characteristics eg. salt tolerant, weeping form*
- *Date collected*
- *Name and contact no of collector*

For more information, please phone:

Trish Kevin	DCNR	Creswick (053) 452502
Roger Thomas	DCNR	Creswick (053) 452502
Tim D'Ombrain	City of Ballarat	Ballarat (053) 381477
Ian Castle	Haddon Landcare Group	Haddon (053) 424550
Fleur Maidment	DCNR	Ballarat (053) 336782
Eriks Muske	DCNR	Colac (052) 335533



This Seed Bank is sponsored by DCNR, NLP and the Ballarat Development Board

The Ballarat Region Seed Bank has been set up at Creswick LandCare Centre in an attempt to monitor and assist seed collection activities. The Seed Bank stores seed from as many areas and remnants in the region as possible, assists groups by training them in seed collection techniques and provides suitable seed for revegetation projects to groups and organisations. (*Figure 13*).

The Seed Bank promotes ethical seed collection and monitors seed collection to ensure over collection from sites does not occur. Collectors can be directed to species in short supply in the Bank and it provides information to collectors of suitable collection sites and seed collection times. Mid-late summer is the peak collection time for most species in the Ballarat Region. The Seed Bank also records information on the source of seed lots and their destination such that future plantings can be used as seed orchards rather than a continuing reliance on the original remnant.

Where possible, seed collection of linear reserves should be done in conjunction with works by authorities such as Powercor line clearance, Council or Vic Roads road widening or maintenance programs or other activities. This rarely happens but should occur as a matter of course. Local seed collectors can be contacted through the Seed Bank.

Plants located along river valleys and stream sides often have much larger seed crops than plants of the same species occurring further afield. (eg. Casuarinas, Wattles and many shrubs).

Seed collection not tied to maintenance works should follow the guidelines prepared by the Indigenous Flora & Fauna Association (*refer to Supplement*).

Seed collection should not be carried out on linear reserves (Crown Land) without the appropriate permit(s) from the Department of Conservation & Natural Resources and the permission of the managing authority of the reserve.

The Ballarat Regional Seed Bank is located at Creswick LandCare Centre (telephone 45-2502.)

Further Information: Supplement, Section A part 11.

References

Ralph, Murray (1993). *Seed Collection of Australian Native Plants for Revegetation, Tree Planting and Direct Seeding.*

2.10 Archaeological and Historical Sites

Marking and protection of important sites should be carried out on linear reserves. Aboriginal sites such as camp sites and important hunting areas, should be recognised along with European history sites such as early settlements, ruins, bridges and mines. Chinese history sites should also be noted. There was a large Chinese population on the Ballarat Goldfields (10,000 in 1858, 24% of the Ballarat East population in 1859) and their contribution is often forgotten.

The Chinese were primarily involved in Market gardening and the reworking of tailings. They were associated with waterways through the construction of dams, conduits and terraced gardens (eg behind "Batch's" on the Yarrowee River). Several mining and garden sites remain identifiable - L T Fraser Reserve and Sunnyside Woollen Mill. Chinese worked as miners, gardeners, hawkers and herbalists. They made a substantial contribution to the health of the community through their understanding of diet, hygiene and waste disposal. Fundraising efforts through the Chinese Theatre provided a substantial donation for the establishment of the Ballarat East Orphanage. There are many Chinese families still in Ballarat today descendants of the Gold Rush settlers (*Cully, 1993*).

Historic markers should be provided at sites and brief descriptions either on signs at the sites or in trail handbooks. Sites may require fencing to protect them from vandalism or provide safety to walkers.

Some weed control or rehabilitation works may be necessary at sites to allow full interpretation by trail users.

A full assessment of the historical significance of sites is beyond the scope of this report.

Public identification, signage and interpretation of Aboriginal sites should only proceed with close consultation and involvement with the Koori community.

Figure 14. **A Koori Hand Tool found near the Yarrowee River, Hill Street,
Ballarat.**

{Insert photo of Koori tool found near Yarrowee}

References and Further Information

Contact Victorian Archaeological Survey

2.11 Flora and Fauna Values

Many vegetation communities are only represented or are best represented along linear reserves. Generally, communities which existed on fertile soils have the lowest representation in the region as these areas were quickly taken up by farming. Forests on poorer soils such as the Stringy bark-Peppermint-Scent Bark forests of Enfield and Creswick are better represented.

Grasslands and Grassy woodlands have the poorest representation. Other than a few cemeteries or town commons they are only represented on roadsides or along rail lines. These communities once covered the Basalt plains primarily in the south of the region and housed a wonderfully diverse range of plants and animals.

Linear reserves of the region also include the best stands of Casuarina and Banksia Woodlands. Rare trees of the region such as Yarra gums and Snow gums have their greatest representation on roadsides.

The gum barked Eucalypts as a group are poorly represented in our forest blocks and parks as they occur on the better soils. Roadsides, rail lines and stream reserves are significant sites for Manna gums, Swamp and Yarra gums and Candlebarks.

Riparian vegetation is found in a semi natural state only on a few sections of our rivers (Woody Yaloak, Leigh, Moorabool). Tussock grasses and Redgums are more common, but the diverse shrub layer is generally missing at most sites.

Consequently, a range of important fauna habitats are provided by linear reserves which are otherwise scarce and disjunct in distribution.

Species such as: Koala, Possums, Gliders and Antechinus require the above habitats.

Further Information: Supplement, Section A parts 6,14,15,16.

References

- Bennett, Andrew F (1990). *Habitat Corridors, their role in Wildlife Management and Conservation*. Arthur Rylah Institute for Environmental Research, DCNR
- Questions and Answers on the Flora and Fauna Guarantee Act 1988*. Department of Conservation, Forests & Lands-Victoria
- Flora and Fauna Guarantee Strategy: Conservation of Victoria's Bio diversity* (1992) Department of Conservation and Environment
- Draft Conservation Program for Native Grasslands and Grassy Woodlands in Victoria* (1992). Department of Conservation and Environment.
- Birkin, Eleisha (1989). *The Value of Wildlife Habitat on the Urban Fringe of Ballarat*. Ballarat University.
- Burns, Darren (1992). *Distribution and Abundance of Native Fish in Creswick and Mt. Emu Creeks in Relation to their habitat requirements*. Ballarat University.

Stuwe, John (1986). *An Assessment of the Conservation Status of Native Grasslands on the Western Plains Victoria and sites of Botanical Significance*. Technical report series No. 48. Arthur Rylah Institute for Environmental Research, Conservation, Forests and Lands

Breckwoldt, R et al (1990) *Living Corridors. Conservation and Management of Roadside Vegetation*. Greening Australia

2.12 Land use Conflicts

Linear reserves are subject to an enormous range of threats from surrounding land uses. The very nature of the reserves means that they have a huge contact area with other uses. A forest block has a buffer area which may be affected to some degree by surrounding land use, but the central core remains relatively unaffected.

It is a case of recognising the various threats and trying to limit their effects. Threats include:

- Weed invasion - from farmland and seed carried by vehicle tyres/loads along the carriageway or by water currents along waterways, management vehicles and animals.
- Spray and chemical drift - from farm activities, weed control, insecticides, fertilisers.
- Run-off - from farms including high nutrients, or roadways including oils and pollutants. The greater run-off from sealed roads can increase turbidity and erosion problems. Run-off from the urban area is a major problem to streams.
- The lack of continuity or depth of a reserve can cause problems to wildlife migration or shelter.
- Unsympathetic fire control measures (for example, spraying, slashing and ploughing of well vegetated reserves rather than of a strip in the adjacent cleared paddock).
- Road works - inappropriate or unnecessary clearing.
- Cropping and grazing of roadsides and stream sides.
- Industrial land adjacent to the reserve.
- Noise, water and air pollution.
- Grazing, including rabbits.
- Loss of aesthetics appeal due to surrounding land uses or removal of remnant vegetation.

Many of the above conflicts are linked to poor or inappropriate planning controls

Figure 15. Weeds! (source Land For Wildlife News vol.2 No. 6)

How to create a weed problem in your bush

introduce livestock
that have fed on
weeds

add fertilizer to
increase the
nutrition level

drive vehicles or
machinery through

disturb soil by
overgrazing,
clearing, or
cultivating



dump garden
rubbish

spread stock-feed &
hay that contain
weed seeds

introduce
contaminated soil

introduce non-local
species without
knowing their
potential

Reckon he's going for Best Burr in Show?

2.13 Who is Responsible?

Perhaps the key to effective linear reserve management is a clear definition of which authority has control over the reserve or section of reserve. Unfortunately, the situation is usually extremely complex with a number of organisations having some control or influence over the management of a reserve.

State highways and major roads are managed by Vic Roads, other roads are controlled by councils. Roadsides are crown land under the control of the Department of Conservation & Natural Resources, but usually managed by a council or Vic Roads.

Councils are taking an increasingly active role in the management of linear reserves (under committees of management to DCNR) particularly in urban areas.

Disused rail lines are gradually being passed from Public Transport Corporation control to DCNR. In some cases such as Ballarat-Skipton, a committee of management which comprises local municipalities will manage the line on behalf of DCNR.

Rail lines are managed by the PTC. River frontages (crown land) are controlled by DCNR but often are also under a committee of management which may be a municipality, water authority or another body. As well as the management authority, many other organisations may influence the reserve. For example, SEC (power lines and tree clearance), Telecom and Optus (cables), Central Highlands Water (water and sewerage pipes), Council (spoon drains, culverts, bridges, stock piles etc.), Southern Water (diversions, stream works), the local community and landowners (adjacent land use) can all have an input.

One of the key aims of the Yarrowee River Case Study was to ascertain exactly where crown land boundaries occurred and which authority managed or had input on each section.

A key objective was to simplify management of the corridor, bringing it under one authority (or each section under a single authority).

The Yarrowee River is probably the most complex example in the region and it was studied for that reason. However, every reserve should be examined to see which authorities have some influence over it or effect on it. This is essential as good lines of communication, an awareness of the value of a reserve and improvements being done to it and who has overall responsibility, must be understood otherwise good work can be wasted, accidentally damaged or destroyed.

Effective management of a linear reserve involves liaison with all parties likely to influence the reserve in some manner now or in the future, and to jointly prepare and follow a code of practice or management plan for the reserve so that its values are not

lost. Linear reserves usually abut private land. Include the local landowners in all activities and decisions over the reserves management.

The LINCOS committee structure provides a model of an approach which includes all relevant parties in managing reserves.

References:

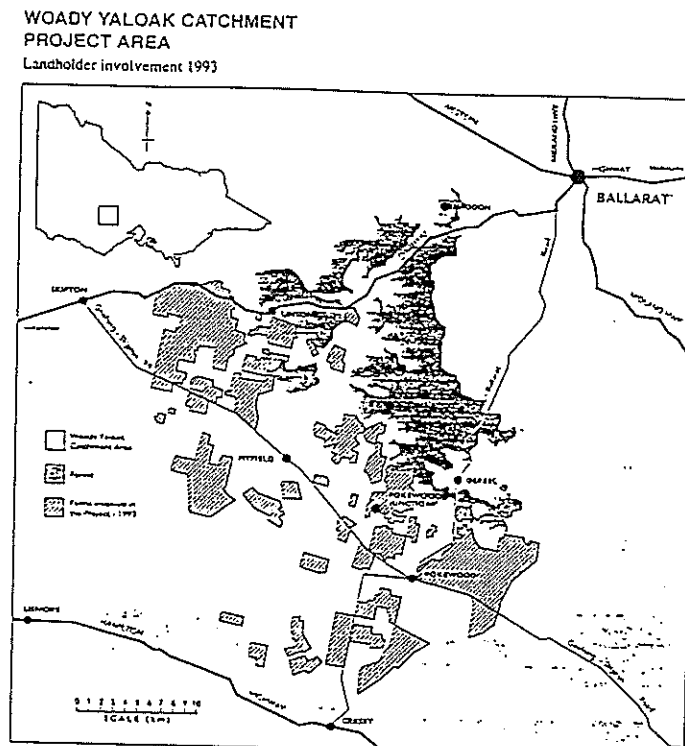
A Handbook for Committees of Management of Crown Land Reserves (1988). Public Land Management Branch, Department of Conservation, Forests and Lands.

2.14 LandCare / Conservation Covenants / Land for Wildlife

The LandCare concept and programs have been an effective method of combating the various problems affecting farmland in the region. Problems include salinity, erosion and soil degradation, weed invasion, water quality and over clearing of native vegetation and tree decline.

The large LandCare movement has an important place in the management of the linear reserves of the region. *(For more information on LandCare refer Supplement section E)*

Figure 16. Woody Yaloak Catchment
showing the number of farms involved in LandCare activities.
 (Source: Woody Yaloak Catchment LandCare and Action Plan Project Report 1993.)



The value of a linear reserve as wildlife habitat can be greatly enhanced if local landowners also manage their land in a manner sympathetic to the needs of wildlife. Land for Wildlife is an effective conservation scheme applied to private land by DCNR. This can increase the amount of suitable habitat at points along a linear reserve giving greater width and wildlife potential.

Managing a farm or land to encourage wildlife by providing habitat and other measures is an excellent way of connecting linear reserves to private land.

Many Land for Wildlife (LFW) notes have been included in the Supplement to this report as additional information. LFW notes are an excellent source of specific information and deserve wider recognition and use.

A further step landowners can take is to place a conservation covenant on the land which effectively prevents the land and its wildlife values from being alienated (cleared etc.) through change of ownership over time by law.

The Conservation Covenant scheme is administered by Environment Victoria. For more details of:

- Land For Wildlife - Contact: DCNR Ballarat.
- Conservation Covenants - Contact: Environment Victoria.

Further information: Supplement, Section A parts 7,8 ; Section E parts 1,2,3.

2.15 Land Zonings and Planning Schemes

Local Government

A major impediment to the protection and enhancement of linear reserves can be land zoning. Land zoned as Industrial, for example, backing onto a linear reserve, will have a significant impact on the reserve once the industry is developed. This may be through the direct impact of pollution (air, noise or water) or simply the reduction in aesthetic appeal created by an inadequate buffer distance.

Some of the land in the former Borough of Sebastopol, adjacent to the Yarrowee River, is zoned Light Industrial. This zoning is totally inappropriate and has led to development right on the river flat and escarpment including one development on the site of the first European settlement in Ballarat (Yuille's Ballarat Station in Bala Street). Other sites have been purchased specifically by local authorities to prevent inappropriate development allowed for in the outdated planning scheme.

The Ballarat planning scheme is undergoing a full review which will undoubtedly solve many of the problems of land use conflicts and future inappropriate development. It will not solve existing problems such as industrial developments along the Yarrowee River Flora Reserve section or old freehold title extending to the centre of streams.

Public expectations are that areas such as the Yarrowee River be developed for the general community. At some point in time, existing land zonings may need to be revoked or incentives offered to some industries to relocate to a more appropriate location.

For the moment, it is essential that no further inappropriate developments are allowed where they will have a negative impact on key linear reserves or conflict with public expectations for those areas.

Crown land along the Yarrowee corridor and other linear reserves should be assessed for its LINCIS potential before being considered for sale regardless of the land's current zoning which may be under review.

Planning zone amendments will be required to protect the river corridors in the region.

Section 6.5 of this report attempts to list all existing and potential corridors. This work is incomplete and further work to identify key links will be undertaken by the LINCIS Committee.

Planning Authorities have an important role in maintaining suitable set backs from reserves and prescribing minimum acceptable widths for reserves to enable revegetation works and path construction to occur. This is particularly relevant given the current pressure for urban infill and consolidation.

River buffer zones to house wildlife (such as Wrens) and to soak up nutrient flow into waterway needs to be at least 30 -50 metres in width. Width is required to provide a core area for habitat and to allow natural regeneration to occur and limit wind shear and other problems.

The Role of the (new) Catchment and Land Protection Boards (CALM)

Boards have been set up for each region of the state.

Catchment and Land Protection Act 1994 (extract)

To encourage the cooperation of persons and bodies involved in the management of land and water resources in furthering the objectives of the act.

To facilitate the operation of regional catchment and land protection boards and monitor their effectiveness.

To promote investigation into and research on any matter related to catchment management or land protection.

To promote community awareness and understanding of issues relating to catchment management and land protection

Functions of a Board (include)

To prepare a regional catchment strategy for the region and to coordinate and monitor its implementation.

To prepare special area plans for areas in the region and to coordinate and monitor their implementation.

To advise the Minister on:

regional priorities for activities by and resource allocation to bodies involved in the management of land and water resources in the region.

guidelines for integrated management of land and water resources in the region

matters related to catchment management and land protection

the condition of land and water resources in the region.

To promote community awareness and understanding of the importance of land and water resources, their sustainable use, conservation and rehabilitation.

To make recommendations to the Minister and the Secretary about actions to be taken on Crown land managed by the secretary to prevent land degradation.

State Government

There are two key pieces of legislation that protect native vegetation:

The Planning and Environment Act, 1987 - Native Vegetation Clearance Controls requires the following:- Prior to removal of any area of Native Vegetation on private or public land (including roadsides), a permit must be issued by the responsible authority unless specifically exempted by the Act. Permits must be referred to DCNR.

The Flora and Fauna Guarantee Act, 1988 - Aims to protect Flora and Fauna and genetic diversity.

References:

Victorian Environmental Policy Guide. A Planner's Guide to Victorian Conservation and Environment Policies. (1992) Office of the Environment

Land Information Management System (LIMS) Cadastral Mapping Project, DCNR Ballarat Region. (Currently available for the former Buninyong Shire maps and assessments of other parts of Ballarat currently under way.)

Native Vegetation clearance guidelines

[Refer also to local strategies and plans eg Mt Emu Creek Land and Water Management plan, Glenelg Regional LandCare Plan, Glenelg Region Salinity Strategy]

2.16 Community Input

What Role does the Community Play?

The community plays an important role in the protection and enhancement of linear reserves. Community pressure has influenced councils and authorities to consider greater protection of road, rail and stream reserves, to modify work practices and to commence revegetation and recreational enhancement programs.

A strong and sustained community push is needed to ensure changes continue and our important linear corridors with their remnant vegetation and habitat are adequately preserved and protected. The community also has an active role to play through:

1. The formation of 'friends' groups for individual reserves or areas (existing example included Friends of: Pryor Park, Napoleons Bushland, Lake Burrumbeet and the Yarrowee River). Friends groups are needed for each section of linear reserve such as the Yarrowee River and the Ballarat-Skipton Rail line, if these are to be effectively managed.
2. Membership of the LINC'S Committee.
3. "Community Watch" - keeping a careful eye on your important local roadside, rail side or stream reserve to ensure no dumping, vandalism or inappropriate work practices take place, ie a neighbourhood watch for linear reserves, after all they are the local community's asset.
4. Collection of local seed and plant propagation, for revegetation works along the reserve.
5. Keeping roadsides and other reserves free of litter - local pride.
6. Joining the local LandCare group. This applies to both urban and rural communities. LandCare groups are active and effective in the areas of revegetation, erosion and salinity control, water quality monitoring, seed collection, education and awareness activities. It is the best way to fight common problems by working with your local community. Combining knowledge, strength and resources.

For more information on LandCare or Friends groups contact:

DCNR, Ballarat
Tel. (053) 33-6782

7. Assisting survey work along linear reserves. Rating roadsides for conservation value.
8. Organising or involvement in planting, direct seeding or weed control days.

Figure 17. Friends Group Involvement.

Page 10 THE COURIER, Ballarat, Thursday, May 26, 1994.

In & Out of town

■ Yarrowee River corridor:

Friends celebrate draft master plan launch

By LEANNE MIDDLETON

A group of people who have been involved with development of the Yarrowee River at various stages since 1981 yesterday met at the river to celebrate the completion of a draft master plan for Yarrowee River Corridor.

The draft was the second of four stages in a project commissioned by the Linear Network of Communal Spaces, LINCOS, committee from landscape architects Thomson Hay and Associates of Ballarat.

The people who celebrated the launch were Friends of the Yarrowee foundation member Michael Adams, resident Susan Cully, City of Ballarat Parks Officer Adam Parrott, the Ballarat Regional Board's regional planner Hedley Thomson and sustainable development officer Tim D'Ombra and landscape architect Stuart Porteous who was involved with the early planning of LINCOS.

Mr Thomson said the first stage in the LINCOS project was a site analysis which described the character and features of the Yarrowee River and included a flora and fauna survey by Roger Thomas.

He said the draft master plan drew together work which had already been done by groups in-



From left Friends of the Yarrowee member Michael Adams, resident Susan Cully, Ballarat City parks officer Adam Parrott and Ballarat Regional Board Regional planner Hedley Thomson.

cluding the Friends of the Yarrowee and the City of Ballarat through its Greening Ballarat program and it made recommendations for the future.

"It prepares a plan for new things to be carried out such as walking paths, drainage works, tree planting, wetlands, any heritage interpretations and recommendations to do with water quality," Mr Thomson said.

He said it also made recom-

mendations about the protection of certain areas for their heritage values.

"The aim of the plan is to draw to people's attention the significance of the river and the reserve as an asset for the community to use," Mr Thomson said.

He said the draft plan would be put on display within the next two weeks for public comment and after about two months a final management plan and a

land management plan would be developed.

Ms Cully said the development of the Yarrowee River, which to date represented a total of \$348,000 to the community in the form of grants and labour, had a number of benefits for the people of Ballarat.

These included job creation, the transformation of a wasteland into a community asset, increased real estate values and environmental benefits.

3. ROAD RESERVES

Management Issues and Guidelines

3.1 Introduction

Perhaps more than any other feature in the Ballarat Region, road reserves visually shape the landscape. Treed roadsides provide the relief or contrast to the extensive farmland with its often monotonous views due to the total or almost total tree clearing that occurred in the past.

Road reserves provide some stock shelter, shade, windbreaks and wildlife habitat and add interest to our journeys .

Road reserves link up different areas and are living transects across the country of the vegetation communities which once were far more extensive.

The large number of roads in the region make road reserves the most important linear corridors. Many have little wildlife or recreational value having been cleared along with the land they adjoin. Others, however, are important for the rare plants and fragile habitats they contain. Some are a single chain in width and so have little potential, whilst other roadsides particularly past stock routes such as the Mt Mercer-Shelford Road are three chains or more in width and are very important conservation corridors. [1 chain = 20.1 metres]

Figure 18 A Summary of some potential roadside values

- Contain significant tracts of remnant vegetation
- Some Sites contain VROTS
- Act as wildlife corridors and habitat
- Contain sites for local seed collection
- Hold recreation, tourism, eco tourism potential
- Aesthetic appeal
- Shade and shelter
- Cultural and heritage values and interest

3.2 Roadside Marking

Every municipality should organise a survey of all roads to discover those of conservation significance. Important roadsides should be marked or signposted where appropriate and a Roadside Management Plan prepared. By identifying significant sections of roadside with marker pegs or signs unnecessary damage is more likely to be avoided. (*Fig. 19*)

Figure 19. Roadside Marking Scheme.



Contacts

The Roadside Conservation Committee can assist with advice through:

R.C.C. Executive Officer
(03) 412 4633

D.C.E. Keith Watson,
Transport Corridors Policy Officer
(03) 412 4413

VICROADS Graeme Stone,
Roadside Development Officer
(03) 860 2335

Acknowledgements

The Roadside Conservation Committee of Western Australia has a system for marking special 'wildflower sites' and flora roads. The use of their ideas is appreciated.

Prepared by VICROADS for the Roadside Conservation Committee of Victoria.

Recording of Sites

A register of marked sites is kept by the relevant municipality or VICROADS and by the Department of Conservation and Environment. Site details include reasons for marking, description of plants and/or features as well as the management requirements.

Management of Sites

Special environmental sites will have a variety of management requirements depending on the type of plants growing there. Native grasses and wildflowers may require or require fire every one or two years. Native grasses and wildflowers may require or require fire every one or two years. Native grasses and wildflowers may require or require fire every one or two years.

Remember as a general principle - soil disturbance brings weeds.

NO DISTURBANCE NO MOWING PLEASE



Environmental Marker

This is a low key sign to identify special sites which are usually smaller than Significant Roadside Area sites.

The Environmental Marker will alert roadside workers, fire brigade members and adjacent landowners without the need to draw attention of the general public.

No works or disturbance of the soil or vegetation is to take place without approval of the road manager or the relevant authority. Some activities, such as occasional burning in some grasslands, may be permitted depending on the site.

Further information can be obtained from VICROADS or the municipality whose logo appears on the sign.

Please quote the code number to identify the site.

This system is supported by VICROADS and the Department of Conservation and Environment.

(right) Kangaroo Grass is a native roadside plant. Look for its rusty brown seed heads in mid summer.

Protected flora

About 10% of the world's flowering plants are threatened with extinction as a direct result of human actions.

201 plants in Australia are threatened with extinction.

Under the Flora and Fauna Guarantee Act 1988, 670 Victorian plant species are protected. Please consult the responsible authority, the Department of Conservation and Environment (DCE) before carrying out works which will remove native vegetation.



Roadsides are often the last refuge for some native plants.

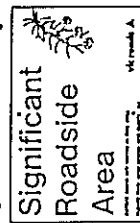
There are sites along roads which are significant and which should be treated with special care when road construction, maintenance or work by service subscribers is undertaken.

These areas may be special because they have:

- scientific, historical or conservation value;
- remnant vegetation not common in the district;
- regenerating native plants necessary for the conservation of roadside vegetation;
- native grasslands and wildflower areas that might be overlooked because there are no shrubs or trees;
- rare or endangered plants;
- unusual geological formations.



Significant Roadside Area sign



A sign for everyone. This sign informs roadside workers as well as the general public where a roadside is important for its regional or local conservation value.

The sign has been designed to alert workers, roadside workers and local people to the value of roadsides.

It will show that a particular roadside is special in some way and should be treated with respect, even more so than other native vegetation on roadsides. A message on the sign gives the municipality or VICROADS Region to be contacted before working on the site.

Some sites may have additional information about the roadside and so add interest to your journey.



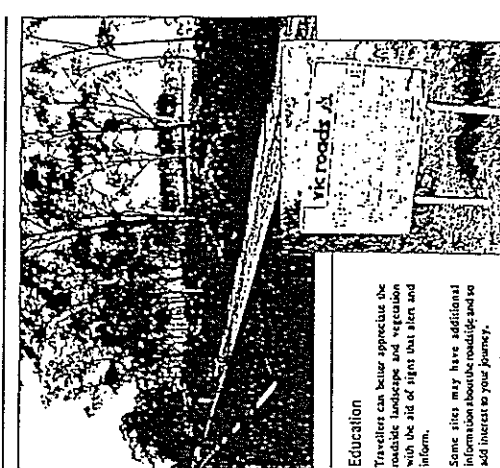
Roadsides may not always have trees and shrubs but may contain valuable native grasses and wildflowers - perhaps the last in the district.

Roadside Signs

Special sites may not be obvious to road users so they need to be marked.

To help prevent damage, the Roadside Conservation Committee of Victoria is encouraging municipalities and VICROADS to make use of a roadside sign, Significant Roadside Area, and an Environmental Marker.

The signs will identify special sites for roadside workers from VICROADS, Telikom, State Electricity Commission, Rural Fire Service, Country Fire Authority or other subscribers.



Signage of Acacia willamsonii on the Midland Highway north of Bendigo

Example In 1994 a significant stand of *Eucalyptus pauciflora*, Snow Gum on the Glenelg Highway near Smythesdale was partly felled. This is the only stand on a highway in the region. Appropriate signage to raise awareness of the significance of these trees may have prevented their destruction. Various levels of management were aware of the significance of the trees. A sign can alert ground crews to seek further advice. This cluster of trees has been felled several times in the last twenty years despite it not affecting site distances or other considerations.

Standardised signs are available and the Victorian Roadside Conservation Committee has prepared several pilot roadside plans which can act as a guide. The Gisborne Roadside Management Plan is a good guide for the Ballarat Region and is an appropriate model with which to begin.

3.3 Roadside Survey

Many areas in the Ballarat Region have been surveyed and roads listed with their conservation value (high/medium/low) based on systems developed by the Victorian Roadside Conservation Council (VRCC). (*Figures 20 & 21*)

Ballarat University Environmental & Biological Resource Management students have prepared roadside surveys of sections of the region over the last few years as part of their final year studies. A compilation of all known roadside survey data is included in the resource inventory section of this plan (*Ch 6*). The gaps in the data need to be addressed and further surveys commissioned. Spring to early summer is the best time for survey work as most species are in flower or actively growing and are more easily identified. Ideally, sites should be visited in both spring and summer.

A copy of an assessment sheet is enclosed. The score is based on a number of variables including width of reserve, native species and weeds present, regeneration, aesthetic values and degree of disturbance.

Methods of assessment varied for each of the surveys done in the region with modifications applied to the VRCC model. Spittle (1992) gives a generalised description for roadsides of High and Medium conservation significance:

HIGH - Relatively pristine condition. Rare, vulnerable or significant Flora species present or Fauna area. Section of vegetation not locally common or of Cultural/Historical/Geological importance.

MEDIUM - Semi-natural indigenous vegetation, modified vegetation with extensive regeneration or a wide reserve with patches of remnant vegetation which could be enhanced for wildlife.

Figure 20. The Victorian Roadside Conservation Committee.

Introduction

The Victorian Roadside Conservation Committee (VRCC) was established in 1975 to provide a forum where the many conflicting issues related to road and rail reserve management could be openly discussed and resolved in a manner which recognised the conservation values of roadsides (flora and fauna, landscape, historical), as well as the functional values (transport, fire prevention, utility installations).

The Committee's work throughout the year has continued to focus on encouraging municipalities and the community to recognise the conservation significance of many of our roadsides. To achieve this, the VRCC's strategy has been to increase awareness by working with people through a sequence of four main activities:

- ▲ encouraging and instructing community volunteers to undertake assessments of the quality and location of native vegetation remaining on road reserves;
- ▲ encouraging management authorities, (mainly municipalities), to develop appropriate management guidelines or plans for areas considered to be of a high conservation value. It is intended that the plans be developed by locals for local conditions, in full consultation with all parties with an interest in roadsides;
- ▲ provision of training to municipal and utility planners, engineers and workers on how to recognise native vegetation, and in the use of new techniques for carrying out works in areas of high conservation value; and
- ▲ provision of signs and markers to highlight to road workers and the community areas of particular significance. Significant areas would normally be recognised habitat for rare or endangered flora or fauna, or be of cultural importance.

The VRCC promotes these

across all parts of the state. It is pleased to report that it has been greatly assisted this year by three regional authorities. The Upper Yarra Valley and Dandenong Ranges Authority, the LaTrobe Regional Commission and the Ballarat Regional Planning Board have promoted to local governments in their areas the need for roadside conservation and training of workers. The Committee itself concentrates its efforts in two main localities – the Geelong region of the Department of Conservation and Environment (DCE) (now the Department of Conservation and Natural Resources (DCNR)) and the Murray-Darling Basin, Victorian section. This year the Committee's Geelong project officer completed the state's first comprehensive roadside management plan in the Shire of Gisborne. The plan was officially launched in Gisborne by the then Minister for Conservation and Environment the Honourable Mr Barry Pullen M. P. There has been considerable interest shown by other municipalities and authorities since its launch, which is very encouraging. Many municipalities are intending to use it as a base document for the development of similar plans for their own locality. In 1991/92 an additional nine municipalities embarked on developing management plans. Local advisory committees or working groups have been established and have successfully acted as forums for the resolution of the many conflicting issues which arise in formulating policies. The experiences of the working groups show that the development and implementation of plans is only successful if all affected parties are fully consulted and decisions are reached by consensus. It is a task that many participants have found difficult as it requires a great understanding of the needs of all parties and a co-operative approach by all authorities. In the long term however the consultative approach should produce more satisfactory solutions to problems associated with native vegetation management on roadsides compared with the regulatory approach used under the Native Vegetation Clearance Controls introduced in 1989.

It is fair to say that the idea of producing conservation-based roadside management plans (RMP's) is still being met with extreme caution from some individuals and groups. Wide acceptance of the need to conserve native vegetation requires a whole change in cultural attitude, from one of regarding it as useless and untidy scrub which needs cleaning up, to one which recognises its qualities for ameliorating land degradation, and for landscape enhancement and flora and fauna conservation. Consequently, some municipalities, landholders and in some instances the Country Fire Authority (CFA) brigades have been reserved about participating fully in the consultative process, or have felt uncomfortable with reaching what may seem 'compromise' agreements. It is understandably difficult for many groups to participate with confidence when conservation has never previously been a consideration in their works planning. This problem highlights the need for wider education and training activities in the future; enabling these people to participate in a way which ensures that their needs as well as conservation objectives are met. As one approach to address this problem, the VRCC together with the CFA proposes to develop a joint program next year to assist fire brigades to evaluate their practices and fire prevention plans, in light of conservation requirements. The Committee is hopeful that management plans will eventually gain wider acceptance as a facility for decision-making for road construction and maintenance works, service location and fire prevention planning, while ensuring the protection of flora and fauna. Greater efficiencies can be achieved by reducing the amount of time spent on conflict resolution between government agencies, local government and the community. The challenge ahead is to increase community confidence in the value of management plans and to assist in their implementation. It will be necessary to ensure that all employees of organisations and the community are agreed about prescribed management and are familiar with the location of any high conservation value areas.

In 1993, as part of LINCS, a proposal was presented to the Municipal Association of Victoria and the VRCC for the funding of roadside assessment and management works in the region. (*refer to Supplement for more details*)

Although unsuccessful at the time, the combined submission on behalf of the Shires of Ballarat, Bungaree, Buninyong, Leigh, Grenville and Ripon did highlight both the need for further survey work and a desire to consider roadside management on a regional basis.

Letters of endorsement were received from each municipality as well as the City of Ballaarat.

The aim of the proposal was to "Achieve a coordinated and regionally consistent approach to roadside management including rehabilitation and community involvement."

Key desirable outcomes were listed as:-

- 1/ Consistent roadside management practices and procedures across the region.
- 2/ Greater efficiency through cost sharing
- 3/ Filling of "gaps" in roadside assessment knowledge
- 4/ Consistent signage and marking of roadsides across the region
- 5/ Community participation in management, protection ('roadside watch') and revegetation activities as a prime focus of the roadside management plans

The VRCC did offer some support toward further survey work in the (then) Shires of Leigh, Bungaree and Grenville and also indicated funds would be sought for the development of a management plan covering Buninyong roadsides for which the survey work was complete.

The local municipalities have changed in name and form since 1993 (*refer Figure 2*) with the council amalgamations taking place across the state. However the high degree of cooperation between municipalities seen in the 1993 roadside meetings and evident in the joint funding proposal can be expected to continue. The smaller number of councils means that a consistent regional approach to roadside management will be easier to achieve

In terms of survey work none of the new municipalities (City of Ballarat, Shires of Moorabool and Golden Plains) or adjoining ones have complete roadside assessments in place.

This LINCS Plan attempts to document all known information on roadsides as well as highlight where further survey works are required. This is detailed in the resource inventory and LINCS map. The summary below lists the roadside assessments and plans known to the author.

A Summary of Roadside Survey works in the Ballarat Region

CITY OF BALLARAT

- *Urban Nature Conservation in the Greater Ballarat Area* (1989) Ballarat University CH. 9.4 (refer Ch. 7)
- Hills, Amanda (1992). *Conservation status of roadsides in the (former) Ballarat Shire*. Ballarat University
- Nally, Simon (1989). *The Conservation Significance of Roadsides in the (former) Shire of Buninyong*. Ballarat University. [PART OF]
- Creswick [PART OF]
- *Invermay Regional Study and Land Management Plan* (1991). Rural Planning Australia/Thomson, Hay and Associates. Salt Action Victoria. (former Bungaree Shire, report includes roadside survey)

GOLDEN PLAINS SHIRE

- Orchard, Andrew (undated) *Draft Management Plan: Mt. Mercer to Shelford road reserve*. Ballarat University
- Nally, Simon (1989). *The Conservation Significance of Roadsides in the (former) Shire of Buninyong*. Ballarat University. [PART OF]
- Mc Dougall et al (1991). *Native Grasslands of significance and species rescue in the Ballarat-Skipton area, Victoria*. Report to Aust. National Parks and Wildlife Service.
- Mc Dougall et al (1992). *Native Grassland Sites of Significance and Species Rescue on the Western Basalt Plains, Victoria*. Report to ANPWS.
- *Mt Mercer Shelford road reserve Management Plan* (1992) Habitat Works. Shire of Leigh
- *Roadside Management Plan. Blackmore's Rd, Geelong-Skipton Rd, Lismore Rd & Willowvale Rd* (1992) Habitat Works, Shire of Grenville

MOORABOOL SHIRE

- Nally, Simon (1989). *The Conservation Significance of Roadsides in the (former) Shire of Buninyong*. Ballarat University. [PART OF]

HEPBURN SHIRE

- Leversha, Janet (1993). *Assessment of Roadside Conservation Values in the Shire of Creswick*. Ballarat University

Several roadsides were also identified by the LCC and these have been ascribed reserve status.

- *Report on the Ballarat Area* (1980) Land Conservation Council, Victoria

Survey work for the City of Ballarat is nearly complete due to the urban nature of much of the land and existing reports.

The Golden Plains Shire contains some of the most important grassland conservation sites in the state. Several reports have been compiled on the Plains section of the shire (Mc Dougall et al) however more work is required to complete the picture. The other section of the shire the more elevated Ordovician forested country has yet to be surveyed other than the former Buninyong component.

It is essential that all high conservation roadsides in the Shire are identified, receive signage and appropriate management as they contain many Victorian Rare or Endangered Species (VROTS).

Further assessment of the basalt plains roadsides in the Golden Plains Shire is currently under way in conjunction with DCNR. Tym Barlow (Habitat Works) is surveying the Rokewood section and Mark Trengrove the Bannockburn area.

The forested Ordovician section of the Shire remains a priority for assessment.

The scoring of roadside assessments is subjective, partly dependent on the individual involved. It would be reasonable to say roadsides closer to the Ballarat urban area are less significant in terms of species present or intactness and other considerations. However their proximity to the population centre gives them added value in terms of recreation, wildlife or corridor potential.

The purpose of roadside assessment in each of the areas is to identify the best or most valuable roadsides such that these may be protected. It is not possible or practicable to protect all roadsides.

3.4 New Roads and Road works

New roads

Construction of roads should limit as much as possible the impact on remnant vegetation.

The new Ballarat Bypass occupies a huge strip of land. The Bypass is a prominent landscape feature which has through construction resulted in the loss of a lot of vegetation. Nevertheless, it offers excellent potential as a linear reserve.

The planting plans prepared by the Vic Roads Landscape Section predominantly prescribe indigenous species plantings.

Some areas adjacent to the freeway batters still contain some mature trees and seedlings can already be seen on some of the batters from seed these trees have thrown. Extensive tube stock planting has also occurred and is continuing. Unfortunately, some material is not of local origin which greatly limits the value of the reserve as an important wildlife and vegetation corridor. It is hoped that further stages of the Bypass follow the plan and more realistic lead times allow more appropriate (indigenous) plant material selection and local seed collection. The LINC'S Committee has been working closely with the Vic Roads Bypass office in an attempt to improve the value of the plantings and the corridor.

Figure 22 The Ballarat Bypass (source Vic Roads)

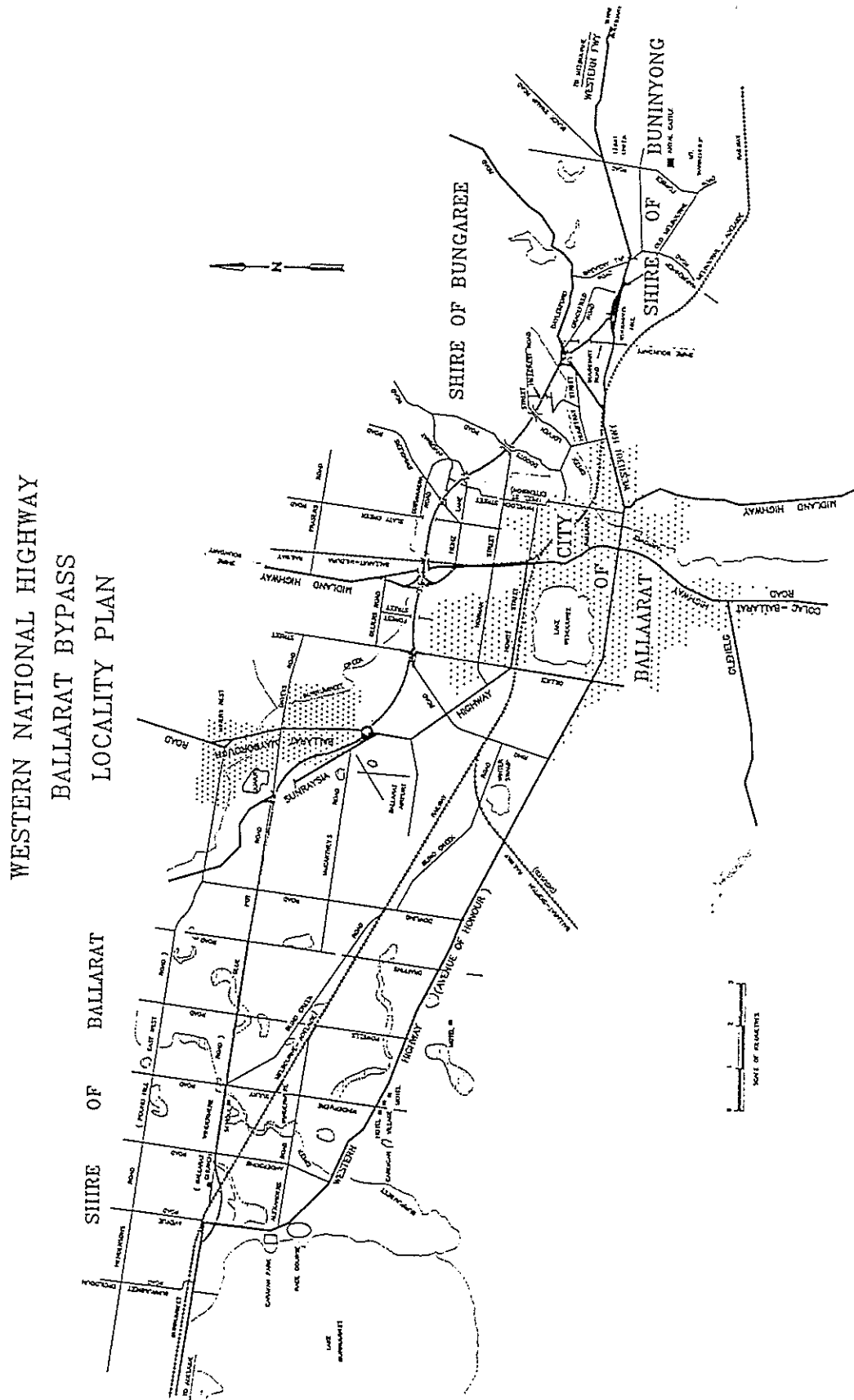


Figure 23

Indigenous Species listed in the Western Freeway Planting Plans Sections A, B, C.

(Source Planting Plans 1982 Vic Roads Road Design Dept. Landscape Section)

<i>Eucalyptus aromaphloia</i>	Scent-bark
<i>E. ovata</i>	Swamp Gum
<i>E. viminalis</i>	Manna Gum
<i>E. dives</i>	Broad-leaf Peppermint
<i>E. obliqua</i>	Messmate
<i>E. radiata</i>	Narrow-leaf Peppermint
<i>E. rubida</i>	Candlebark
<i>Acacia melanoxylon</i>	Blackwood
<i>A. dealbata</i>	Silver Wattle
<i>A. retinodes</i>	Wirilda
<i>A. mearnsii</i>	Black Wattle
<i>A. stricta</i>	Hop Wattle
<i>A. implexa</i>	Lightwood
<i>Cassinia aculeata</i>	Dogwood
<i>Bursaria spinosa</i>	Sweet Bursaria
<i>Leptospermum continentale</i>	Prickly Tea-tree
<i>L. myrsinoides</i>	Silky Tea-tree

Aside from the visual impact, there have been other effects caused by the extensive freeway development. Run off from as yet unvegetated batters has flowed into streams, in particular the Yarrowee River near Brown Hill, carrying with it an extremely high sediment load. Fish numbers in this previously healthy section of river have decreased. The water is rarely clear and the river is currently silting up.

Sediment traps and the immediate planting of batters is required in this kind of development with such large run-off capacities. If suitable native grass seed isn't available to sow on batters, a sterile rye grass or another quick growing species should be sown at the earliest chance to prevent batter erosion and stream deterioration. Almost any vegetation cover is better than nothing in instances like this. Virocells of native grasses have proven successful on difficult sites such as steep clay batters.

These areas, if revegetated using local provenance seed or seedlings, are areas for future seed collection benefiting the community. The extensive nature of the freeway makes it an ideal reservoir for local seed, provided the right species and provenances are utilised now.

The public has made clear its expectations for the freeway and other plantings. It is important however that the community supports Vic Roads and other authorities in these

works because the expertise may not be available or conflicting work demands may mean that revegetation activities may not have the forward planning or commitment required for success.

For example a good supply of local tree, shrub and native grass seed is essential to enable Vic Roads to perform the works outlined in the freeway planting plans.

The community, including LandCare groups, has a role in working with Vic Roads and other authorities planting out or direct seeding roadsides.

Road works

The NSW Department of Main Roads has prepared a Code of practice for works on roadsides which is a good guide for councils to follow entitled "Guidelines for the control of Sedimentation in Road works"

Works such as cleaning of spoon drains, road reconstruction, stockpiling of materials, parking of vehicles, siting of borrow pits and the construction of firebreaks all impact on road reserves. Vehicles should be cleaned after use, spoil directed to the road rather than spoon drain or vegetation and collected and removed to a suitable designated dump site to prevent the spread of weed seed. Woody weeds should not be chipped but removed to a dump site taking care not to dislodge or spread the seed in the process.

The EPA publication "Construction Techniques for Sediment Pollution Control" (May 1991) provides the technical information. This publication should be a standard reference for all civil engineers, land managers, planners and officers involved in construction of roads or other works which impact on waterways management. (Refer Chapter 5)

The VRCC has prepared an excellent video entitled "Managing Linear Reserves" which gives many examples of management techniques to minimise the impact on roadsides. Council and Vic Roads staff (management and road workers) should view this video as part of a training program. The VRCC runs training programs on a semi-regular basis.

Fire breaks

Graded or ploughed firebreaks on roadsides are ineffective, encourage weeds and damage remnant vegetation. Wherever possible firebreaks should be located on cleared private land rather than on treed roadsides or in remnant vegetation. Fences however should be kept free of debris.

An edited text of a talk by Steve Petris, CFA to the VRCC on the nature of wildfire and the usefulness of firebreaks is included as Figure 24.

Figure 24

Steve Petris CFA

My work for the three months of the past year has concentrated on farm fire safety, which has an obvious impacts on roadside conservation.

The only research on linear fire breaks has been Wilson's study in the Northern Territory. His research clearly shows that trees and fire breaks don't mix which implies that narrow meandering track between trees are of little use but may reduce the intensity of a fire. Fire breaks should not be located near trees to be effective. Fire intensities recorded in his study were generally less than 10 megawatts per meter (MWm^{-1}) (87%) although one fire burned at 17 MWm^{-1} . Macedon fires were between 500 KiloWm^{-1} to 60 MWm^{-1} . Some Ash Wednesday fires jumped breaks 60m wide. Our experience from all major fires suggests that firebreaks will not have any impact on the spread of fires, so it seems that for roadside firebreaks, we need to ask why we are doing it? Many fire fighters argue that a firebreak is not designed to stop a major fire, but are to stop fires beginning on the roadsides, (CFA statistics are not good enough to provide any data on the frequency of occurrence of fire initiating on roadsides) or are to provide a safe place for a firefighter to begin a back burn. It is important for people to make explicit the reasons for constructing the break.

Given that the vast majority of bushfire losses occur on the one or two bad fire days we experience every decade, and given that our experience of these fires shows that people can survive in their homes and then save their homes, perhaps efforts should be concentrated on asset protection rather than stopping the fire.

There is no evidence that houses actually explode; most houses ignite by sparks and embers which are not put out. This suggests that people can survive in their homes and then can be there to save the house. Radiant heat and direct flame attack were identified in one study as being the most important factor in determining whether a house survives, therefore some level of fuel reduction is needed. However I'd argue that the presence of people is just as important in saving a home.

Of the 47 deaths in Ash Wednesday, 7 died in the home (of which some were over 80 and all were over 50), at Mt Macedon 80% of houses with people present were saved. In the 20% of cases where houses did burn, the house provided protection while the fire front passed, as the fire often began in the roof or under the eaves. Of the empty houses, 44% did not burn down because they were saved by neighbours or the passing fire brigade.

If the reason to construct a firebreak is to stop a fire, then it needs to be recognised that it may not (cannot) stop a major fire while weather conditions are severe. Although you can survive a major fire it is nearly impossible to stop a major fire. The implication is that there is a need to adopt other holistic approaches to fire safety and asset protection.

What of the role of shelter belts? Some farmers say that while firebreaks are breached, shelter belts shielded their homes. If trees can reduce wind speeds, they can reduce fire intensity and therefore be beneficial to fire suppression. Shelterbelts need to be tall, permeable and without gaps to be effective. Similarly, gaps in a shelterbelt will increase wind speed and intensity. Gaps in shelterbelts (and by implication roadside vegetation) designed to stop the vegetation acting as a fuse may have a negative effect on fire safety if the wind is moving across rather than along the shelterbelt. The need to construct fusebreaks should be carefully considered.

Fine fuels building up in forests lead to crown fires, whereas this does not apply to open paddocks and shelter belts. While native forests are subject to huge build ups of fuel which can lead to crown fires, a shelterbelt in an open paddock will not produce these huge amounts of fuel. Grass fires will generally run through the base of the shelterbelt.

Farmers have a good understanding of fire as they live and work with fire. However they rarely experience major fires. Many strategies are currently based on these once in a lifetime experiences. My experience of talking to farmers, while not a sound statistical sample, illustrate that not all farmers understand the principles of house survival and personal survival. More research is also needed.

References:

Construction Techniques for Sediment Pollution Control (May 1991). EPA (publication No. 275)

Planting Guidelines for the Western Freeway (1992) Vic Roads Landscape Section.

Guidelines for the control of Sedimentation in Road works (1984). Department of Main Roads NSW.

Figure 25 Article (LFW News Vol 1 No 9)

Firebreaks and roadside remnant vegetation

Ploughed firebreaks are often placed within roadside remnant vegetation but is this a sensible management action? Disturbance of native vegetation is highly undesirable. It destroys understorey species, altering the ecological balance and favouring invasion by weeds and pest birds. A common invader is *Phalaris* sp., which can create many times the quantity of fine fuel (the main fire risk) originally present from native trees, shrubs or ground cover.

During intense forest fires, small firebreaks around paddocks play a secondary role to adequate protection around major assets such as the home. "The vast majority of Victoria's bushfire losses are the result of a handful of major fires that occur once or twice a decade. Experience has shown that fire breaks make no impact on these major fires. On Ash Wednesday (1983), for example, fire effortlessly jumped two and three chain roads with full-width ploughed firebreaks on either side. Similarly, no suppression force in

the world is able to impede the progress of fires such as those of Ash Wednesday. Consequently, the emphasis of fire protection efforts should be on protecting lives and assets rather than on stopping fires" [under Ash Wednesday conditions] (Petrís, 1992).

Petrís also comments that "Research on the ability of fire-breaks to stop low intensity grassfires has shown that the presence of a handful of trees within 20 metres of a fire-break dramatically reduces its effectiveness". However, the value of trees on farms is undisputed. So, there seems to be a dilemma. Trees are desirable but don't mix with firebreaks. The key point is that, in the farm layout, the two can occupy different areas - a combination of firebreaks and other measures around the home and other assets (which may include some trees, without ground litter, to reduce windspeed, filter embers and absorb radiation) and vegetation, including trees, on other parts of the property.

If fire-breaks are constructed near roadside vegetation or shelterbelts they should be placed outside the vegetation (usually in the paddock) where competition from the trees reduces the growth of adjacent pasture or crops. The competitive effect from trees can reduce the rate of regrowth and prolong the effectiveness of the fire-break. Loss of space in a paddock is adequately compensated for by the benefits of the shelter provided to the paddock (up to 25 times the height of the trees). The role of firebreaks in providing access for firefighters and landholders must also be considered. CNR plans to develop a 'Code of Practice for Fire Prevention' providing a holistic approach to fire prevention planning.

Stephen Platt
Reference: Petrís, S. (1992) Planting trees to enhance bushfire safety. *Trees and Natural Resources*, Vol.34 No.4 Dec. 1992. This issue of TNR contains many articles on fire protection and fire and native vegetation and is highly recommended. Available from NRCL, PO Box 105, Springvale, 3171. Ph. 03-546 9744.

3.5 Roadside Management Plans

A Roadside Management Plan need only be a simple document, in fact the more concise the better. It should be prescriptive and cover the elements listed below for a given road or section of a municipality. Where there is a general council policy covering all roads (for example general policies such as no stock grazing or ploughing on roadsides) a broad Management Plan can be prepared, similar to the Gisborne model, and Roadside Management Prescriptions can be very brief covering only factors relating to the management of specific road(s).

Clearly the more consistent roadside management is across a municipality or municipalities the better. The LINC plan should be used to guide roadside management policy development and the preparation of a broad Roadside Management Plan for each municipality.

Key prescriptions for a specific road should include:-

- Species list and roadside conservation rating, significant plants and animals
- Markers or signs - presence or absence and explanation, locations of rare plants
- Vegetation removal (methods, collect seed before road works remove vegetation)
- Exotic grass and weed control, herbicide spraying (constraints), slashing heights (eg >200 mm for med-high conservation value roadsides)
- Road Maintenance - use of machinery (use smallest suitable machine, specialised equipment such as a Rotary Drain Cleaner which can clean drains from the road pavement, clean machinery after use, no work when too wet)
 - cleaning of table drains
 - deposit of spoil
 - locations for stockpiles and dump sites (not in high conservation roadsides or drainage lines, use degraded areas, store topsoil do not bring in material)
 - locations for borrow pits (in work area, do not disturb vegetation.)
- Fire Management - if and when to burn roadside (burning regime)
 - fire prevention works, fire breaks (all works to be authorised by the Fire Prevention Officer in accordance with Fire Prevention plan, no ploughed or sprayed firebreaks - burn or mow instead)
- Fencing of vulnerable or important sections of roadside
- Movement of livestock (permit required)
- Grazing (no grazing on medium-high conservation value roadsides, no cropping on any roadsides)
- Graded or ploughed fence line breaks
- Seed Collection
- Tourism
- Tree Planting/revegetation (if appropriate)
- Monitoring
- Notification of any proposed works (DCNR, Municipality etc)
- Services on roadside (eg Powercor management practices)

[The more of these points that can be consistent for all roads in the municipality the better]

A Roadside Management Plan should aim to meet the following objectives:

- Protect and restore Indigenous vegetation communities
- Protect rare, significant or vulnerable species
- Maintain and enhance flora values
- Prevent further land degradation and improve water quality
- Prevent the spread of weeds
- Maintain and enhance visual and landscape qualities
- Protect cultural and heritage values
- Minimise fire risk.

(Source; Gisborne Roadside Management Plan)

Constraints which may affect the retention or protection of indigenous vegetation include interference with:

- tactical firebreaks
- Powercor and other services
- drains
- sight distances
- road structure
- road widening

(Source; Gisborne Roadside Management Plan)

3.6 Roadside Vegetation Management- The South Australian Example

South Australia's Native Vegetation Council (NVC) has produced guidelines for the management of roadside vegetation (1992).

Victoria does not have a body similar to the NVC to control Roadside Vegetation Management; instead local councils or Vic Roads manage roadsides on behalf of the Department of Conservation and Natural Resources. The VRCC does not have the legislative powers of the SA NVC but can assist councils in many ways.

In SA local councils refer to the NVC in regard to proposed works.

The NVC guidelines do provide some interesting information and an excellent guide for councils to follow. Some key points are summarised in figure 26:-

Figure 26 S.A. NVC Guidelines Summary

(Adapted from *Guidelines for the management of roadside vegetation* (1992) SA, Native Vegetation Council)

Main Principles to Guidelines include;

(a) Road reserves are corridors of land used for many purposes. While the safe movement of the travelling public is a key requirement, road reserves have become increasingly important for conservation reasons as vegetation has been removed from adjoining land.

(b) Local councils and other road management authorities have a responsibility to maintain adequate levels of safety and efficiency, but also have a responsibility to retain and protect roadside vegetation wherever possible.

(c) Road works programs and other activities which affect roadside vegetation should be subject to environmental assessment in much the same way as they are subject to engineering or technical assessment.

Clearance for road safety- Roadside Maintenance

Low shrubs and ground covers generally do not reduce road safety and, where possible should be retained in safety clearance zones. Ground cover species will help prevent weed invasion and erosion and therefore reduce roadside management costs.

Road Construction - New Works

For new roads or undeveloped roads - offsetting the road to one side of the road reserve is advocated to conserve a broader strip of vegetation. In cases where there is particularly important vegetation but where adjoining farmland is cleared it may be possible to acquire a strip of cleared land for the new road thus leaving the road reserve intact.

Road reconstruction

Road reconstruction will often involve widening or realigning sections of road and significant impact upon roadside vegetation is therefore possible. Consult with _____ (DCNR in Victoria). Particular attention needs to be given to the presence of shrub and ground cover species.

Control of Pest Plant and Animals

The value of native vegetation in suppressing weeds is being recognised more by local councils. In parts of SA roadsides are now being revegetated as a means of suppressing weeds in the long term.

- avoid off target damage by herbicides
- baits and poisons should be selected and used in a way which minimises the risk to native animals
- avoid extensive ripping of warrens where there is a good cover of native vegetation
- hand pull small infestations of weeds (avoid sprays)
- work from areas of low weed infestation in towards more densely infested sections

-pasture grasses and non-local Australian natives can also degrade native vegetation

Bushfire Hazard Reduction

Where a well vegetated roadside adjoins cleared farmland any required fence line firebreak should be established on cleared land rather than through clearance of roadside vegetation. Clearance of the road reserve should be the minimum needed to provide a reasonable degree of protection for the fence

Any larger fuel-reduced zones to be managed as refuge areas for motorists in a bushfire situation should be established on cleared or highly degraded sites

Slashing or mowing are preferable methods of maintaining fuel breaks. Methods which involve repeated soil disturbance are not favoured because of likely problems with weed invasion and erosion

A reasonable degree of fire protection can usually be attained by focusing fuel reduction activities upon exotic vegetation on roadsides

Clearance Along Powerlines and other services

New or replacement services to be established on cleared land wherever possible

Where services occur on roadsides the clearance of native vegetation should be kept to a minimum

The disturbance of understorey vegetation and soils (eg. through intrusion of vehicles and machinery) should be kept to a minimum.

Grazing of roadsides

Grazing of stock in areas of native vegetation can have a severe impact, damaging existing plants, encouraging weed invasion, compacting and polluting the soil and preventing natural regeneration.

Many roadsides have been degraded to the stage where they consist of mature trees over pasture grasses. The native understorey layers have been lost and the pasture grasses prevent or out-compete any regeneration of native species. In high bushfire risk areas the grasses may present a serious fire hazard. In this situation controlled grazing could be an acceptable means of hazard reduction.

Revegetation of roadsides

It is important that local native plants be used in rural road revegetation programs, using seed collected locally. Non-local plants even if Australian natives, will disrupt the local

ecology and may have the capacity to out-compete the local species and to become weeds.

For roadsides in and around rural townships a more flexible approach to species selection may be adopted. However, care should be taken to avoid species which have the capacity to spread into nearby bushland.

Replant near powerlines in accordance with guidelines.

On roadsides containing some remnants of native vegetation it may be possible to achieve revegetation through natural regeneration. Natural regeneration may be encouraged through control of exotic weeds and grasses.

Where natural regeneration is not an option direct seeding may be a cheap and effective approach using seed collected from nearby.

Formation of Local Roadside Vegetation Advisory Groups

Within South Australia several district councils have formed groups or sub-committees to provide advice on the management of native vegetation on road reserves and other council lands. This has proven to be very useful in several respects:

- eg
- in promoting community interest and involvement in roadside vegetation management;
 - providing the local council with direct access to local expertise;
 - in resolving particular local management issues;
 - in involving local people in roadside revegetation projects and other management programs (eg weed control);
 - in preparing applications to relevant funding bodies.

Councils are strongly encouraged to adopt this approach. Representation such as the following could be considered.

- councillors (1 or 2)
- animal and plant control officer
- district bushfire prevention officer
- representative of local LandCare group
- representative of local naturalist group
- representative of local community with interest in native vegetation management.

Further Information on roadside reserve management is contained in the Supplement Section B parts 1-13 inclusive.

References

- Spittle, Jeanette (1992). *Gisborne Roadside Management Plan. Part 1-Policies and Guidelines and Part 2-Operators Manual*. VRCC/Shire of Gisborne
- Scott, Kerry (1990). *Roadside Conservation Committee Roadside Assessment Manual*.
- Roadside Management Guide* (1990). Vic Roads
- Petris, Stephen & Spittle, Jeanette (1994). *Roadside Management Guidelines for Fire Prevention Planners*. CFA
- Breckwoldt R et al (1990). *Living Corridors, Conservation and Management of Roadside Vegetation*. Greening Australia.

4. RAIL RESERVES

Management Issues and Guidelines

4.1 Introduction- A short history of Rail in the Ballarat Region

The railway came quickly to the Ballarat region after establishment of the Victorian Railways Department in 1856.

Together with the Sandhurst (Bendigo) line, the Geelong-Ballarat railway was the first of the Colonial Government's main trunk lines, opened in 1862, and built to the best British standards of construction. These standards were never to be repeated.

The Government's decision to build one of its first trunk lines to Ballarat recalls the great importance of Ballarat and East Ballarat as an economic centre in the Colony and the largest mining centre of the world famous Victoria Central Goldfields.

The railway acted as a catalyst for the development and redevelopment of Lydiard Street North throughout the nineteenth century.

Ballarat Station was the Colony's busiest non-metropolitan station for a period during the nineteenth century, its pre-eminence only being surpassed at different times by Echuca and Geelong. The entire complex is expressive of this fact.

During 1860, the municipalities of Ballarat and Ballarat East competed for the site for a railway station at Soldiers Hill and Bakery Hill respectively. Ultimately, the Soldiers Hill site won out in terms of providing the location for the main Ballarat Station, with the "Star" reporting:

"Everything about the station itself will be most substantial, and when finished there will be hardly any station in the Colony equal to it in appearance".

Main trunk routes and branch lines were steadily added:

- 1875 – trunk routes to Maryborough and main western line to Ararat.
- 1881 – Ballarat racecourse branch.
- 1883 – Ballarat to Scarsdale branch.
- 1886 – Lal Lal racecourse and Ballarat cattleyards branches.
- 1887 – North Creswick to Daylesford branch.
- 1888 – Ballarat racecourse to Waubra branch.
- 1889 – Buninyong branch; main line to Melbourne via Bacchus Marsh.
- 1890 – Scarsdale to Linton branch.
- 1900 – Bungaree racecourse branch.
- 1904 – Burrumbeet racecourse branch.
- 1911 – Newtown to Irrewarra branch.
- 1916 – Linton to Skipton branch.

Traffic figures for the year 1884/5 for Ballarat showed 232,534 outward journeys and 368,772.5 inward journeys representing a total of more than twice that of Sandhurst, the nearest non-metropolitan rival. Inwards goods loading of 86,820 tons and outwards loading of 35,823 tons was the highest non-metropolitan aggregate loading in the Colony. In the same year, the Dowling Forest (Waubra line) and Ballarat racecourse platforms recorded a total of 20,231.5 inwards and outwards journeys.

Lines were progressively closed from 1940 onwards to the point today where the only branchline remaining in the Ballarat district is the Cattleyards (Redan) line.

4.2 Rail Lines: Current and Disused

Existing Rail Lines

Melbourne - Ballarat -> Western Victoria (at present to May 1995).

Ballarat - Geelong (North Shore).

Ballarat - Maryborough .-> Mildura

Ballarat Cattle yards branch line

Disused Rail Lines (not sold off)

Ballarat - Skipton

Ballarat - Cressy (Cross Country line) - parts of

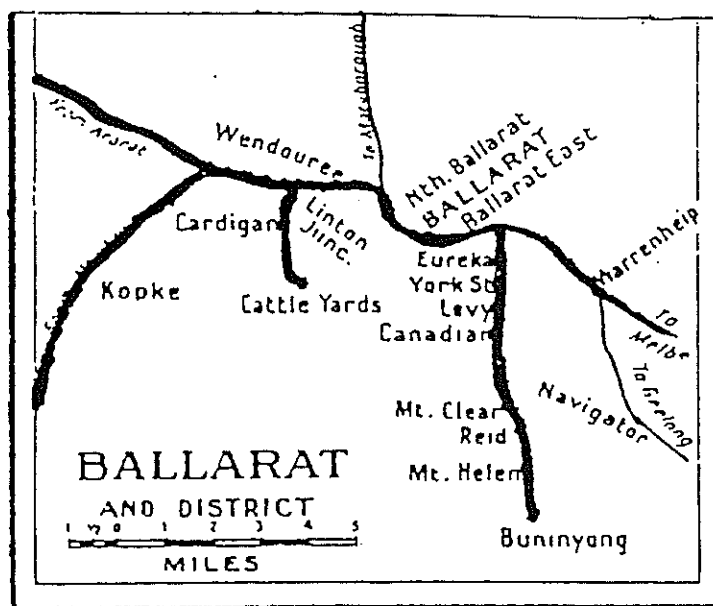
Learmonth and Waubra station grounds and part of the reserve through Learmonth

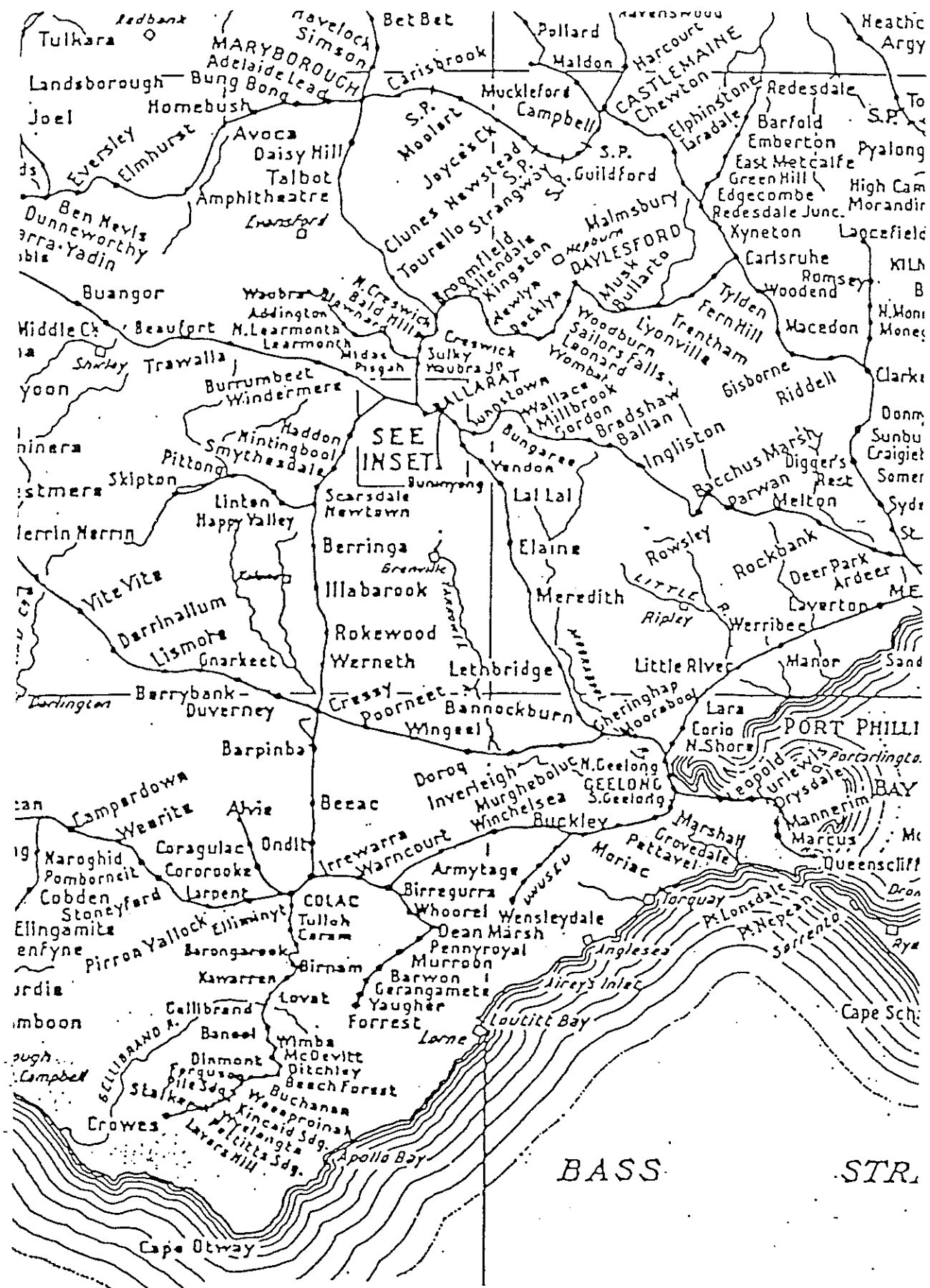
Ballarat - Buninyong (parts of)

Creswick - Newlyn .

Even small sections of the disused lines remaining in public ownership are often very important for the plant species and habitats they contain.

Figure 27 - Ballarat rail lines past and present.





4.3 Management of Reserves, PTC, the "Rail Trail" concept

The rail era of the late 19th century and early 20th century has left a legacy of important linear corridors. The management practices adopted for rail sides for much of the last century (until 1972) were sympathetic to the retention of native vegetation.

Apparently, the Victorian Railways burnt the rail reserves each year, sending a man from Melbourne-Geelong-Ballarat-Melbourne. He would leave Melbourne in November with a brief to burn the rail sides and return by Christmas. Some areas would burn well each year - others every few years.

What this management practice did do was maintain some magnificent diverse plant communities for much of the century and in particular native grasslands.

A change in management practices to spraying and slashing in the 1970's had an immediate and damaging result on these remnant grasslands. However, the rail lines still contain the best examples of native grassland and other vegetation and include a number of VROTS.

4.4 The Ballarat-Skipton Rail Trail

The Ballarat-Skipton linear reserve is being developed as a Rail Trail under a Victorian State Government program to turn disused lines into walking/cycling/horse riding trails. The line will be managed by a local committee of management once it is transferred from PTC to DCNR. (*Figure 28*).

The LINC'S Committee will have some input in assisting the management of the trail via the coordination of on-ground works by community groups.

Disused lines such as the Ballarat-Skipton Rail Trail have great recreation and Eco tourism potential.

The line contains many sections of significant vegetation (a variety of grasslands, Casuarina and Banksia woodlands and other communities), historic sites such as Nimons trestle Bridge, old station grounds, cuttings, sidings and the remains of settlements or historic buildings in towns near the line.

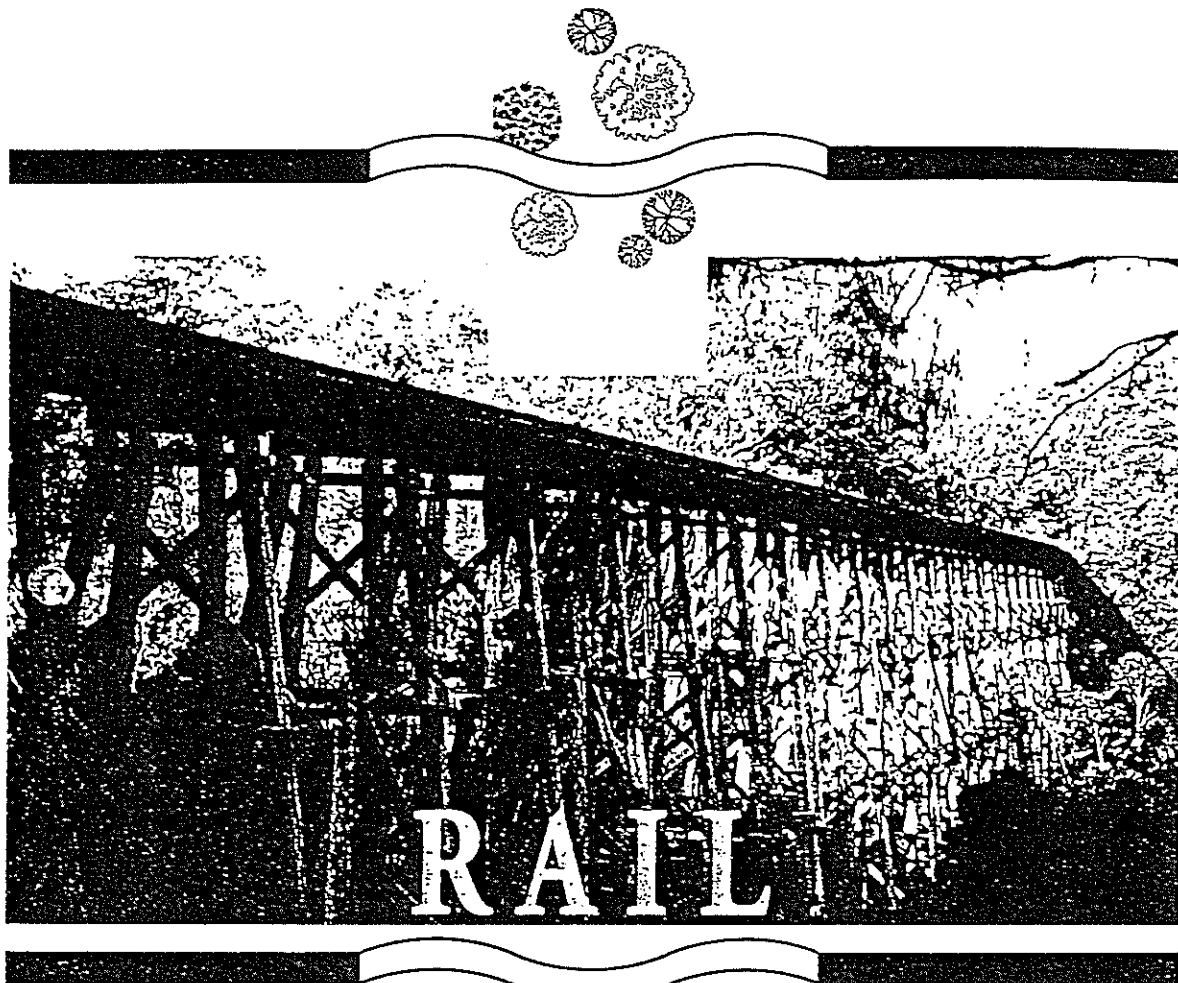
Further Information is contained in the Supplement, section D.

References

Harrison, Brett (1989). *Resource Inventory for the Ballarat-Skipton disused railway line*. DCNR Ballarat Region.

Rail Trails Victoria. Planning, design & management of multi-use recreational trails. (1994) Office of the Environment, DCNR.

Figure 20. The Rail Trail Concept.



TRAILS VICTORIA

PLANNING, DESIGN & MANAGEMENT
OF MULTI-USE RECREATIONAL TRAILS



5. STREAM RESERVES

Management Issues and Guidelines

5.1 Introduction: Catchments of the Ballarat Region

Ballarat is in a fairly unique position sitting at the headwaters of 5 different catchments near the top of the Great Dividing Range. Northern flowing streams are part of the Loddon system (part of the Murray basin). Southern flowing streams include parts of the Hopkins River system, Barwon River system, Corangamite basin and Moorabool River basin. (*Figure 6, Ch 2.3*).

5.2 Catchment Awareness, Water Quality and Signage

Ballarat's location potentially ensures it has access to good quality drinking water and there are many reservoirs close to Ballarat and the top of the Divide. It also means that we influence the water quality of all communities downstream. Our pollution, urban run-off, farm run-off, sediment loads, litter, increased flows from the concrete urban catchment, all negatively impact on those downstream from us.

We have a duty therefore to clean up our act. To treat our waterways with greater respect, prevent where possible pollution, nutrients, sediment, litter and other substances entering streams. A change in our attitude to waterways is required involving a shift from considering our waterways as drains to important community assets. This involves education and a greater community awareness of the problems.

The Yarrowee Case Study takes on some of these issues as does recent work by Central Highlands Water through the Waterwatch program and the Waterwise education package, policy papers and media statements.

Many schools, community and LandCare groups (*Figure 30*) are currently involved in monitoring streams in the region collecting data on a range of water quality parameters. These include temperature, pH, conductivity, dissolved oxygen, total phosphates and nitrates. The presence or absence of certain pollution sensitive Macro-invertebrates is also recorded as well as the amount of Algae present. Waterwatch is possibly the most effective way of raising community awareness, understanding and interest in water quality issues and concerns.

Ballarat has a real challenge before it to maintain and improve drinking water quality by the sensitive management of the catchments as well as to improve in-stream water quality for areas below Ballarat.

Figure 29. Yes it is a River!

GOVERNMENT GAZETTE 1971
(page 2138)

SURVEY COORDINATION ACT No 6388

Notice of the Alteration of a name;

Persuant to the powers under Section 29 of the above Act the Place Names Committee hereby gives notice that it has altered the Name of the Stream mentioned hereunder:-

Municipalities;- City of Ballaarat, Borough of Sebastopol
Shire of Bungaree and Buninyong.

Location:- From the source of the stream in the Shire of Bungaree to its junction with Williamson Creek.

Old Names:- Yarrowee Creek or Yarrowee or Leigh River.

New Name;- Yarrowee River.

By order of the Committee
C.E.E. Barlow
Secretary

Figure 30. Waterwatch Involvement in the region (source Waterwatch CHW newsletter).

Regional Round-Up - Whats happening around the region

There is a lot of Waterwatch activity happening within the Central Highlands Region. To date, seven secondary schools and an increasing number of community groups and landowners are becoming involved in collecting and analysing water samples.

Monitoring groups and sites.

Moorabool Basin

Ros Spiering
Moorabool River at Corkscrew Glen

Jim Seager
Several springs at Emily Park

Loddon Basin

Daylesford Secondary College
VCE Biology Unit 1
& Year 9 - 10 Science

Jim Crow Creek
Daylesford Lake

Cinnamon Evans

Nolah Creek,
Wombat State Forest

David Clarke, Lexton Landcare Group
Burnbank Creek
Mc Cullum Creek
Blackbottom Creek
Trawell Creek
No Name Creek at
Lexton

Julie Whyte, Bald Hills Landcare Group
Creswick Creek, Bald
Hills

Woody Yallock Catchment

Smythesdale Progress Association
Woody Yallock Creek
Several sites in the
Smythesdale area.

Barwon Basin

Mount Clear Secondary College
Unit 1 VCE Environmental Studies
Canadian Creek

Sebastopol Secondary College
Unit 1 VCE Environmental Studies
Unit 1 VCE Biology
Year 10

Yarrowee Creek near
Eclipse Motors
Redan Creek

Ballarat Secondary College
Midlands Campus
VCE

Yarrowee Creek,
Progress Park
Wendouree Campus

Friends of Napoleons Bushlands
Yarrowee Creek
Dog Trap Creek

Hopkins Basin

Wendouree Campus
Year 9 Science

Burrumbeet Creek at
Invermay

Ballarat High School
Year 10 General Science

Burrumbeet Creek at
Bo Peep

Ballarat and Queens Grammar.
Year 9

Burrumbeet Creek
above and below
Miners Rest

Proudly Sponsored by Central Highlands Water in conjunction
with Laminex Industries, Ballarat Goldfields N.L. and The City of Ballarat



Figure 31 CHW position paper No. 2 (Oct 1994)-Water Quality Management Strategy for Ballarat

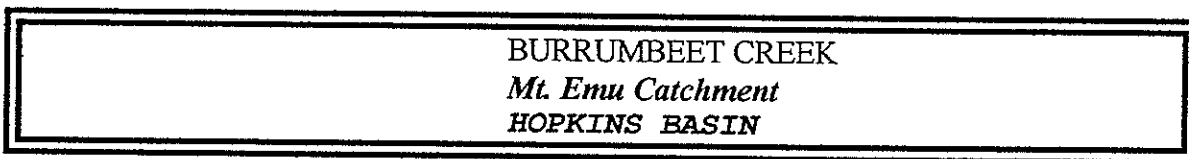
Section 4; The Problem to be solved - some solutions offered

"Continue and improve catchment management strategies to minimise impacts on watercourses and reservoirs of run-off from forests, farms, roads and urban stormwater and to secure the longer term viability of water sources for Ballarat"

"Promote and if necessary lead the planning processes which control changes in land use and management in the catchments in order to minimise risks to present and future water supply quality"

One of the best ways to raise awareness and change attitudes is to signpost all waterways in the region. At present, most tributaries and even many major stream crossings are unnamed. A design that includes the name of the catchment and the particular tributary would help raise awareness. Some examples are given below:

Figure 32 Catchment Signage



A design competition could be run to come up with suitable graphics for the signs.

The former City of Ballarat approved the signposting of streams in the municipality at all road crossings (*refer letter in Supplement*) however this has not taken place.

Issues affecting waterways are covered in detail in the Yarrowee River Corridor Case Study. In summary, the following issues should be considered for any stream in the region:

- Drainage issues - flooding
- Erosion and erosion control, salinity
- Revegetation and weed control

- Water quality - urban and farm run-off, pollution
- Litter - drain covers, litter booms and clean up days
- Water quality monitoring - Waterwatch
- Signage
- Nutrients and blue green algae
- Recreation, public access
- Stock access and grazing
- Gold mining and sand extraction
- In stream works - weirs, fords, fish ladders, crossings, bridges, vegetation clearance
- Environmental flow, diversions for irrigation or stock/domestic supply

Note permits must be obtained for any works on waterways if the waterway is a gazetted waterway as defined under the Water Act. Permits can be obtained from Southern Rural Water Authority.

It is hoped a litter trial will be conducted by the LINCIS Committee and the City of Ballarat shortly in a Ballarat suburban street. Side entry pit (drain) covers will be fitted (*Refer Figure 8, Ch.2*) and the amount of litter trapped monitored. Some estimates can then be made on the amount of plastic and other debris finding their way into drains from one street. This will help raise awareness of the problem and attacks the cause not the effect. One of these litter baskets, made from recycled plastic is currently on trial in Learmonth Road, Wendouree.

Regular cleaning of covers is an issue, but it is much easier to clear covers than to clear 30 km of banks and vegetation of litter.

Marking of drain entrances to show where they lead is another key method to raise awareness; for example "Yarrowee river system" and a statement such as "Please do not flush litter or pollutants into this system". Councils should cease the now illegal practice of flushing of street litter and gutters and investigate other methods of street cleaning. All council officers should be authorised by the EPA to act as litter officers with the capacity to charge persons for littering offences.

5.3 Catchment Rehabilitation

Some fundamental changes to our traditional approach to Catchment management need to occur for streams in the region to become less degraded.

The so called river improvement works of moving the water as quickly as possible, straightening and channelisation of streams, removal of bank side vegetation, logs and other obstructions to flow need to be reversed. We need to slow down streams, allow them to meander, encourage and restore bank side vegetation and variations in flow and depth to provide in stream habitats. Flood plains should be retained not built on or modified and wetlands and billabongs reinstated. Reed beds should be encouraged to

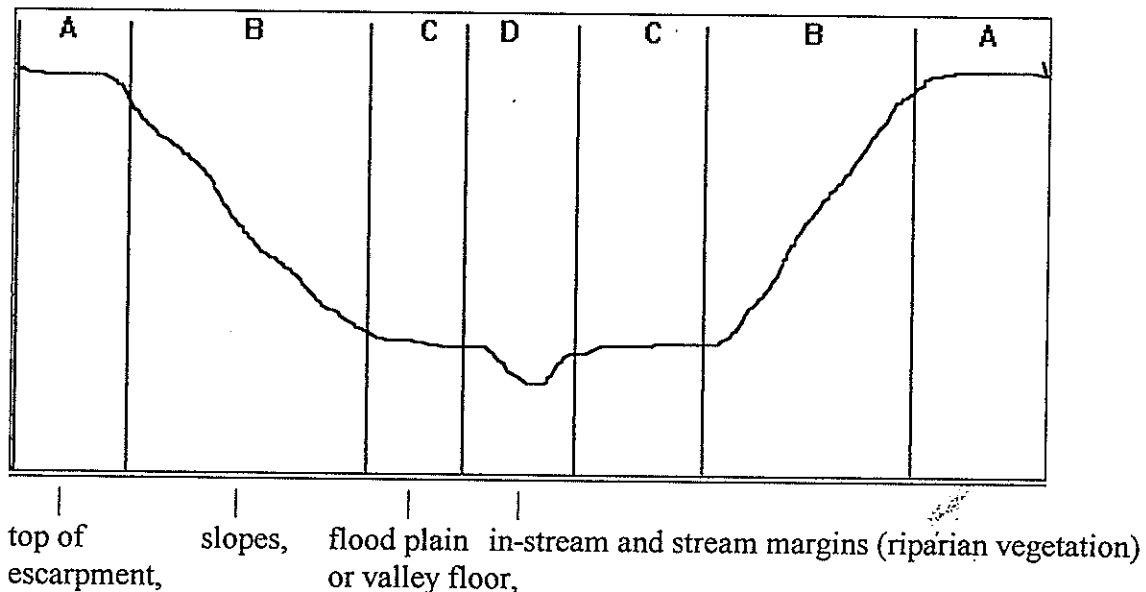
filter water, slow flow and remove sediment. In short allow rivers to adopt a natural path and flow.

Many of these changes in approach are starting to occur. Other essential measures include restriction of stock access to stream banks, control of rabbits and noxious and environmental weeds, altered fertiliser rates, provision of buffer vegetation strips, and modifying land use where necessary to protect catchments and water quality, improved urban run off management and storm water treatment and septic and sewage secondary treatment monitoring.

5.4 Riparian Vegetation

RIPARIAN AND RIVER VALLEY VEGETATION OF THE BALLARAT REGION (based on observations of existing vegetation)

Figure 33. Stream profiles (stylised)



KEY sample stream sites

1. Tullaroop & Birch's Creeks
2. Yarrowee River north of Ballarat
3. Leigh (Yarrowee) River, Mt Mercer
4. Smythes Creek (Woody Yaloak River), Smythesdale
5. Woody Yaloak River, Devils Kitchen
6. Woody Yaloak River, Happy Valley
7. Woody Yaloak River, Pitfield
8. Moorabool River, Meredith
9. Lal Lal Creek (falls)
10. Creswick Creek, Creswick

SPECIES NAME	COMMON NAME	(SOME) STREAM SITES AND ZONES OF OCCURRENCE
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TREES AND SHRUBS

<i>Acacia dealbata</i>	Silver Wattle	1/3/4/8/10, CD
<i>A. implexa</i>	Lightwood	3/6, BC
<i>A. melanoxylon</i>	Blackwood	1/2/3/4/5/6/7/8/9/10, BC
<i>A. mearnsii</i>	Black Wattle	3/4/5/6/8/10, B
<i>A. paradoxa</i>	Hedge Wattle	3/4/5/6/7, A
<i>A. pycnantha</i>	Golden Wattle	3/4/5/6/7/8, A
<i>A. retinodes</i>	Wirilda	2/3/4/5/6/7/10, BCD
<i>A. verticillata</i>	Prickly Moses	3, B
<i>A. littoralis</i>	Black She-oak	3/4, AB
<i>Allocasuarina verticillata</i>	Drooping She-oak	3/6, AB
<i>Banksia marginata</i>	Silver Banksia	3 (N of Mt Mercer on basalt, with Casuarinas)/4, A
<i>Bursaria spinosa</i>	Sweet Bursaria	2/3/4/5/6/7, BC
<i>Cassinia aculeata</i>	Dogwood	2/3/4, BC
<i>C. arcuata</i>	Chinese Scrub	2/3, A
<i>C. longifolia</i>	Shiny Cassinia	2(reserve) B
<i>C. uncata</i>	Sticky Cassinia	2 (Black Hill lookout), B
<i>Callistemon sieberi</i>	River Bottlebrush	1/3/5/6/7/8/10, D
<i>Callitris glaucophylla</i>	White Cypress Pine	3, B
<i>Coprosma hirtella</i>	Rough Coprosma	Gullies in Wombat Forest, May have occurred in wet gullies on Mt Buninyong, C
<i>Coprosma quadrifida</i>	Prickly Currant Bush	Buninyong Creek, C
<i>Correa glabra</i>	Rock Correa	3/5/6, B (especially base)
<i>Cyathea australis</i>	Rough Tree-fern	3, D

<i>Daviesia leptophylla</i>	Narrow-leaf Bitter-pea	2/3/4, AB
<i>Dicksonia antarctica</i>	Soft Tree-fern	6, Previously more common eg wet gullies Mt Buninyong, D
<i>Discaria pubescens</i>	Anchor Plant	9/10, C
<i>Dodonaea viscosa</i>	Giant Hop Bush	3/5/6/7/8, B and base of B
<i>Eucalyptus aromaphloia</i>	Scent Bark	2/3/4, AB
<i>E. baxteri</i>	Brown Stringy bark	4, A
<i>E. camaldulensis</i>	River Red Gum	3/6/7, BCD
<i>E. dives</i>	Broad-leaf Peppermint	4, A
<i>E. macrorhynca</i>	Red Stringy bark	4, A
<i>E. obliqua</i>	Messmate	2/4, AB
<i>E. ovata</i>	Swamp Gum	2, CD
<i>E. radiata</i>	Narrow-leaf Peppermint	2/3/4, BC
<i>E. rubida</i>	Candlebark	1/4, Also Yarrowee & tributaries around Napoleons, CD
<i>E. viminalis ssp viminalis</i>	Manna Gum	2/3/8/9, BCD
<i>E. yarraensis</i>	Yarra Gum	2/4, CD
<i>E.viminalis ssp cygnetensis</i>	Rough-bark Manna Gum	3/4, C
<i>Exocarpos cupressiformis</i>	Cherry Ballart	2/3/4/5/6/8, B
<i>Goodenia ovata</i>	Hop Goodenia	2/3/8, B (especially base)
<i>Gynatrix pulchella</i>	Hemp bush	2/3/5/6/9, C
<i>Hymenanthera dentata</i>	Tree Violet	3/5/6/7/8/9/10, ABCD
<i>Kunzea ericoides</i>	Burgan	8, AB
<i>Leptospermum continentale</i>	Prickly Tea-tree	1, A
<i>L. lanigerum</i>	Woolly Tea-tree	1/3/5/6/7/8 Pound Creek spring reserve Mt. Buninyong, D
<i>L. myrsinoides</i>	Silky Tea-tree	3/4, B
<i>L. obovatum</i>	River Tea-tree	3/6/7/10, C
<i>Myoporum viscosum</i>	Boobialla	3/5/6, B rocky esc.
<i>Olearia argophylla</i>	Musk Daisy-bush	Occurred in wet gullies on Mt Buninyong, C
<i>Ozothamnus ferrugineus</i>	Tree Everlasting	2/4, BC
<i>Pomaderris racemosa</i>	Cluster Pomaderris	3, B
<i>Prostanthera nivea</i>	Snowy Mint-bush	3, B
<i>Solanum laciniatum</i>	Kangaroo Apple	2/3/5, B

GROUND COVERS

<i>Adiantum aethiopicum</i>	Maiden-hair	2/3/5, base of B
<i>Asperula scoparia</i>	Prickly Woodruff	2/3, B
<i>Carex appressa</i>	Tall Sedge	1, CD
<i>Carex inversa</i>	Tassel Sedge	3, CD

<i>Carpobrotis modestus</i>	Inland Pigface	3/5/6/8, B
<i>Cheilanthes austrotenuifolia</i>	Rock Fern	3, B base of
<i>Chenopodium glaucum</i>	Glaucous Goosefoot	3, B
<i>C. pumilio</i>	Clammy Goosefoot	1, B
<i>Clematis microphylla</i>	Small-leaved Clematis	3/6/7, B
<i>Cynoglossum suaveolens</i>	Sweet Hound's-tongue	1/3, C
<i>Dianella revoluta</i>	Black-anther Flax-lily	2/3/4, BC
<i>Dichelachne rara</i>	Plume Grass	3, B
<i>Einadia hastata</i>	Saloop Saltbush	3, B
<i>Enchylaena tomentosa</i>	Ruby Saltbush	3, B
<i>Lepidosperma laterale</i>	Variable Sword-sedge	3, BC
<i>Lomandra filiformis</i>	Wattle Mat-rush	2/3, AB
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Widespread, BC
<i>Microlaena stipoides</i>	Weeping grass	2/3, C
<i>Poa labillardieri</i>	Tussock grass	Widespread, ABCD
<i>Senecio quadrifidus</i>	Cotton Fireweed	2/3/5/6/7, C
<i>Senecio spp.</i>	Fireweeds & Groundsels	2/4, C
<i>Stellaria pungens</i>	Prickly Starwort	2/3, B
<i>Stipa spp</i>	Spear grasses	3, B
<i>Themeda triandra</i>	Kangaroo grass	Widespread, AB
<i>Tricoryne elatior</i>	Yellow Rush-lily	2/3/4, AB
<i>Viola hederacea</i>	Ivy-leaved Violet	3, C

AQUATICS AND SEMI AQUATICS

<i>Crassula helmsii</i>	Swamp Crassula	Widespread, margins
<i>Eleocharis acuta</i>	Common Spike-rush	1, D
<i>Juncus spp.</i>	Rushes	Widespread, margins
<i>Phragmites australis</i>	Common Reed	Widespread, margins
<i>Potamogeton crispus</i>	Curly Pondweed	2/3/8, aquatic
<i>Triglochin procera</i>	Water-ribbons	1/2/3/4/5/6/7/8, aquatic
<i>Typa spp.</i>	Bulrush	Widespread, margins
<i>Vallisneria spiralis</i>	Eel-weed	10, aquatic

OTHER COMMENTS ON RIPARIAN VEGETATION

The major weed species occurring on waterways in the region and requiring control are Gorse, Blackberry, Fennel and Willows.

At most elevated sites streams have cut down through the Ordovician layer to the underlying basalt. The Leigh river south of Mt Mercer has cut down further still and exposed the Tertiary Sedimentary sequence and Palaeozoic bedrock. This section of river has an extremely diverse range of plants, particularly shrubs on the rocky escarpments, occurring along it. The Leigh River from the Williamson's Creek junction to Shelford

should be protected at all costs due to this diversity and intactness. Currently Water Frontage Reserve it should be altered in status to Flora and Fauna reserve to ensure it is not sold off and so that it can be managed by the Parks section of DCNR.

Very little indigenous vegetation exists along the stretch of the Yarrowee River south of Ballarat to the Williamson's Creek confluence. Notable remnant trees include Candlebarks in the river valley around Durham Lead and Napoleons and as far as the Dredge Reserve Buninyong, all showing a distinct Redgum-like form. A single Yarra gum still occurs on Ross Creek, Napoleons near the junction with the Yarrowee River on Nolan's farm and a Swamp Gum on Gaunt's farm near the Midland Hwy/Colac Rd intersection. Swamp and Yarra Gums are dotted in paddocks around Wiltshire Lane but are in poor condition and threatened by development (It would appear that the area to the West of the Yarrowee bounded by Latrobe St/Carngham Rd and Winters Creek was once an extensive Swamp/Yarra Gum woodland with occasional Snow Gums also present. A small patch of bush exists near Martin Drive, Delacombe which would make an excellent pocket park of this vulnerable vegetation community.

North of Ballarat on the Yarrowee Manna Gums still exist in places, for example near Ditchfields Lane however construction of the Bypass removed the best section of native vegetation).

Further Information on Stream management is contained in the Supplement, Section C parts 1-23 inclusive.

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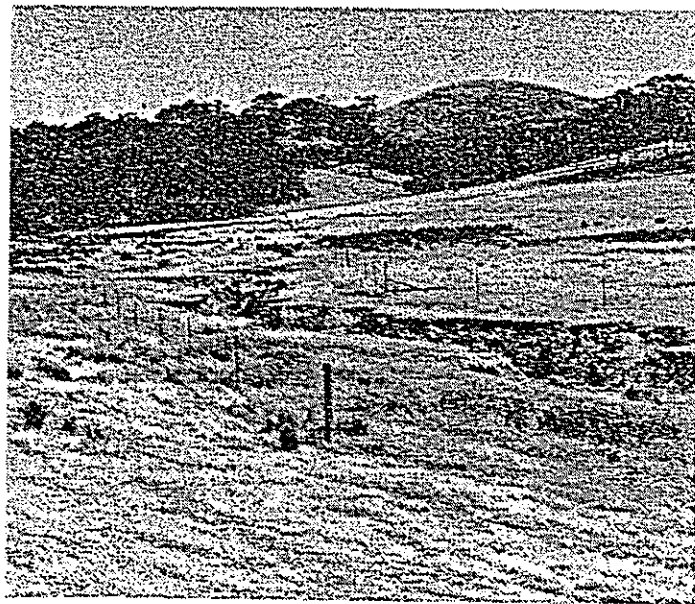
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Figure 34 - Erosion Control Using Local Riparian Vegetation
(Source LFW News Vol.1 No.2)



Retaining native vegetation along streams can prevent expensive problems such as this eroding gully which is being revegetated using local native species to control the erosion, provide shade and shelter for stock, create recreational areas and wildlife habitat. The aim is to make a continuous link with crown land on adjacent hills. Fencing followed by extensive planting or natural regeneration is the first step. Expensive programs to control erosion can be prevented by retaining natural vegetation along stream banks. Vegetation offers long-term protection from erosion as well as other values such as wood and, if local native species are used, wildlife.

6. RESOURCE INVENTORY

Areas and linear reserves in italics are shown on the accompanying LINC'S 1:30,000 scale map.

6.1 Areas for connection: Major forest blocks, Urban Ballarat, Parks and Lakes etc.

Urban Ballarat

City Of Ballarat

Forests

Mt Buninyong
Mt Warrenheip
 Lal Lal State Forest
 Mt Egerton
Creswick State Forest
Enfield State Forest
Canadian Forest
 Wombat State Forest
 Mt Beckworth
 Trawalla block
 Mt Misery
Union Jack Reserve
 Mt Erip

Natural Features

Mt Emu
 Mt Bolton
 Black Hill
Mt Rowan

Lakes

Lake Wendouree
 Lake Learmonth
 Lake Burrumbeet
 Lake Wongan
 Hepburn Lagoon
 Lake Goldsmith
 Black Lake

Wetlands

Winters Swamp
Flaxmill Swamp
Horse Lagoon
Dereel Lagoon
Bittern Lagoon

Reservoirs

White Swan
Gong Gong
Kirk's
Pincott's
Lal Lal
Wilson
Moorabool
Newlyn
Cosgrove
Dean
Beales

Parks, Reserves and Golf Courses (Urban open space)

Lake Wendouree
Victoria Park/Ballarat Botanic Gardens
Pryor Park
Ballarat Common
Eureka Stockade Park
Nerrina Historic reserve
Buninyong, Midlands, Ballarat and Xavier golf courses
Lake Esmond
Ballarat University Grounds and Arboretum
The Dredge reserve
Mt Pleasant Primary School (refer Urban Nature Report)
Tannery Flat (De Soza park, Buninyong)
St Martins in the Pines
Lal Lal Falls Scenic Reserve
Lal Lal - Bungal Historic Area
Masthead Park
Linton Flora and Fauna Reserve
Chisholm Street reserve
Brown Hill reserve
Marty Bush Reserve
Sparrow ground

Cemeteries

Old Ballarat
New Ballarat
Buninyong

6.2 Road Reserves of Medium and High Conservation Value

Reserves in Italics are at least partly shown on the accompanying LINCIS map.

MAP KEY	
Dark Blue —————	Major Road links to Ballarat
Green —————	High Conservation Value
Green -----	Medium Conservation Value
Red —————	Key Missing links

ROAD NAME AND DESCRIPTION	NEW MUNICIPALITY	CONS. STATUS
<u>Former Shire of Bungaree:-</u>		
<i>Alkera Rd, (North of White Swan Rd) Invermay</i>	City of Ballarat	medium
<i>Clearview Rd, Invermay</i>	City of Ballarat	medium
<i>Dawes Rd, Invermay</i>	City of Ballarat	medium
<i>Millers Rd, (Slatey ck Rd to Banksia Rd) Invermay</i>	City of Ballarat	medium
<i>Silver Wattle dve, Invermay</i>	City of Ballarat	high
<u>Former Shire of Ballarat:-</u>		
Mt Bolton Rd , NW section of shire	City of Ballarat	high
Sandpit Rd, NW	City of Ballarat	high
Eastern Peake Rd, NW	City of Ballarat	high
Drifes Rd, NW	City of Ballarat	high
Cattle Station Hill Rd, NW	City of Ballarat	high
Road res. cont. NE of Cattle Station Hill Rd, NW	City of Ballarat	high
<i>Gillies St, NW</i>	City of Ballarat	high
Road res. running E from Gillies St and Addington-Creswick Rd, NW	City of Ballarat	high
Road res running W from Cattle Station Hill Rd (joins Ascot Hall Rd), NW	City of Ballarat	high
Ascot Hall Rd, NW	City of Ballarat	high
<i>Sulky Rd, Bald Hills (BH) area</i>	City of Ballarat	high
Grays Rd, BH	City of Ballarat	high
Blackmores Rd, BH	City of Ballarat	high
Jubilee Rd, BH	City of Ballarat	high
Boundary Rd, BH	City of Ballarat	high

Schwartz's Rd, BH	City of Ballarat	high
Sims Rd, BH	City of Ballarat	medium
Muir Rd, BH	City of Ballarat	medium
Sharpes Rd, BH	City of Ballarat	medium
Miners rest Rd, BH	City of Ballarat	medium
Midas Rd, BH	City of Ballarat	medium
Battery Rd, BH	City of Ballarat	medium
Slattery Rd, BH	City of Ballarat	medium
Sweeney Rd, BH	City of Ballarat	medium
Scott Rd, BH	City of Ballarat	medium
Masons Rd, BH	City of Ballarat	medium
Grills Rd, BH	City of Ballarat	medium
Road res. off Pound Hill Rd, SE section	City of Ballarat	high
Kennedy's Rd, SE	City of Ballarat	high
Road res running S of Garlands Rd, SE	City of Ballarat	high
New Winters Swamp Rd, SE	City of Ballarat	high
Learmonth St, SE	City of Ballarat	high
Finches Rd, SE	City of Ballarat	high
Western hwy, SE	City of Ballarat	medium
Blind Creek Rd, SE	City of Ballarat	medium
Powells Rd, SE	City of Ballarat	medium
Howitt St, SE	City of Ballarat	medium
Airport Access Rd, SE	City of Ballarat	medium
Learmonth Rd (Sunraysia hwy), SE	City of Ballarat	medium
Morgans Rd, SW	City of Ballarat	medium
Weatherboard-Addington Rd, SW	City of Ballarat	medium
Southern access Rds to Lake Learmonth, SW	City of Ballarat	medium
Fentons Rd, N	City of Ballarat	medium
Glendaruel-Creswick Rd, N	City of Ballarat	medium
Lesters Rd, NE	City of Ballarat	medium
Andersons Rd, NE	City of Ballarat	medium
Charlesons Rd, NE	City of Ballarat	medium
<u>Former Shire of Buninyong</u>		
Ballarat-Navigators Rd North central area (Buninyong, Canadian, Warrenheip, Yendon and Scotsburn)	N-City of Ballarat S-Shire of Moorabool border	high
Lyons Rd, NC	Shire of Moorabool	high
Yendon No 1 Rd, NC	City of Ballarat	high
Mt Buninyong access Rd, NC	City of Ballarat	high
Triggs Rd-Skelton's Rd, NC	Shire of Moorabool	high
Butler's Rd and Lyons South Rd, NC	Shire of Moorabool	medium
Nash's Rd, (Bedwell lane-Webbs hill Rd) NC	City of Ballarat	medium
Boundary and Green Hill Rds, NC	City of Ballarat/Shire of Moorabool border	medium
Spreadeagle Rd, Duggans la, North East area	Shire of Moorabool	high

(Wallace, Millbrook, Egerton, Lal Lal, Yendon)	Shire of Moorabool	
Diamonds Rd, NE	Shire of Moorabool	high
Old Melbourne Rd, NE	Shire of Moorabool	medium
Sharrock's la S of Trounces Rd, Trounces Rd and Mc Intosh Rd, NE	Shire of Moorabool	medium
Lal Lal Falls Rd, (between Lal Lal & Diamonds Rd)	Shire of Moorabool	medium
Iron mine Rd and Rotten la, NE	Shire of Moorabool	medium
<i>Kitty's lead, SW area (Napoleons, Enfield)</i>	Golden Plains Shire	high
<i>Log Hut Rd, SW</i>	Golden Plains Shire	high
<i>Morris Rd, SW</i>	Golden Plains Shire	high
<i>Mc Kees Rd, SW</i>	Golden Plains Shire	high
<i>Souths Rd, Southern Central area (Durham Lead, Garibaldi, Clarendon, Grenville, Mt Mercer)</i>	Golden Plains Shire	high
<i>Peers la, SC</i>	City of Ballarat	high
<i>Scott's la, SC</i>	City of Ballarat	high
<i>Unnamed track linking Scott's la & Pryors Rd, SC</i>	City of Ballarat	high
<i>Track (two) linking Pryors Rd & Hopwoods Rd, SC</i>	City of Ballarat	high
<i>Pryors Rd, (Scott's la-Sands Rd) SC</i>	Ballarat/Moorabool boundary	medium
<i>Sands Rd (Pryors Rd -Rosenow's la) SC</i>	Ballarat/Moorabool boundary	medium
Arthur's la, SC	Golden Plains Shire	medium
Cahirs and Mc Kennals Rd, SC	Golden Plains Shire	medium
Flemings Rd, SC	Golden Plains Shire	medium
<i>Ravas la and Hardies Hill Rd, SC</i>	Golden Plains Shire	medium
<i>South Durham and Bridge Rds, SC</i>	Golden Plains Shire	medium
Elaine-Blue Bridge Rd & Mt Doran Settlement Rd	Shire of Moorabool	high
South Eastern area (Clarendon, Mt Doran, Elaine)	Shire of Moorabool	
Mystery la, SE	Shire of Moorabool	high
Mc Alister's Rd SE	Shire of Moorabool	high
Mt Doran-Egerton Rd & Elaine-Mt Doran Rd, SE	Shire of Moorabool	medium
Blue Bridge Rd, SE	Shire of Moorabool	medium
<i>Fisken Rd from Midland hwy, Mt Helen</i>	City of Ballarat	high
<i>Midland hwy (Buninyong ck bridge north-top of hill)</i>	City of Ballarat	high
<i>Hitchcock's Rd, Buninyong</i>	City of Ballarat	high
<i>Sandy's Hill Rd, (Walsh's lane-Macleods Rd) Buninyong</i>	City of Ballarat	high
<u>Former Shire of Grenville</u>		
Rankins Rd, Mannibadar	Golden Plains/Corangamite boundary	high

Skipton-Geelong Rd, near Illabrook	Golden Plains Shire	high
Bradshaws Rd, Mt Kinross	Golden Plains Shire	medium
Willowvale Rd, Mt Kinross	Golden Plains Shire	medium
<i>Post Office Rd, Smythes Creek</i>	Golden Plains Shire	high
Blackmores Rd, Geelong Skipton Rd, Lismore Rd and Willowvale Rd have a Roadside Management Plan-prepared by Habitat Works (1992)	Golden Plains Shire	
Linton - Pitfield Rd (LCC roadside)	Golden Plains Shire	high
Linton - Mt Kinross Rd (LCC roadside)	Golden Plains Shire	high
Illabrook Rd (LCC roadside)	Golden Plains Shire	high
<u>Former Shire of Leigh</u>		
Mt Mercer-Shelford Rd	Golden Plains Shire	high
Shelford-Cressy Rd	Golden Plains Shire	high
(Man. plans Prep. by Habitat Works, 1992)		
<u>Former Shire of Ripon</u>		
Carngham Rd at Chepstowe	Shire of Pyrenees	high
Carngham Rd near Streatham	Shire of Pyrenees	high
Skipton Rd	Shire of Pyrenees	medium
Stockyard Hill Rd	Shire of Pyrenees	
Eurambeen-Streatham Rd	Shire of Pyrenees	sig. veg.
Beaufort Rd, Skipton	Shire of Pyrenees/Shire of Ararat boundary	sig. veg.
Chepstowe - Mt Emu Rd	Shire of Pyrenees	sig. veg.
<u>Former Shire of Hampden</u>		
Chatsworth Rd (between Deep Lake and stock grid)	Shire of Ararat	high
Lower Darlington Rd	Shire of Corangamite	medium
<u>Former Shire of Creswick</u>		
(section number given in brackets)		
?Unused road reserve, crossing Lawrence Rd (3A, 3B, 3C)	Creswick- Shire of Hepburn	high, medium medium
Lawrence-Glengower Rd (4A, 4B)	Shire of Hepburn	medium
Turkey Hill Rd (5B)	Shire of Hepburn	high
Wrigley's Rd (6A, 6B)	Shire of Hepburn	medium
Pasco's Rd (8A, 8B, 8C, 8D)	Shire of Hepburn	high, medium medium medium
Ewan Charleson's Rd (9A, 9B)	Shire of Hepburn	medium
R Charleson's Rd (10B, 10C)	Shire of Hepburn	medium
Loan Hand Rd (14A)	Shire of Hepburn	medium

Beaconsfield Rd (15A)	Shire of Hepburn	medium
Hills Rd, East-west (17B)	Shire of Hepburn	medium
Nolan's Rd (18A)	Shire of Hepburn	medium
Weatherson's Rd (24A)	Shire of Hepburn	medium
Deep creek Rd (28B, 28C)	Shire of Hepburn	medium
Mc Kenzies Rd (30A)	Shire of Hepburn	medium
Hills Rd, North-south (31A)	Shire of Hepburn	medium
Mark's Rd (34A)	Shire of Hepburn	medium
Kelly's Rd (37A)	Shire of Hepburn	medium
West from Creswick-Newstead Rd 3 chain Rd continued (40A)	Shire of Hepburn	medium
Bowies Rd (41B)	Shire of Hepburn	medium
Cemetery Rd (42A)	Shire of Hepburn	medium
Ullina-Kooroocheang Rd (44F, 44G)	Shire of Hepburn	high, medium
Blampied-Kooroocheang Rd (45A, 45B)	Shire of Hepburn	medium, high
Captains Rd (46A)	Shire of Hepburn	medium
?Old Creswick-Newstead Rd, Stoney rises (47A, 47C)	Shire of Hepburn	medium
Williams Rd, Kooroocheang (48A, 48B, 48C, 48E, 48F, 48G, 48H, 48I)	Shire of Hepburn	ABCF- medium EG-high BF medium CDE- high
Wilson's Rd (50B, 50C, 50D, 50E, 50F)	Shire of Hepburn	high, medium, medium
Muddy creek Rd (51A, 51B, 51D)	Shire of Hepburn	medium medium
Lang's Rd (53C)	Shire of Hepburn	medium
Morganti's Rd (54A)	Shire of Hepburn	medium
Werona-Kingston Rd (60A, 60B, 60D)	Shire of Hepburn	high, medium, medium
Blampied-Mollonghip Rd (62D)	Shire of Hepburn	medium
Ti-tree Rd (63A, 63B)	Shire of Hepburn	high, medium
Kangaroo hills Rd (65D)	Shire of Hepburn	medium
Frenchman's {King's} Rd (68D, 68E)	Shire of Hepburn	medium
Allendale reservoir Rd (69B)	Shire of Hepburn	medium
Smokeytown Rd (81A, 81B)	Shire of Hepburn	medium, high
Mc Millans Rd (82A, 82B)	Shire of Hepburn	high

Acacia drive (83A, 83B)	Shire of Hepburn	high, medium
?Old Creswick-Smeaton Rd (85B)	Shire of Hepburn	medium
Graham Rd (86A)	Shire of Hepburn	medium
Barby's Rd (87A, 87B)	Shire of Hepburn	medium, high
?East from Creswick-Smeaton Rd, Opp. Barby's Rd (88A)	Shire of Hepburn	high
Gedds Rd (89A)	Shire of Hepburn	medium
Australasia drive (90A, 90C)	Shire of Hepburn	medium
Jubilee Rd (92B, 92C)	Shire of Hepburn	medium
Boundary Rd (93A, 93C, 93D)	Shire of Hepburn	high
?Track East of Boundary Rd (93E)	Shire of Hepburn	high
Blackmoor's Rd (94A)	Shire of Hepburn	medium
Kelly's lane (95A, 95B)	Shire of Hepburn	medium, high
Hyde park Rd (96A, 96B)	Shire of Hepburn	medium
Creswick-Bald Hills Rd (97D)	Shire of Hepburn	medium
Creswick-Ascot Rd (98A, 98D, 98E)	Shire of Hepburn	medium
Hurn's Rd (99A, 99B)	Shire of Hepburn	high
Treweek's Rd, Blampied (100A, 100B)	Shire of Hepburn	high, medium
Telegraph Rd (103C)	Shire of Hepburn	high
?North from Telegraph Rd (104A)	Shire of Hepburn	medium
?South from Telegraph Rd (105A, 105B)	Shire of Hepburn	medium
Langdon's Hill Rd (106D)	Shire of Hepburn	medium
Suckung's Rd (107B)	Shire of Hepburn	medium
Barkstead-Dean Rd (109C, 109D)	Shire of Hepburn	high
?North from Rocklyn (110A)	Shire of Hepburn	medium
Newlyn Reservoir Rd (111B)	Shire of Hepburn	medium
Longswamp Rd and cont. east (117B, 118A)	Shire of Hepburn	medium
?South from Meyer's Rd (121A)	Shire of Hepburn	medium
?Old Midland hwy, E of Smokeytown Rd (123A)	Shire of Hepburn	medium
?South from Sawmill Rd (129A)	Shire of Hepburn	medium
Bowen's lane (136B, 136C, 136D, 136E)	Shire of Hepburn	medium, high, medium, high
Creswick-Dean Rd (138B, 138C, 138D, 138E)	Shire of Hepburn	BDE- medium
?South from Creswick-Dean Rd, W of Smith's Rd (139A, 139B)	Shire of Hepburn	C-high high
Bungaree-Creswick Rd (140A, 140B, 140E)	Shire of Hepburn	medium

<i>?West from Bungaree-Creswick Rd, opp.</i>	Shire of Hepburn	high,
<i>Howard's Rd (141A, 141B)</i>		medium
<i>Howard's Rd (142A, 142B)</i>	Shire of Hepburn	medium
<i>Smith's Rd, Dean (143A, 143B)</i>	Shire of Hepburn	medium,
		high
Cheney St, Creswick (145A)	Shire of Hepburn	medium
Liddicote drive (153A)	Shire of Hepburn	medium
Creswick-Smeaton Rd (154B, 154C)	Shire of Hepburn	medium
Gillies Rd (155A, 155B)	Shire of Hepburn	medium,
		high
Mendam's dam Rd (156A)	Shire of Hepburn	medium
Clunes-Creswick Rd (157B)	Shire of Hepburn	medium
Creswick-Newstead Rd (158F, 158G)	Shire of Hepburn	high
<i>Midland hwy (159B, 159C, 159K, 159L, 159N)</i>	Shire of Hepburn	medium
Ullina Rd, Creswick (LCC roadside)	Shire of Hepburn	high

Note further assessment of roadsides in the basalt plains section of the Golden Plains Shire was undertaken in 1995 by Mark Trengrove in the Bannockburn sector and Tym Barlow in the Rokewood sector. A summary of the results of the Rokewood sector study are included here

Additional Information :

Roadside Survey conducted by Tym Barlow in Golden Plains Shire

List of Roadsides containing good community representation
(but not necessarily VROTS).

Dereel

Dereel -Mt Mercer Rd (part)
Tippets Rd
Faggs Rd
Colac Hwy (part)
Ferrars Rd (part)
Camms Rd
Rokewood Junction Rd (part)
Mc Phersons Rd (part)
Paynes Bridge Rd (part)
Reservoir Rd (part)

Corindhap

Mc Cal Lane
Nestors Rd
Geggies Rd (part)

Rokewood Junction

Chathams Rd (part)
Rokewood Junction Rd (part)
Cape Clear - Rokewood Rd (part)

Rokewood

Geggies Rd (part)
Two Bridges Rd (part)
Geelong - Portland Rd (part)

Werneth

Cressy - Shelford Rd

Mt Mercer

Rices Rd (part)

Linton - Pittong

Linton - Mannibadar Rd (part)
Francis Lane (part)
Happy Valley rd
Pittong - Snake Valley Rd
Glenelg Hwy (part)
Linton - Mortchup Rd (part)
Kennedys lane (part)

Mannibadar - Pitfield

Linton - Mannibadar rd (part)
Geelong - Portland Rd (part)
Ryans Rd (part)
Lismore - Pittong rd (part)
Cressy - Pitfield Rd (part)

Wallinduc - Wingul

Padgetts Lane & Lismore rd (part)
Urches Rd (part)
Werneth - Berrybank Rd (part)
Burgers & Quarrells Rd (part)
Brindleys Rd (part)
Lismore Rd (part)

References:-

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- Mc Dougal et al, Habitat Works (1991). *Native grassland sites of significance and species rescue in the Ballarat-Skipton area, Victoria*. Australian National Parks and Wildlife Service (ANPWS) report, Latrobe University
- Habitat Works (1992). *Roadside Management Plan. Blackmore's Rd, Geelong-Skipton Rd, Lismore Rd & Willowvale Rd*. Shire Of Grenville
- Habitat Works (1992). *Roadside Management Plan. Mt Mercer Road*. Shire of Leigh
- Habitat Works (1992). *Native Grassland sites of Significance & Species Rescue on the Western Basalt Plains, Victoria*. ANPWS report. Latrobe University
- Leversha, Janet (1993). *Assessment of roadside conservation values in the Shire of Creswick*. Ballarat University
- *Report on the Ballarat Area* (1980) Land Conservation Council, Victoria

6.3 Rail Reserves

Reserves in Italics are at least partly shown on the accompanying LINCS map

MAP KEY	
<i>Existing rail line</i>	<i>Brown</i> —————
<i>Disused lines (crown land)</i>	<i>Brown</i> - - - - -

Existing Rail Lines

Geelong (North Shore)-Ballarat

Melbourne-Ararat

Ballarat-Maryborough

Ballarat-Saleyards

Disused Rail Lines

Ballarat-Buninyong (part)

Ballarat-Skipton Rail Trail

Newtown-Cressy (part)

Creswick-Newlyn

Waubra - Learmonth

6.4 Stream Reserves

*Streams in Italics at least partly shown on the accompanying LINCS map.
Bracketed numbers refer to the Victorian Drainage Basin Classification*

MAP KEY	
<i>Rivers and streams</i>	<i>Light Blue</i> —————

BARWON BASIN (33)

Yarrowee River Catchment

Yarrowee River

Williamson's Ck, Back Ck Clarendon, Monmouth Gully Garibaldi, Buninyong Ck Buninyong, Dog Trap Ck Napoleons, Ross ck, Winter Ck, Canadian Ck, Little Bendigo Ck, Gong Gong Ck, Giles Ck, Lake Wendouree, Ballarat South Treatment Plant, Gong Gong, Kirks, Pincotts and White Swan reservoirs
City Tributaries: Pennyweight gully, No 3 Channel, Specimen Vale, Warrenheip Gully, Redan Ck, Water St, Black Hill Ck, Gnarr Ck, Gladstone Ck.

HOPKINS BASIN (36)

Mt Emu Creek Catchment

Mt Emu Creek

Broken Ck (Emu Ck to origin), Reedy Ck, Spring Hill Ck, Fiery Ck, Middle Ck, Baille Ck, *Burrumbeet Ck*, Trawalla Ck.
 St Enoch's Res, Lake Goldsmith, Bittern Lagoon, Horseshoe Lagoon, Lake Ercildoun, Lake Burrumbeet, Cockpit Lagoon, Black Swamp and drains, Lake Learmonth, Mortons cutting, *Ballarat North Waste water Plant, Winters Swamp*, Slaters Lake, Lake Beaufort, Troy res, Musical Gully Reservoir

LODDON BASIN (7S)

Loddon River South Catchment

Tullaroop Creek

Creswick Ck, Birch's Ck, Reedy Ck, Coghills Ck, Tourello Ck and *Slaty Ck*.
Russell's dam, Government dam, *Dean Reservoir*, Newlyn Reservoir, Hepburn lagoon.

CORANGAMITE BASIN (34)

Woody Yaloak River System

Woody Yaloak river

Kuruc-a-ruc Ck, Ferrers Ck, Spring Ck, Pinchgut Ck, Corindhap Ck, Little Woody Yaloak Ck, Mt Misery Ck, Moonlight Ck, Illabrook Ck, Naringhal Ck, Springdallan Ck, Italian Gully, Caledonian Ck, Smythes Ck.
 Dereel Swamp, Old Linton Reservoir, Cardigan Village treatment plant, Kopke farm dam,

MOORABOOL BASIN (32)

Moorabool River System

Moorabool river

Woollen Ck, Black Ck, Tea-tree Ck, Whisky Ck, Black Ck No2, Devils Ck, *Granite Ck, Lal Lal Ck, Two Mile Ck*, Lal Lal Reservoir, Sharrocks Rd farm dam (Woollen Ck), San Michelle farm dam (Black Ck), Moorabool Res, Fiskens's homestead dam, Beale's Res, Wilson's Res,

Mahers farm dams Ormond Rd 1&2, *Britt's farm dam Mt Warrenheip, Britts dam (Granite Ck), Glenanes farm dam (Ring Ck)*, Toohey bros dams, Stella's dam, Bubb's dam, Blood's dam, Murphy's dam, Clarke's dam, White's dams, Wade's dam, Trigg's dams, Grigg's dams,

(Source. Central Highlands Water)

6.5 Identification and listing of key Corridors (existing and potential links)

- Burrumbeet Creek, [from Creswick Forest to Lake Burrumbeet.]
- Yarrowee River, [from reservoirs to Enfield and Durham Lead forests.]
- Ballarat - Skipton Rail Trail, [Lake Wendouree, Ballarat Common to Skipton.]
- Canadian Creek, [Mt Helen to Yarrowee River.]
- Buninyong Creek, [Mt Buninyong, Union Jack Reserve, Tannery Flat Reserve, Buninyong Golf Course to Yarrowee River.]
- Moss Avenue Mt Helen, The Dredge reserve, Buninyong Cemetery, Helen View Estate Recreation Area (between Eddy ave and Bergs lane), Ballarat University Arboretum, Mt Buninyong and Canadian Creek.
- Canadian and Creswick Forests link
- Mt Bolton and Mt Beckworth link
- Woody Yaloak River and tributaries
- Buninyong - Sebastopol - Haddon link (Mt. Buninyong, Midland Highway, Bell's Road)
- Bicycle paths, walking tracks and trails

Figure 35. High Conservation Value Roadsides Identified in the Urban Nature Study (Ballarat University)

Assessment of high conservation value sites

At all sections of road having high conservation value, a detailed floristic assessment needs to be carried out using a modification of the technique used by Gullan et al (1981).

Apart from providing detailed information on the species present this data can be used to confirm the high conservation value categorisation produced by the rapid survey technique. This detailed assessment is best carried out in spring to get the best coverage of species present.

The following notes relate to those sections of road characterised as having high conservation value in this survey.

Locations are shown on figure 7

1. Fiskin Road from the Midland Highway has retained a good roadside strip of semi natural *Eucalyptus obliqua* / *E.radiata* open forest. From the intersection of Chapman's Lane the community becomes more natural with the disappearance of weeds and utilities..

2. The Midland Highway from the Buninyong Creek bridge north to the top of the hill is a two chain road with a wide reserve on the west side. This strip carries *Eucalyptus obliqua* forest with all structural layers present and good patches of *Themeda triandra* in the understorey.

From the top of the hill the roadside narrows and the vegetation is influenced by the presence of residences. A good tree cover remains but the understorey and ground cover have been modified.

3. Hitchcock's Road in Buninyong retains a good strip of semi natural *Eucalyptus obliqua* / *E.radiata* forest which becomes more natural where the road runs through a large block of forest on the edge of the town. Here all layers of the community are present and there are no weeds.

4. The understorey of the *Eucalyptus obliqua* / *E.aromaphloia* community along Post Office Road, Smythes Creek contains some notable species, including *Xanthorrhoea minor*, *Acacia genistifolia* and large patches of *Themeda triandra*.

5. Sandy's Hill Road, south of Buninyong has a particularly good stretch of the *Eucalyptus aromaphloia* / *E.ovata* / *E.radiata* community between Walsh's Lane and Macleod's Rd. *Leptospermum myrsinoides* and Fabaceae species are found in the understorey with patches of *Themeda triandra*.

6. Nash Road is typical of the gravel roads running through the Durham Lead forest area. The near natural *Eucalyptus obliqua* / *E. dives* forest has been retained up to the road's edge and degrades only at the northern end where weed species appear as it runs through farmland.

7. The track heading north from Nash Road over Mt Buninyong runs through a near natural example of the *Eucalyptus viminalis* / *E. obliqua* forest found growing on the volcanic cone. Some weeds are present but native understorey species of this forest are also present.

8. Yendon Number One Road from Pound Creek Road east for one kilometre is a two chain gravel road which supports a near natural stretch of *Eucalyptus obliqua* / *E. radiata* forest.

9. The three chain road reserve between Navigators Road and the railway line, from Navigators to Yendon, supports a number of significant species despite the vegetation being only a remnant of original forest. Scattered *Eucalyptus yarraensis* can be found, with *Davesia latifolia*, the occasional *Banksia marginata* and patches of *Themeda triandra* in the understorey.

10. Several of the gravel roads in the Invermay area support strips of near natural roadside vegetation. The typical forest consists of *Eucalyptus obliqua*, *E. aromaphloia* and *E. dives* with scattered *Acacia* species and Fabaceae in the understorey. This vegetation can be found along Clearview Road, short sections of Alkera Road, most of Silverwattle Drive, a section of Millers Road and the White Swan Road where it passes through the State Forest.

11. Two stretches of near natural *Eucalyptus aromaphloia* / *E. radiata* / *E. viminalis* vegetation can be found along the South Durham Bridge Road. Occasional *E. yarraensis* occur, and the more natural parts of the understorey support *Xanthorrhoea minor*, *Bursaria spinosa* and species of Fabaceae, with patches of *Themeda triandra* at the edges of the forest.

7. CONCLUSION

A Summary of the major points and recommendations highlighted in the report

Agencies responsible for implementing the recommendations are given in brackets following each action.

The role of the LINCS Committee is to coordinate the actions in conjunction with the agencies listed below.

Chapter 1 Introduction

1. LINCS = Linear Network of Communal Spaces. A program of linking agencies and the community together in the management of linear reserves with the aim of enhancing recreational and conservation values.

[LINCS Committee]

2. Linear reserves (the roadsides, rail lines and streamsides) are important given the massive past overclearing in the Ballarat Region.

Chapter 2 General Management Issues

1. Spring burning is an effective vegetation management tool particularly for roadsides. Burning is generally a better management option than spraying, slashing or ploughing to reduce the risk of wildfire and control grass weeds.

[CFA, Councils]

2. Pocket guides covering a/ the weeds and b/ indigenous plants of the Ballarat Region be produced

[City of Ballarat/DCNR]

3. Litter controls are essential in linear reserves, particularly streamsides. Community education, regular clean up days, litter booms and side entry pit covers are some solutions.

[City/Community]

4. Linear reserves and particularly roadsides require signposting of conservation values. Vulnerable sections of reserve with high conservation value may require fencing.

[Councils/DCNR]

5. Regular woody weed control is essential on linear reserves and should be done in tandem with replacement planting using desirable species.

[Councils/Community/DCNR]

6. The Action plan for Water Pollution Control in the Mordialloc Creek, Dandenong Valley and Western Port Catchments is an important model to follow. A similar coordinated approach in Ballarat will assist solving catchment management problems such as pollution from farmland, roads, landfills, sewage treatment plants and industry. The Plan covers in-stream control methods, monitoring, public education and involvement. It provides detailed information on specific issues such as street sweeping, erosion along roads, stream buffer zones and revegetation, installation of pollution traps, construction of wetlands and retarding basins which are all relevant to the Ballarat situation.

[EPA/Councils/DCNR/CHW/Dept Agriculture/VRCC]

Chapter 3 Road Reserves

1. An assessment of the conservation value of all roadsides needs to be completed for each municipality to ensure appropriate future management practices. Roadside management plans are required to be produced. These plans should cover a road or group of roads in an area and cover management issues and information specific to those road(s).

[Councils/DCNR/VRCC/Field Nats]

2. Important roadsides require marking and possibly signage and fencing in some cases.

[Councils/DCNR]

3. Golden Plains Shire has some of the most important roadsides in the state. The basalt plains native grassland communities surviving on these roadsides are of high conservation value and interest and have eco tourism potential.

[Golden Plains/DCNR/VRCC]

4. New roads, such as the Ballarat Bypass, offer an excellent opportunity for increasing the linear reserve network through the planting or direct seeding of indigenous species. Aside from aesthetic, wildlife and recreational considerations, considerable cost savings can be achieved through lower establishment and maintenance costs, reduced long term weed control and in some cases fire risk.

[Vic Roads/Councils]

5. Native grasses require lower maintenance (mowing) than many of the introduced grasses that currently dominate some roadsides. Roadside weeds such as Phalaris require regular maintenance and pose a greater fire risk in Summer. Native grass re-establishment should be considered as a lower cost option for roadside management.

[Councils/CFA]

6. Ploughed firebreaks on roadsides particularly those with a tree canopy are useless. Firebreaks should be located in paddocks to be effective rather than vegetated roadsides.

[Councils/CFA/Local Land holders]

7. No grazing of roadsides (or other linear reserves with high conservation values) by stock.

[Councils/DCNR]

Chapter 4 Rail Reserves

1. The Ballarat - Skipton Rail Trail has recreational and eco tourism potential, sections of significant vegetation including native grassland and Banksia/Casuarina woodland communities, sites of historic interest including trestle bridges. The Rail Trail requires sensitive management that both protects and enhances these attributes.

[Councils/Community]

Chapter 5 Stream Reserves

1. Ballarat is at the head of five catchments and has a responsibility to protect water quality and stream condition for both the local community benefit as well as communities downstream.

[CHW/Council/Community/CALM (Catchment & Land Management Boards)]

2. Drain entrances should be marked to indicate the river system they feed to raise awareness of catchments and the problems of litter and pollution in streams from urban catchments.

[City of Ballarat/CHW]

3. As a general rule streams should be encouraged to 'slow down' or meander to increase the capacity to handle storm flows and introduce a greater time delay to reduce the incidence of flash flooding. Bank side and stream bed vegetation must be encouraged to filter water to control turbidity and reduce erosion potential. Flood plains and associated wetlands and billabongs should be retained and recognised as important components in ensuring both the natural health of the stream and its ability to handle peaks flows. Building or other inappropriate land use on flood plains shall be discouraged or prevented.

[Councils/CHW/DCNR/Southern Water/CALM]

4. Restrict stock access to stream banks to help reduce bank erosion and encourage revegetation.

[Land holders/DCNR/CALM/Water Authorities]

5. The Yarrowee River Corridor Plan be used as a blue print for rehabilitating this important corridor as well as a model for other catchments and stream works in the region.

[LINC'S Committee]

[City of Ballarat/CHW/Community groups/DCNR]

Chapter 6 Resource Inventory

1. Further work is required to identify existing and potential corridors and linkages using information contained in the LINC'S maps, additional survey work and from public consultation

[The LINC'S Committee/Community/DCNR/Councils/Ballarat University]

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Appendix 2:

BACKGROUND TO THE LINCS CONCEPT

LINCS is the major implementation project arising from the Ballarat Region Conservation Strategy (December 1991). It is a practical example of a LCS (Local Conservation Strategy) in action.

Many of the Actions outlined in the Strategy can be significantly advanced through the LINCS program.

The major areas of the Strategy covered by LINCS are:

RESTORING THE LAND

Sustainable Land Use

Salinity

Fire Management

REVIVING RIVERS, WETLANDS AND GROUND WATER

Catchment Management

Stream and Stream Frontages

Wetlands

Ground water

Water Quality

Recreation

PROTECTING FLORA AND FAUNA

Native Vegetation and Habitat Loss

Wildlife Corridors

Pest Plants and Animals

USING RESOURCES WISELY

Waste Management (Litter)

Pollution (land and water pollution)

Underground Resources (Mining in the Yarrowee Valley)

Transport (Bicycle and walking paths)

PRESERVING THE PAST, PLANNING THE FUTURE

Natural and Cultural Heritage

The original LINCS Concept was prepared by Ballarat Region Conservation Strategy Chairman, Stuart Porteous in 1992 (*Appendix 3*).

A LINCS committee was set up in November 1992. The committee comprises representatives of all the managing authorities in the region as well as a large number of community groups and local residents, thus presenting a truly coordinated approach to linear reserve management. (Appendix 1.) Membership has continued to increase and the committee meets on a semi-regular basis. The brief for the committee was to oversee the production of a LINCS concept plan. The plan includes the following elements:

1. An overview or rationale.
 - The need for a coordinated approach to the management of all linear reserves across the Ballarat Region to assist the linking of the major forest blocks through the use of road, rail or stream reserves.
 - The recreational and conservation potential of these areas.
 - A short treatment of the issues relating to managing - road
 - rail
 - stream reserves.
2. A detailed case study of a particular linear reserve. The Yarrowee River was chosen for:
 - Its geographic location (running North-South through the centre of Ballarat).
 - The important part the river has played in the history of Ballarat.
 - Its current degraded state, and the
 - Major potential it possesses as an important recreational asset and vegetation corridor linking the forests to the North and South of Ballarat's urban environment.
3. A resource inventory and maps of the key linear reserves of the region such as:
 - Medium-high conservation value roadsides.
 - Rail lines (including the Ballarat-Skipton rail trail).
 - The Yarrowee and Woody Yaloak river systems.
 - Major highways and roads

The aim of this section was to firstly collate and record all existing survey information and note any gaps (for example, many roadsides in the region have been assessed for conservation value but this is by no means complete) and secondly determine where important missing links occur and therefore future works should concentrate to improve the continuity of linear reserves.

Funding

Grant monies were received to develop the plan from the following organisations:

Department of Planning; Department of Sport & Recreation; City of Ballarat (the former municipalities of the City of Ballarat, Shires of Ballarat, Bungaree, Buninyong and Borough of Sebastopol), Central Highlands Water Authority (formerly Ballarat Water Board), Ballarat Development Board (formerly Ballarat Regional Board).

Development

The LINC'S committee met through 1993 and 1994. The committee:

- considered many issues relevant to the development of the project;
- produced a consultants' brief;
- considered immediate LINC'S issues. (Councils and the community have quickly and readily accepted the LINC'S approach and planning issues have been referred to LINC'S as well as the revegetation ideas and works of local groups and residents.)
- appointed Thomson Hay and Associates, a local firm of landscape architects specialising in revegetation works, as consultants to prepare the Yarrowee Case Study.

The Case Study was divided into three stages to allow better management and greater community participation and input:

Stage 1 Yarrowee River Corridor Environmental and Recreational Assessment Report.

Stage 2 Yarrowee River Corridor Draft Landscape Master Plan.

Stage 3 Yarrowee River Corridor Land Management Plan.

By demonstrating a coordinated and carefully planned approach to Linear Reserve management through the preparation of this LINC'S Plan and the above documents it is hoped that grant funding for specific works may be successfully sought.

Stage 1

Stage 1 was completed in October 1993. It comprises a detailed flora and fauna survey of the study area (The Gong Reservoir north of Ballarat through to Franklin's Bridge, Napoleons, to the south - a distance of approximately 26 km.).

The flora and fauna survey was prepared by noted naturalist Roger Thomas in conjunction with Thomson Hay & Associates.

The committee engaged the State Data Centre to prepare A3 base maps of the Yarrowee corridor showing land tenure and boundaries. The consultants modified these strip maps. These are contained in the report.

A full assessment of the recreational potential of the corridor is included detailing such things as access, existing facilities, aesthetics, major weed infestations, natural and artificial features.

Stage 2

The draft Master Plan was on public display at three locations in the City of Ballarat from 1 July to 31 August 1994.

The Master Plan provides detailed maps of each section of the Yarrowee with designs and notes as to how the corridor could be developed.

It is a grand plan which will take decades to fully realise in practice. However, this does ensure that revegetation and other activities along the river don't occur on an ad hoc basis, but are part of a coordinated long term program.

The plan has been met with widespread interest and public support.

Many detailed submissions have been received by the committee for consideration as well as countless telephone calls from the public on various aspects of the plan.

A three page "Advertorial" (*refer Supplement*) in the Ballarat *Courier* newspaper helped publicise the project (prepared by Susan Cully, a LINC'S committee member, local resident and committed Yarrowee supporter).

This Advertorial combined with a very user-friendly or "non official" residents survey (*Appendix 5*) to elicit information on the localised history of the river and its place in the community consciousness, a children's photo competition in the *Courier*, a strong *Courier* editorial (*Figure 36*) and other articles and the visual Master Plan display have given the LINC'S project an extremely high public profile.

Some indications of the widespread acceptance of LINC'S and the Master Plan include:

- A letter advising the LINC'S committee that the DCNR has appointed a LINC'S coordinator to ensure the plan is considered fully in relation to Crown Land asset sales or DCNR work.
- Several local farmers south of Ballarat, who have properties bisected by the river and with considerable river frontage, have indicated not only support for the plan, but a desire that "their" section be used as a model or demonstration of the revegetation/rehabilitation/recreation works that can be done on private land. (The section of the river south of Sebastopol is the most degraded [erosion and weed infestation] and the cooperation of local landowners is paramount to success.)
- A prominent local service club has contacted LINC'S indicating their desire to support LINC'S on ground works financially (and possibly through the provision of labour as well).
- Local businesses have donated funds for the project and prizes for the *Courier* photograph competition (the photos were provided by a local real estate agent and avid photographer with a keen interest in improving the river environment).
- Formal submissions from the new Ballarat City Council and DCNR on the plan.

The LINC'S committee met to discuss the draft plan and the submissions received. These were then passed onto the consultants who produced the final master plan taking into account modifications based on the public comments and committee feedback. The final plan was presented to the City of Ballarat for approval in April 1995 and a public launch took place on 3 May 1995..

The Courier

EDITORIAL OPINION

Welcome plan for Yarrowee

ALL of Ballarat stands to gain from the efforts of a group that has quietly gone about implementing its objective of reclaiming neglected public areas.

The Linear Network of Communal Spaces (LINCS) project committee was formed as a result of the Ballarat Region Conservation Strategy to create a blueprint for road, rail and waterway reserves.

Its major current cause is the Yarrowee River corridor from the Gong Gong Reservoir to the Napoleons-Buninyong Rd, now on the threshold of an ambitious restoration program.

Though efforts to improve the waterway and surrounds predate the committee's formation, LINCS has brought together concerned community groups, authorities and individuals in a partnership capable of achieving genuine long term improvements.

The result is the newly released Yarrowee River Corridor Draft Landscape Master Plan, which is open to public discussion before the final plan is completed.

As it stands, the plan promises much more than a continuation of the good work already completed on large sections of the river valley. It covers further revegetation, walking and bicycle tracks, recreational facilities, wildlife sanctuaries and extensive clean-ups as well as ongoing maintenance. Areas of historic significance will be given their due recognition.

The plan deserves the full support of the community as its implementation will transform what was once an embarrassing eyesore into an attractive and valuable asset. Much of the corridor has the potential to regain the beauty it has lost through years of early mining abuse and more recent pollution and neglect.

For citizens it can be a lush natural retreat, while its transformation would create another attraction for visitors to the region. Finally, it will again be worthy of its official title "Yarrowee River", which has lapsed through common usage in favour of the more demeaning "Yarrowee Creek".

Stage 3

The Land Management Plan was completed in tandem with the final Landscape Master Plan such that the key changes to the plan could be taken on board.

The Management Plan covers management approaches and techniques suitable for controlling weeds, fire, litter, pollution, vandalism, flood, mining, revegetation, park furniture designs and other aspects for the entire corridor. It provides information on potential funding sources and includes a priority list for works in the corridor, ie. where should the committee concentrate its actions. A sample of some priorities includes:

- a particular section in dire need of erosion or weed control works.
- the provision of a continuous walking/cycling path across the corridor as a whole.
- concentrated works on a section with great potential for public use.
- opening up of the river where it is presently underground in the Curtis Street car park (this point has received widespread support and will transform an ugly part of Ballarat into an asset).

Funding will be targeted where possible to the priorities listed in the Management Plan.

The Yarrowee Corridor Plan was completed in April 1995.

On Ground Works

On ground works have been occurring to date (through LINCS and the City of Ballarat's popular Greening Ballarat program) and will receive a greater emphasis with the final release of this plan.

The Yarrowee River Corridor Plan builds on the revegetation work begun by the "Friends of the Yarrowee" (formed 1982). Friends of the Yarrowee, a group of concerned residents living close to the Yarrowee River, achieved an enormous amount in a ten year period particularly along the stretch of river known as the Yarrowee Flora Reserve. Friends of the Yarrowee are now incorporated in the LINCS Committee.

The plan also recognises the excellent work of the Australian Trust for Conservation Volunteers (ATCV) over the same period. In fact, the ATCV has its origins in community revegetation works along the Yarrowee and has since grown into a national conservation organisation.

It is expected on-ground works will concentrate on the Yarrowee River corridor and the Ballarat-Skipton Rail trail in the foreseeable future.

It is hoped that this LINCS Plan will be seen as a practical guide to assist the development of linear reserves - the maintenance and rehabilitation of reserves.

LINCS is the mechanism - a coordinated approach to linear reserve management - combining management authorities with community groups that can achieve significant on ground results..

LINCS is the process by which reserves can be developed using labour provided by councils and other authorities, government employment programs (such as LEAP or Job skills), community groups, LandCare groups and schools, toward a common goal.

The LINCS committee has been successful in grant applications for funding on-ground works. The committee will continue to apply for funding to enable a coordinated program in line with the Plan to be undertaken.

Mapping

Mapping for the project by the State Data Centre includes:

1. Yarrowee A3 strip maps (used in the survey and Master Plan).
2. 1:100,000 overview map of the Ballarat region - showing forest blocks.
3. 1:30,000 - Ballarat LINCS map. This specially commissioned map with Urban Ballarat in the centre shows the corridor developments radiating out from the built environment. This map will be printed and available for sale as it is already proving to be an extremely popular resource. It has a wide application and can be used by schools, tourists, residents and authorities.

Other Comments

The LINCS committee will also play a role in the Ballarat-Skipton Rail trail development by providing the mechanism by which community groups can be involved and voluntary labour and resources coordinated and harnessed.

After the final publication of the LINCS Plan, the committee will have completed its task.

A restructured committee will continue to have an active role in:

- coordinating on-ground works
- Preparing funding submissions
- Considering land use and planning issues (brought to the committee's attention and which relate to linear reserves).

Figure 37 Release of the Yarrowee River Corridor Plan
(Source: Ballarat Courier)

■ Environment:

Yarrowee plan released

By FIONA CARTLEDGE

A 50-year blueprint for the future of the Yarrowee River corridor was released yesterday.

Among its key recommendations are an interpretive walking trail and revegetation and weed control.

The plan — known as the Yarrowee River Corridor Landscape Masterplan and Land Management Plan — took more than two years to complete.

The study covers 30km of the river from the Gong Gong reservoir to Franklin Bridge, near Napoleons.

Ballarat City commissioner Malcolm Lee launched the plan, by consultants Thomson, Hay and Associates, at the City's Wendouree offices.

It has been a co-operative effort between the former

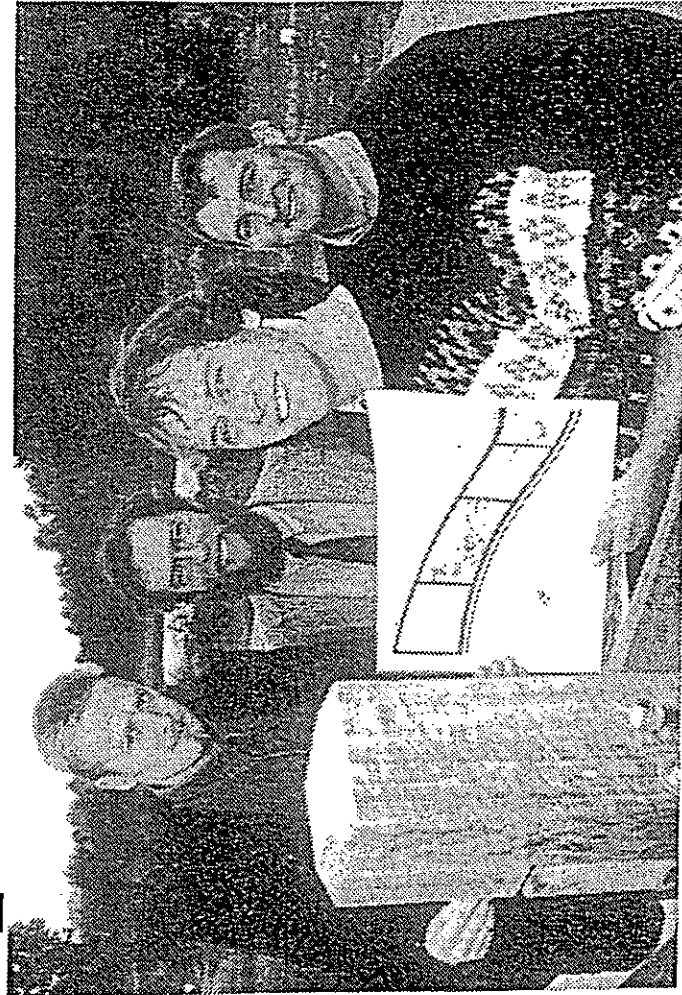
shires (now Ballarat City), residents, landcare groups, Central Highlands Water, the Department of Sport and Recreation and the Department of Planning.

The committee formed from these groups is called the Linear Network of Communal Spaces, LINCOS.

Ballarat City's general manager economic development and planning Eugene Kneebone said the plan would ensure works took place in a "co-ordinated fashion".

As well, he said it would maximise the chances for Federal, State and business funding.

Ballarat City's manager of strategic planning Hedley Thomson said the interpretive walk, planned to stretch the length of the river, would identify historical features, such as mining activity.



Preparing for the launch of the Yarrowee River corridor plan are, from left, Linear Network of Communal Spaces (LINCOS) chairman Adam Parrot, Ballarat City's manager of strategic planning Hedley Thomson, LINCOS secretary Tim D'Ombain and consultant David Hay.

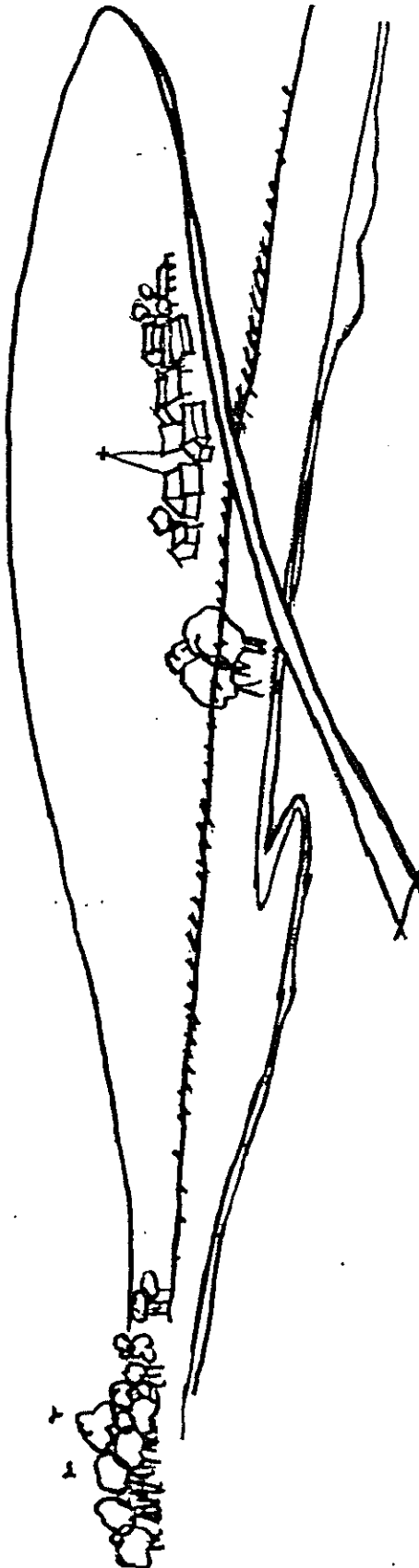
Picture: LYNDELLE FLINTOFT

Appendix 3:

Original LINC S Concept Outline

L I N C S

LINEAR NETWORK OF COMMUNAL SPACES
(BALLARAT REGION)



LINEAR NETWORK OF COMMUNAL

There has been considerable community interest in the development of a system of linear reserves for the urban areas of the Ballarat Region. Linear reserves serve to link areas of public land to form a continuous public open space reserve providing many benefits.

The Ballarat Regional Board, through the Ballarat Region Conservation Strategy, has identified a community and council concern over the ad hoc nature of development along the various areas of public land adjacent to the extensive urban waterways, and to a lesser extent some road and rail reserves.

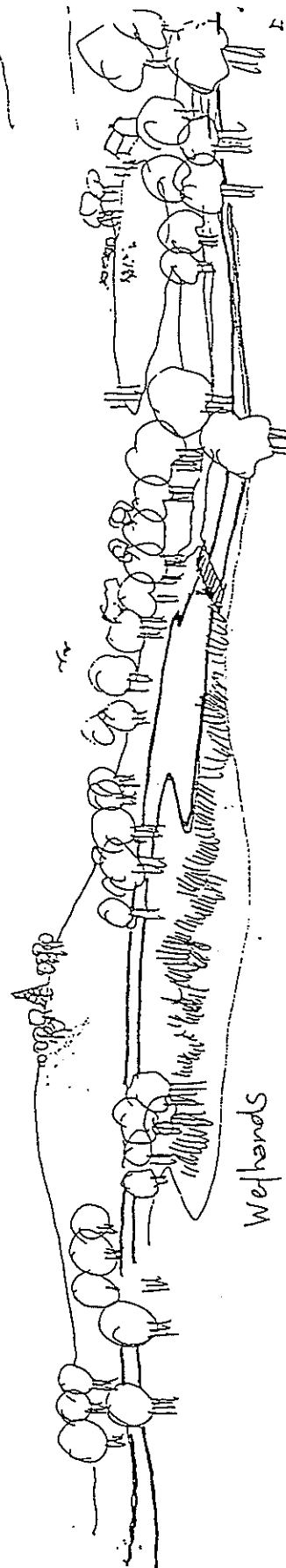
Primarily, the Board, the councils of the region, and the Departments of Conservation & Environment and Planning & Housing, have agreed to work together in an attempt to develop a consistent set of aims and objectives for the development of these areas of public land for the leisure and recreational opportunities they can provide, and in the enhancement of urban wildlife corridors.

It has long been recognised that these public reserves could be useful in providing links from the residential areas to the urban centre, linking various recreational facilities, and in providing leisure, recreation and wildlife enhancement in its linear form.

The nature of linear reserves means they cross through a number of separate municipalities. In addition, many reserves are under the management of numerous committees or other state government departments.

As a consequence, whilst the potential for linear reserves has been apparent, the development of an overall concept and management which will not compromise the integrity of linear reserves has never been co-ordinated.

The Ballarat Regional Board can act in the capacity of an organisation able to co-ordinate the numerous committees, councils,



SPACES (BALLARAT REGION)

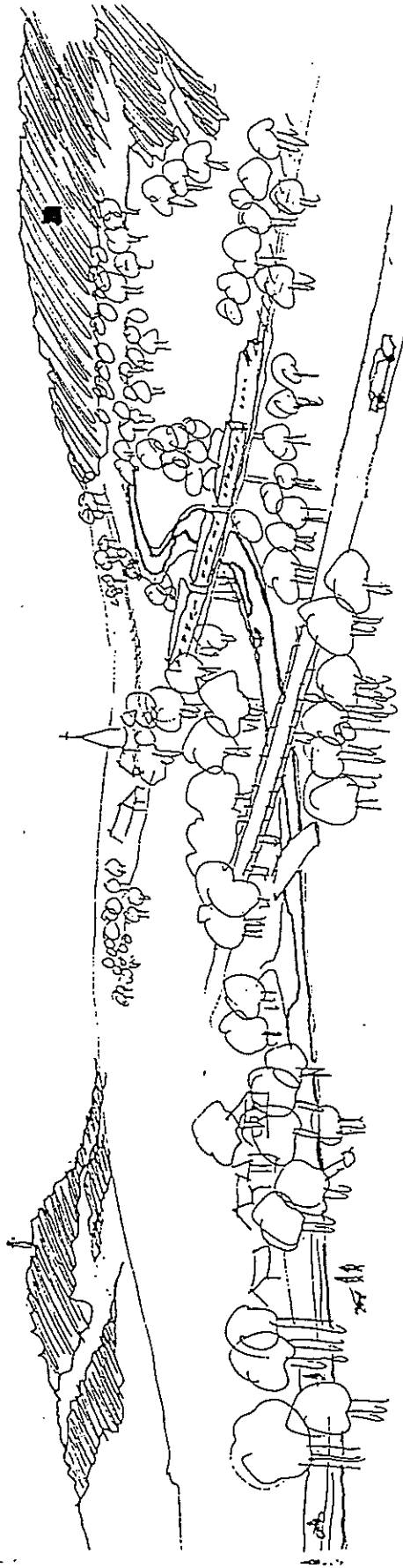
government departments and community groups in the planning of linear reserves for their recreational and leisure capacity.

The Ballarat Region encompasses the municipalities of the City of Ballaarat, Shires of Ballarat, Bungaree, Buninyong, Grenville and Creswick, and Borough of Sebastopol, with a population in the vicinity of 93,000.

The management and reporting of the project would be overseen by the Ballarat Regional Board with a steering committee reporting to the Region's Conservation Strategy Implementation Committee.

Existing prominent

State forests





Methodology

It would be wrong to assume that this project should be based on developing detailed concepts for all linear reserves in the urban area. The considerable length of potential linear reserves would not allow any detailed inventory, management or strategic plans to be developed for all areas with these funds.

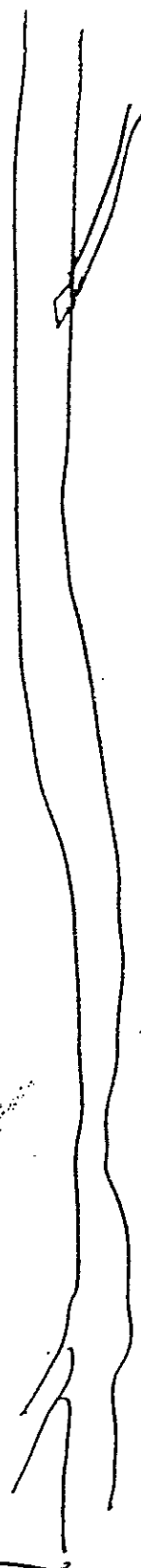
It should be stressed, however, that considerable community, council and Department of Conservation & Environment interest has focused on the Yarrowee River and its potential as a linear reserve. All agree that immediate action is necessary. Therefore, whilst in general terms all reserves of a linear nature need investigation and consideration and agreed objectives be developed so as not to compromise their future integrity, some areas can be examined in a far more detailed fashion. This would enable action to occur on priority areas at the earliest possible time, while serving as a working example for linear reserves generally in the region.

The initial task of the project would be to raise community awareness and interest in linear reserves in providing a wide range of leisure, sporting and social opportunities. This would be achieved through public meetings and extensive media coverage of the issue. A representative steering committee would be established to make decisions on objectives, submissions and final concepts.

Reflecting public opinion, it would be necessary to develop a "Discussion Paper" highlighting local examples, major opportunities, costs and benefits which would be widely distributed and publicised seeking further public comment on priorities and localities.

The second component of the project embraces the first, but extends further by developing a comprehensive resource inventory of the Yarrowee River system which extends for some 15km through the Ballarat urban area. This inventory would examine water quality, flora and fauna surveys, recreational needs survey, associated planning investigation, and options for development. This would complement work already completed by the Department of Conservation & Environment and Ballarat University College through the use of reports already undertaken.

The Yarrowee River would then benefit by the development of a number of planning options or "concept" plans which demonstrate and incorporate a full range of recreational and leisure opportunities like bike paths, wetlands, sports areas, the river itself and exercise structures, together with the incidental provision of alternative access to the city centre, other residential areas and adjacent sporting facilities. These concepts would stress the importance of passive recreation opportunities for people with limited options, and encourage access through cycling, walking and jogging.

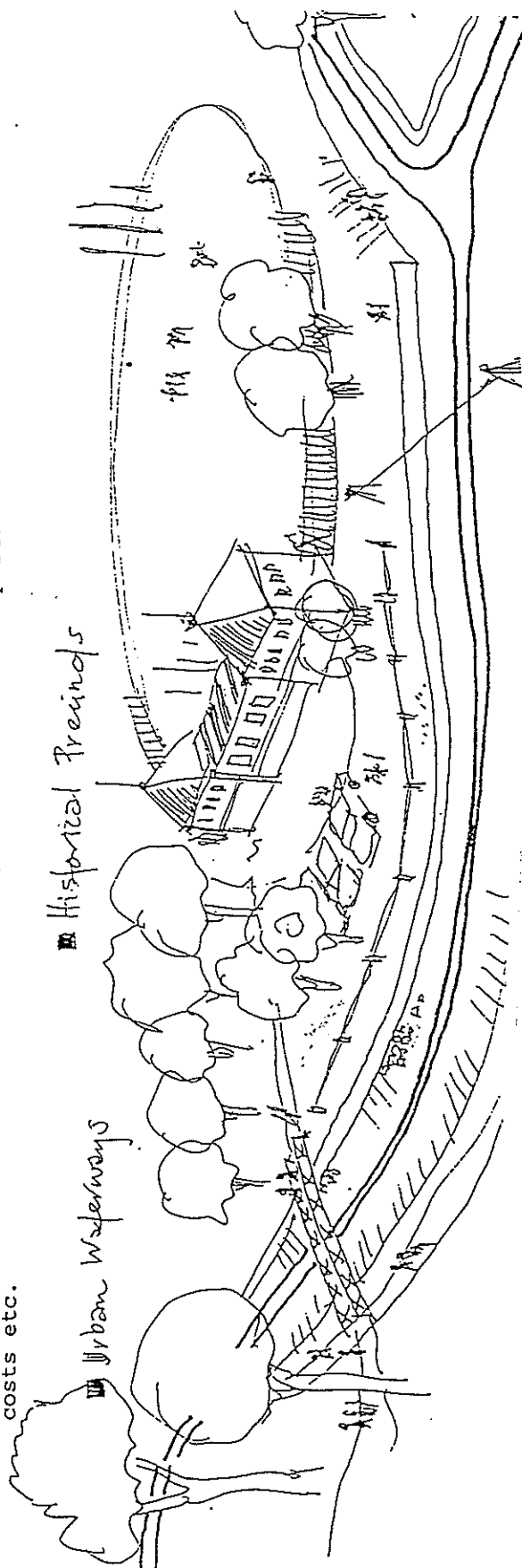


Project Objectives

The project's objectives are to:

1. Raise community awareness and interest in the opportunities found in linear reserves.
2. Develop a set of objectives for the future development of linear reserves.
3. Establish a representative steering committee which would include community representatives, Ballarat Council representatives, Ballarat Regional Board, Departments of Planning & Housing, Conservation & Environment, Sport & Recreation, and the Ballarat Water Board.
4. Develop a discussion paper highlighting local examples, major opportunities, costs etc.

5. Develop a resource inventory of the significant linear reserves from which a steering committee can make informed decisions with regard to concept and management plan formulation.
6. Explore the recreational and leisure opportunities afforded by linear reserves themselves, and by providing links with other recreational opportunities through enhanced access.
7. Provide a range of opportunities and easy access for all members of the community, especially those physically handicapped through the provision of ramps, crossings and easy gradient pathways.
8. Provide alternative access through the form of linear reserves for those without the available use of private transport.



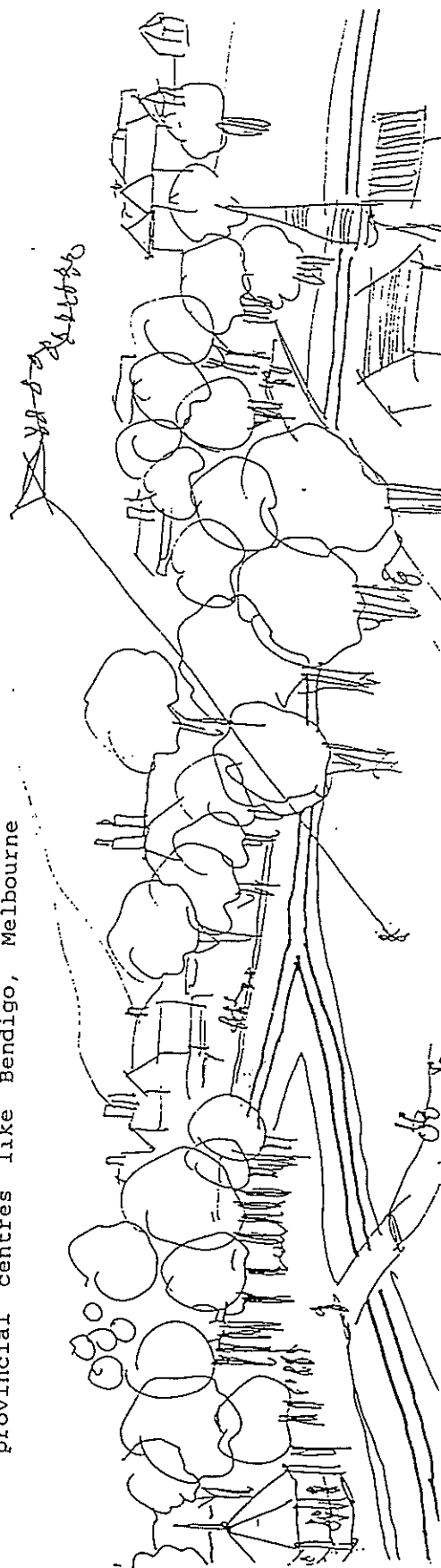
9. Seek to implement the recommendations found in the:

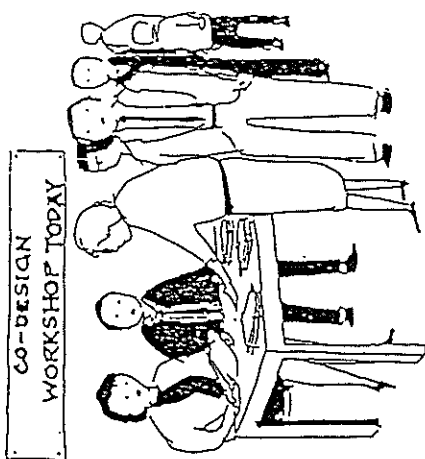
- * Ballarat Region Strategy Plan (with regard to urban wildlife corridors);
- * Ballaarat City Council (Linear Reserve Study);
- * Dept of Conservation & Environment (Urban Nature Conservation Program);
- * Ballarat Region Conservation Strategy (numerous actions).

The Ballarat Regional Board and participating organisations see in this project the opportunity to comprehensively plan for the development of a range of linear reserves in the Ballarat Region. This is something that has not been done before in the 140 years since white settlement in this region. Other provincial centres like Bendigo, Melbourne

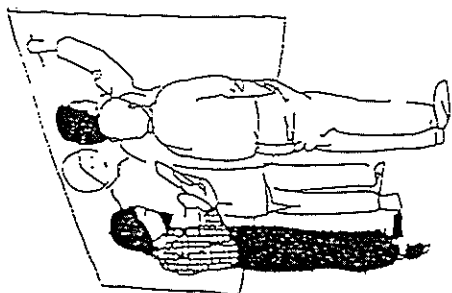
and other capitals, have all benefited from linear reserves. The extent of co-operation and financial commitment is indicative of the importance placed upon this project by the community and its formal representatives.

While Ballarat has a number of excellent recreational facilities, both passive and active, their patronage is assured only through the reliance on public transport. Further, the small parcels of public land adjacent to urban waterways, rail reserves etc., have never been fully utilised because they have never been linked with each other. While their very nature means easy access is assured because of level grades etc., the lack of the linking function means that recreational facilities adjacent, of which there are many, are isolated from each other.

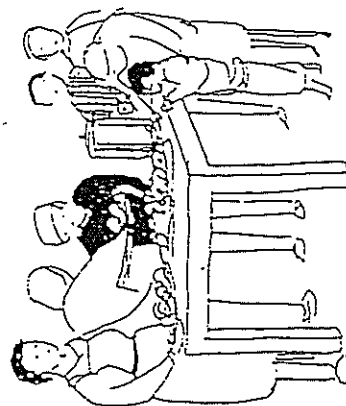
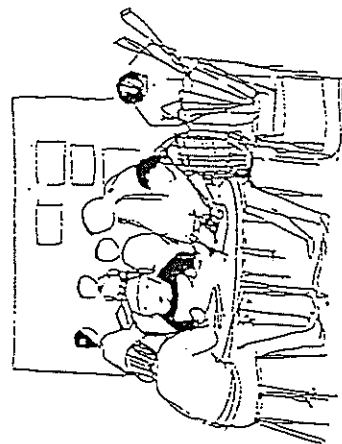
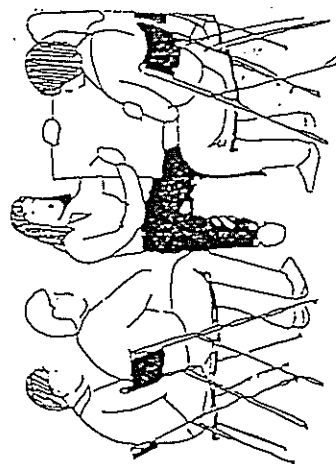




The overall management of these linear reserves will enable local service clubs, local groups and individuals to have a direct



involvement in the development and maintenance of areas given over to their control.



Appendix 4: Original LINC'S Committee list and listing of organisations involved in on ground works in and around Ballarat

LINC'S STEERING COMMITTEE

NAME	ORGANISATION
Paul Miller	resident
John Ruyg	Brown Hill Progress Association
Michael O'Meara	resident
Adam Parrott, Chairman	City of Ballarat
Gavin Jamieson, Resources spokesman	City of Ballarat (Shire of Ballarat)
Allison MacWhinney	(EPA)
Chris Van den Hoek	(Borough of Sebastopol)
Steve Mitchell	(Shire of Grenville)
Stuart Porteous	(BRCS)
Greg Anders	(Shire of Buninyong)
Stephen Cornish	(Shire of Bungaree)
Leo Violini	CHW
Steven Addicott	CHW
Tim D'Ombraim, Secretary	(BRB/BRCS) City of Ballarat
Hedley Thomson, Publicity Spokesman	(BRB) City of Ballarat
Greg Stewart	(DCNR) resident
Geoff Park, Treasurer	Creswick LandCare Centre
Ed Ferguson / Tracey Hull	Department of Sport & Recreation
Pat Previtt	University of Ballarat
Paul Stephens	resident
Rick Blanchfield	resident
Bob Hall	resident
Jenny Burrell	Mt Clear Primary school/ Canadian Ck Project
Susan Cully	resident/ Friends of the Yarrowee
Colin Jackson / Maddie Townsend	ATCV
Grahame Searle	State Data Centre
Ian Colquhoun	Department of Planning & Development
Digby Jessop	(City of Ballarat)
Brian Pola	resident
Graeme Ambrose	University of Ballarat
Theo Kuiller	resident
Simon Nally	DCNR
Brian Simpson	DCNR
Rosemary Cousin	(City of Ballarat)
Malcolm Trainor	School of Mines
John Gregurke	Field Naturalists Club of Ballarat
Helen Knowles	Friends of Napoleons Bushland

Mathew Pywell	resident
Jane Bateson	CHW
Rod Nicholls	Golden Plains Shire
Ann-Maree Tenni	DCNR
Colin Butson	resident
Alan Wright	resident/ATCV & FOY foundation member
Paul Jenkins MP	LINCS Patron

COMMUNITY GROUPS INVOLVED IN REVEGETATION WORKS OR PROJECTS

Alfredton Neighbourhood watch No 22
 Australian Conservation Foundation
 Ballarat & Clarendon College
 Ballarat Adult & Further Education (BRACE)
 Ballarat & Clarendon College
 Ballarat Bushwalking Club
 Ballarat East Rotary Club
 Ballarat Four Wheel Drive Club
 Ballarat Goldfields
 Ballarat Grammar School
 Ballarat High School
 Ballarat North Primary school
 Ballarat Pony Club
 Ballarat Soccer Club
 Ballarat South Rotary Club
 Ballarat Touch Football Association
 Ballarat Venturers
 Black Hill Primary School
 Brotherhood of St Lawrence
 Brown Hill Lions Club
 Brown Hill Progress Association
 Caledonian Primary School
 Canadian Lead Primary School
 Central Highlands Water
 Church Groups
 Chisholm Street Reserve Advisory Committee
 City of Ballarat
 Coltmans Mitre 10
 Creswick LandCare Centre
 DCNR
 DEET (CES)
 East Ballarat Football Club
 E.R.T.H.
 Eureka Apex Club

Eureka Neighbourhood Watch
 Eureka Neighbourhood Watch Association
 Ewing House
 Field Naturalists Club of Ballarat
 Four Wheel Drive Club
 Friends of Napoleons Bushland
 Friends of the Yarrowee River
 German Shepherd Dog Club
 Golden Point - Mt Pleasant Progress Association
 Lake Esmond Advisory Committee
 LandCare Groups
 Leap (CES)
 Learmonth Football Club
 LINCS Committee (FOY)
 Lions Club of Ballarat
 Mt Clear Primary School
 Mt Clear Secondary College
 Mt Pleasant & Golden Point Progress Association
 Mt Pleasant Primary School
 Napoleons Reserve Committee
 New Work Opportunities
 People for Pryor park
 Rotaract Club of Essendon
 Sacred Heart College
 Scout & Guide Associations
 Sebastopol Historical Society
 SMB Turf volunteer conservation group
 Society for Growing Australian Plants
 State Emergency Service
 St Francis Xavier College
 St John's Lodge
 University of Ballarat
 Wendouree Breakfast Rotary Club
 Zonta Club

and especially the continuing efforts of residents and the Australian Trust For Conservation Volunteers (ATCV).

Appendix 5:

Yarrowee Nearby Residents Survey

NEARBY RESIDENTS OF THE YARROWEE

Your ideas and assistance are needed!

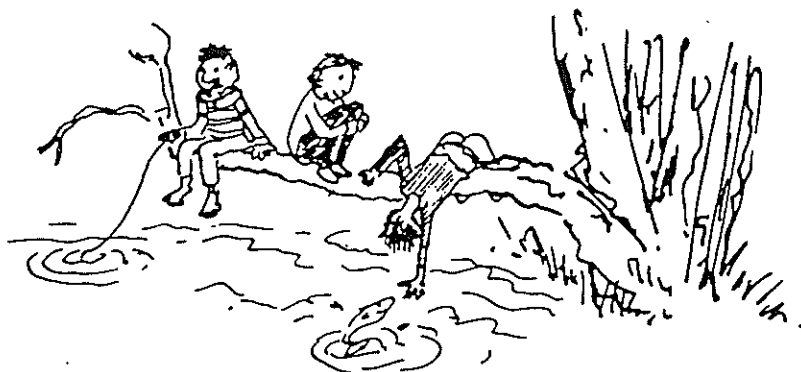
The LINC'S Committee is collecting information on the Yarrowee's history, plants and animals, structures (geological, man-made), distinctive features.



Together with information we have been able to obtain, your local knowledge will make a valuable contribution towards building a comprehensive picture of the River.

This would contribute to better overall management so that the River will again become an attractive community asset.

LINC'S is a group of concerned individuals, community groups, local governments and agencies, formed to find the best ways of looking after our public road, rail and river reserves. Many of these are important as wildlife and recreation reserves.



Work already carried out by local residents and community groups include: tree planting, wetlands construction and seed collection from remnant vegetation.

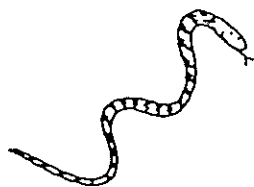


We would appreciate your assistance to enable the full potential of the river to be realised. If you would like to help, please answer the attached questionnaire with as much or as little information as you are able. If you prefer to talk about all this, feel free to ring Tim D'Ombrain at the Ballarat regional Board on (053) 315 866.



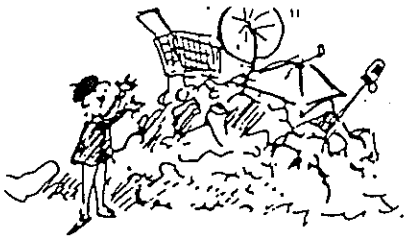


1. Local history (e.g., names of river bends, stories passed on by grandparents etc, gold mining, Chinese history, early pastoralists, childhood memories, pastimes ...)



2. Plants, animals, birds and fish - past and present ...

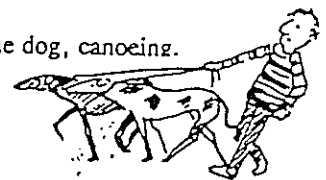




3. Features - geological, man-made, waterfalls, bridges, artificial diversions

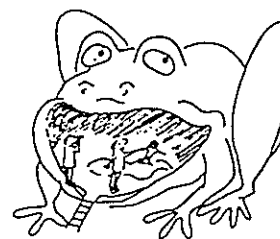


4. How do you use the river now? - walking the dog, canoeing, grazing, bird watching, picnicking ...

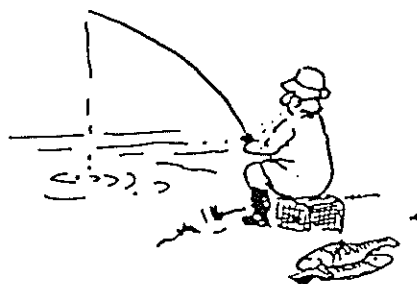




5. Your visions for the rehabilitation, revegetation and development of the Yarrowee as a recreational resource: What would you like to see provided or included in your section of the river reserve?



6. Other comments:



If you want to:

Name

Address

Phone

Age Sex

Place of Birth

How long have you lived in your locality (you/family)



A COLLATION OF ALL COMMENTS ARISING FROM THE YARROWEE NEARBY RESIDENTS SURVEY

1. Local History (eg. names of river bends, stories passed on by grandparents, etc gold mining, Chinese history, early pastoralists, childhood memories, pastimes..)

- 1 "Lived near Chinese gardens on flats near Woollen Mill.
Rabbiting on site now used as Sebastopol tip as a child."
- 2 "Great area for market gardens esp. cabbages and caulies.
Herb garden was largest in southern hemisphere."
- 3 "Chinese gardeners Won & Tan and their horse drawn van.
Later on panning for gold near Leith St.
Red poppies near gardens (Chinese used for smoking?)."
- 4 "The Whitehorse ranges were apparently named because of mines in the vicinity had a white horse driving a whim. On the topside of the old bridge there was a floodgate where we used to get our tennis balls and collect all the toys that were washed down and all types of balls. On Guy Fawkes night, we would go down to the creek area and light furze. There were several places where we used to slide down the hill on pieces of tin. In my early days there was a lot of fossicking for gold going on by out of work men with a dish-cradle and cyanide, some were scratching along the creek bed, digging down looking for a reef and following the rain in the gullies."
- 5 "There were many shallow mines in the area where local men fossicked during the depression years. The early bridge was made of wood and the road was gravel. The rifle range was on the left just over the bridge about 100 yards. (East of the creek and Mt Clear Road). The water from the sewerage was clear and clear after being treated."
- 6 "Gold mines on hill (dangerous). Our house was built in early 1900's. Originally a miners cottage. Have been told about old families who used to pan for gold in the creek and made quite a lot of money".
- 7 "The new bypass embankment over the Yarrowee now forms a flood retarding basin at the spot where in the 1850's numerous reports recommended the construction of a dam to create Ballarat's first water storage. Also another major dam was designed for a location in the narrowed valley on the Ballarat side of Brewery Tap Road intersection but was abandoned in favour of the smaller Gong Reservoir because of the public fear that failure of the bank would wash Ballarat away.

The location could be defined and information boards established with statistics of the proposal and a brief account of the public outcry. Central Highlands Water would have information (refer Bob Downey).

Numerous earth channels or "races" exist in the state forest north of the river at Brown Hill used to transfer water from the eastern "plateau" to the Ballarat mines. These have stood up to 130 years of weathering."
- 9 "Every Thursday (?) the creek used to stink when they flushed out the tanks and barrels at the Brewery. 1937-40 used to catch the corks in the creek from the Brewery. 1937? Creek overflowed at Grant St. Dye from Lucas's was washed down the creek and water would change colours. Mum rescued a kid being washed down the creek during the 1960's.

As a kid I saw a kid washed down the creek, he was later found drowned behind the mill."
- 9b I fell into the creek when I was about 8. I can remember being tumbled over and over as it was so smooth I couldn't stand up." (born 1960).
- 14 "Market gardens were set out in small thin rows in the area from the Gladstone St bridge over the Yarrowee to the Hill St bridge so that the gardeners could water by bucket.

Cabbages, Chinese lettuce, silver beet, peas and beans provided the whole of the residents living on the hillsides, both sides of the valley with their own fresh market garden.

- 14 People and children came from miles around with baskets to buy their food, collect their bread from Davies, pick up their milk from the farm where Oliver and Stevens factory stands and trudge home via the butcher shop at the corner of Cobden and Barkly Street."

- 17 Mrs Vin Stephens (nee Bandy) married in Black Hill church (moved from Black Hill to Cambrian Hill but name was not changed).

Lived in Cambrian Hill, (1922-1941) learned a rhyme:

The Yarrowee into the Leigh
The Leigh into the Barwon
The Barwon into the sea.

Began work at 13.

Muriel Clough (nee Johnston) lived on the corner of Skipton and Darling St 1916-1918.

Behind the church, big mullock heaps. Ministers daughter and Muriel used to slide down mullock heaps (Glenda Currie).

"There were Chinese gardens at the bottom of the hill. They used to "cheek" the Chinese who would shake their fists at them - they never went right down to the creek, the gardens were beautiful."

After a flood sand, corks, tennis balls came down the river. I remember someone saying a vinegar factory was further upstream. Floods used to come into Bardy's property.

"It was the day of horse drawn cabs which used to take people to the miner's race."

- 23 "Original course - see W S Urquharts 1852 plan. (A Clear copy is the original? hangs in the State Data Centre, Central Square)

"Wetlands - see Urquharts 1852 plan. Also known as the Washpools, these have non-English names on the plan. Are they Aboriginal/or perhaps Indian? If Aboriginal, one name could perhaps be transferred to the 1992 wetland below Hill Street.

- 25 Moorabool River - childhood memories of swimming with parents. Late fathers youth, Chinese in Ballarat discovering gold and vegetable gardens."

- 30 "Pre 1950 step type bridge rear of Brown Hill Hotel - access to Sparrow Ground - firstly (trap shooting) also 2-up until bridge fell into disrepair (Horseshoe Canyon) Eureka Tile Co extracted clay 1920-30's via overhead trolley over creek and then horse and dray. Nearby was the Little Wonder Gold Mines No 1 and 2. Opposite side of creek (Kinder site) Andersons Gold Mine. Chinese vegetable gardens along creek between Ainley and Haines Sts (Charlie Din) mainly used wells to water but also two holes in creek also. As a child used to swim in the larger one near to Ainley St."

- 33 "I've heard that my backyard which backs on to Yarrowee was once a creek and that there are at least 3 car bodies buried there!
Many times I've nearly lost the shovel when planting a tree - 2 or 3 mines in my backyard.
Many trees live for 2 years then suddenly die - cyanide?
Most artefacts are about 45 cm below surface (eg horse shoes, old chains, picks, etc).
Did it flood annually prior to Kirks Reservoir?
A little upstream on north bank was old brick factory.
One historian also told me that Prince Street is where the troopers crossed the Yarrowee on the way to Eureka."

- 36 "Where can we learn about Sunnyside Mill ?- we have seen pictures."

- 37 "Chinese were there, also a cow during the day."

- 38 "About 35 years ago, we used to play in the tunnels that run under Hill Street and empty into the bluestone channel. We used to be chased by a Chinese market gardener."

- 39 "Leith Prest Bridge was called Baud and Albion Bridge"

- 42 "As a relative newcomer to the Ballarat area, I am not familiar with this creek or surrounding parkland."

- 44 "Have historical interest in area".

45 "We are only starting to appreciate our local history but my grandparents were born in the Ballarat area. We were told all about mullock heaps etc. I believe there was a mullock heap opposite our house at 2 Darling St until the 1950's or 1960's. Other neighbours have said that Yarrowee River really was a smelly cess pool and open drain. So we have come a long way - so to speak. (Some of the old folk in Yarrowee Parade and Campbell Crescent would be a great source of information)

48 "Having only been here 20 years we don't know much local history though we've seen a few local oldies die or move on over the years. Our house though, would be the oldest in the area. From that we know the land was bought from the Crown in 1864 by a John Ralph, stone mason, then carter. He owned a few blocks along our side of the street and possibly built our house. The first mention of a stone house in the rate records seems to be 1868. It also seems it may have been used twice by mining companies - the house as an office and the land for mining. In 1868 it was used by the New Malakoff Gold Mining Co and later in 1880 was leased to the North Hardsfield Freehold United Co. It has had seven owners in its near 130 year history (including family changes) but more people renting or leasing."

50 "There is a basalt rock about 2 feet across with very weather worn letters chipped into it in my garden."

52 "My early memories of Yarrowee Creek are the family walks to the top of the hill then down to the creek to paddle or play in the water if it was clean that day. My late father taught us to pan for gold also to roll some soft clay into small balls to press the gold specks we found in our dish, once home the gold would be gently washed from the clay. Our specks are still with us today. We would paddle or jump rocks to cross the creek to go over to the old Pyrites Works ruins, where our grandfather worked in the early 1900's. I can remember my father digging a deep shaft near the creek, we could look down and see him working always with a candle burning in the side of the mine.

My four brothers and friends from Sebastopol State School would enjoy many hours, sliding down the hill to the creek on pieces of old roofing iron, or anything nearby, most of us ended up in the blackberry bushes or hit one of the several large rocks. My father's sister Mrs Phyllis Franklin (80 years) of Vickers Street, Sebastopol has lived in Sebastopol most of her life. She remembers when very young, with her parents and some of the 10 brothers, would walk from their back gate, through the oval and down to the top of the hill to spend their Saturday evenings watching all the rabbits feeding and playing around the Pyrites Works, this was well lit up by the outside lights.

A piece of wire was strung across the creek for a hand rail, this did not stop many of the falls into the water, she remembers crossing the creek to pick gum leaves or tips to sell for 3 pence a bunch for her pocket money. My aunt loved the many bushes of golden broom with the hundreds of golden beetles that lived in these bushes. Mrs Franklin's brother Bill Snowden (82) of Ballarat remembers his childhood days down the creek with his brothers, dogs, ferrets and panning for gold with his father. Often he would cross the creek and walk to Buninyong (through the bush now Sebastopol tip) on his way home he would pick gum tips and Sarsaparilla blooms to take home to his mother.

Four generations of my family have wonderful memories of the Yarrowee Creek, the rabbits, a few foxes, sheep, lots of birds and many snakes. We all remember the roast, stewed and fried rabbits, blackberry jam and pies - all ingredients from down near the creek.

Miss Flo Reynolds (95 years, Albert St) told me of her memories. When very young walking along Charlotte street down to the Whitehorse Bridge and walking with her mother through the bush (North) to Geelong Road. There was a path alongside the creek going north but for their Sunday visits they preferred going through the bush."

53 "Seeing that I have lived in Sebastopol all my life, the area of the Yarrowee Creek is an interest to me. I can remember very plainly going down to the area east of where we lived most Sunday afternoons. We usually climbed onto the chain bridge and to get over the water was a big achievement. As children we often put pieces of wood into the creek and follow them along for quite a long way. We always felt sorry for the people who lived in the house over the creek as they had a long way to get their provisions, not only that to get to school as well. As we got a bit older we used to ride our bikes to the water, it was a very rough track but we always enjoyed it. We always felt there should be a traffic bridge built over this Yarrowee Creek to enable the residents from Mt Pleasant to cut across to Sebastopol to shop at the various super markets which have been built in the last fifteen or so years. I am very much in favour of beautifying the Yarrowee Creek and making it an area that we can be proud of.

A few yards south of the Sunny Side Mill, Hill Street was always known as the Dye Hole. During the depression years gold mining and fossicking was taken on and mining, especially along Yarrowee Creek, supplemented many families for food in the Sebastopol area. The Little Whitehorse bridge which is the bike track today would cause horses to shy as it was concrete and echoed. Tuddinhams of Ross Creek supplied the nearby Pyrites Works with five foot wood which was drawn by horse/wagon 1928 onwards to get over the bridge. The 2 leaders were always taken out because not enough width as it was very narrow.

My Mother who is 94 years of age remembered the Yarrowee Creek with the swinging bridge over Winters Flat in her school days at Cambrian Hill School, the reason it was built was to get families from east side of Yarrowee River across to Cambrian Hill School as the Maggie School closed between 1894-1914. The Andrew Jenkin Family that crossed on the swinging bridge were George, Dick, Alice, (Lol) May, Mabel, Lily, Stan and Jack. It was a very large bridge made from large chains and planks."

- 54 "I recall the wagons carting fire wood to the Pyrites works.
As boys we spent lots of days rabbiting with dogs, searching the rifle range for spent cartridge cases, and sometimes swimming in Buchanan's Dam, rabbiting in Holmes Dam was also a favourite past time.

A small hut built of stones gathered at a site occupied by Mick Morrissey comes to mind readily.
We played football and cricket on the flat (now the tip site) wandered along the bank of the creek looking for balls or anything brought down after rain. "

2. *Plants, animals, birds and fish - past and present..*

- 2 "Seen 2 snakes in 11 years.
Frogs making a comeback
Black cockatoos come over in waves
Swallows when it is about to rain
Lot of blue wrens
Saw only one robin last year
Lots of little birds in garden
Too many starlings and flies
Firetails
Currawongs in the mulch
Saw a family of wild ducks over the paddock
Finches nesting
Willy wagtails seem less in number
Black faced cuckoo - shrikes
Lost two lots of ducks to foxes. Hear the foxes calling often.
Koalas visit annually
Rabbits depleted
Lizards, blue tongues
Dumped domestic pets"
- 4 "There was very little bird and plant life in the area looking back. I think mainly due to the effluent put into the creek from the Sunnyside Woollen Mills and the sewerage works. There was also the by product from Edwards Sheep dip works and several cyanide treatment dumps. Rabbits were the most plentiful animal. Furze rushes and blackberries the main plants."
- 5 "Rabbits, as youngsters, we went along the river playing and ferreting the many rabbit warrens. Foxes also were in the area with plenty of cover and holes. Swallows and wrens were plentiful and lots of other birds. Many snakes were to be found during summer."
- 6 "Brown trout, perch, eels, foxes, rabbits, possums, wallabies, snakes. I have also seen wild (feral) cats and dogs up on the bush tracks, I think the freeway bypass is stopping many native animals coming over to our side."
- 7 "At present, a few blacktail wallabies in the State Forest east of the Bypass. Koalas used to be seen frequently but not since the Bypass. Birds are limited by lack of understorey I think. Plantings along the river corridor could correct this. Small fish now present upstream and in Gong Gong creek along Springs Road towards White Swan Reservoir."
- 8 "I have caught in excess of thirty trout in the river since September 1991. "
- 9 "Foxes ate 24 chooks at rear of house (720 Humffray St Sth in 1970)."
- 14 "Both rosellas and magpies - the crimson, eastern and Black Cockatoo that lived in the pine trees behind Tress Street flew down every day - foxes still live along the patch to White Flat and often howl at night. Dogs are their predators and are mostly let out at night. I notice Hawthorn trees growing along the banks and presume they were planted on the city side by English miners."
- 16 "Have seen Egrets, ducks and other water fowl which often visit our property. Also foxes and snakes."
- 18 "Whilst I have not kept a record of the birds seen on my few walks along the creek the area is important as a refuge and corridor for birds to move into and around the city from surrounding areas. I have seen Blackbirds, Blue Wrens, Musk Lorikeet, Crimson Rosella, Kookaburra, Yabbies, fish, koalas, black duck, moorhen with young."

- 22 "A few years ago I saw a turtle swimming near the footbridge at Gladstone St. He climbed out and rested then got back into the water and continued down stream. We often hear plovers calling at night. One year a pair of green grass parrots looked as if they were trying to nest around our house - they were looking down chimneys etc. There have been other parrots, galahs etc in drum behind pigeon club. Also silver eyes, gold finches, a blue crane (2 years running) finches, wattle birds, magpies, mudlarks, honey eaters. About 25 years ago there used to be blue wrens in bushes along the small creek which runs into the Yarrowee beside the pigeon club. The creek has now been covered over and bushes removed and birds have less places to drink."
- 23 "2 June 1994. One Kookaburra seen 100m downstream from the end of the lined channel."
- 25 "Abolish duck shooting."
- 30 "In 30's and 40's very few willows, a lot of furze and cape broom. Have caught eels in 40's and 50's, boys still catch the odd redfin."
- 32 "Broom, Wallabies - not seen for some months. Koalas - left our area not long after 100 year old Bluegum fell. Rosellas, White and Black Cockatoos, Galahs, kookaburras, honey birds, Magpies, Miners, very small ground bird, Wrens, Grass Parrots, finches, water birds, Trout and Eels."
- 33 "Silver eyes, Thornbill, Stumpy tailed lizard (5/5/94) wattle bird (large one) magpie, kookaburra, feral cats, currawongs, rats, rabbits.
I've heard Cockatoos/Galahs/Corellas. I've never seen a snake, but they must be there."
- 34 "Many different birds and ducks in creek area. Up till September last year we had Koala bears(sic) in the tree across the creek"
- 36 "Cool evenings this summer hundreds of birds sang very loudly."
- 37 "We used to get tadpoles in the pond where the Cement works are."
- 38 "I've seen Black snakes and Copper heads - not so many in last year. I've also seen trout in the creek, Eels and a tortoise. Cattle Egrets were really common before the landfill went in next to Barry James' wrecking yard."
- 39 "No fish below channel."
- 43 "Numerous Superb Blue Wrens, Thornbills, Grey Fantails and Black ducks."
- 45 "Past - Native grasses, River Redgums, Swamp gums, Blackwoods, Kangaroo, Emu, Dingo, Ducks and Quail.
Later - Cattle, Sheep and Horses.
Now - Rabbits, Blackberry, Wild Dill, Thistles, Koalas, Possums, Honeyeaters and Rosellas. We are told there are also fish (? Carp, ? Perch) and Thornbills, Kookaburras, Falcons and Kites in the area. We have heard Owls though and there are also snakes, lizards and tortoises. Trees, several species of gum, native grass, pines and poplars."
- 48 "Twenty years ago there were few birds in the area around the house - mainly Starlings and Sparrows and occasional Crows. There were no Magpies!
However there were quite a few animals (domesticated) apart from foxes. In 1975 there was a 'wild' steer living along the creek for about 2 months. It came up to our garden once and stole some straw!
Macklins had a cow, Mr Fletcher in Hickman St, and later Craig Smith, had goats which were tethered in various parts of the neighbourhood.
There were horses along the creek between Sebas. and Hill St, partially fenced although it was rarely mown or used so was a jungle of weeds and wildflowers.
Until a few years ago there was also a cow across the creek, its bellowing adding to the rural flavour.

By the late 70's native trees in our garden were growing and birds started to come in. Then in the early 80's after tree planting further downstream more birds came into the area
In 1985 we saw the first Koala in our garden.
At various times since the early 80's we've taken (some) notes on what we have seen:
Currawongs, Wattle birds, Fantails, Silvereyes, Kookaburras, Eastern Spinebills, Golden Whistlers, Grey Shrike-thrush, Spotted Pardalotes, Crimson Rosellas (who look at our nesting box every year), Thrush, Musk Lorikeets, Butcher birds, Magpies as well as other Honeyeaters, common birds and those not recognised!

We've had 2 Koalas and Ringtail possums (who live here).
The most exciting birds were 2 King parrots. We also hear the Spur-winged plovers."
- 50 "Bats can be heard in late summer around White flat. I believe both Bushy and Ringtailed Possums survive in this area too.

Birds which stay for a while in our garden include Pardalotes, Thornbills, Grey fantails Silver Eyes, which I believe nest here and Crimson rosellas. Many other birds pass through particularly in spring time. Each summer a Musk lorikeet parks its family in our pink flowering Yellow Gum. Wattle birds also feed regularly in this tree. I believe the many cats in the area take a very large number of native birds."

- 53 "I don't remember much about the bird life in general but rabbits were most plentiful"
- 54 "These days I walk our dog along the creek bank, there is a wide variety of bird life many water birds, I have seen the wallaby four times at least. One small finch (white fronted chat) appears to have disappeared completely
- 55 "1960 - For several years my husband had the contract for Forest Commission to cart pulpwood from the local pine plantations. This pulpwood went into railway trucks at Ballarat East Railway Station and forwarded to Maryvale Railway Siding for Australian Paper Manufactures where it was made into toilet paper. The Yarrowee plantation had a lot of various fungi of which local newly naturalised women would come and collect different varieties for pickling and stewing and for making various sauces, they were fascinated with so many varieties. As children we were always told not to touch them as they are poisonous. The purple fungi with brown spores and the yellow staining mushroom were the main ones they gathered. The red top with a white fleck grew down the edge of the plantations nearest the creek between the sewerage farm and Whitehorse Bridge. We called these fungus with a "skirt". The honey fungus also grew in the hundreds along and in the plantation along with Inky Caps and also around the rotten logs. Panus and Armillaria grew in clusters at the base of the large trees. In school holidays we had to be careful with snakes with our children in the plantation during the hot weather they would lay on the bottom limb to get the breeze of the forest and would catch insects, grasshoppers and frogs. In this area they were mainly black and brown. Snipe were plentiful and lived and fed in the long grass out from the river."
- 56 "I have seen one kookaburra behind our house in the Yarrowee Reserve."

3. *Features - geological, man made, waterfalls, bridges, artificial diversions.*

- 2 "Love the river - used to paddle down it on a raft with kids.
Too much gorse and blackberry.
Lovely area near Sykes Road Bridge is overgrown now."
- 5 "There were whirlpools in the larger water areas, some rocks where we could get across to the other side. The waste water from the woollen mills and all the gutter water from Ballarat came down and made the water black and dirty. Balls and rubbish also littered the creek from Ballarat. There was a spring on the left hand side of the end of Bridge St, women came from Bonshaw and the Sebastopol area to get drinking water."
- 6 "Several caves and mine shafts on hill. Bridges (Black Hill) near Progress Park. Pipes that leak something awfully smelly and oily in appearance."
- 8 "It is a pity the river was diverted because of the bypass. The water has been constantly dirty since then and fish much more scarce."
- 9 "Culvert from back of scout hall went up through Pierces Park with walking track with Redgum sleeper roof - could walk through to creek."
- 13 "The creek marks the eastern extent of the basalt lava flow except for a few patches on the east such as the Albion St hill. (Refer Ballarat Goldfield South 1:10,000 map available from the State Data Centre).
The Creek was once a municipal boundary - bluestone and steel bridges built in 19th century are interesting. Grant St, Hill St, Prest St - Sunnyside Mill is a magnificent building but may not have been a pleasant place to work."
- 14 "The only diversion I can remember is where the river floods the flats from the back of Barry James car yard and settles on the plain between the pylons of the sewerage outlet. After each heavy flooding you wouldn't believe the seagulls, herons and an occasional ibis that stalk the wet looking for food. I feel that the sewerage flat should be planted with low growing food shrubs which can withstand wet feet. To me, one who has crossed the bridge to Sebastopol for thirty years; food shrubs and trees should proliferate that area for the sake of birds and animal wildlife."
- 15 "The bluestone channel is a significant person made feature with tourist potential. Need for the channel to have a permanent body of water from side to side (not too deep) with fishing and boating, punting, canoeing possibilities. Installation of floating boom to stop rubbish going into the natural river where the channel ends near the Woollen Mill. I have a vision of the Yarrowee Park as the major park threading its way through Ballarat as the lungs of the City of Ballarat."
- 18 "I don't think artificial structure need to be incorporated into the waterway (eg waterfalls) but existing level changes and concrete bits (near the mill) add interest and need not be removed. The natural features ie trees and scenic value are more important than tourist attractions."

- 19 "I continue to enjoy and use a number of key natural and man-made features including rock formations river/water formations, tree planted areas, revegetation and fauna (bird life) the Woollen Mill, bridges and mining relics (eg. near Redan Creek) evidence of tipping and the water treatment area for recreational and educational purposes with my family, students and the ACF."
- 23 "The river course length has been roughly halved between Black Hill and the end of the lined section. The gradient has therefore roughly doubled. Doubling the gradient quadruples the velocity of water. Lining the river has also increased water velocity by smoothing the bed.
- Weirs are recommended to increase visual appeal and to give fish a chance. Spaced close enough to eliminate fast water (tailwater reaches toe of next weir). Height to take up no more than 5% of bank full capacity."
- 25 "Lal Lal falls, bridges on Yarrowee, Grant Street."
- 33 "No diversions please. I'm worried about what's going to happen to north side of Yarrowee in the future.
- Footbridge at end of Princes St (many maps need updating)."
- 36 "Mullock outcrops are interesting."
- 37 "The bluestone channel."
- 38 "As I said, most of the time we played in the storm drains opposite the Sunnyside Woollen Mill."
- 40 "We like the steps."
- 45 "Geological - the escarpment and mullock heap remains.
 - soft rocks, shales and mudstone.
 - the river bends"
- Man made improvements - access to the reserve, steps near church and further down the river, bridge at Tannery lane."
- 50 "There is a spring which flows on average for about six months each year between 114 and 116 Hickman St. Our block has both volcanic soil and mine tailings on the surface."
- 55 "The footbridge at Glassons Road was man made and local resident the late Mr Hazlett planted the willows that are still there today. During a thunder storm the older folk said the willows would sear off a limb to protect the rest of the tree during strikes of lightning."

4. *How do you use the river now?... walking the dog, canoeing, grazing, bird watching, picnicking....*

- 2 "Annoyed at limited access because of barbed wire. Believe we should be able to walk along its banks but it's impossible but legal."
- 3 "Walking the dog. Observation of bird life"
- 5 "We do not go down to the river much these days. The Historical Society had a tour early last year. We looked across to the site of the old pyrites works and down the river toward Magpie State School."
- 6 "Fishing, running, walking, picnicking, yabbing."
- 7 "Horse riding, walking (too old to run), taking the grandchildren for walks and picnics - a great place for playing make believe games."
- 8 "Fishing, walking, running, kids play in the river. Walking my dogs."
- 9 "Have moved away from area but occasionally go for a walk from White Flat to Prest Street."
- 10 "We just enjoy the beauty of it and the children enjoy playing along the banks."
- 12 "Walking the dog."
- 13 "Walking I like to check the trees I helped plant in September 1990."

- 14 "Walking my six kilometres every day and mostly observing the wildlife."
- 15 "Quiet nature walks, bird watching."
- 16 "Walking, fossicking for stones, recreation."
- 17 "My daughter took me to the river last year for my birthday. The river looks bigger now."
- 18 "Walking and bird watching."
- 19 "Jogging, walking, playing sports on White Flat ovals, taking students on excursions to research water, geology landscape and natural features."
- 21 "Very occasionally walk along part of it between Humffray St Sth access and the footbridge further downstream."
- 22, 23 "Walking the dogs and watching birds."
- 24 "Occasional walking, educational purposes with VCE Geography class."
- 25 "Don't use river, afraid to walk dogs in Ballarat as there are so many dogs roaming the streets."
- 26 "Walking, aesthetic pleasures."
- 29 "We took two bus loads of students to the creek for a clean up. Besides shopping trolleys, etc. one student found a \$5 note (plastic)."
- 30 "Cutting weeds, mowing weeds, walking, cleaning rubbish from water way, cleaning rubbish at ford."
- 33 "Walking, bird watching, cooling off in summer, gold panning, a place to send the kids exploring when relatives visit."
- 32,36 "Walking."
- 34 "Restful area - a beaut spot in the evening after a hot day."
- 37 "My wife and I walk along the track by the creek. It's very nice."
- 38 "I sometimes pan for gold down near the footbridge near the cement works."
- 39 "Walking and driving past."
- 40 "Walking, especially when grandchildren visit, good where there's no traffic."
- 41 "Walking the dog."
- 42 "Walking with dog. Now that I've discovered the area I will use it."
- 43 "Walks/runs."
- 44 "Recreation/walking."
- 45 "Short cut to the city, I do a lot of walking. Picnicking very occasionally, taking a quiet walk often."
- 46 "January 1994 - spoke to two joggers - YCW athletes - regularly use Grant St to sewerage farm. Track for jogging - training."
- 47 "Orienteering Club looks for bushy areas and could use stretches of Yarrowee paths.
- Ballarat Harriers could use a loop, eg. down creek from city, across Whitehorse ranges, up Canadian Valley, back to city.
- I think it would be a good fun run and publicity event.
- Ballarat Hash House Harriers (separate group) now use Yarrowee Flora reserve on some Monday nights."
- 48 "Walking, cycling, picnicking(?) looking for tadpoles/frogs, bird watching, cleaning up."

- 49 "We have just moved into Campbell's Crescent and we discovered the creek and its bridge and walkways last week whilst walking our dog. Needless to say we've walked along the banks of the creek since our discovery." What a lovely spot. How can we help? I walk all day, every day - but I can lend a hand (or a few hours) of a weekend if it would help."
- 50 "Used mainly for walking and children's' bike riding."
- 51 "I currently use this area only to walk the dog. It is a wonderful area for us to have a great variety of walks and adventures. I also use the area for running for my own fitness - it's wonderful to be able to run up the river banks, not in the streets."
- 52 "My grandchildren and I walk to the top of the hill to look at the creek. We look forward to the time when we can walk and picnic, as I'm sure the Historical Society and residents from the Rosebank Village will enjoy this area also."
- 55 "I still use the riverbank, especially between Morgan St East and Doowra St (road to Magpie School) for bird watching and blackberrying. Eastern Rosellas still feed on the Hawthorn Berries on the west side of river and many of the birds take cover at night on the Blythewood Grange lake. (Grant and Morgan Sts East, Sebastopol) This blackberrying season 1994, we counted 18 dead rats in the flat near the Magpie bridge, some were very large!"
- 56 "We walk along Yarrowee Reserve often, probably once a week in the winter and every night in the summer. We walk the dog and also look for birds and look at the eucalypts and try to distinguish them. We always take our visitors for a walk along Yarrowee Creek."

5. *Your visions for the rehabilitation, revegetation and development of the Yarrowee as a recreational resource. What would you like to see provided or included in your section of the river reserve?*

- 1 "Plant trees. Plant trees opposite Ballarat Bowling Club (near Rowe St)".
- 2 "Pathways free of noxious weeds and pollution."
- 4 "A walking or bicycle track with areas of native trees to try and encourage some native birds to the area."
- 5 "I would like to see the river area cleared up, made into picnic grounds and walking tracks, to stop certain people from taking sand from the rich river flats. The dairy farmers, Dickinsons, Effords and Williams families all grew rich lucerne pasture on the river flats to provide luxurious food for their cows. The people who now own these farms have let the lucerne die out."
- 6 "More fish released, better fighting fish introduced eg. Rainbow trout. Better walking and riding tracks. People stopped from shooting animals on hill. Parks, benches, picnic areas, camping areas."
- 7 "A continuous maintained "Native" strip from vicinity of Peel Street to Gong Reservoir park with :- regular slashing, blackberry/gorse removal, tree plantings, occasional seats, running/walking track to join largely unused and unknown running tracks in bush near Gong reservoir (developed 1983). Simple pedestrian bridges or crossings of stream at access points. Parallel horse riding tracks where appropriate (koala crossing under bypass might provide safe pedestrian crossing). Picnic tables near car access points."
- 8 "Clean up the bracken and other weeds that surround the river in the Brown Hill and Black Hill areas. A running track from Springs Road to Mt Clear following the river."
- 10 "The blackberries removed and a bridge across it."
- 12 "The current wetland adjacent to the cement works ponds is a unique feature for reed nesting, birds, frogs, etc. Blackberries and other feral plants and animals need to be controlled."
- 13 "A variety of vegetation to shelter and feed native birds and animals.
- Other possibilities bird hides, picnic tables, playground equipment, self guided walks, an adventure playground with a flying fox and an obstacle course, nesting boxes for birds."
- 14 "I could go overboard with this question however as the section from Ballarat East has improved out of sight in the past ten years, I am pleased just to have a walking track on the Eastern side and trees to look at.

The commercial industries could be asked to move away from the Yarrowee, but I suspect they would object on the grounds that where could they run their effluent in such a snide hidden area and remain innocent?"

- 15 "Revegetation has significantly enhanced bird-life. Time to further this revegetation on the east side between White Flat and Hill Street."
- "Creation of a canal. Also the need to revegetate the east side of river between White Flat oval and Hill Street where ugly tin fences spoil the enormous potential. I've been pushing this for years but no action yet.
- Open Yarrowee between Dana Street and Little Markets Sts. (Heritage railing replace ugly cyclone wire bridges with bluestone bridges). This could be a community project with LEAP/DEET funding. Let's get cracking!!
- The relocation of the concrete making factory (Tannery Lane) to the industrial estate is critical to the river being developed as a linear reserve.
- Ballarat bulk containers have not carried out the works ordered in the AAT decision. Why don't the council officers enforce their own decisions in this matter?"
- 16 "An extensive parkland extending from the current reserve through to Magpie. Picnic spots, tables, fireplaces, walking tracks, reforestation."
- 18 "Existing plantings appear to be doing well and the only thing I would like to see changed is improved rubbish removal and some weed control (blackberry and gorse) though these need not be eradicated completely if resources are not available - just controlled a bit."
- 19 "I would like to see, to begin with -
- (i) a walking track (paved for prams, etc) from the City to Magpie
 - (ii) a walking guide with markers (numbers) to highlight key features.
 - (iii) promotion of this concept in community, education and tourism circles, etc.
 - (iv) Link progressively this track concept with other corridors in the Ballarat area.
 - (v) Strong support encouraged for local school involvement in research, management and usage, etc.
 - (vi) and Ballarat Goldfields Gold Museum (eg a Yarrowee collection) and exhibitions."
- 20 "More seats and tables wanted."
- 21 "Because it is down to such a low volume up and downstream from Grant St it is hard to think of it as an asset there. However the banks could be made into a communal park south of Grant St. It would be a pretty key big commitment though but I suppose a park would get used but hopefully not by defecating dogs (a pet hate). As usual it would need management and labour of which I maybe could provide a bit on a working bee occasionally. I'm not a good volunteer."
- 22 "A clean up of all weeds growing especially the long grass and Aniseed weed that is let get too long around the trees that have been planted.
People to stop throwing rubbish over their back fences plus more trees and shrubs."
- 23 "Clean up residents rubbish dumped on east bank in the kilometre downstream from Grant St. Plant natives on both sides from Eastwood St to Grant St and downstream for the next kilometre."
- 24 "Improved access - walking paths on the eastern side - complete tracks from north-south on the eastern side.
Removal of unsightly landfill (tiles, etc) from eastern side.
Removal of remains of transfer station.
Additional seats/tables provided.
Revegetation to hide car yard.
Litter trap in bluestone channel section?"
What can be done to improve the visual amenity of the areas associated with the cement works? eg clay embankment & associated ponds. Are these actually within the boundaries of the reserve and if so how come???
- 25 "To be kept as clean as possible."
- 26 "Replanting of creek side reserve with endemic plant species. Control of exotic flora and fauna, including cats, rabbits.
Publication of a newsletter of accomplishments for local residents."
- 27 "I would like to see approaches made to the Federal Government for funding for land reclamation along the Yarrowee. In particular, the large areas which are smothered by blackberry could be reclaimed fairly easily. I would think that 20 people employed on a three month project could eradicate blackberry and plant out native grasses, etc. This is not just another example of painting the rocks white!"

- 28 "Would like to see blackberry bushes destroyed, grass kept short so the children can walk along paths feeling safe. Small bridge put over river so easier for them to cross rather than having to walk through or all the way around at sewerage pipe end."
- 29 "An undercover picnic table and chairs, like a five sided gazebo. (Table made of 1/2 tree trunk looks great.) Signs requesting users to "take rubbish with you" Little stakes (like Melbourne Botanical Gardens) identifying indigenous trees etc, that have been planted. Gas BBQ?"
- 30 "Eliminate noxious weeds, plant natives, walking/bicycle paths perhaps as far as Gong Reservoir."
- 32 "Definite paths along creek and points of interest noted, including local wildflowers, etc. Some form of seating occasionally and possibly picnic facilities where practical."
- 33 "Not parkland (but) Natural bushland. I'd love to see the pine trees on Black Hill go. Get rid of blackberries!!!"
- 34 "A few more gum trees in the area to encourage the koalas to eventually return."
- 35 "A path/walk along the creek."
- 36 "Trees are nice."
- 37 "Seats and trees."
- 40 "More trees."
- 41 "More paths and bridges."
- 42 "Clearly a lot of work has already been done in this area. It would be good to see the Yarrowee rehabilitated as close as possible to its original state."
- 43 "Much revegetation removal of exotic plants/animals. Litter control eg. boom. Perhaps some control of cat/dog attacks on native wildlife."
- 44 "A natural environment."
- 45 "To preserve and improve on what we already have - future tree planting.
- protect the environment from the recent plan to mine the area (gold and its waste extractions)
- take regular clean ups/plantings
- tourist walks/bird watching club
- improve the area by weed control, especially the Humffray St side of the river.
- media involvement emphasising the good, the bad and the ugly and the historical aspect.
- return fish to the area - any information on original species? Future fishing recreation.
- heavy penalties to those who continue to use the river as a drain and rubbish dump.
- native frogs."
- 48 "1. A cycle track.
2. Use of other side near the Leith St bridge so we can walk back that way (ie. the eastern side between Hill St - Leith/Pryor St).
3. Low shrubby "hedge" along channel edge to keep children out.
4. Clear water, abundant fish and bird/animal life.
5. Some sort of catchment at the end of the channel to collect and stop garbage getting into the unchanneled section. Surely there has been some sort of precedent for a trap of this kind - metal mesh that water can still flow over/through around in times of high water when it gets blocked? This high water junk - plastics, etc, is the hardest to clean up as it gets stuck in trees. Would need to be able to lift it somehow to clean junk off."
- 50 "Children's playground in White Flat area for local children and those families spectating at footy, cricket, etc. Running/bike track - a good idea. Further clean ups to remove litter. Clean up and plant bank area behind houses in Humffray St Sth (opposite White Flat oval) invite householders to help and care for area."
- 51 "I think the vegetation and planting are great now, but I feel the river is still very unclean and would like to see a major effort to clean it up."

- 55 "Being interested in local history, I would be in favour of a park near the monument or a small lake in the valley east of the monument, as suggested some years ago, as this would encourage more bird life to the area and would be of interest to local schools for studies and nature. Birds never inhabited the creek because the water was so putrid in this area of the Yarrowee. Further downstream the Leigh Junction Bridge near Grenville platypus are now getting more plentiful in the cleaner water."
- 56 "Maybe a walking track down to the creek, near Latrobe St. Many young people scramble down there anyway amongst the blackberry bushes so a proper track would make life easier for a lot of people. Also I have noticed a lot of people taking dogs for a walk in that area so the Yarrowee Reserve would be utilised more if these people had a track down to the creek from that point."

6. *Other comments*

- 1 "Protection from weeds and people throwing rubbish in creek"
- 2 "Well done, keep going - I applaud you - I'll help if you need me."
- 3 "More seats both sides of river. Better walking paths."
- 4 "Something has to be done to the valley area before it will be a suitable place for people to view say from the club area of the Gun Club or at the end of Morgan Street."
- 5 "I lived at Napoleons as a youngster, my father could remember when the Aborigines came in from the bush during summer and went down the Leigh River to catch Blackfish that would be past the Scotchman's Bridge down near the Durham."
- 6 "I would like to see some fishing inspectors monitoring the creek to stop undersized fish being caught especially trout. Some people to stop pollution in the river. Ever since I moved here I have thought that our house is situated in the best place in Ballarat. Far better than living in the city (Brown Hill)."
- 7 "Present leases of river frontage could be a major issue to the feasibility of linear reserve."
- 8 "The river is a tremendous asset that should be developed and protected."
- 11 "A map of something in way of direction - how to get to reserve would have been welcome."
- 12 "Relocate (to an industrial estate) industries currently situated on the east side of the Yarrowee between Hill & Prest Streets. In addition to the visual detriment of the wreckers and cement works there is considerable noise pollution from the cement operation.
- Rehabilitate the east side with native plantings, access for pedestrians and cyclists.
- Rubbish traps at the end of the channel to reduce rubbish going into the "natural" waterway.
- The Yarrowee corridor offers marvellous potential - to see a river run through (at least the major part of Ballarat) would be a great achievement for future generations to inherit. In its present state it is a testament to the lack of vision, exploitation and failure to regard the natural environment as a valued resource by the city's fathers.
- Having lived in England I can appreciate the scenic and recreational value of a river running through the town or city."
- 13 "What is the zoning of the wreckers yard? Would it be possible to rezone it and transfer the land to public ownership?"
- 14 "I feel the wool wash and tannery factories on the Mt Pleasant side need watching and checking occasionally because the powerful smells emanating from that area must be disbursed somehow."
- 16 "Landowners in my locality have made serious efforts to clean up furze and blackberry via prompting from eradication notices. However other vacant properties are infested heavily particularly bordering the river downstream of Leigh St. Can anything be done?"
- 18 "It's a great resource and is progressing well with the care and attention it has received thanks, keep up the good work."
- 20 "Remove blackberries at the back of properties in Yarrowee Parade area."
- 22 "Get rid of starlings as there are quite a few native birds around but then the starlings arrive they take over and the others disappear."

23 "I will develop the weir idea, if required, by: -

- Consulting with council engineers re flood capacity needs
- Consulting with council engineers re costs.
- Consult fish experts re a suitable weir design.
- Preparing a staged proposal, with costs.

Soil erosion upstream causes heavy discolouration after rain - this needs to be addressed by DCNR, Council and construction authorities."

25 "City council to inspect tunnels every so often."

26 "Attempt to include volunteer labour such as local community members and school children or the use of groups such as the ATCV or LEAP scheme members. Educate householders that creeks are not rubbish disposal sites."

28 "Motor bikes stopped from being allowed to go there as many times I've seen them spooking the kids riding their horses."

29 "An undercover noticeboard with glassed in information (eg Apex park, Barwidgee Creek Myrtleford) on where river flows, etc. Map of its course through Ballarat (to sea). Litter trap at end of bluestone."

31 "Walk to Brown Hill pub bridge.
Quail-thrush.
Freeway was best part. Must watch/ward against more losses."

32 "Have motor cycles and the bikes kept out of the area."

33 "I was extremely upset last summer (92/93) when a well meaning group planted many native trees along the Yarrowee then some months later the council slashed them. Not only that, but they backed the slasher into my backyard and took three of my trees which were 2 metres high as well. When I phoned - "We'll look into it!"
I also lost the ancient Plane tree on my nature strip when Princes St was remade (early '93). I was away at the time. There has been no attempt to replace the tree - not even any power lines above it!"

34 "Walking, bird watching, cooling off in summer, gold panning, a place to send the kids exploring when relatives visit."

35 "Have only been here one month, but would be happy to assist the local community."

36 "Longer path would be nice."

37 "Clean out the blackberries and gorse."

39 "Highlight mining history naming features by nearest mine."

40 "Get rid of trail bikes."

41 "General clean up"

42 "This is a valuable recreation/educational area and reserve for wildlife. It should at very least be retained as such."

43 "There is a sharp bend in the creek just below (100-200m) the end of the bluestone drain that acts as a natural catching area for rubbish. For example, I once found at least seven shopping trolleys there."

44 "We agree with the aims and desires for the future of the Yarrowee Creek precinct."

46 "Train at White Flat oval. Early in season some stretch of Yarrowee track is used for jogging, most of training on oval (1989 - YWY Junior coach used Yarrowee track for off road running."

48 "Thankyou for helping improve the Yarrowee."

50 "There has been a great improvement in this area of the past 10 years or so, keep up the great work."

51 "Its a great resource which I did not know was so close to my back door."

- 52 "I would like to see a monument in memory of the early miners placed near the creek, just south of the Whitehorse bridge with as many gum trees as possible all along the Yarrowee."
- 55 "The only way to be a nice river would be to dredge and bleach the putrid water to get the creek flowing. Eels, and fish cannot live in this dirty water."
- 56 "Down the far end where there is a small bridge and concrete factory, the track is always muddy with large puddles and sludge. This could be fixed."

RESPONDENT DETAILS

RESPONDENT CODE	AGE	SEX	BIRTHPLACE	YEARS IN BALLARAT
1	73	M	SEBASTOPOL	20
2	42	F	BALLARAT	12
3 (4 persons)	70's	M/F	SEBASTOPOL	70+
4	74	M	TASMANIA	65
5 (2 persons)	-	M/F	BALLARAT	all lives. family 4 generations in Sebastopol area.
6	13	M	HORSHAM	1
7	58	M	BALLARAT	27 (in present house)
8	40	-	BALLARAT	4
9	65	M	BALLARAT	65
10	-	F	AUSTRALIA	10
11	-	-	-	-
12	48	M	UK	5
13	41	M	KYNETON	5
14	-	-	-	40/70
15	45	M	MELBOURNE	4
16	41	M	HEATHCOTE	5
17 (2 persons)	75	F	HORSHAM	66
18	-	F	-	4
19	39	M	MELBOURNE	14
20 (2 persons)	70 & 76	M/F	NSW/BOX HILL	36
21	57	M	NETHERLANDS	12
22	-	F	BALLARAT	34
23	55	M	MARYBOROUGH	8
24	-	-	-	-
25	52	F	BALLARAT	-
26	21	M	-	4
27	-	M	-	3.5
28	32	F	ENGLAND	4.5
29	31	F	MYRTLEFORD	2
30	58	M	BALLARAT	58 (140+ years, family)
31	-	-	-	-
32	67	F	MT PLEASANT	9
33	45	M	MELBOURNE	5.5
34	-	F	CRESWICK	23.5
35	46	F	ENGLAND	1
36	-	-	MELBOURNE	2
37	46	M	SEBASTOPOL	54
38	-	-	-	-
39	-	-	MT PLEASANT	-
40	-	-	MT PLEASANT	4
41	74	M	BALLARAT	20
42	-	F	-	6
43	20	M	BRISBANE	1.5
44	47	M	MELBOURNE	3
45 (Couple)	-	M/F	BEEAC/BALLARAT	2
46	-	-	-	-
47	-	-	-	-
48	40	F	ROBINVALE	20
49	54	F	UK	8 months
50	56	M	ST KILDA	15
51	29	F	MELBOURNE	2
52	-	F	SEBASTOPOL	4 Generations Sebastopol born.
53	74	F	SEBASTOPOL	74
54	-	M	SEBASTOPOL	-
55	66	F	SEBASTOPOL	66
56	35	F	JEPARIT	1

A further 4+ forms were returned without information.

Appendix 6: Educational Resources available

Videos available for loan from LINCS committee

- Drains to the bay. (Melbourne Water)
- Managing Linear Reserves. (VRCC)
- Preserving Native Grasslands. (VRCC)

Other Items available (source):

- LINCS 1:30,000 map Ballarat Region (LINCS Committee)
- Cycling Sights Guide, Ballarat & District (City of Ballarat)
- LINCS Plan, (LINCS)
- LINCS Yarrowee Case Study:
 - Part 1. Yarrowee River corridor Environmental & Recreational Assessment Report
 - Part 2. Yarrowee River Corridor Landscape Master Plan & Landscape Management Plan
- Yarrowee Management Guideline brochures: (LINCS)
- Yarrowee tour guide (LINCS)*
- Ballarat-Skipton Rail Trail guide (LINCS)*
- Waterwise 1 Years P-6. More Precious than Gold* (1993). Central Highlands Water Authority. (CHW)
- Waterwise 2 Years 7-10 Living in a Catchment* (1993). CHW.
- Burrell, Jennifer (1992). *Environmental Action Mt Clear 1990-1992. Mt Clear Primary School.* (Mt Clear Primary)
- Jenkins, Arthur J (undated). *Notes on the first settlement of Ballarat.* Sebastopol Historical Society

Appendix 7:**AVENUES FOR PUBLICITY AND
AWARENESS RAISING**

- 3BBB Right Environment Program
Contact: Hedley Thomson Tel. 38-1477 BH
- Ballarat Environment Network (BEN) Newsletter and Activity Sheet
Contact: Bob Hall (newsletter) Tel 36 2891 AH
Contact: Tim D'Ombra (activity sheet) Tel 46-1495
38-1477
- 3BA
Tel. 31 1333
- Ballarat Courier
Contact: The Environmental Reporter Tel 20 1200
- WIN TV News
Tel. 20 1366
- Talks to schools, LandCare groups and community groups
- Poster displays of the plan
- Linear Reserve open days or promotion days, eg Yarrowee River Tour and barbecue
- Resident Surveys, eg Yarrowee Nearby Resident survey
- Site signage
- Brochures, pamphlets, tour guides, information with rate notices
- Waterwatch
contact CHW Tel 20 3100

Appendix 8.

LIST OF POTENTIAL FUNDING AND LABOUR SOURCES (for on ground works)

GRANT PROGRAMS

- **National LandCare Program (NLP)** State/Federal Includes:-

Australian Nature Conservation Agency (ANCA) - One Billion Trees Program.

ANCA-Save the Bush.

Murray Darling Basin Commission (MDBC) - Natural Resources Management Strategy.

Department of Primary Industries and Energy (DPIE) - Land and Water Management Program. Includes City LandCare
[Applications usually close in March]

- **Department of Conservation and Natural Resources (DCNR)** State
Includes:-

DCNR Community Grants Scheme. Administered by the Office of the Environment, 240 Victoria Pde, E. Melbourne 3002

DCNR Land Protection Incentives Scheme. For private land. Administered by the Regional Office, corner of Mair and Doveton Streets, Ballarat 3350.

- **Greening Australia.** Birdwood Avenue, South Yarra 3141. Tel. (03) 654 1800.
- **National Estates Grants Program.** Heritage Projects
Contact:- Ann Van de Meene, NEGP Coordinator, Office of the Environment, 240 Victoria Pde, E. Melb. 3002
[Applications usually close in March]

LABOUR and/or FUNDING

- **Local Government**
- **Service Clubs**
- **Community Groups**
- **Corporate Sponsors**
- **Australian Trust for Conservation Volunteers (ATCV)**

Appendix 9: Further references and information

ENVIRONMENTAL MANAGEMENT

- Newman, P, Kenworthy, J, Robinson L. (1992) *Winning Back the Cities. A Choice Guide*. Australian Consumers Association
- Towards Sustainable Land Use, The Victorian Decade of LandCare Plan-discussion paper* (1991). Decade of LandCare Steering Committee.
- Fisher, Tim (1992). *Greening the Neighbourhood. A guide to Conservation and Environmental management by local Government in Victoria*. Australian Conservation Foundation.
- Managing for the Future. A local Government guide, Local Agenda 21* (1994). Municipal Conservation Association.
- Creating Our Future. A community plan for Ballarat*. (1994) City of Ballarat
- Wilson, Sayer, Core Pty Ltd (1990). *Ballarat Region Strategy Plan*. Ballarat Regional Board for Planning and Development, Area Planning Standing Committee.
- Habitat-A Model for Integrated and Sustainable Urban Development in Australia* (1993). Habitat Project, Melbourne.
- Corangamite Regional LandCare Plan* (1993). LandCare Victoria
- Avoca-Loddon-Campaspe Regional LandCare Plan* (1993). LandCare Victoria
- Glenelg Regional LandCare Plan* (1993). LandCare Victoria
- Grow a Green Web* (Brochure)

Appendix 10: VEGETATION OF THE BALLARAT REGION

SOILS KEY W = WIDESPREAD ON A RANGE OF SOILS
 O = ORDOVICIAN
 G = GRANITE
 GB = GREY BASALTIC
 RV = RED VOLCANICS
 A = ALLUVIAL SILTS, SANDS, CLAYS &

GRAVELS.

The More Common Trees and shrubs

Soil types

<i>Acacia acinacea</i>	Gold-dust Wattle	ORD/A
<i>A. aculeatissima</i>	Creeping Wattle	ORD
<i>A. aspera</i>	Rough Wattle	ORD
<i>A. dealbata</i>	Silver Wattle	W-on wetter soils
<i>A. genistifolia</i>	Spreading Wattle	ORD/G
<i>A. gunnii</i>	Ploughshare Wattle	G/A
<i>A. implexa</i>	Lightwood	GB/G
<i>A. lanigera</i>	Woolly Wattle	ORD
<i>A. mearnsii</i>	Black Wattle	W
<i>A. melanoxylon</i>	Blackwood	W
<i>A. mucronata</i>	Variable Sallow Wattle	RV/G
<i>A. myrtifolia</i>	Myrtle Wattle	ORD/G
<i>A. paradoxa</i>	Hedge Wattle	W
<i>A. pycnantha</i>	Golden Wattle	W
<i>A. retinodes</i>	Wirilda	GB/A
<i>A. stricta</i>	Hop Wattle	ORD
<i>A. verniciflua</i>	Varnish Wattle	A
<i>A. verticillata</i>	Prickly Moses	ORD/RV/G
<i>Allocasuarina littoralis</i>	Black She-oak	ORD/A
<i>A. muellerana</i>	Slatey She-oak	A
<i>A. verticillata</i>	Drooping She-oak	A/GB/G
<i>Amyema spp.</i>	Mistletoes	W
<i>Banksia marginata</i>	Silver Banksia	A/G/GB/ORD
<i>Bursaria spinosa</i>	Sweet Bursaria	GB/ORD/G
<i>Callistemon sieberi</i>	River Bottlebrush	GB-river banks
<i>Calytrix tetragona</i>	Common Fringe-Myrtle	A
<i>Cassinia aculeata</i>	Dogwood	W
<i>C. arcuata</i>	Drooping Cassinia	W
<i>C. longifolia</i>	Shiny Cassinia	RV
<i>C. uncata</i>	Sticky Cassinia	ORD
<i>Coprosma hirtella</i>	Rough Coprosma	RV
<i>C. quadrifida</i>	Prickly Currant-bush	RV
<i>Correa glabra</i>	Rock Correa	GB/G rocky esc.

<i>C. reflexa</i>	Common Correa	ORD/G
<i>Cyathea australis</i>	Rough Tree-fern	mountain gullies
<i>Daviesia latifolia</i>	Hop Bitter-pea	RV
<i>D. leptophylla</i>	Narrow-leaf Bitter pea	ORD
<i>D. mimosoides</i>	Blunt-leaf Bitter-pea	ORD/A
<i>D. ulicifolia</i>	Gorse Bitter-pea	ORD/A
<i>Dicksonia antarctica</i>	Soft Tree-fern	mountain gullies
<i>Dillwynia cinerascens</i>	Grey Parrot-pea	ORD
<i>D. hispida</i>	Red Parrot-pea	ORD
<i>D. glaberrima</i>	Smooth Parrot-pea	ORD
<i>D. sericea</i>	Showy Parrot-pea	ORD
<i>Dodonaea viscosa</i>	Hop Bush	GB/ORD/G
<i>Epacris impressa</i>	Pink Heath	ORD/G
<i>Eucalyptus aromaphloia</i>	Creswick Apple box or Scent Bark	ORD/G
<i>E. baxteri</i>	Brown Stringy bark	ORD/G
<i>E. camaldulensis</i>	River Redgum	GB/A-rivers
<i>E. dives</i>	Broad-leaf Peppermint	ORD
<i>E. globulus ssp bicostata</i>	Bluegum	G
<i>E. goniocalyx</i>	Long-leaf Box	G
<i>E. leucoxydon</i>	Yellow Gum	G
<i>E. macrorhynca</i>	Red Stringy bark	ORD/G
<i>E. melliodora</i>	Yellow Box	ORD/G/A
<i>E. microcarpa</i>	Grey Box	G
<i>E. obliqua</i>	Messmate	ORD/G/RV
<i>E. ovata</i>	Swamp Gum	ORD/A/G-poorly drained
<i>E. pauciflora</i>	Snow Gum	ORD/G/GB
<i>E. polyanthemos</i>	Red Box	G
<i>E. radiata</i>	Narrow-leaf Peppermint	ORD/G/A
<i>E. rubida</i>	Candlebark	W-drainage lines
<i>E. sideroxylon</i>	Red Ironbark	ORD
<i>E. viminalis</i>	Manna Gum	RV/GB/G
<i>E. viminalis ssp cygnetensis</i>	Rough-bark Manna Gum	ORD/GB
<i>E. yarraensis</i>	Yarra Gum	ORD-poorly drained
<i>Exocarpos cupressiformis</i>	Cherry Ballart	ORD/G
<i>Gompholobium huegelii</i>	Common Wedge-pea	ORD
<i>Goodenia ovata</i>	Hop Goodenia	GB/ORD
<i>Goodia lotifolia</i>	Golden Tip	RV
<i>Grevillea spp</i>	Grevilleas (many localised species)	ORD/G
<i>Gynatrix pulchella</i>	Hemp bush	GB
<i>Hakea sericea</i>	Bushy Needlewood	ORD/A
<i>Hymenanthera dentata</i>	Tree Violet	GB/G
<i>Indigofera australis</i>	Austral Indigo	RV
<i>Leptospermum continentale</i>	Prickly Tea-tree	W
<i>L. lanigerum</i>	Woolly Tea-tree	W-stream banks
<i>L. myrsinoides</i>	Silky Tea-tree	ORD/A

<i>L. obovatum</i>	River Tea-tree	GB-streams
<i>Myoporum viscosum</i>	Boobialla	GB-rocky escarpments
<i>Olearia ramulosa</i>	Twiggy Daisy-bush	ORD
<i>Ozothamnus ferrugineus</i>	Tree Everlasting	ORD/G
<i>O. obcordatus</i>	Grey Everlasting	W
<i>Parahebe derwentiana</i>	Derwent Speedwell	RV
<i>Pimelea axiflora</i>	Bootlace bush	RV
<i>Pomaderris spp.</i>	Pomaderris	GB-streams
<i>P. daphnoides</i>	Large-leaf Bush-pea	RV/G
<i>Pultenaea gunnii</i>	Golden Bush-pea	ORD
<i>P. humilis</i>	Dwarf Bush-pea	ORD
<i>Solanum laciniatum</i>	Kangaroo Apple	GB/ORD/G
		-gullies + escarpments.
<i>Xanthorrhoea australis</i>	Large Grass-tree	ORD
<i>X. minor</i>	Small Grass-tree	ORD/A

Common Ground covers and Grassland Species

<i>Acaena spp.</i>	Bidgee Widgee & Sheep's Burrs
<i>Arthropodium spp.</i>	Vanilla and Chocolate Lilies
<i>Brachyscome multifida</i>	Cut-leaf Daisy
<i>Brunonia australis</i>	Blue Pincushion
<i>Bulbine bulbosa</i>	Bulbine Lily
<i>Burchardtia umbellata</i>	Milkmaids
<i>Calocephalus spp.</i>	Beauty Heads
<i>Carex appressa</i>	Tall Sedge
<i>Chrysocephalum spp.</i>	Common and Clustered Everlastings
<i>Danthonia spp.</i>	Wallaby grasses
<i>Dianella revoluta</i>	Black-anther Flax-lily
<i>Drosera spp.</i>	Sundews
<i>Eryngium ovinum</i>	Blue Devil
<i>Geranium spp.</i>	Cranes Bills
<i>Hardenbergia violacea</i>	Happy Wanderer
<i>Helichrysum scorpioides</i>	Button Everlasting
<i>Hibbertia spp.</i>	Guinea flower
<i>Hovea linearis</i>	Common Hovea
<i>Juncus spp.</i>	Rushes
<i>Kennedia prostrata</i>	Running Postman
<i>Leptorrhynchos spp.</i>	Buttons
<i>Lomandra spp.</i>	Lomandras
<i>Pimelea spp.</i>	Rice Flowers
<i>Poa spp.</i>	Tussock grasses
<i>Rumex spp.</i>	Docks
<i>Senecio spp.</i>	Fireweeds and Groundsels
<i>Stackhousia monogyna</i>	Creamy Stackhousia
<i>Stipa spp.</i>	Spear grasses

Stylidium graminifolium

Tetralathea ciliata

Themeda triandra

Tricoryne elatior

Veronica spp.

Viola spp.

Wahlenbergia spp

Wurmbea dioica

Plus a range of Orchids. Heaths, other

Grasses, Sedges Peas and Daisies etc

Grass Trigger-plant

Pink Bells

Kangaroo grass

Yellow Rush-lily

Speedwells

Violets

Bluebells

Early Nancy

Appendix 11: Moordialloc Creek, Dandenong Valley and Western Port Catchments Action Plan - Strategy (Summary)

PART 4: THE STRATEGY

The following general strategy was used to identify specific sources of sediment and related pollutants, and appropriate control methods prior to developing a comprehensive action plan.

Issue	Proposed Action (agencies)
-------	----------------------------

1. SITE IDENTIFICATION

- | | |
|---------------------------|---|
| a. Land development sites | List and rank existing and proposed land development sites known to agencies (DPD, Municipal Councils, EPA). |
| b. Pollution sites | Complete stream and catchment surveys of sediment & other pollutant sources in accord with <i>Landcare</i> plans (MW, EPA, CNR, Dept. Agriculture). |
| c. Pollution traps/basins | Identify, plan for & liaise regarding sediment/litter/pollution traps & basins (MW, DPD, Municipal Councils). |
| d. Commercial premises | Inspect industrial/commercial premises (EPA). |

2. CATCHMENT CONTROLS

- | | |
|------------------------|---|
| a. Planning & contract | <p>Prepare & promote contract specifications, planning controls & permit & subdivision controls for litter, erosion & sediment control in the context of general environmental needs (DPD, EPA, Municipal Councils, ULA, Vic Roads, Industry Associations, other professional groups).</p> <p>Compare land uses & zones with land capability & buffer zone needs (Municipal Councils, DPD, CNR, EPA, Department of Agriculture).</p> <p>Sponsor a local government project to develop a model pollution control plan and implementation process (EPA, DPD, MW).</p> |
| b. Construction sites | Identify priority construction sites, review status annually & ensure erosion & sediment controls are adopted (Municipal Councils, DPD, CNR, EPA, MW). |
| c. Roads | <p>Include sediment & pollution controls in road designs & contracts (Municipal Councils, Vic Roads).</p> <p>Identify priority sites and obtain commitment from relevant Authorities or land owners to undertake appropriate erosion & sediment control works in accord with <i>Landcare</i> plans (CNR, EPA, Vic Roads, Municipal Councils).</p> |
| d. Landfills | Continue licence monitoring data & leachate containment (EPA). |

Issue	Proposed Action (agencies)
e. Sewage treatment plants	<p>Control sewer overflows & implement <i>SEPPs</i> (MW). Monitor licence controls (EPA). Monitor permit controls (Municipal Councils)</p> <p>Investigate sewage irrigation & recycling & assess sewerage strategies & onsite disposal in accord with the <i>Victorian Nutrient Management Strategy</i> & relevant guidelines (MW, EPA, HCS).</p>
f. Sullage & related	<p>Connect to sewer, recycle in accord with current regulations or guidelines, or retain sullage within residential allotments in accord with <i>SEPPs</i> and "<i>Septic Tanks Code of Practice</i>" (EPA 1990). (MW, Municipal Councils, Water Boards, HCS).</p>
g. Intensive animal industries:	<p>Implement relevant policies, codes, guidelines & strategies (Municipal Councils, Dept. Ag, EPA)</p>
h. Quarries & extractive industries:	<p>Monitor, control and assess impacts. (DEM, EPA, CNR, Municipal Councils).</p> <p>Investigate need for truck washing & covering code-of-practice (DEM, EPA, MW).</p>
i. Other industries	<p>Routine scheduled premises Works Approvals & Licence processing (EPA).</p>
j. Urban & industrial	<p>Assess existing & proposed <i>Urban Runoff Pollution Control</i> guides & prepare codes & guidelines as required (EPA, MW, Municipal Councils, CNR, DPD, ULA, Associations).</p> <p>Develop street sweeping, litter control codes & local conservation strategies (Municipal Councils, MW, EPA).</p> <p>Check & develop guide for cooling tower & boiler wastewater disposal (EPA, Industry Associations, HCS).</p>
k. Cropland	<p>Map cropland and horticultural sites subject to erosion, assess downstream impacts, prepare publicity information, promote & support <i>Landcare</i> projects, establish streamside buffers, provide for sustainable land use (CNR, Dept. Ag, MW, EPA, HCS).</p>
l. Pasture & bushland	<p>Monitor vegetation clearing & encourage local native tree planting and retention (CNR, Municipal Councils, MW).</p> <p>Promote, implement & support <i>Landcare</i> plans (CNR).</p>
m. Other pollution problems	<p>Identification, surveillance & control of other pollution problems including litter and ground water pollution control (EPA, MW, RWC, Municipal Councils, CNR).</p>

Issue	Proposed Action (agencies)
3. INSTREAM CONTROLS	
a. Stream beds & banks	<p data-bbox="707 432 1362 495">Continue the progress and maintenance of bed and bank stabilization progressively implemented over the past 15 years (MW, CNR).</p> <p data-bbox="707 517 1318 633">Map and prioritize erosion sites, and develop annual works programs in accord with the <i>Victorian Nutrient Management Strategy</i> and <i>Landcare</i> plans, including local community groups where appropriate (MW, CNR).</p> <p data-bbox="707 663 1331 745">Trial aquatic and riparian plants to stabilize stream banks with & without thick mulch matting in accord with <i>Landcare</i> plans (MW, CNR).</p> <p data-bbox="707 775 1337 837">Map livestock access to streams and establish buffers on a priority basis in accord with <i>Landcare</i> plans (CNR, MW, Dept.Ag).</p> <p data-bbox="707 864 1318 927">Strengthen planning scheme buffer zone setbacks particularly for erosion controls (DPD, CNR, Municipal Councils).</p> <p data-bbox="707 954 1147 983">Review works program annually (MW, CNR).</p>
b. Pollution traps /wetlands /floodplains /waterways	<p data-bbox="707 1003 1278 1066">Investigate designs for improved pollutant trapping & treatment eg. easy litter removal (MW, Municipal Councils).</p> <p data-bbox="707 1093 1355 1209">Identify & promote sites suitable for sediment trap dams & litter traps downstream from all existing and proposed urban areas and prepare a works program, to be reviewed annually (MW, Municipal Councils, EPA, co-ordination/advisory committees).</p> <p data-bbox="707 1236 1353 1352">Prepare, promote and implement concept plans, including streamside buffer zones & revegetation, for each waterway with the first priority being the Mordialloc Creek/Dandenong Creek system (MW, Implementation Committees).</p> <p data-bbox="707 1379 1283 1408">Prepare works programs/projects and review annually (MW).</p>
c. Emergency response	Continue DISPLAN for HAZMAT incidents (Emergency Service Combat & Support Agencies).

5. MONITORING & EVALUATION

- | | |
|-------------------------------|--|
| a. Water & sediment qualities | <p>Examine existing water monitoring data to detect specific pollution problems & contaminant sources (EPA, MW, CNR).</p> <p>Check for improvements/changes in stream, estuary & bay water & sediment quality resulting from the strategic actions above, using existing and new monitoring programs (EPA, MW).</p> <p>Establish new monitoring points to cover gaps in existing monitoring systems (EPA, MW, CNR).</p> <p>Identify & estimate sediment, nutrient & other contaminant sources & flow rates/loads in accord with the <i>Victorian Nutrient Management Strategy</i> & other studies to help prioritise control works (MW, EPA, CNR).</p> |
| b. Biota | <p>Monitor & report on instream, coastal, mangrove, seagrass and benthos, biota, particularly invertebrates, as indicators of pollution; monitor changes in potential native fish habitats (EPA, MW, CNR).</p> <p>Monitor seagrass and mangrove distribution (CNR, EPA).</p> <p>Identify most probable reasons for decline of bay seagrass & mangroves & control where appropriate (CNR, EPA).</p> |
| c. Contaminated sites | <p>Identify, provide advice & control contaminated sites (EPA, Dept. Ag., Municipal Councils, DPD, HCS).</p> |
| d. Annual review | <p>Prepare annual status reports on the implementation of this strategy including the preparation of schedules, general maps & inventories of problem sites; develop achievement and performance criteria. (Implementation Committees).</p> |

6. EDUCATION & COMMUNITY INVOLVEMENT

- | | |
|-------------------------|--|
| a. Education activities | <p>Trial & initiate "Streamwatch" & "Litterwatch" style campaigns (MW, EPA).</p> <p>Provide information about streams & wetlands to schools & community groups (MW, CNR).</p> <p>Provide information about pollution control to the community (EPA, MW).</p> <p>Review signage promoting litter control. (MW, CNR, EPA).</p> <p>Distribute general <i>Landcare</i> ethic brochures to Municipal Councils and other key groups (CNR).</p> |
| b. Codes & guidelines | <p>Promote "<i>Construction Techniques for Sediment Pollution Control</i>" (reference 15) & other relevant guidelines (EPA, CNR, MW, DPD, ULA, Vic Roads, Industry Associations).</p> |

Figure 11. More detail is provided below on a selection of Strategy items which should be adopted in the Ballarat Region. (EPA)

2.6 Erosion Along Roads (strategy item 2c)

Agencies/Groups:	Vic Roads, Municipal Councils, Department of Conservation & Natural Resources, Environment Protection Authority, Roadside Management Council
Tasks:	<ol style="list-style-type: none"> 1. Vic Roads and Municipal Councils should include erosion, sediment, litter etc. controls in road designs in accordance with <i>Landcare</i> plans and relevant guidelines (eg. references 7, 8, 10, 15, 17). 2. CNR to identify priority road erosion sites & liaise with relevant agencies. 3. Vic Roads and Municipal Councils should stabilize & maintain sites on a priority basis, using locally indigenous vegetation where practicable.
Priority:	High
Status/Date:	Stabilization works are ongoing. Standard contract specifications for erosion & sediment pollution control have been developed by Vic Roads and EPA.

2.7 Landfills (strategy item 2d)

Agencies/Groups:	Environment Protection Authority
Tasks:	<ol style="list-style-type: none"> 1. EPA to continue checking licence compliance, follow-up complaints, assess impacts on ground waters, initiate controls where necessary & identify & initiate leachate control measures as needed. 2. EPA to obtain comments from Melbourne Water, Municipal Councils, Rural Water Corporation, South East Waste Management Group & other relevant groups on Works Approval applications etc. in accord with the <i>Environment Protection Act 1970</i>. 3. Regional Waste Management Plans to comply with EPA & SEPP requirements.
Priority:	High
Status:	Existing & old landfill licence sites have been mapped. Monitoring in accord with licence requirements is a routine function. Tip leachate containment is being monitored at each site and a regional impact study is to commence shortly (Action item 5.5 is relevant). The <i>State Environment Protection Policy (Siting and Management of Landfills Receiving Municipal Wastes)</i> is relevant. EPA is preparing a Sandbelt Landfill Control Strategy and a general Code of Practice.

2.19 Street Sweeping & Maintenance (strategy item 2j)

Agencies/Groups:	Municipal Councils, Environment Protection Authority, Melbourne Water
Tasks:	<ol style="list-style-type: none"> 1. Municipal Councils should identify problem work practices and must dispose of street sweeper sludge to sewer via triple interceptor traps. 2. MW to prepare strategies with Municipal Councils including review of street cleaning practices & side entry pit maintenance. Cessation of street flushing by machine or use of water from fire hydrants to remove litter from street. Waste disposal at EPA licensed landfill sites. Melbourne Water and EPA could investigate containment/treatment of street flushing waters & prepare street sweeping code-of-practice and model litter control code for inclusion in Council Conservation Strategies. Action item 6.2 is relevant.
Priority:	Very High
Status:	<p>The Victorian Anti Litter Action Committee (VALAC) has been established. A litter study has been published and Melbourne Water is about to prepare a litter strategy in conjunction with Municipal Councils. Some Municipal Councils in the greater Melbourne area are still known to use street flushing vehicles and water hydrants which wash litter and other pollutants into the drainage system. Vacuum eductor trucks should be used instead. Field investigations are being undertaken by EPA and Melbourne Water. Melbourne Water South East Region has included a <i>Litter Mitigation</i> Improvement Action in their 1993 <i>Integrated Water Management Report</i>. This Improvement Action includes the development of a litter mitigation strategy in conjunction with Municipal Councils in the South East Metropolitan Region. Priority areas and time frames have been identified.</p>

3.2 Streamside Buffer Areas & Zones (strategy item 3a)

Agencies/Groups:	Melbourne Water, Department of Conservation & Natural Resources, Municipal Councils, Department of Agriculture
Task:	<ol style="list-style-type: none"> 1. CNR to identify all riparian sites needing protection & their priorities & costs for works. 2. On a priority basis CNR and MW to encourage & support community based <i>Landcare Plans</i> for offstream stock watering, riparian fencing & densely vegetated buffer areas with no stock access along streams to prevent livestock damage to stream banks & pollution by livestock excreting in streams. 3. CNR to check land use, planning zones and Crown Land lease arrangements for environmental suitabilities. 4. Municipal Councils should check planning schemes for erosion and buffer zone setbacks sufficient for sediment controls, wetlands, pollution traps etc.
Priority:	High
Status	Concentrations of livestock, such as at stream stock crossing and watering locations, can result in significant pollution problems as a result of manure dropped in or alongside streams, vegetation damage and physical disturbance of stream beds and banks by livestock hooves. Regeneration of native vegetation along stream sides is also prevented by grazing livestock.

3.3 Stream Revegetation (strategy item 3a)

Agencies/Groups:	Melbourne Water, Department of Conservation & Natural Resources
Tasks:	<ol style="list-style-type: none"> 1. MW to trial and establish native aquatic, semi-aquatic & riparian plants along streambanks to reduce erosion & nutrient mobilization. Use locally indigenous vegetation where available and model re-plantings on the basis of local native vegetation communities. 2. CNR should establish an inventory and map of the condition & species relationships of riparian vegetation for each subcatchment and prepare a report on sustainable management, revegetation and regeneration of riparian habitats. 3. CNR to collect seed for the seed bank established by "Greening Australia". 4. CNR to investigate weed control & plant replacement along streams.
Priority:	Moderate
Status:	MW funds allocated in capital works program. Increased use of local indigenous aquatic and riparian low growing plant species should be used to stabilise streams wherever practical.

3.4 Assess Wetland & Litter/Sediment/Pollution Trap Performance (strategy item 3b)

Agencies/Groups:	Melbourne Water, Municipal Councils, Environment Protection Authority, Department of Health & Community Services
Tasks:	<ol style="list-style-type: none"> 1. MW should measure sediment flow rates into and out of sediment trap structures and basins including Police Road Retarding Basin and under Mile Creek Sediment trap (page 36 of J Tilley report). 2. On the basis of existing studies, MW to assess sediment/water pollutant exchange within sediment trap basins and the need for regular sediment removal. MW to review & assess design criteria for pollution trap works eg. emergency spillway overflows to prevent flooding, baffles on basin inlets & outlets to trap oil & floating litter, side-cast or upward sloping screens to assist easy litter removal, public health and safety needs and alternative materials eg. stainless steel which is not a source of downstream contamination by zinc. Action items 1.3 & 6.2 are relevant.
Priority:	High
Status:	<p>Melbourne Water and some Municipal Councils have installed a number of litter traps and booms in the greater Melbourne area. Floating booms tend to be more effective during low rather than heavy storm discharge events.</p> <p>In the United States, vertical baffles are placed at many dam, basin and pit inlets & outlets downstream from urban and industrial areas to trap oil & floating litter. Grassed basins with water detention times of about 48 hours and sand filters are also used to help treat urban runoff water prior to discharge to streams or groundwaters. Trapped street gullies consisting of stormwater entry pits with baffles to trap floating litter and sediment are installed in Sydney harbourside suburbs. Frequent street sweeping and regular eductor truck emptying of gully pits is practiced.</p> <p>Metal grills are placed on side entry pits at some fast food outlets and regularly cleaned to prevent litter and flooding problems. A group associated with Whittlesea Municipal Council is fabricating wire basket litter traps for installation in supermarket and car park drainage pits. These are regularly cleaned out and help prevent pipe blockages in the Municipality. Frequent street sweeping is also undertaken to reduce litter and pollution problems. Geotextile bags in drainage pits are being trialed in some Bayside drains. A Rosebud based company Pollutec has designed a stormwater filter which consists of a stainless steel perforated and deformed separator plate placed at an angle to the flow in a pipeline or open channel. Melbourne Water is trialling the device. The use of Pollutec screens to trap litter at outside river bends is being investigated.</p> <p>Horizontal trash collection bars have been installed by the Sydney Water Board and found to be successful when placed at an acute angle to water flow in a tributary to Cook's River. Closely spaced vertical trash screens have been installed in many locations such as at Badger Creek Weir, South Morang, Healesville Sanctuary and Wyong in NSW. They can be easily cleaned with rakes or hooks if they are inclined. Litter traps trialled to-date show that heavy duty materials are needed to cope with high stormwater flow rates. Vertical litter screens in deep pits, however, are difficult & expensive to clean.</p>

3.5 Promotion Of Litter Traps & Booms (strategy item 3b)

Agencies/Groups:	Melbourne Water, Municipal Councils, Implementation Committees, Environment Protection Authority
Task:	<ol style="list-style-type: none"> 1. MW and Municipal Councils should promote the installation and maintenance of heavy duty litter traps and booms in appropriate locations by premise owners including retail, industry, commerce groups. 2. MW and EPA to promote school, community and industry education programs to increase awareness of litter travel paths and the need for proper litter control, prevention & recycling. Action items 1.3, 3.4 & 6.2 are relevant.
Priority:	Very High
Status	An EPA/Melbourne Water public awareness program about litter control is underway in both corporate and regional programs.

3.6 Installation of Pollution/Litter Traps, Basins & Wetlands (strategy item 3b)

Agencies/Groups:	Melbourne Water, Municipal Councils, co-ordination committees
Task:	<ol style="list-style-type: none"> 1. On a priority basis Melbourne Water and Municipal Councils should treat urban stormwater runoff including eg. installation & maintenance of litter screens & pollution trap basins and wetlands downstream from existing & proposed urban areas. Action items 1.3, 3.4 & 6.2 are relevant. 2. MW to liaise with Federal Airports Commission & Moorabbin Municipal Golf Course regarding installation of sediment traps or other stabilization works such as a stormwater pipe along Settlement Drain to help reduce sedimentation & pollution of Mordialloc Creek estuary.
Priority:	Very High
Status:	Many wetlands are being planned eg. designs are currently being prepared for a wetland adjacent to Balnarring Primary School, Shoreham.

Surrounding dams with access roads and planting macrophytes in gently sloping dam edges can improve land values & public safety. Fencing or adequate buffer distances between wetlands and houses may be needed for public safety. Mosquito larvae "wigglers" tend to propagate in shallow temporary isolated pools of water. Wetlands near urban areas need to be designed with sections of deep water to maintain communities of mosquito predators such as predators such as water beetles & dragonfly nymphs mosquito nuisance. Regular inspection and maintenance during hot weather and periodic de-watering of wetlands may also assist in mosquito larvae control. Instream structures may need to allow for fish migration/passage. The construction of dams across secondary creeks rather than major creeks and rivers is needed to minimise changes to downstream aquatic ecosystems and to allow the passage of migratory fish. Action item 1.3, notes "*Benefits of Pollution Control*" on page 4 & the reference list are relevant.

SUPPLEMENT INDEX

ADDITIONAL INFORMATION ON LINEAR RESERVE MANAGEMENT AND BACKGROUND INFORMATION FOR LINC'S COMMITTEE MEMBERS.

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- 1 Forest blocks
- 2 Native Grasslands and Grassy Woodlands
- 3 Western (basalt) Plains Grasslands
- 4 Corridor map Ballarat Urban Nature Study
- 5 What is a Green Web? (Article)
- 6 Creating Habitat Corridors for Wildlife (LFW Notes)
- 7 Land For Wildlife Scheme
- 8 Conservation Covenants
- 9 Weeds
- 10 Feral Animals
- 11 Seed Collection/Plant Propagation
- 12 Why plant Indigenous species?
- 13 Direct Seeding
- 14 Wildlife requirements
- 15 Edges - their effect on vegetation and wildlife
- 16 Management of isolated remnant trees, Tree Decline
- 17 The Greening Ballarat Program
- 18 Urban Recreational Forestry (History of FOY & ATCV notes by Alan Wright)

SECTION B - ROADSIDE MANAGEMENT

- 1 Management of Grasslands in the Melbourne Area - Mowing and Slashing, Fire Management.
- 2 Information from Vic Roads Roadside Management Guide
- 3 VRCC Outline and Brochures
- 4 VRCC Road Reserve Management - Operator's Training course
- 5 Roadside Assessment Manual (VRCC)
- 6 Roadside Marking Scheme
- 7 Roadside Management Guidelines (Invermay Study)
- 8 Extracts from Vic Roads 2000 Western Region Report
- 9 Former Buninyong Shire Roadsides - correspondence
- 10 Roadside Management Program - Regional Funding Application 1993
- 11 Forests Act
- 12 Roadsides the forgotten farm environment? (Chris Bluett)

- 13 Roadsides Vital for Native Animals - Press Release
- 14 SEC Tree Clearing Notes/Tree removal notes
- 15 Tree Planting on Roadsides (Haddon LandCare Group)
- 16 On the Road (VRCC Newsletter)

SECTION C - STREAM MANAGEMENT

- 1 Summary of the Nutrient Management Strategy
- 2 Yarrowee "Courier Advertorial" Feature
- 3 Yarrowee Photo Competition
- 4 Wetlands in Ballarat
- 5 Willows
- 6 Indigenous Plants for Erosion Control
- 7 Stream improvements for Wildlife
- 8 The Yarrowee Walk
- 9 Signage of Ballarat Streams - correspondence
- 10 The 99 Year Lease Issue
- 11 Helen View Estate Recreation Reserve LINCIS investigation
- 12 EPA Drain Stabilisation Techniques
- 13 Friends of Napoleons Bushland Yarrowee Planting Map
- 14 Stream zone Vegetation Map (Cragie & Assoc.)
- 15 Canadian Creek Project, Mt Clear Primary
- 16 Flood works article (Malcolm Lee)
- 17 Waterwatch Program Outline
- 18 Plastics Industry Association - Potential sponsorship
- 19 EPA Moordialloc Creek Action Plan (Press Release)
- 20 Water Management - An Alternative View (Mathew Cawood)
- 21 DCNR - LINCIS correspondence
- 22 Yarrowee River Land Use Conflicts & Media articles
- 23 Yuille Park Development, site plan and notes
- 24 Yarra Corridor Program
- 25 Ovens River Management Board Brochures "Down the Drain - Preserving our Waterways", "Reviving Our Rivers", "Recreation Guide Ovens River Catchment"
- 26 Stream Condition Field Data Sheet (Southern Water)

Additional notes available:

Miscellaneous information on mining in the Yarrowee valley
 Yarrowee Flora Reserve Development notes, Friends of the
 Yarrowee notes, information and photographic record.

SECTION D - RAIL MANAGEMENT

- 1 Plains, Trains and Fencing
- 2 Ballarat - Skipton Rail Trail Map of Conservation Value
- 3 Eureka Rail link - correspondence
- 4 Allendale - Newlyn Line (DCNR letter)

SECTION E - LANDCARE INFORMATION

- 1 What is LandCare
- 2 Sources of Advice
- 3 Creswick LandCare Centre

