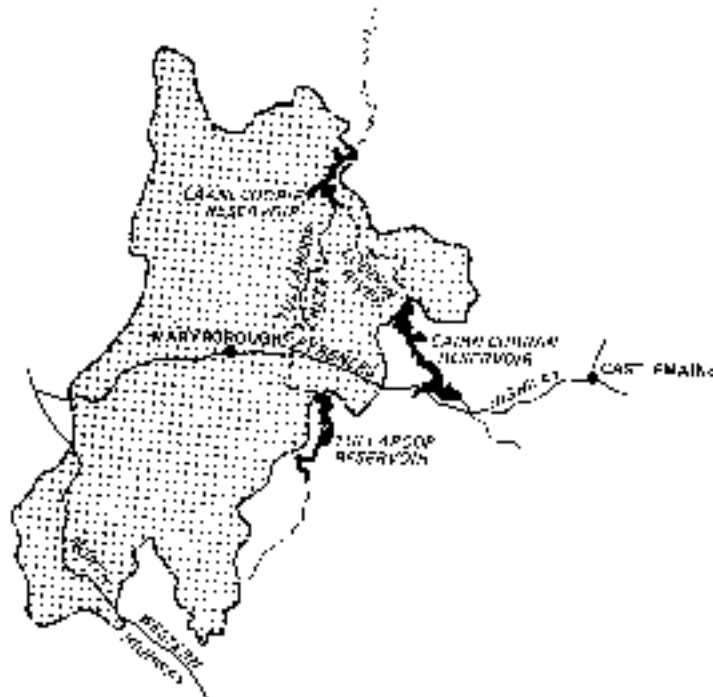


# A REPORT ON PART OF THE LAANECOORIE RESERVOIR CATCHMENT



**A Proposal for Proclamation Prepared For Consideration By The  
Land Conservation Council**

**BY D. SMITH & I. MASTER**

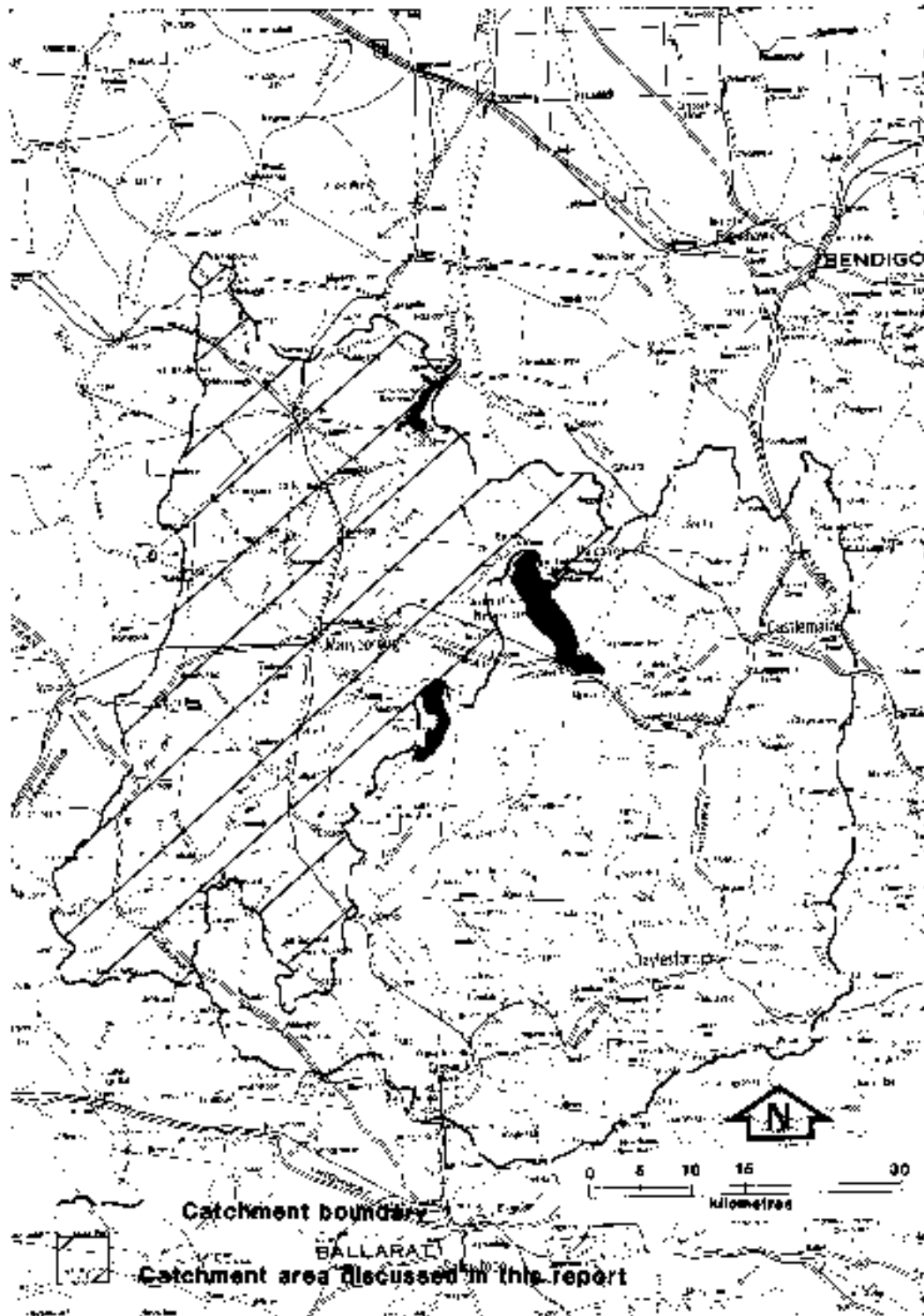
**June 1985**

**Soil Conservation Authority  
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**FIGURE 1 - CATCHMENT LOCALITY PLAN**



## INTRODUCTION

The Laanecoorie Reservoir on the Loddon River, is one of three major storages in the Loddon Drainage Basin. In addition to the Loddon River inflow, Laanecoorie Reservoir is also fed by the McCallum - Tullaroop and Bet Bet Creeks. The reservoir is located in central Victoria, 16 kilometres north of Maryborough.

The major function of Laanecoorie Reservoir, along with the Cairn Curran and Tullaroop Reservoirs, is to provide a regulated flow for irrigation in some areas of northern Victoria. The reservoir supplies water for domestic purposes to a number of townships, localities and individual dwellings, and is used extensively for recreational activities which include water skiing, sailing, fishing and seasonal duck shooting.

The catchment to the Laanecoorie Reservoir (Figure 1) covers 4178 km<sup>2</sup>. More than half this area is proclaimed, being the land within the catchments to Tullaroop, Creswick, Evansford, Talbot and Cairn Curran Reservoirs shown in Figure 2. Information about these catchments is contained in separate reports published by the Soil Conservation Authority.

This report deals with the balance of land in the catchment to Laanecoorie Reservoir, an area of 1830 km<sup>2</sup> (Figure 2). The area includes in its south - western part, the catchment (26 km<sup>2</sup>) to Doctors Creek Reservoir, from which the township of Lexton obtains domestic water supply.

The area proposed for proclamation covers the western portion of the Laanecoorie Reservoir catchment and includes the river environs for one kilometre downstream of the dam where the offtake point for the Dunolly/Tarnagulla water supply is located.

## **DESCRIPTION OF THE CATCHMENT**

### **Topography and Geology**

The catchment is bordered in the south by the Great Dividing Range, in the west by a string of mountain ranges including the Black Ranges and Bealiba Range and in the north by the Green Valley Ranges. The eastern and part of the northern boundaries for the greater distance follow undulating ridges, or cross the extensive flat to undulating plain. Some of the prominent peaks within, or on, the catchment boundary are Mount Moliagul and Mount Beckworth (granite), Mount Tarrengower and Mount Bealiba (contact metamorphic ridges) and Mount Moolort and Mount Greenock (volcanic vents).

An area of deeply weathered Lower Devonian granodiorite is present at Dunluce on the western boundary. Intrusive rocks also occur on or near the boundary in the north (Mount Moliagul and Tarnagulla), the east (Maldon and Tullaroop Reservoir) and the south (Mount Beckworth). Associated contact metamorphic ridges include the Black Ranges and Bealiba Range in the west and in Green Valley Ranges in the north.

Scattered occurrences of Tertiary sands and gravels, including deep lead deposits, are also present throughout the catchment.

The hilly to undulating land surrounding Maryborough is formed on Ordovician sediments. Streams dissecting the area have created broad areas of Quaternary alluvium, examples of which include the Bet Bet and Loddon valleys.

The Moolort and Lillicur areas in the central east of the catchment, where ancient lava flows inundated river valleys, show little topographic variation.

### **Soils and Vegetation**

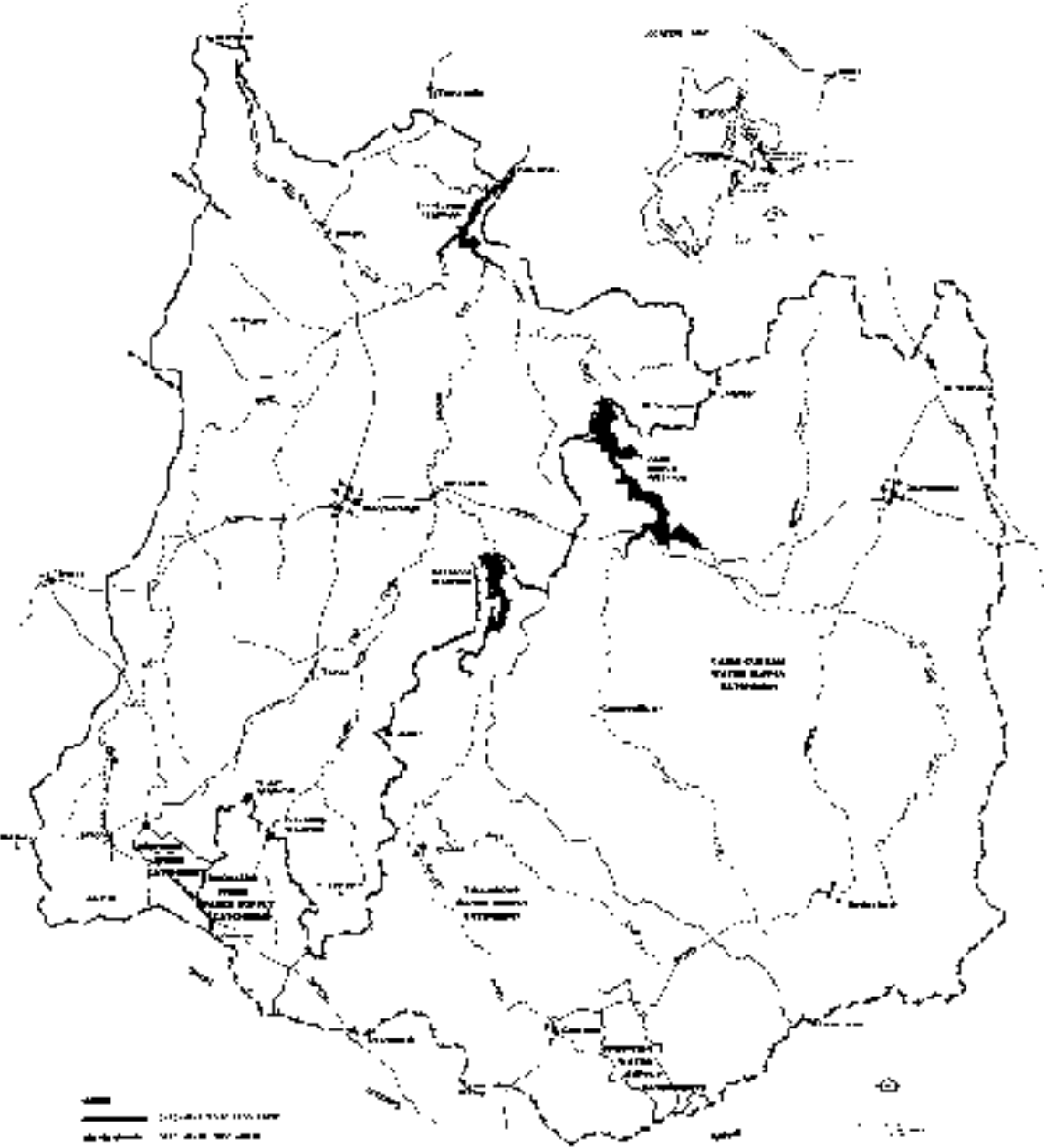
Soils developed from Ordovician parent material cover approximately fifty per cent of the catchment. These occur principally in the northern and eastern areas and include soils derived from metamorphic parent material. Soil types include red gradational on steeper slopes, red sodic duplex on gentler slopes and yellow duplex in drainage lines.

The Volcanic plains in the south and central regions have predominantly clay soils, covering approximately thirty five per cent of the catchment.

The remaining fifteen per cent of the catchment has predominantly sandy loam soils derived from either granitic parent material or alluvial material associated with the river systems.

A large proportion of the catchment land has been cleared of its original vegetation, as a consequence of agricultural development. Indigenous species remain in public reserves, forest reserves, etc and valuable remnants of species indigenous to the area can be found along many streams, roads and railway lines. Grey box, red ironbark, yellow gum, and to a lesser extent red stringybark, red box and long leaf box, were dominant species on the soils of Ordovician parent material. On the soils overlaying basalt, red gum, grey box and yellow box were dominant species.

**FIGURE 2 - SUBCATCHMENT AREAS OF LAANECOORE RESERVOIR CATCHMENT**



## **Climate**

Within the catchment, rainfall is generally fairly evenly distributed throughout the year, with about one third falling in the winter months.

A rain shadow of the Great Dividing Range in the south and the ranges along the western boundary influences the rainfall in the catchment. The average annual rainfall decreases from 617 mm at Lexton in the south, to 451 mm at the Laanecoorie Reservoir in the north. Appendix 1 contains rainfall statistics for stations within or adjacent to the catchment.

The temperatures in the catchment are fairly moderate, with the warmest period being January and February. Frosts occur mainly during July-August, limiting plant growth particularly in southern parts of the catchment.

Estimates for the length of growing season, based on effective and median rainfall, are from nine and a half months in the south with a gradual decrease to seven months in the north near the reservoir.

## **WATER SUPPLY SYSTEM**

### **Domestic water supply**

#### **(a) *Laanecoorie Reservoir***

The present capacity of the Laanecoorie Reservoir is about 7770 ML. There has been a loss of capacity, estimated to be in the order of 12000 ML., due to siltation since construction of the dam was completed in 1891. By 1930 the capacity of the storage was reduced by some fifty three per cent. This was attributed to extensive gold mining activity and consequent removal of natural vegetation and disturbance of the surface soil in the latter part of the last century and the early part of this century. The general decline in alluvial mining activity was accompanied by a marked reduction in the siltation rate. The current siltation rate is regarded as generally being negligible.

The reservoir provides domestic water to the Laanecoorie caravan park and adjacent dwellings. The towns of Tarnagulla, Dunolly, and Laanecoorie obtain supply by diversion from the Loddon River downstream of the reservoir.

Water at Dunolly can be held in service storage for an average detention time of four weeks. Detention time at Tarnagulla is on average two weeks. Apart from detention, no additional treatment is given to supplies. Most residents in Dunolly, Tarnagulla and Laanecoorie rely on rainwater tanks for drinking supply.

#### **(b) *Lexton***

A reservoir of 135 ML capacity on Doctors Creek in the south west of the catchment provides domestic supply to the township of Lexton.

#### **(c) *Other Towns***

Domestic supply to other townships within the catchment, e.g, Talbot, Carisbrook, Maryborough are obtained from outside the catchment and have been discussed in earlier reports referred to in the introduction.

## **Irrigation water supply**

The main function of the Laanecoorie Reservoir is to provide flow control to the Loddon River from water released from the larger Tullaroop and Cairn Curran storages for irrigation.

Irrigation supply is diverted from the Loddon River at weirs near Serpentine and Fernihurst to the Pyramid Hill and Boort irrigation areas respectively.

## **WATER QUALITY**

Appendices II and III summarise available water quality data for samples taken from Laanecoorie Reservoir, points upstream and the domestic supply systems.

The raw water quality, as some parameters indicate, is below the standards set by the Australian National Health and Medical Research Council for potable supplies. Colour and turbidity of water in and upstream of the reservoir are periodically very high.

In addition, bacteriological counts of coliforms and *E. coli* in the reticulation storages at Laanecoorie, Dunolly and Tarnagulla are occasionally higher than the currently acceptable standards noted in Appendix III. None of the supplies receive treatment other than detention in storage.

## **HAZARDS TO WATER SUPPLY**

Since large scale mining activity ceased in the catchment, and rehabilitation of affected areas has taken place, the catchment land has become relatively stable and the siltation of the reservoir has been greatly reduced. The major sources of turbidity and sedimentation are from the following areas particularly during periods of high intensity storm run-off:

- crop land
- roads
- gully systems
- mining and gravel stripping areas
- stream bank erosion

Bacterial, nutrient or chemical pollution may affect quality for domestic supply; possible sources within the catchment include:

- direct access to water ways and the reservoir by stock and humans
- unsewered dwellings
- industrial wastes
- recreational activities on and around the reservoir which include fishing, water skiing and camping
- the large numbers of waterbirds on the reservoir

Although retention of water improves the general quality of water, it is unlikely that a potable supply could be assured without some form of basic treatment.



## **LAND USE AND LAND TENURE**

### **Public land Use**

Approximately twenty per cent of the catchment area is public land. This is mostly State forest confined predominantly to the hilly country to the south of and surrounding Maryborough and surrounding Dunolly. The volcanic plains in the central and southern areas contain only small areas of public land.

The State forests contain species which are relatively slow-growing, and which produce strong, durable timbers. Grey box, red ironbark and yellow gum are the important species. Sleepers, fencing material and firewood are the main products derived from forest timbers.

Apiculture is also an important forest use.

Many small gold mining operations are located within the forests.

There are 42 ha of softwood plantations at Mount Beckworth in the south of the catchment.

### **Freehold Land Use**

Most of the freehold land has been developed for agriculture. Grazing is the predominant use of land with moderate to steep slopes. The gently undulating and flat country is used for mixed farming: mainly crop production associated with grazing. The Moolort Plains in the east offer some of the finest grain growing land in Central Victoria.

### **Mining and Extractive Industries**

The catchment has mineral and rock resources of considerable extent that generate a comparatively high level of mining and exploration activity, especially for gold.

Slate, basalt, hornfels, granite, gravel, sand and clay are other materials which are of interest for extraction. Metals other than gold which have been mined in the catchment are: antimony, arsenic, bismuth, copper and molybdenum.

Large areas of the catchment have been worked for gold at some stage since the 1850's. Initially, interest concentrated about the more accessible shallow gold bearing river deposits. Auriferous reef mining followed; later again the extensive Loddon deep lead systems were mined for alluvial gold. The renewed interest in gold exploration and mining operations during recent years has resulted in considerable activity throughout the catchment. The many small claims pegged on alluvial deposits within drainage lines are a principal concern, on the grounds that these have a potential to adversely affect water quality if operations are poorly managed.

There are presently three major hardrock quarries which supply aggregate for the local areas.

## LOCAL GOVERNMENT AND STATUTORY PLANNING

Municipalities involved in the catchment are the shires of Bet Bet, Marong, Talbot and Clunes, Lexton, Avoca, Korong, Maldon, Tullaroop, Ballarat and the City of Maryborough. All exercise planning control under planning schemes or interim development orders. Municipal areas within the catchment are shown in Appendix V. There are 37 parishes wholly or partly located in the catchment. These are listed in Appendix IV.

## LAND CONSERVATION COUNCIL (LCC) RECOMMENDATIONS

Most of the catchment is located within the North Central Study Area (Final Recommendations, February 1981). A small portion in the south west is located in the Ballarat Study Area (Final Recommendations April 1982). Recommendations for the public land in the catchment are shown on Figure 3. The particular recommendations relating to water production for both study areas with land in the catchment are as follows:

That in the case of the locations listed below and shown on Figure 3 the present tenure and management of public land continue for the time being.

D11 - Laanecoorie Reservoir, Rural Water Commission (Final Recommendations, North Central Area).

D5 - Doctors Creek Reservoir Lexton Water Board (Final Recommendations Ballarat Study Area).

### NORTH CENTRAL AREA

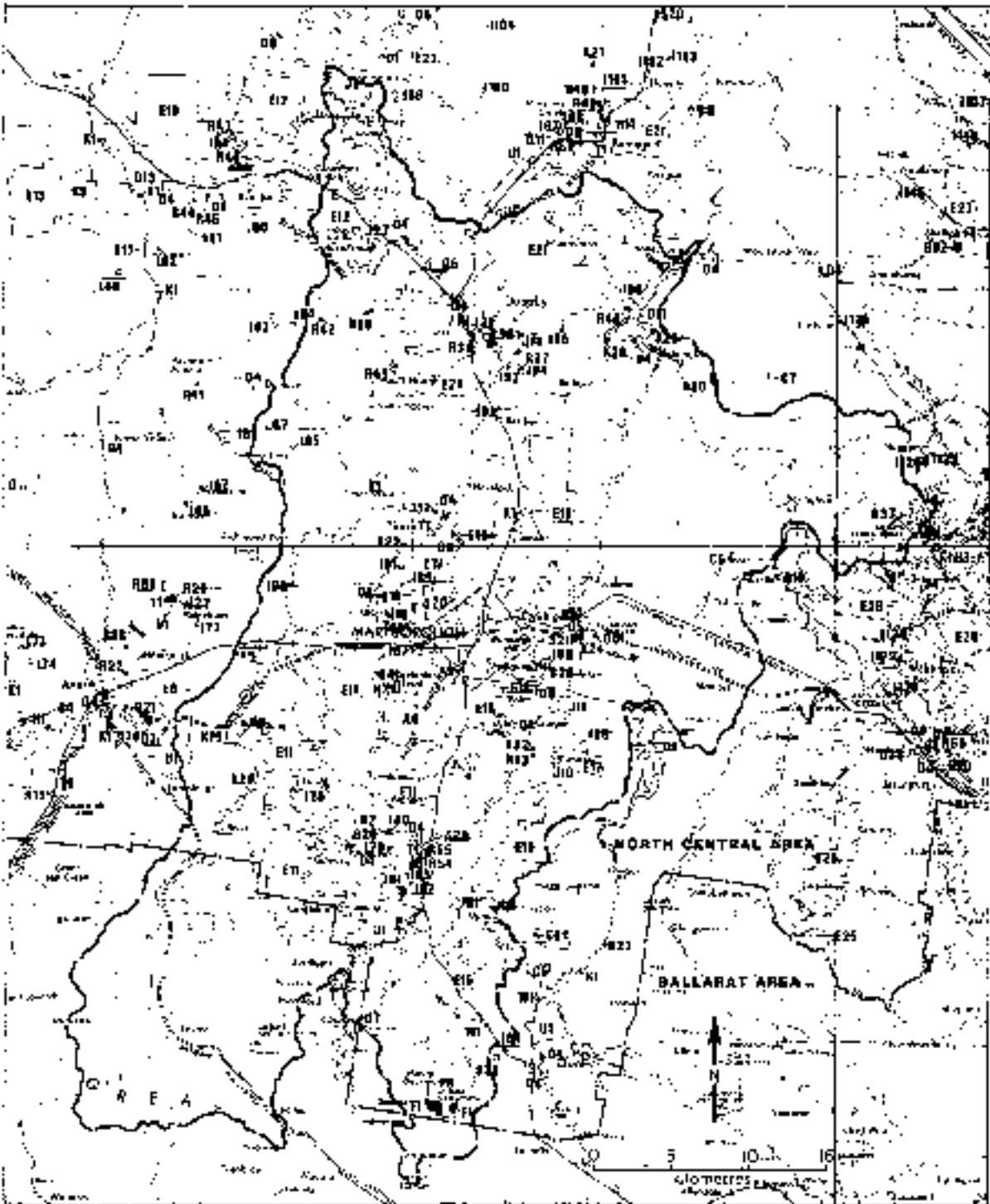
PARKS:	A4	A9								
WILDLIFE RESERVES	C6	C7								
WATER PRODUCTION	D8	D11								
HARDWOOD PRODUCTION:	E8	E11	E12	E15	E16	E17	E18	E19	E20	E21
SOFTWOOD PRODUCTION (Existing Plantation)	F1									
BUSHLAND RESERVES:	I65	I66	I78	I79	I80	I81	I82	I83		
	I85	I86	I87	I88	I89	I90	I91	I92		
	I93	I94	I95	I96						
HISTORIC AREAS:	J4	J5								
HISTORIC RESERVES:	J10	J11	J12	J13	J18	J27	J29			
PUBLIC LAND WATER FRONTAGES:	K1									
STREAMSIDE RESERVES:	K19	K20	K21	K22	K24	K25	K26			
GEOLOGICAL RESERVES:	N1	N2								
RECREATION RESERVES:	O4	O5	O8							
SCENIC RESERVES:	P3	P6								
AGRICULTURAL LAND:	Q6	Q7								
STONE PRODUCTION:	R37	R38	R39	R40	R42	R43	R51			
	R52	R53	R54	R55	R60	R88				
OTHER UTILITY AREAS:	S20	S21								
TOWNSHIP LAND:	T1									
UNCOMMITTED LAND:	U1									

OTHER RESERVES & PUBLIC LAND: W1

**BALLARAT AREA**

WATER PRODUCTION:	D5	D27
HARDWOOD PRODUCTION:	E5	E8
BUSHLAND RESERVES:	H5	H6
PUBLIC LAND WATER FRONTAGES:	J1	
STREAMSIDE RESERVES	J4	
RECREATION RESERVES:	O4	
SCENIC RESERVES	P1	
AGRICULTURAL LAND:	Q2	Q3
UNCOMMITTED LAND:	U1	

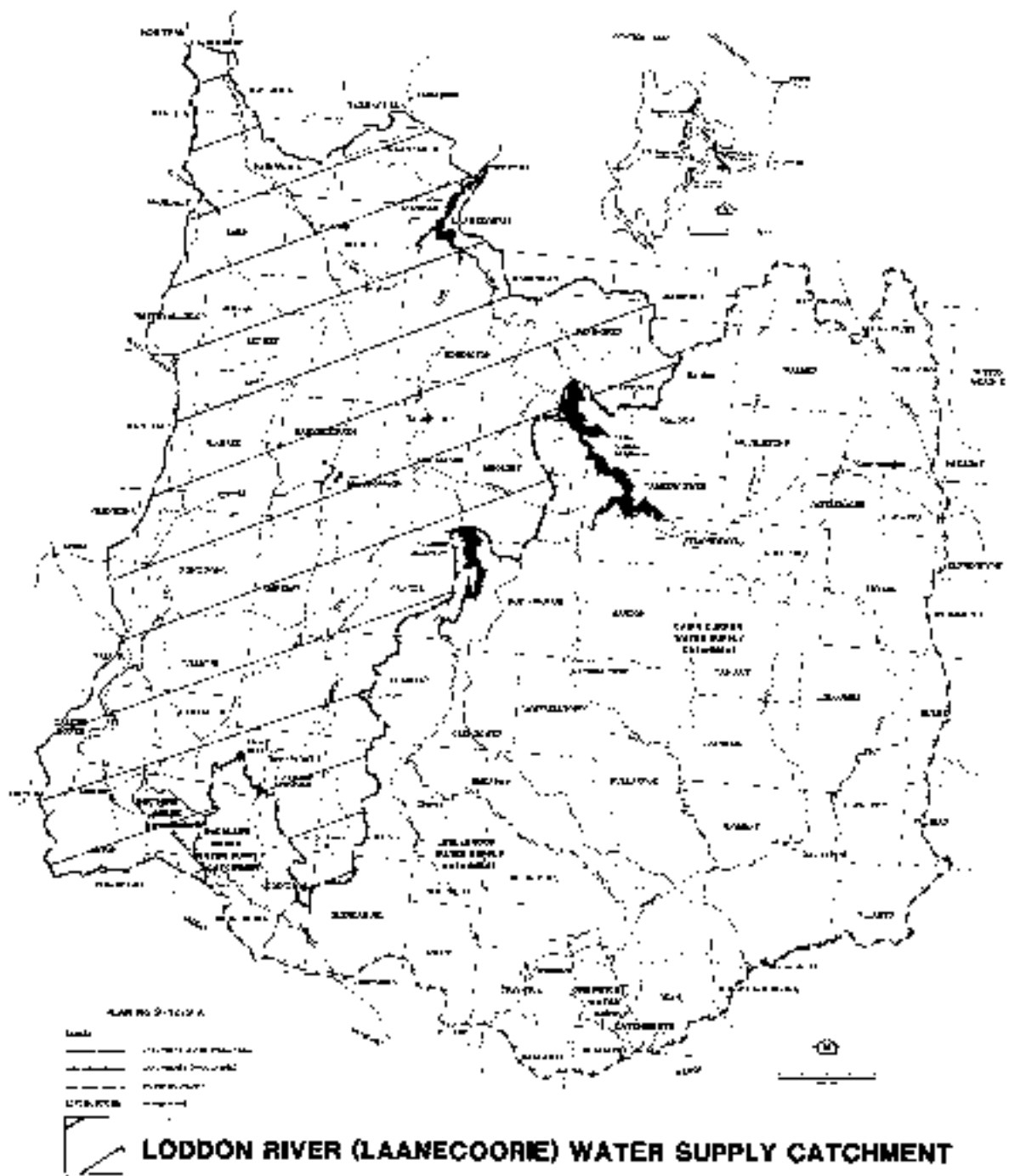
FIGURE 3 - LCC RECOMMENDATIONS



## RECOMMENDATIONS

That the Land Conservation Council under the provision of section 5(1) (b) of the *Land Conservation Act* recommends to the Governor-in-Council that the section of catchment to the Laanecoorie Reservoir not presently proclaimed, and referred to as Loddon River (Laanecoorie) Water Supply Catchment in Figure 4 (Plan No.S-1279A), be proclaimed under the provisions of section 22 (1) of the *Soil Conservation and Land Utilization Act 1958*.

**FIGURE 4 - CATCHMENT PROCLAMATION PLAN**



## APPENDIX 1

### Average Rainfall Statistics for stations within and adjacent to Laanecoorie Reserve Catchment.

Station	No. Yrs	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Year
Laanecoorie Weir	83	25	33	29	31	44	48	46	47	44	45	31	28	451
Maldon	96	33	40	37	47	59	64	60	64	57	57	44	39	601
Maryborough	96	29	35	32	41	49	56	53	55	51	49	38	37	525
Avoca	91	27	37	30	41	51	60	60	61	53	50	38	36	544
Talbot	75	27	40	32	38	52	58	61	60	53	51	40	36	548
Clunes	96	31	41	35	44	56	61	59	63	55	55	45	40	585
Lexton	72	32	44	33	44	59	62	69	70	60	58	46	40	617

Source: 'Rainfall Statistics Australia' Bureau of Meteorology May, 1977.

## APPENDIX 2

### SUMMARY OF AVAILABLE WATER QUALITY DATA FOR PHYSICAL & CHEMICAL PARAMETERS (1977-1982)

Parameter	Loddon R		Loddon R		* NH & MRC Standards Long Term Desirable
	Newstead	Cairn Curran	Laanecoorie		
<b>Physical</b>					
Colour Pt-Co units	10-160	10-200	20-200	50	5
Turbidity NTU	1.8-200.0	1.0-29.0	1.3-100.0	25	5
Ph units range	6.8-8.9	6.5-8.8	6.3-9.4	6.5-9.2	7.0-8.5
<b>Chemical</b>					
T.D.S. (PPM)	180-760	220-440	290-1200	1500	1500
Calcium as Ca	7.1-34	7.4-21	10-38	200	25
Chloride as Cl	63-320	64-140	81-480-	600	200
Total Hardness as Ca Co3	62-300	62-190	82-360	600	100
Dissolved Oxygen (PPM)			7.4-14.2		

\* NH & MRC - National Health and Medical Research Council

Source: Rural Water Commission



### APPENDIX 3

## SUMMARY OF AVAILABLE WATER QUALITY DATA FOR SEVERAL MICROBIOLOGICAL PARAMETERS (1982 - 1983)

Dunolly Parameter	Loddon R		Laanecoorie		Tarnagulla		* NH & MRC Standards		
	Pumphouse	Water Tanks	Reticulation	Basin	Reticulation	Basin	Current	Long Term	
Coliforms orgs/100ml	35-18000	11-700	5-380	1-1200	0-23	20-1300	0-80	90% of samples should be <20/100 ml	none in 95% of samples. No more than 10 in any sample.
<i>E.coli</i> orgs/100ml	8-530	1-210	0-110	0-250	0	5-35	0-4	90% of samples should be <2/100 ml	Zero in all samples.

• NH & MRC - National Health and Medical Research Council

Source: Rural Water Commission

## **APPENDIX 4**

### **LIST OF PARISHES IN THE CATCHMENT**

ADDINGTON	GLENMONA
AMHURST	LAANECOORIE
ARCHDALE	LEXTON
BARINGHUP	LILLICUR
BARP	LIVINGSTONE
BEALIBA	MALDON
BECKWORTH	MARYBOROUGH
BET BET	MOLIAGUL
BRADFORD	MOOLORT
BUNG BONG	NATTEYALLOCK
CARALULUP	NEEREMAN
CARISBROOK	PAINSWICK
CLUNES	RATHSCAR
CRAIGIE	TARNAGULLA
DUNOLLY	WAANYARRA
EDDINTON	WAREEK
EGLINTON	YALONG
ERCILDOUNE	YALONG SOUTH
GLENDARUEL	

