

# **A REPORT ON THE TULLAROOB RESERVOIR CATCHMENT**

**A proposal for proclamation prepared for consideration by the Land  
Conservation Council**

**March 1980**

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## INTRODUCTION

In 1947, a report of the Parliamentary Public Works Committee dealing with the conservation and distribution of Loddon River water recommended the construction of a storage (Tullaroop Reservoir) on Tullaroop Creek. The State Rivers and Water Supply Commission was authorised to proceed with construction of the dam in February 1958, and by November 1959 the project was completed.

The same report also recommended, that soil conservation practices be encouraged throughout the catchment, and in particular that erosion prevention measures be taken at mining dumps and other places where erosion is occurring. Although it was concluded that soil erosion in the catchment was not a major problem, it was felt that erosion prevention measures should be adopted in order to minimise siltation of the proposed storage.

Subsequently, a report<sup>1</sup> on the condition of the catchment was published by the State Rivers and Water Supply commission. The report concluded that although small sections of the catchment, such as mine dumps and the steeper forested areas were potentially hazardous, generally, land use within the catchment would not produce quantities of sediment that would endanger storage capacity.

Within recent years there has been a renewed awareness of the need for protection of water supplies and catchment function. This has been brought about by many factors including the general increase in the intensity of farming operations, the tendency for the use of chemicals in controlling disease, weeds and insects and the tendency towards subdivision of rural properties as the demand increases for residential living away from urban centre.

The Soil Conservation Authority in July 1978 notified the Land Conservation Council and the State Rivers and Water Supply commission of developments proposed or about to take place in the catchment regarding water supply and statutory planning matters; and, that it seemed an appropriate time to carry out investigations with a view to proclamation of the catchment.

Investigations that followed were concerned mainly with the subcatchments providing water supply for the township of Creswick. A report<sup>2</sup> on these subcatchments was subsequently prepared and proclamation was made in May 1979. To assist the Creswick Shire Council during its review of planning to evaluate appropriate planning constraints for the subcatchments, a further study was carried out to assess the capability of the land for intensive cultivation, and the residential use under various allotment sizes. The results of this study were published in May 1979<sup>3</sup>

The Land Conservation Council has yet to make recommendations for the bulk of public land, and in particular water production, within the study areas covering the Tullaroop Catchment. It is however the general policy of Council, that where multiple use is required of a catchment supplying water used for domestic, industrial or irrigation purposes, the catchment should be proclaimed under Section 5(1) of the *Land Conservation Act* 1970 and Section 22(1) of the *Soil Conservation and Land Utilisation Act* 1958.

The report which follows is the result of a preliminary investigation of the catchment to Tullaroop Reservoir and it is recommended that the LCC make a recommendation for proclamation of the unproclaimed section of catchment.

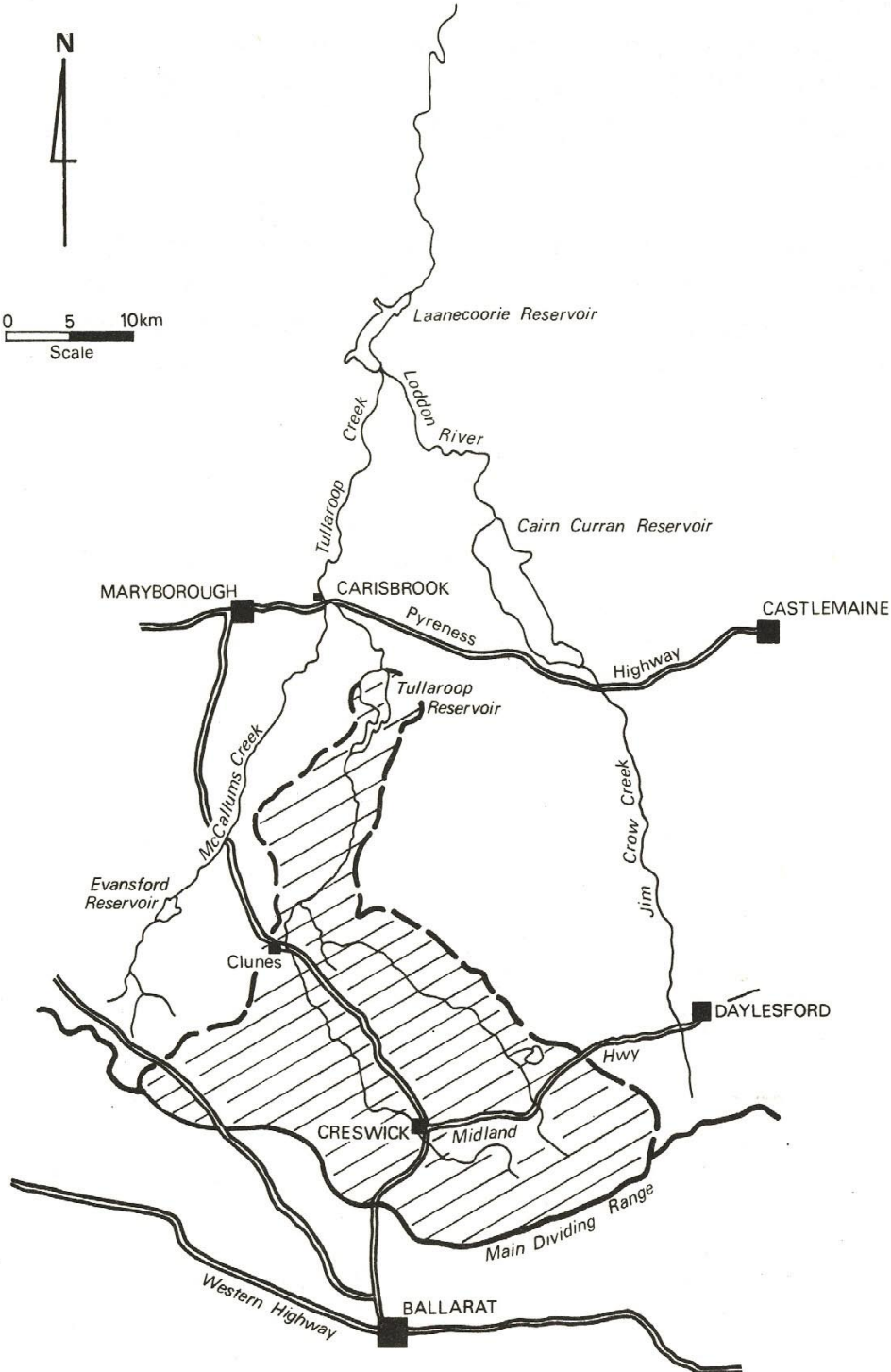
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<sup>1</sup> The Tullaroop Reservoir Catchment - State Rivers and Water Supply Commission (1949).

<sup>2</sup> A report on the Creswick Water Supply Catchments - Soil Conservation Authority (November 1978)

<sup>3</sup> Land Capability Assessment of the Creswick Water Supply Catchments - Soil Conservation Authority (May 1979)

**FIGURE 1 - LOCALITY PLAN**



## GENERAL

The general locality of the catchment is shown in Figure 1. Tullaroop Reservoir, some 8 km south from Carisbrook, is located on Tullaroop Creek, a tributary of the Loddon River. The reservoir is an important large water storage, supplying irrigation water to northern Victoria and domestic water to the City of Maryborough and the surrounding area. Other storages are located within the catchment to the reservoir and these provide water for irrigation and township supplies to areas upstream of Tullaroop Reservoir.

The catchment to the Reservoir extends upstream to the Dividing Range. This forms the extensive southern boundary, common for part of its length to the Ballarat Water Catchments and to the Moorabool River (She Oaks) Water Supply Catchment. The Cairn Curran Water Supply Catchment, also a subcatchment of the Loddon River Basin, abuts the Tullaroop Catchment in the east. Total catchment area is about 722 km<sup>2</sup>.

Two main tributaries, Birch Creek<sup>4</sup> and Creswick Creek, drain the bulk of the catchment before joining just north of Clunes to become Tullaroop Creek. Newlyn Reservoir and Hepburn Lagoon are located in the south east, within the upper reaches of Birch Creek subcatchment.

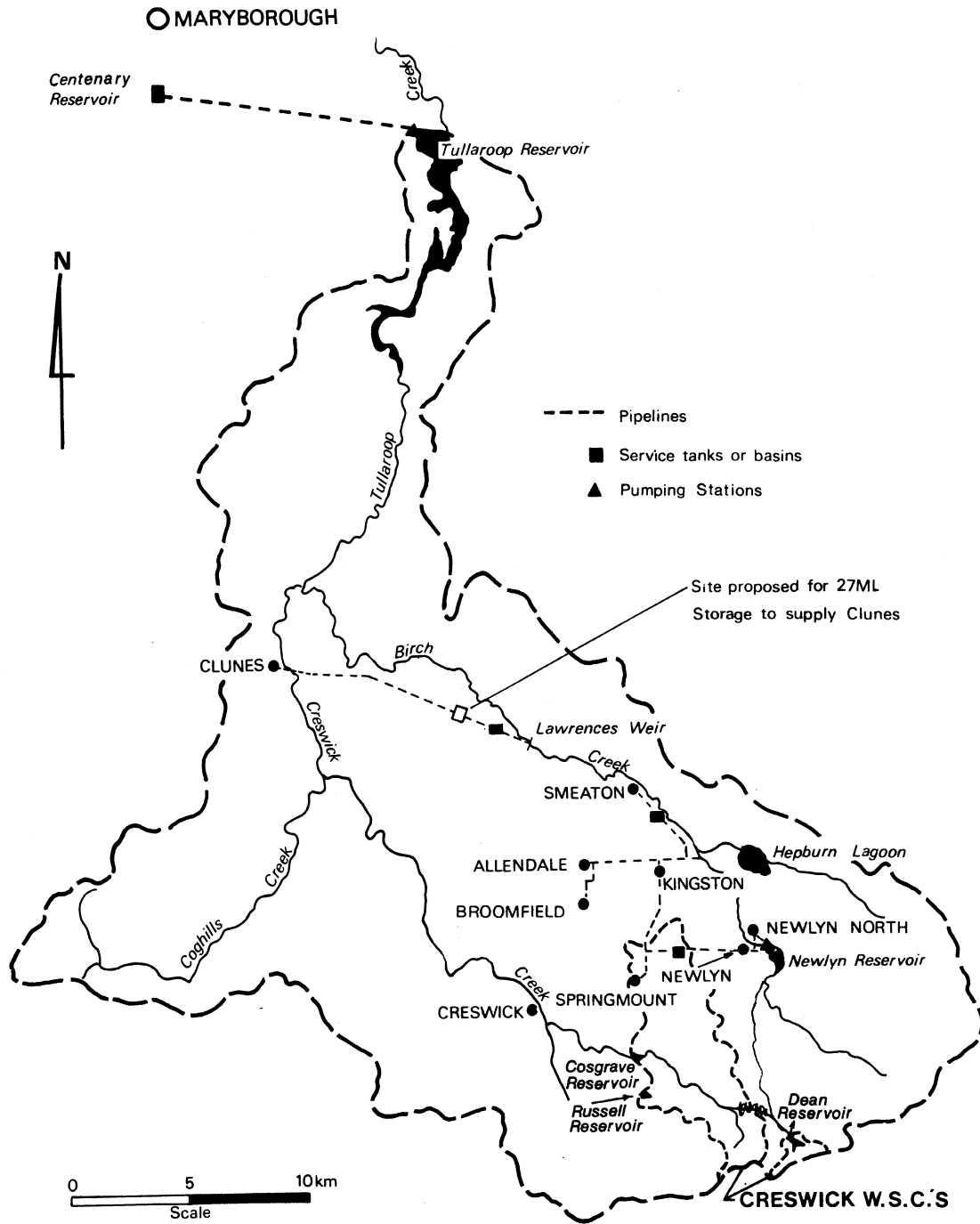
Creswick and Clunes, both located on Creswick Creek, are the largest centres in the catchment. The smaller towns of Smeaton, Kingston, Newlyn, Allendale and Broomfield are located about the south east.

Planning and Local Government within the catchment are the responsibility of the Shires of Tullaroop, Talbot and Clunes, Ballarat, Creswick, Daylesford and Glenlyon, and Bungaree. Their respective boundaries are shown in Appendix a. The Whole of the catchment lies within the county of Talbot. Parishes within this area are listed in Appendix B.

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<sup>4</sup> Some reports, and early maps in particular refer to Birch Creek as Bullarook Creek. Birch Creek is the name given to the stream on the most recent map series and that approved by the Place Names Committee and is the name used throughout this report.

**FIGURE 2 - WATER SUPPLY SYSTEMS**



## WATER SUPPLY SYSTEM

The Tullaroop catchment contains several storages, in addition to Tullaroop Reservoir, that provide both urban and irrigation water supplies, and several storages providing only for urban water supply. These are set out in Table 1.

**Table 1 Water Supply Storages in the Tullaroop Reservoir Catchment.**

Storage	Estimated Maximum Capacity (ML)	Water Use
Tullaroop Reservoir	74 100	Irrigation & Urban
Newlyn Reservoir	3 280	Irrigation & Urban
Hepburn Lagoon	3 040	Irrigation & Urban
Cosgrave Reservoir	680	Urban
Dean Reservoir	163	Urban
Russell Reservoir	72	Urban

All urban supplies, with the exception of Clunes, are obtained directly from storages as shown in Figure 2. In the case of the three larger storages the bulk of water is released for irrigation purposes.

### ***Tullaroop Reservoir***

The State Rivers & Water Supply Commission supplies annually from Tullaroop Reservoir, between 35,00 ML and 40,00 ML of irrigation water to private diverters and to the Loddon Irrigation District, and about 3,00 ML (depending on demand) to the Maryborough Waterworks Trust.

The Maryborough Waterworks Trust supplies the urban and industrial requirements of the City of Maryborough (population 8,000); and through an extensive distribution network, the townships of Adelaide Lead, Alma, Havelock and Majorca in the Shire of Tullaroop, the township of Betley in the Shire of Bet Bet, and many of the rural holdings in the Shire of Tullaroop within a 24 km radius of Maryborough.

In addition, bulk supply is provided to the Bowenvale-Timor Waterworks Trust and Carisbrook Water Trusts.

From Tullaroop Reservoir the Trust's supply is pumped a distance of 11 km to Centenary Reservoir a service basin of 173 ML capacity, located 3 km south of the City. From there water is gravity fed to the reticulation system.

Currently the Maryborough Trust obtains forty per cent of its requirements from Tullaroop Reservoir. The remainder comes from Evansford Reservoir the towns original storage on McCallum Creek.

### ***Newlyn Reservoir and Hepburn Lagoon***

Newlyn Reservoir on Birch Creek supplies annually, between 125 ML and 190 ML to the water supply districts of Spring Hill and Smeaton; and in conjunction with releases from Hepburn Lagoon, meets the annual requirements down stream of the private diverters (between 290 ML and 707 ML) and urban supply for the township of Clunes (about 135 ML). Hepburn Lagoon on Langdons Creek discharges to Birch Creek some 5 km down stream from Newlyn Reservoir. Both storages are controlled by the State Rivers & Water Supply Commission.

The Shire of Creswick, acting as the Local Governing Body for the Spring Hill and Smeaton system, obtains urban supply direct from Newlyn Reservoir. From the reservoir water is pumped to a service basin located at Forest Hill, and from there distribution is by gravity to the townships of Newlyn North, Newlyn, Kingston, Springmount, Allendale, Broomfield and Smeaton.

The Clunes water supply district is administered by the Shire of Talbot and Clunes as the Local Governing Body. The township's supply is obtained from Lawrence Weir, an off take on Birch Creek some 13 km downstream from Newlyn Reservoir. From the Weir, water is taken approximately 1.5 km by pipeline to a 6.6 ML service basin. A further 9.5 km of pipeline takes the water to Clunes for distribution.

Tentative approval has been given by the State Rivers & Water Supply Commission for the construction of a 27 ML storage midway along the above pipeline as shown in Figure 2. This storage will serve the dual role of minimising the water storages, presently experienced, and act as a settling and detention basin so improving water quality.

In addition to the above there is currently an annual commitment to transfer up to 1120 ML from Newlyn Reservoir to the Werribee River system for industrial requirements at Bacchus Marsh. Up to the present no requirement for this has been made on the Loddon system and with the completion of Merrimu Stage 3 it is unlikely that this water will be required in the near future. However, the diversion works and agreement will be retained.

### ***Creswick Water Supply***

The Tullaroop Reservoir Catchment contains the catchments of Cosgrave Reservoir, Dean reservoir and Russell Reservoir, supplying domestic water to the township of Creswick. These catchments shown in Figure 2 were proclaimed in May 1979, and were described in a report<sup>5</sup> November 1978. The reader is referred to this report for greater detail.

## **WATER PRODUCTION AND WATER QUALITY**

Most streams in the catchment exhibit great variation in flow. Records show that flow in many catchment streams ceases in summer while after heavy rainfall, flood discharges of short duration occur. This pattern of flow produces a corresponding variation in water quality especially in regard to turbidity, colour and *E.Coli* levels.

Water samples from the three storages (Tullaroop, Newlyn and Hepburn) and from Lawrences Weir are analysed regularly for various physical, chemical and bacteriological parameters. Results of these tests show that colour and turbidity levels together with numbers of coliforms and *E.Coli* generally exceed desirable levels set for drinking water standards. Samples analysed from Lawrence Weir (Clunes diversion) are particularly poor in these respects.

Algal blooms frequently occur in Hepburn Lagoon and though the specific stimulants for these have not been determined, it is probable that nutrients derived from the intensively farmed catchment, and bird life on the Lagoon, play an important role.

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<sup>5</sup> A Report on the Creswick Water Supply Catchments. Soil Conservation Authority (November 1978)

The bulk of land in the catchment is used for farming, both grazing and cropping, and stock generally has unrestricted access to the streams and foreshores of the storages. In addition there are unsewered urban areas and many kilometres of roads all contributing at different times to water quality problems in streams in so far as urban supplies are concerned. Detention in storage offers some natural improvement in quality, but in the case of Clunes supply, deterioration in quality occurs during the course of flow down Birch Creek from Hepburn Lagoon and Newlyn Reservoir. The proposal to construct a 27 ML storage en route from Laurences Weir to Clunes will, as a result of detention time, marginally improve water quality.

## **WATER TREATMENT**

Currently there is no treatment or sterilisation of urban water supplies obtained from the Tullaroop catchment. Construction of a water treatment plant for the Maryborough Waterworks Trust is scheduled for completion in late 1979. All supplies provided by the Trust including those to rural areas will be treated. Treatment is designed to improve turbidity, colour and hardness of Tullaroop water by coagulation, clarification, softening, filtration and sterilisation processes.

## **THE CATCHMENT**

### ***Physiography and Topography***

The catchment to Tullaroop Reservoir lies on the northern slopes within the Western Highlands of Victoria. The catchment incorporates part of the basalt plain sloping gently towards the north, with patches of higher lands scattered along the southern and western boundaries. Conical hills, presenting the sites of past volcanic activity, are dispersed across the plain. Much of the catchment boundary where it crosses the plain is poorly defined, except for the volcanic cones. As an example, the southern perimeter for part of its length is located across the basalt plain which forms a low level corridor in the Highlands of the Great Dividing Range.

In the south eastern corner near Leonards Hill the boundary reaches its highest elevation of 740 m. From there, the land falls to the north (F.S.L. of Tullaroop Reservoir is 223 m), and to the west (410 m NE of Lake Learmonth) before rising again to the western perimeter where Mt. Bolton the main topographic feature reaches 640 m.

The sharply dissected but low hills forming the Highlands in the south east and to the south of Creswick comprise the erosional slopes of the ancient Kinglake Surface. Along the western perimeter south of Clunes the more erosion resistant granite material has resulted in the formation of hills with greater relief and steeper slopes. North of Clunes low gentle hills grade to the plain.

### ***Geology***

Throughout the catchment, basalt of the newer volcanic series predominates. Extruded during the late Tertiary/early Quaternary period, this parent material accounts for almost 80 per cent of the catchment area. Scoria cones are widely scattered about the catchment, indicating the many eruption points from which the lava flows originated.



The basalt overlays Ordovician and Tertiary aged sediments and as a result of stream dissection the sediments are exposed frequently at the base of the basalt along many stream margins.

Ordovician sediments, the oldest material in the catchment, form the basement rock for much of the catchment. They outcrop in a large area about Creswick, in the Highlands of the south east and at several locations along the catchment boundary in the west.

Exposures of Tertiary age deposits are generally small in area but are widely scattered throughout the catchment, chiefly adjacent to streams. Other exposures occur where denudation of the basalt 'mantle' has taken place. Beneath the basalt these Tertiary deposits comprise some of the most extensive and best known Deep Leads in Victoria. Being richly auriferous in places, these leads were extensively mined as indicated by the mine dumps scattered about the catchment.

Granite extruded during the Middle Devonian era underlies the Mt. Bolton/Mt. Beckworth locality and is exposed in the south west corner of the catchment. A smaller exposure of the Tullaroop pluton, an intrusive mass of upper Devonian Granodiorites, extends into the catchment near the Tullaroop Reservoir.

Quaternary aged Deposits are not extensive, being confined to stream margins and beds of gullies (in particular to the streams draining from Ordovician and Tertiary deposits), the flat swampy areas such as Merrin Merrin Swamp and the granite detritus forming the piedmont and fan delta deposits found in the Mt. Bolton area.

### ***Climate***

Climate within the catchment ranges from the moist cool highlands of the Great Dividing Range in the south east, to the more exposed drier plain in the north. Topography of the surrounding region exerts some influence on the climate the central valley almost as far south as Creswick is affected by a rain shadow. Differences in temperature are less marked, with the greatest difference from south to north occurring in the summer months.

Climatic information for recording stations within and adjacent to the catchment is given in Appendix C. The trend in rainfall from south to north is shown in Table 1.

**Table 2 Annual Average Rainfall for Stations Within and Adjacent to Tullaroop Reservoir Catchment**

<b>Representative section of Catchment</b>	<b>Station</b>	<b>Annual Average Rainfall (mm)</b>
South East Highlands	Moorabool Reservoir	941
Southern Hills	Creswick	784
Central Plain	Clunes	585
Northern Plain	Majorca	489

Annual average rainfall across the catchment decreases from south to north and in the southern catchment from east to west. There is a fairly even distribution of rainfall throughout the year, with almost a third falling in the winter months. Approximately fifty per cent of the catchment receives annual average rainfall less than 680 mm.

Hottest months in the region are January and February, with average daily mean temperatures ranging from 21.6° C at Maryborough to 19.5° C at Creswick. Temperatures in winter fall to 7.7° C and 6.4° C (for July) at the respective locations. Conditions in the Highlands of the south east could be expected to be colder than at Creswick.

Estimates for the length of growing season based on effective and median rainfall, are from 9 1/2 months in the Highlands, decreasing to 6 1/2 - 7 months about Tullaroop Reservoir. Limited growth especially in the Highlands could be expected in winter due to cold temperatures.

## ***Soils***

Soils derived from basalt parent material predominates throughout the catchment. These soils range from the red gradational types with fine structure found on the gentle hills in the moist southern areas, to the grey calcareous sodic clay types typical of the plains in the northern catchment. The gently undulating to flat plain between these areas is dominated by the coarsely structured yellow/brown calcareous sodic duplex soils found on the long slopes. All the above soils are deep, with clay to clay loam textures. Excepting for the well structured soils in the south, internal drainage is very slow; consequently surface ponding across the plain is common following rain.

Characteristic soils of the cones are the finely structured stony red gradational types. Drainage lines generally have uniformly textured black cracking clay soils with low permeability.

Soils derived from the Ordovician sediments are predominantly red duplex or yellow duplex types which occur on the longer and gentler slopes from the ridges. Higher and steeper positions in the landscape are generally occupied by red gradational types with crests characterised by shallow stony gradational types where the surface textures are gravelly loam.

Course sand soils have developed on the steep slopes and outwash fans of the granite in the south-west. A mottled duplex soil with ironstone occurs on the intermediate slopes.

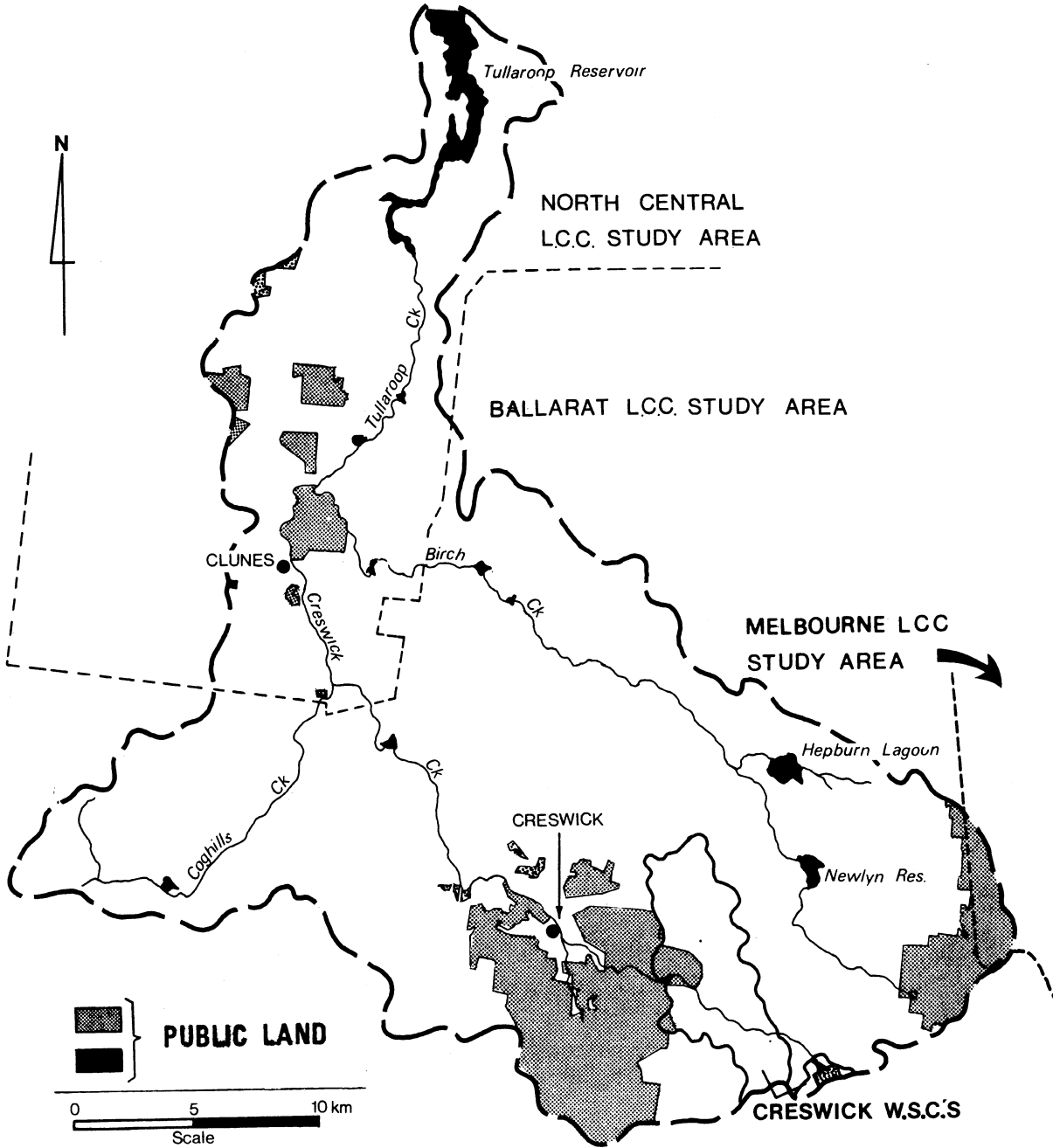
## ***Vegetation***

Most of the land within the catchment has undergone development. As a result, native vegetation characteristic of the area has to a large degree disappeared, and now, is confined to the State Forest, and to the steeper and the more rugged areas of freehold land in the Highlands. Elsewhere catchment cover is predominantly improved pasture. Areas of softwood plantations occur about Creswick and in the south-east.

Based on information given in the Land Conservation Council's reports for the North Central and Melbourne study areas, native forests in the south and south-east would conform to an open forest II structural form with open forest III occurring in the more sheltered situations. Dominant species are messmate stringybark, associated with manna gum and broad leaf peppermint.

Along the western boundary are small sections of open forest of red ironbark, red box and red stringybark and these grade to the red gum woodland vegetation of the basalt plain.

**FIGURE 3 - PUBLIC LAND**



## **LAND USE AND LAND TENURE**

Figure 3 gives some indication of the location and the general proportion of public to freehold land within the catchment. Freehold land is of higher agricultural quality than the bulk of public land which is confined mainly to the steeper hills in the south and south-east and the gentler hills on the western perimeter.

### ***Public Land***

The two large blocks of public land are essentially reserved forest, forming part of the Wombat or Creswick State Forests and managed by the Forest Commission. Present use of these areas includes hardwood and softwood production, mining and an increasing tendency for recreational activities. Located within the Creswick State Forest is the Victorian School of Forestry, the St. George Lake Scenic Reserve and the Koala Park Scenic Reserve. Small sections of reserved forest extend into the catchment on the western boundary.

Other areas of significant size, all to the north of Clunes, are the Merrin Merrin and Middle Swamps, at present managed by the Fisheries and Wildlife Department, and a block of agricultural land held under ten grazing licences.

The areas which make up the balance of public land are, with one exception, reserves scattered throughout the catchment. These include reserves for gravel, stone, water and reservoirs. The one notable exception is the large area adjacent to Reserved Forest on Creswick and Adekate creeks, reserved for water supply, reservoir, race track and plantation purposes.

It is significant that the three water storages, Newlyn, Hepburn and Tullaroop, have above full supply level, only very narrow marginal lands over which the State Rivers & Water Supply Commission has control.

Much of the land within the Creswick State Forest has in the past been affected by gold mining activities. Stabilisation of the worst affected areas has been achieved with softwood plantations. Additional planting of adjacent areas has followed. There are a number of tailings heaps adjacent to streams within the forest where tailings licences are periodically issued. It is not known how much sediment these heaps contribute to the bed load.

### ***Freehold Land***

With few exceptions freehold land outside the urban areas has undergone development for agriculture, with grazing the major activity overall. Stock are predominantly sheep but cattle numbers are tending to increase.

In the south the well structured red soils support intensive agriculture with potato production the major enterprise in a potato/cereal/grazing rotation. Summer irrigation of potatoes is common throughout this region with many large farm dams providing for these needs.

To the north the heavier and less permeable clay soils of the flatter plain are farmed under a cereal/pasture rotation with the upper slopes and crests of volcanic cones generally restricted to grazing.

Population within the catchment is between 5 000 and 6 000. More than half this number is concentrated in the urban centres of Creswick and Clunes. A further 900 is located in smaller townships within the Shire of Creswick, from Smeaton in the north to Dean in the south. Both Creswick and Clunes are located on Creswick Creek and it is highly probable that much of the townships sillage and septic wastes eventually find their way to the stream, either directly or in urban run-off. In the case of Creswick it is anticipated that these sources of pollution will be greatly reduced with the completion of the townships sewerage scheme scheduled for operation in 1980.

Within recent years increased activity about Clunes has been shown in the subdivision of rural properties into sizes from 1 to 4 ha. These generally, are located some distance from the main stream environs, creating minimal risks to stream quality; however, the provision of reliable water supply to many of these allotments has led to pressures for obtaining supply from catchment streams with an existing high commitment.

### ***Mining and Extractive Industries***

The most extensive development of deep lead gold mining in Victoria including operations in the Tullaroop catchment. Reef and alluvial mining at Clunes and alluvial mining at Creswick were all extensive. The effects of these activities produced major land disturbances often adjacent to streams, and left many tailings dumps. Although tailings dumps in the main remain unvegetated, regrowth and the establishment of pines has, to a large degree stabilised other areas previously disturbed.

Silt movement from the tailings dumps is a significant localised problem affecting streams, road drainage and private land, both the true extent of the problem has never been fully investigated. To determine suitable treatment methods for stabilisation of these heaps, the SCA between 1969 and 1972 conducted revegetation trials at one site in the catchment. Results showed that suitable species could be established which would persist if given appropriate protection and management. Further action was not taken on the basis that benefits did not appear to offset the high costs involved.

A proportion of the tailings heaps comprises the gravels from the placer deposits. These gravels provide a source of aggregate for road construction and other uses. Extraction of scoria and granitic sand also occur but are of little concern to the catchment.

The situation in the catchment with respect to mining is that several large sections, including water reserves and storage areas, are excepted from occupation under mining right claim; exploration licences have been granted for almost the entire area, a number of tailings licences are current, and several mining leases are held for areas near Clunes. The renewed interest being shown in prospecting for gold could increase activity, especially within stream zones where tighter control over these activities may be needed.

### ***PLANNING CONTROL***

Statutory planning control within the catchment is the responsibility of individual Shire Councils.<sup>6</sup> Control is exercised through Interim Development Orders, several of which are fairly detailed.

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<sup>6</sup> (i) Planning within the area surrounding the Clunes swamps (Merrin Merrin and Middle swamps) is currently administered by the T & CPB. Planning control for this area will be transferred back to the Shire of Talbot and Clunes in the near future when an IDO for the Shire is finalised and approved.  
(ii) All of the catchment falling within the Shire of Daylesford and Glenlyon is public land.

Constraints on future development will generally direct urban type residential development to the townships of Clunes, Creswick and the smaller townships within the Shire of Creswick. Rural residential and hobby farm type developments will, in the main, be confined to an area adjacent to or within a short distance of Clunes and Creswick townships, and not be dispersed throughout the rural zone designated for farming and rural amenity where land is held principally in large allotments. This latter zone covers the major portion of catchment land where subdivisional constraints include a 40 ha minimum lot area in the IDOs of Tullaroop, Talbot and Clunes, and Ballarat Shires and 16 ha in the IDO of the Bungaree Shire. In the Shire of Creswick, an innovative approach based on agricultural capability and erosion hazard has been used to specify minimum subdivision constraints in the rural zone. Guidelines accompanying the IDO specify minimum lot sizes of 200 ha for grey basalt soils, 100 ha for red/grey basalt soils, 50 ha for red basalt soils and 40 ha for Ordovician sedimentary areas.

Restrictions on development apply within the Natural Beauty and Special Significance zones covering the Mt. Bolton area, many of the volcanic cones and land within 100 metres of specified streams in the Shire of Ballarat, and land surrounding the Clunes swamps. Special controls also apply to land within 100 metres of streams within the Shire of Creswick, within 50 metres of specified streams within the Shire of Talbot and Clunes, within 20 metres of defined water courses and water bodies within the Shire of Ballarat, and within 500 metres and 300 metres of full supply level of Tullaroop Reservoir in the Shire of Tullaroop.

Draft reports<sup>7</sup> in the series 'The Rural Land Mapping Project' have been prepared for the Shires of Tullaroop and Bungaree; and, in addition a detailed account of the capability of land within the Shire of Bungaree is contained in a separate report.<sup>8</sup> These reports aim to identify and explain physical constraints which can be taken into account in the preparation of planning requirements for an area, or when making subsequent planning decisions.

The Shire of Bungaree is currently giving consideration to amending its I.D.O., and the Shire of Creswick is working towards finalisation of its planning scheme. It is expected that improved planning control will result from consultations with the T & CPB and SCA during the review of planning in these Shires.

The Land Conservation Council is currently preparing proposed recommendations for use of public land in the North Central Study Area, which covers the northern part of the catchment shown in Figure 3. The Ballarat Study Area, which is currently under study, contains most of the remaining public land. The final recommendations for the Melbourne Study Area apply to the small section of public land in the south east where it is recommended that a small area (F3) of the Wombat Forest continues to be used for the production of softwoods and that the remainder (E2) be used primarily for the production of hardwood.

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<sup>7</sup> (i) The Rural Land Mapping Project 1979. Loddon-Campaspe Region - SHIRE OF TULLAROOP Loddon-Campaspe Region Planning Authority and Town & Country Planning Board (March 1979).

(ii) The Rural Land Mapping Project 1979 - SHIRE OF BUNGAREE Town & Country Planning Board (November 1979).

<sup>8</sup> A Study of Land Capability in the Shire of Bungaree - Soil Conservation Authority (February 1979).

## **HAZARDS TO THE WATER SUPPLY**

### ***Turbidity to the water supply***

Since the cessation of mining activities and the rehabilitation of the affected areas, the general condition of catchment land has remained relatively stable. Under present management it is not expected that the land will have serious erosion problems endangering storage capacity.

With respect to sediment and turbid runoff, the hazard it poses to the water supply will be greatest during periods of high runoff from the following areas:

- the intensively cropped land in the south.
- roads
- eroded gully systems particularly to the south and south-east of Creswick.
- to a limited extent the tailings dumps
- the forested land with a high to moderate erosion hazard, during the following forestry operations until revegetation occurs.

### ***Pathogens, Nutrients and Toxic Chemicals***

Hazards created by the presence of the above pollutants in the water supply could arise from:

- the generally unrestricted access that stock and humans have to the streams, and that stock have to the storages, thus providing an opportunity for the entry of pathogens to the water by way of direct contact or by faecal contamination.
- contamination of streams with urban drainage, or polluted runoff from the intensively cropped areas, the grazing land and the unsewered areas, giving rise to the possibility of streams and storages containing toxic chemicals, high levels of nutrients and pathogenic organisms.

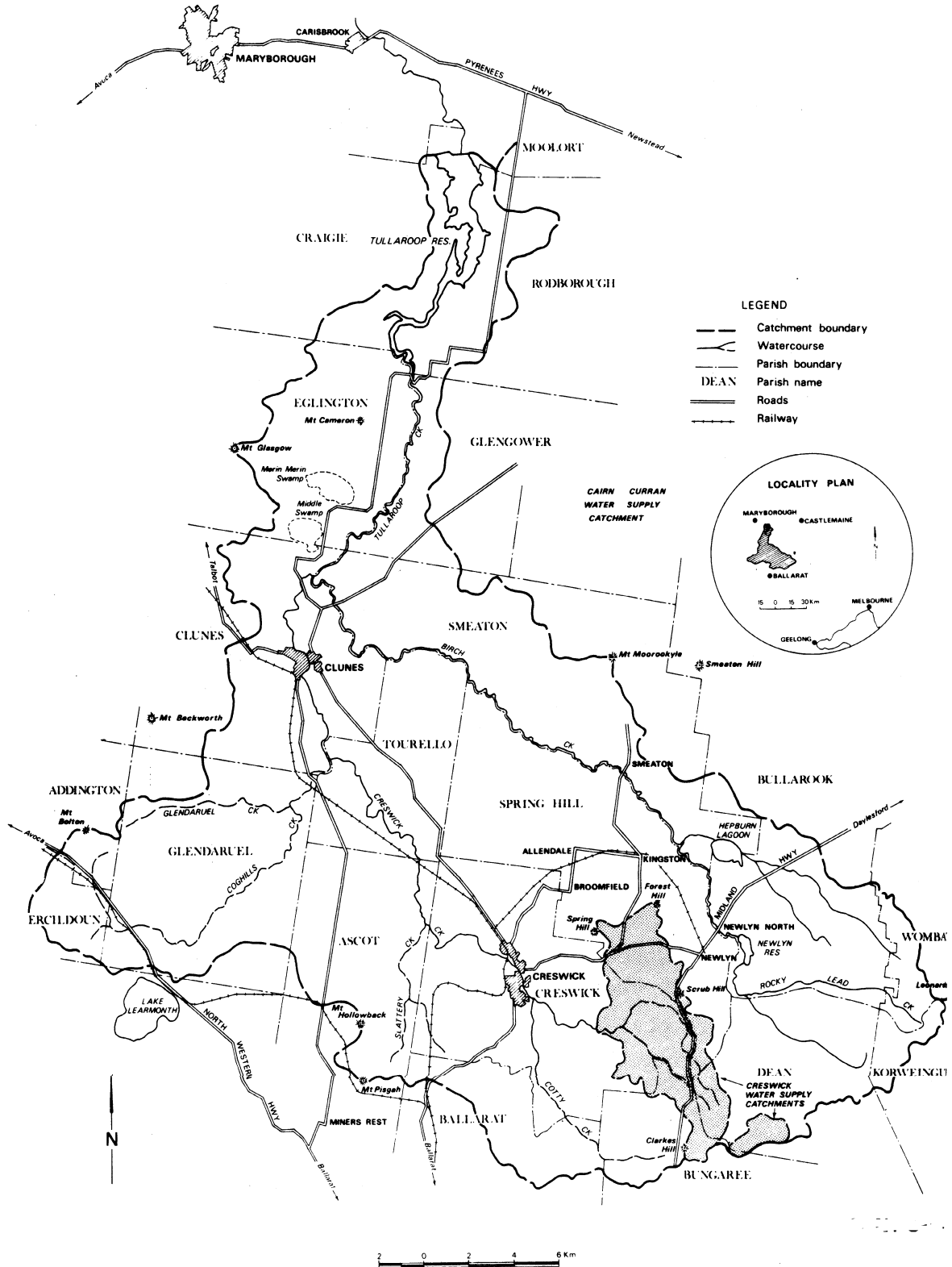
### ***Specific Hazards***

Potential hazards of a more specific nature, present in the catchment consist of:

- the discharge of waste process water from the woollen mill at Clunes to an area of land adjoining Creswick Creek at Clunes. The water contains high quantities of detergent.
- the discharge of phosphate rich sludge, from a potato processing enterprise, to lagoons on land located near Birch Creek downstream from Lawrences Weir.
- a proposed development to increase the recreational facilities on and adjacent to Creswick creek at Clunes.

In general terms, detention in catchment storages improves some aspects of water quality above the level of the inflowing streams, so that turbidity (muddy water) and the risk of pathogen survival is lower in supplies taken from Newlyn and Tullaroop Reservoirs than would be the case for Clunes supply taken from Lawrence Weir on Birch Creek. The Maryborough supply is to be fully treated in the near future and this will improve further the quality of water before use.

**FIGURE 4 - CATCHMENT PLAN**

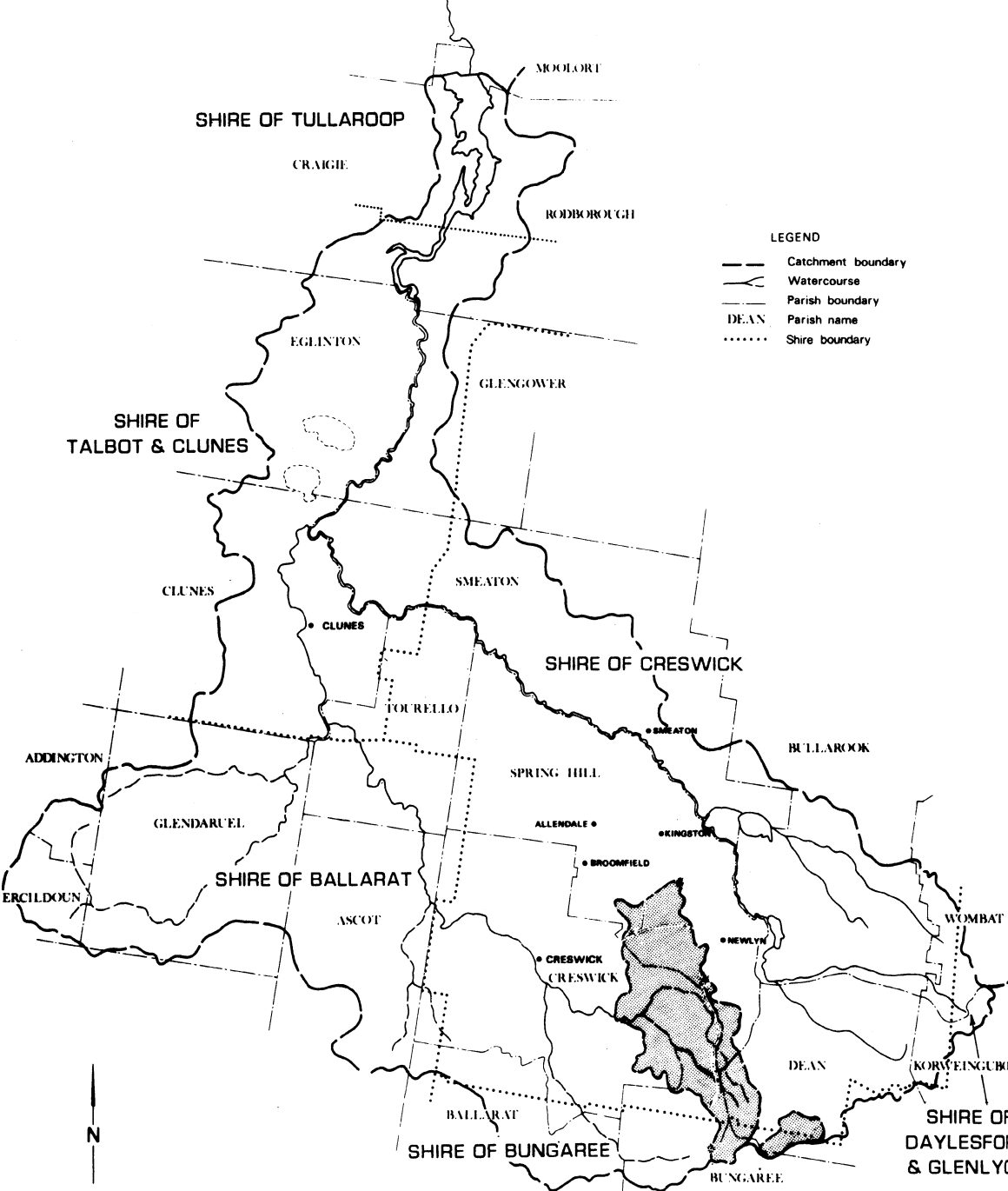




## RECOMMENDATIONS

1. That the Authority approves this report and forwards it to the Land Conservation Council.
2. That the Land Conservation Council recommends to the Governor-in-Council that the remainder of the Tullaroop Reservoir Catchment as shown on Plan No. S-768 (Figure 4) be proclaimed under section 5(1) (b) of the *Land Conservation Act* 1970 and under section 22 (1) of the *Soil Conservation and Land Utilization Act* 1958.

**FIGURE 5 - SHIRE BOUNDARIES**



## APPENDIX A PARISHES WITHIN THE TULLAROOP RESERVOIR CATCHMENTS

Parish	Amount in Catchment
Addington	Part
Ascot	Part
Ballarat	Part
Bullarook	Part
Bungaree	Part
Clunes	Part
Craigie	Part
Creswick	Whole
Dean	Part
Eglinton	Part
Ercildoun	Part
Glendaruel	Part
Glengower	Part
Korweinguboora	Part
Moolort	Part
Rodborough	Part
Smeaton	Part
Spring Hill	Whole
Tourello	Whole
Wombat	Part



