

**A REPORT ON THE
GELLIBRAND RIVER (SOUTH OTWAY)
CATCHMENT**

**A PROPOSAL FOR PROCLAMATION PREPARED
FOR CONSIDERATION BY THE LAND CONSERVATION
COUNCIL**

By

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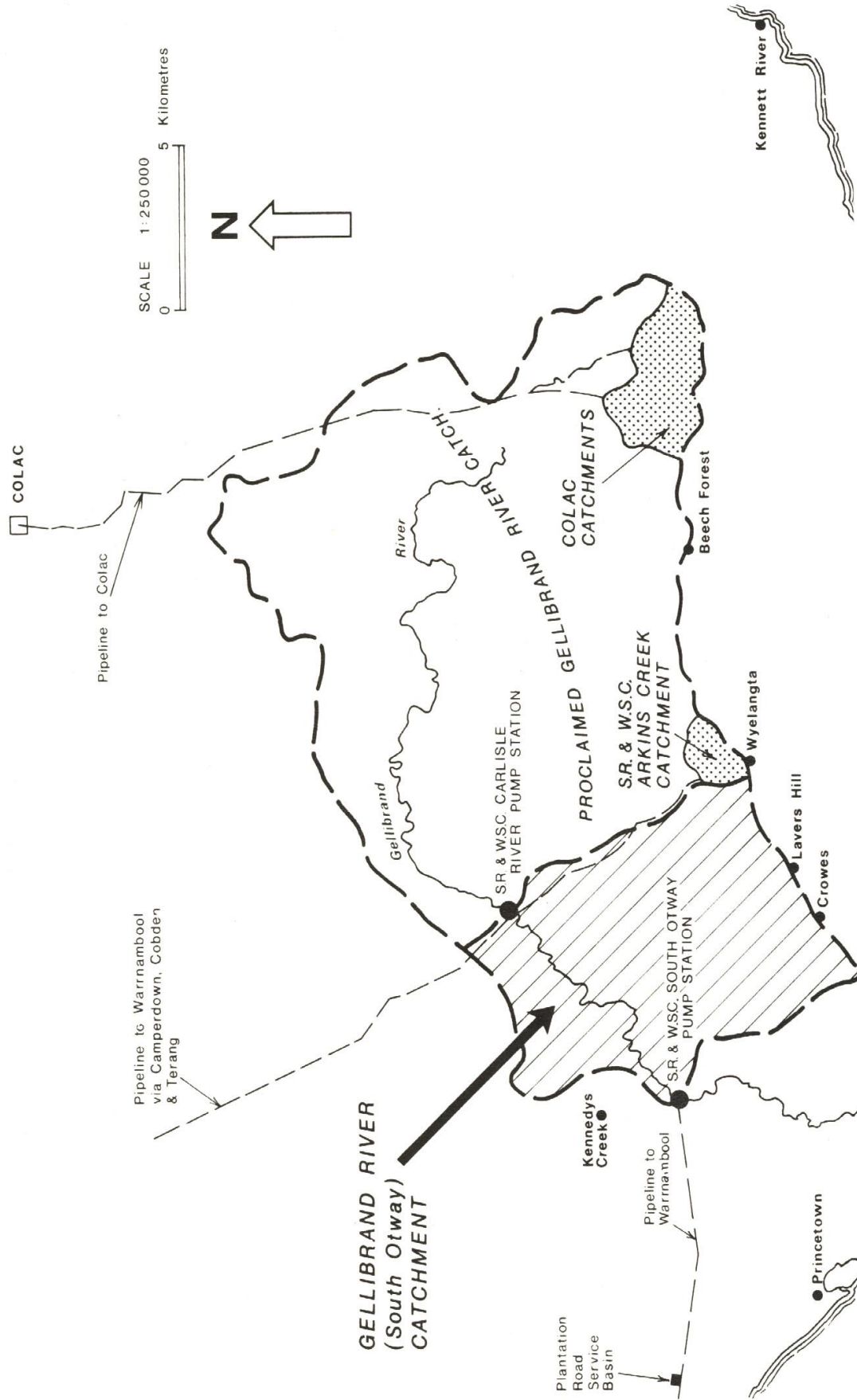
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SOIL CONSERVATION AUTHORITY
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FIGURE 1 - LOCALITY PLAN



INTRODUCTION

The City of Warrnambool, Town of Camperdown, Otway Urban and Otway Waterworks Districts are supplied with water from three State Rivers and Water Supply Commission offtakes in the Gellibrand River Catchment (see Figure 1):

- 1 The catchment to the Carlisle River pump offtake, which includes
- 2 The Arkins Creek weir offtakes, was proclaimed on 5th November 1969;
- 3 The catchment to the South Otway pump offtake, on the Gellibrand River downstream of Carlisle River, has now been investigated, following a request from the Water Commission.

This report has been prepared on behalf of the Land Conservation Council, to advise Council members of the present situation in the catchment.

The site of the Otway pump offtake and its catchment are in the LCC Corangamite Study Area. The Final Recommendations for this area state "Where a number of other products are required from a catchment supplying water used for domestic purposes, the catchment should be proclaimed.....":

The majority of this catchment is public land, parts of which are used for forestry and recreation;

On the private land, dairying, grazing, and some cropping are the most common agricultural uses. Land owned by softwood timber companies for pine plantations also covers a significant area;

Major earthworks for road construction, and gravel and sand stripping have also been carried out in the catchment.

All these land uses, if unsatisfactorily managed, can lead to water supply problems. The Authority will therefore recommend, at the conclusion of this report, proclamation of the catchment under the Land Conservation, and Soil Conservation and Land Utilization Acts.

THE SUPPLY SYSTEM

The Gellibrand River is an extremely important source of domestic water supply for the south of the Western District. The portion of the Gellibrand Catchment proclaimed in 1969 to the Carlisle River pump offtake (See Figure 1) supplies water to Camperdown, Cobden, Terang, Warrnambool, Lismore and Derrinallum as well as smaller towns and properties in the Water Commission Otway Districts. This catchment also contains the headworks of the separate supply system for Colac, and the Gellibrand township offtake.

Over the drier months the Carlisle River - Camperdown Otway main pipeline is unable to meet peak demand for water supply in Warrnambool, and this led to the Water Commission installing the South Otway system. This is also located on the Gellibrand River, approximately 15 km by road downstream of the Carlisle River offtake.

The South Otway offtake works comprise a low-lift pump (No. 1) from the River into a holding tank. The water is chlorinated and pumped (No. 2 pump) through a new pipeline to Brierly Basin at Warrnambool. There are no diversions from this pipeline, although Port Campbell and Peterborough could possibly be supplied from the Plantation Road storage.

The South Otway pumps and pipeline provide 13 ML/day through the drier months of the year, flow in the Gellibrand River at the pump station for the months of December to March averaging 183 ML/day.¹

¹ Estimated from upstream and downstream gauges; 1967/68 - 1976/77 readings.
Streamflow and water quality information from SRWSC Hydrographic and Laboratory Sections.

Water Quality

Counts of *Escherichia coli* (organisms/100 ml) are consistently high: in 43 monthly readings from 1975-78 only three counts were below 20, the majority being between 50 and 200. A regular peak occurs over the spring months, and high readings often follow storms. This is thought to arise from effluents and putrescible material flushed into the river.

Colour and turbidity in the water are both regularly above desirable standards (5 units each). Colour measurements are commonly very high, with a variable spring peak, and very few monthly values (1974/78) are below 50 units. The peak of turbidity is generally earlier, in late winter-early spring, with values up to 77 Jackson Turbidity Units but with a summer-autumn trough, when values are often within the acceptable limits.

Both parameters also have irregular minor peak values throughout the year, as a result of storms or individual examples of large-scale soil disturbance.

Regular chlorination of water pumped from the river is carried out at the South Otway station and the Plantation Road Storage on the pipeline, for two reasons:

To reduce the high bacterial numbers;

To prevent the development of iron and manganese bacteria, and plumatella and sponge growths in the pipeline.

These raw water quality factors are not particularly bad for a river the size of the Gellibrand. In order to improve the quality for domestic use of water pumped from the South Otway station, treatment is necessary. As mentioned above, the supply is chlorinated, and to determine the type and extent of other treatment necessary in a plant proposed for construction at Warrnambool, a pilot treatment plant has been operating at the South Otway pump station.

THE CATCHMENT

The Gellibrand River (South Otway) catchment comprises the additional catchment to the Gellibrand River between the Carlisle River and South Otway pump stations. This section of the river drains short steep slopes to the north west, and to the south east it drains the deeply-dissected slopes and lower foothills of the main Otway Range, from Wangerrip to Wyelangta.

The total catchment area to the South Otway pump including the proclaimed catchment to the Carlisle River pump is 690 km², of which 183 km² is presently under consideration for proclamation.

Geology and Topography

Lower Cretaceous sandstones and felspathic sandstones largely make up the parent material for the Otway Ranges, which forms the southern boundary of the Gellibrand River (South Otway) catchment. This Mesozoic surface was weathered and dissected, probably to an undulating landscape, remnants of which are still present along the top of the main ridge from Crowes to Wyelangta, the highest point in the catchment (534 m).

Following substantial uplift of this surface the processes of dissection were renewed, and a young landscape has resulted, with steeply sloping spurs and valleys. This covers the south-eastern third of the catchment with a number of parallel north-west aligned creeks draining the high-rainfall undulating area.

In the Tertiary Period sedimentation occurred in several phases. River and lake deposition alternated with marine transgressions, resulting in sedimentary beds of varying age, extent, depth and texture. Much of this material comprises unconsolidated sands, silts, clays and gravels.

These sediments from the surface material between the slopes of the Otways ridge and the north western catchment boundary, from Chapple Vale to Carlisle River. These areas are strongly dissected, but have less local relief than the steep slopes on Lower Cretaceous rock.

Quaternary alluvial deposits of sand, silt, clay and gravel have been laid down along the Gellibrand River and Chapple Creek, on the present floodplain and older terraces. In some areas in the catchment the freehold land follows the extent of the alluvium, but terminates abruptly at the edge of the adjacent Tertiary sands.

*Soils and Vegetation*²

In this section of the Gellibrand catchment the main soil type developed on the Lower Cretaceous rock is a brown gradational soil. This soil is found over 32% of the catchment, on gentle slopes along the catchment boundary from Wyelangta to Crowes, and on the steep slopes of the Otway Range. The soil has a loam or clay loam surface texture grading to a clay in the subsoil; it is well-structured, comparatively fertile, from 1-2 m deep on the gentler slopes, and shallower on the steep slopes.

In the higher rainfall areas adjacent to the main ridge this soil supports a tall open forest³ of mountain ash (*Eucalyptus regnans*), messmate (*E. obliqua*), mountain grey gum (*E. cypellocarpa*), and blackwood (*Acacia melanoxylon*). Further north there is a tall open forest of messmate and mountain grey gum.

A wide variety of soils have developed on the Tertiary deposits, depending on the coarseness of the sediments and the prevailing weathering and leaching conditions.

On the older sediments the most common soils (approximately 27% of the catchment) are grey sand soils. These have a deep uniform-textured profile, with organic staining in the surface horizon. They are strongly leached, acidic, and highly permeable, and hence have low water-holding-capacity and nutrient levels. These harsh conditions limit vegetative growth to a low woodland⁴ of shining peppermint (*E. nitida*), narrow leaf peppermint (*E. radiata*), and brown stringybark (*E. baxteri*).

Soils similar to those above, but having cemented hardpans, occur in small patches on the Tertiary sands, on about 10% of the catchment. The hardpan impedes the passage of water, so that waterlogging is common in winter months. Plant roots are also restricted by the hardpan, and the soil profile has the low fertility characteristic of the leached sand soils. The resultant vegetation is a closed heath⁵ of Casuarina and Leptospermum species with austral grasstree (*Xanthorrhoea australis*).

On deposits of fine Tertiary sediments north of Chapple Vale, the yellow gradational, weak-structured soil types have developed on about 10% of the catchment. These have a grey sandy loam over a weakly-structured sandy clay loam, supporting an open forest⁶ of brown stringybark, shining peppermint, messmate, and narrow leaf peppermint.

In the Sheeppark Creek subcatchment (5% of the catchment) the yellow-brown gradational, coarse-structured soils have developed. These have a fine sandy loam surface horizon over a sandy loam, grading to a coarsely-structured clay. Tree cover comprises an open forest of scentbark (*E. aromaphloia*), messmate, narrow leaf peppermint with some manna gum and swamp gum on wetter sites.

Other soil types of minor importance occur on the Tertiary sediments, and also on recent alluvium on the present river floodplains and terraces.

² Information adapted from and SCA Report (unpublished): "A Study of the Land in the catchments of the Otway Range and surrounding plains" A. J. Pitt.

³ 30-70% foliage cover; tree height >30 m.

⁴ 10-30% foliage cover; tree height 5-10 m

⁵ 70-100% foliage cover, shrub height 0-2 m

⁶ 30-70% foliage cover, tree height 10-30 m

Climate

The Gellibrand River (South Otway) catchment is at the western edge of a high-rainfall region influenced by the Otway Range. The main ridge of Wyelangta receives an average annual rainfall in excess of 1800 mm; Lavers Hill gets approximately 1750 mm over 205 rain days each year, with peaks in August and October. Chapple Vale, in the centre of the catchment, has an average annual rainfall of about 1060 mm, illustrating the steep gradient in rainfall with distance from the main ridge. Further west however, at Kennedys Creek, the annual rainfall is very similar to Chapple Vale, both having a late winter peak. There are also fewer wet days, Chapple Vale and Kennedys Creek averaging 164 each year.

The reduction in rainfall across the catchment is also reflected in streamflow records. In the catchment to a gauging station on the Gellibrand River near Sandy Creek there are many creeks with headwaters in the high rainfall area to the south and east, and the average daily flow for the months December - March is 0.26 ML per kg² of catchment. The Kennedys Creek catchment has an average daily flow of 0.03 ML per kg².

Mean daily temperatures in the centre of the catchment range from 8.5°C in July to 18°C in January, and on the Otway Ridge in the South range from 6°C to 15°C respectively. For most of the catchment south of the river, plant growth would be restricted for 3 - 4 months each year because of temperatures below 10°C.

Lack of rainfall is not likely to limit plant growth in the catchment, except in severe droughts. However where the highly permeable sand soils occur in the lower rainfall areas, this combination leads to moisture stress over summer months, and only hardy species adapted to these circumstances survive.

LAND AND TENURE USE

Public Land

The majority of land in the Gellibrand River (South Otway) Catchment is Crown Land, covering 56% of the area. This includes two main land types: the deep, infertile sands which if alienated would have been extremely unproductive; and areas on the steep thickly-forested slopes of the Otway Range, parts of which were opened up for selection in the 1870's and 1880's, but since resumed by the Crown after being abandoned.

Reserved Forest makes up 13% of the catchment. Mountain ash, messmate and mountain grey gum stands on the steep slopes in the headwaters of Sandy and Chapple reeks are harvested for sawlogs, the operations often being integrated with pulpwood utilization. These highly productive areas cover approximately 20% of the Public Land.

In the foothill forests, covering about 40% of the Public Land, messmate and mountain grey gum are also harvested for milling timber. The mature height of these trees is generally less than 40 metres, while those on the higher slopes are generally taller.

Between the above forests and the Gellibrand River, on the remaining 40% of Public Land, the vegetation on the Tertiary sand soils is generally unsuitable for timber production. However strips along the forest margin and adjacent to settled areas are managed for fire protection by fuel reduction burning.

Public land is also used for recreation and extractive industries. Established recreation uses such as pleasure driving, picnicking, and bushwalking are not widespread in this catchment.

With careful management parts of the large area of gently -dissected sand soils could be used for trail-bike riding, without appreciably affecting the water supply. Because of the distance from the large townships there has been no noticeable bike activity in these areas; however on the more sensitive steep slopes of the Range and on gravel extraction sites, there is some evidence of degradation caused by trail-bikes.

Land Conservation Council Recommendations

The Land Conservation Council has published final recommendations for the public land in the catchment (see Final Recommendations - Corangamite Area) and these are shown in Figure 2.

Freehold Land

The remaining 31% (57 km²) of the catchment is freehold land.

Parts of the area along the Otway Ridge are used for potato cropping, often for production of seed potatoes. The remainder is used for pasture production and grazed for fattening cattle.

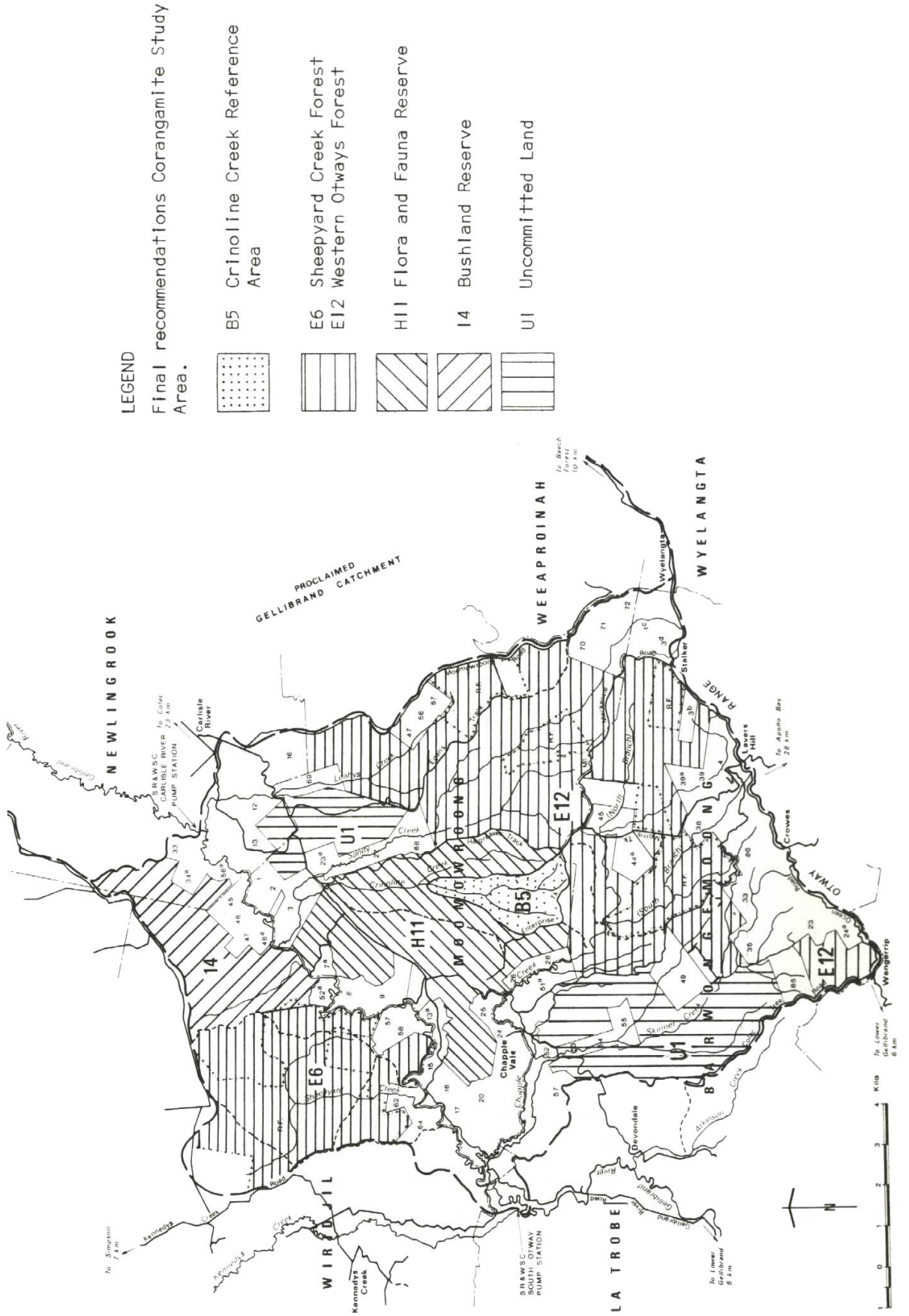
The alluvial flats and the hills around Chapple Vale are largely cleared for grazing. Dairying is a common enterprise on the flats, but as these flood most years, each farm also has some adjacent hills.

Freehold land on the steep slopes of the Range abuts the gently-sloping ridgetop or exists as scattered, isolated blocks. These are almost all forested, either having never been cleared or being covered with thick regrowth. Pine plantation companies have been buying similar land for clearing and future planting, and in the Gellibrand River (South Otway) Catchment own at least 7.6 km² of these steep slopes.

Planning Controls

The catchment is entirely in the Shire of Otway, and the freehold land in the catchment is covered by the Shire's Interim Development Order. With regard to subdivision of land, the IDO requires that Council approval is obtained for plans of subdivision, but no minimum allotment size is stated.

FIGURE 2 - PUBLIC LAND (LCC RECOMMENDATIONS)



HAZARDS TO THE WATER SUPPLY

The combination of high rainfall and steeply dissected slopes in the Otway Ranges suggest high potential hazards of soil erosion and water supply degradation. Any operation involving soil disturbance is likely to cause short-term quality deterioration, and possibly longer term problems. The high rainfall produces good growing conditions, but major soil losses can occur before natural regeneration stabilizes a disturbed area, and an active revegetation programme is preferable.

Harvesting of mountain ash necessitates clear felling, followed by managed re-establishment. During logging the following changes occur: a change in the hydrologic balance of rainfall, vegetation, and soil; removal of much of the protective litter on the surface; disturbance of soil along roads, tracks, snig tracks, and log-landing and hard-surfacing of access roads and tracks. Together these cause increases in surface runoff and sheet and rill erosion, resulting in colloidal material and sediment in runoff. However with properly managed operations, soil loss can be reduced to an acceptable level, with implementation of forest management prescriptions and regular joint inspections by FCV and SCA officers.

On the Tertiary sediments on Crown Land, revegetation of sand and gravel stripped areas has been inadequate in the past. Stabilization of these areas is now being undertaken by the Crown Land Management Branch in conjunction with SCA officers.

Private pine planting operations on freehold land are accompanied by similar potential water supply hazards to hardwood forestry. However because of the shorter rotation, management operations are more frequent.

It is important to implement management prescriptions for operations in the softwood plantations. In the land use determination (in preparation) for this catchment and the proclaimed Gellibrand River catchment, greater emphasis will be placed on control of these operations.

Roadworks, along the Gellibrand River Road near Mt Mackenzie, have created major soil disturbance. Large areas of erodible soils have been left without vegetation protection; high, steep cut and fill batters have not been stabilised; and the local drainage pattern has been altered; resulting in turbid runoff and sediment movement toward the River.

Soil erosion following the major works mentioned above is more severe than that on farms in the catchment. However, dairy shed effluent from many properties is unsatisfactorily treated before being discharged into watercourses.

RECOMMENDATIONS

1. That the Authority approves this report and forwards it to the Land Conservation Council for consideration;
2. That the Land Conservation Council recommends to the Governor-in-Council that the Gellibrand River (South Otway) Water Supply Catchment, as shown on plan S-746, be proclaimed under Section 5(1)(b) of the Land Conservation Act 1970 and section 22(1) of the Soil Conservation and Land Utilization Act 1958;
3. That the Authority introduces a land use determination for the Gellibrand River (South Otway) Catchment and the proclaimed Gellibrand River Catchment.

FIGURE 3 - CATCHMENT PLAN NO. S-746

