

SOIL CONSERVATION AUTHORITY

REPORT ON THE
BETKA RIVER WATER SUPPLY CATCHMENT
(Mallacoota Waterworks Trust)

Prepared for consideration by
the Land Conservation Council

June 1973

TABLE OF CONTENTS

1. INTRODUCTION.....	3
THE SUPPLY SYSTEM:.....	3
THE CATCHMENT.....	3
2, DESCRIPTION OF THE CATCHMENT**.....	3
CLIMATE.....	3
GEOLOGY AND TOPOGRAPHY.....	6
SOILS.....	6
VEGETATION.....	7
EROSION HAZARD.....	7
LAND TENURE.....	7
3. DISCUSSION OF LAND USE.....	8
FORESTRY.....	8
GRAZING AND AGRICULTURE.....	8
SUMMARY.....	8
4. RECOMMENDATION.....	8

LIST OF FIGURES

FIGURE 1 - LOCALITY PLAN.....	4
-------------------------------	---

LIST OF TABLES

TABLE 1 - TEMPERATURE DATA (°C) GABO ISLAND ALT. 15 M.....	5
TABLE 2 - RAINFALL DATA - GENOA.....	5
TABLE 3 - SEASONAL DISTRIBUTION AT GENOA.....	6

Report on the Betka River Water Supply Catchment (Mallacoota Waterworks Trust)

1. INTRODUCTION

Engineering Consultants for the Waterworks Trust, H R Keogh and Associates, first discussed proclamation of this catchment with Authority officers in 1970. In January 1971 the Trust formally applied to the Land Conservation Council for proclamation, and in a letter dated April 7th, 1971, Council asked the Authority for a report and recommendation.

The Supply System:

See locality plan and proposed Proclamation Plan.

The Betka River enters Bass Strait approximately 1.5 miles (2 km) south east of the entrance to Mallacoota Inlet, and the Trust's pump station is some 4 miles (6 km) upstream of that point. A small stone weir ponds water for the pumps, which lift water 50 metres over a distance of 6 km to a reservoir near the Genoa-Mallacoota road. Present reservoir capacity is 5 million gallons (22,73 megalitres) and this can be duplicated when demand necessitates it. The water is supplied without treatment to a fluctuating population made up of 450 permanent residents and up to 6,000 visitors.

During December 1972 and January 1973 flow in the Betka River ceased for the first time in local memory and emergency measures were taken to get water from the nearby Long Swamp and Sheepstation Creeks. Apart from this recent no-flow period, flows recorded over the past 6 years range from about 40 cusecs down to 0.6 cusecs. (1130 to 17 litres per second)

Water in the main stream and the storage reservoir has a reddish colour, but apparently this causes no strong complaints from consumers. The colour appears similar to that in the West Tarago water and in the absence of any conclusive information as to its source, is attributed to by-products of decaying forest litter.

Quarterly water samples are collected by the Trust for bacteriological analyses, and at the Authority's suggestion these samples will also be tested for turbidity, over the next twelve months at least.

The Catchment

The catchment extends to the Princes Highway 12 miles (20 km) northwest of the pump station, and its total area is 42 square miles (108 km²). Highest points are Genoa Peak at 1607' (505 m) on the northern boundary and Stony Peak at 1200' (380 m) on the southern boundary. Betka River itself falls from 125 m elevation at its headwaters to 30 m at the pumps.

All of the land concerned is within the Shire of Orbost and three Parishes involved are Mallacoota, Betka and Bralak.

2. DESCRIPTION OF THE CATCHMENT**

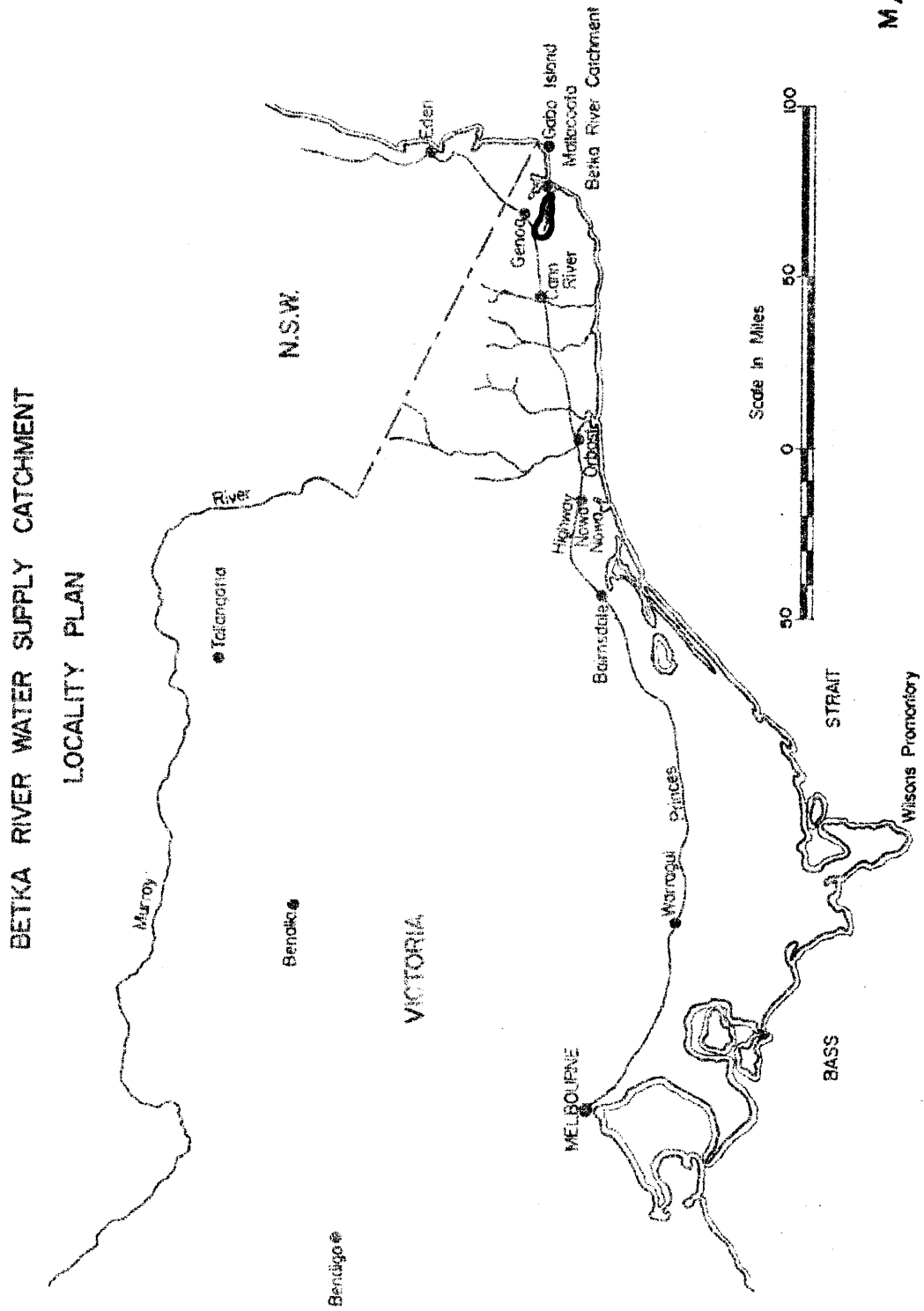
Climate

Linforth (1968^{*}) has pointed out that climate in East Gippsland is influenced by depressions moving south off the New South Wales coast, as well as the depressions which move from west to east below Victoria. In fact most of the rainfall in East Gippsland comes from depressions of the former type.

Long term temperature records are not available for Mallacoota or Genoa, but the data from Gabo Island 10 miles (16 km) east of Mallacoota give an indication of the mild temperature conditions which exist in the area throughout the year:

^{*} Linforth, D J 1968. The climate of East Gippsland. Proc. Roy. Soc. Victoria 82 part 1 pp. 27-36.

Figure 1 - Locality Plan



M/344

Table 1 - Temperature data (°C) Gabo island Alt. 15 m

	J	F	M	A	M	J	J	A	S	O	N	D
Mean Max	21.0	21.3	20.8	19.1	16.8	14.7	14.1	14.8	16.0	17.1	18.5	19.8
Mean Min	15.6	16.0	15.4	13.5	11.0	9.0	8.0	8.5	9.7	11.0	12.8	14.3
Record High	39.1	39.0	38.6	31.7	28.9	28.3	26.7	26.7	29.4	33.9	35.0	38.3
Record Low	5.0	6.1	3.3	2.8	0.6	0.0	0.6	0.0	0.0	2.2	1.1	3.9

Note in particular that the difference between the mean minimum and mean maximum is seldom more than 6°C in any one month, and the range in mean temperatures throughout the year is less than 14°C. Compared to the rest of Victoria winter temperatures can be quite high due to a warm northerly airstream precipitating on the north east highlands and leaving warm dry air to flow down to the coast.

On the basis of six years of records, average annual rainfall for Mallacoota is 40.0" (1020 mm) which is slightly below the eighteen year average of 41.3" (1050 mm) for Genoa. Tables 2 and 3 summarise rainfall characteristics at Genoa, and are considered to be indicative of rainfall within the catchment.

Of the seasonal rainfalls shown in Table 3 the winter total is 62% above the corresponding figure Linforth has given for the East Gippsland District. Presumably this is due to the earlier mentioned effect of east coast depressions. Rainfall variability is 18% of the average and that is comparable to the remainder of the East Gippsland District. Table 3 also shows the distribution of "storms" (daily rainfalls exceeding 100 points) over a 16 year period to 1970 and there is no marked seasonal variation in their incidence. Pluviograph records taken at Genoa in recent years show that rainfall intensities up to 1"/hour are relatively common in February, but this has no significance in the catchment while forestry remains the principal land use. Linforth points out that the frequency of rainfalls exceeding 3" in 24 hours is greater in East Gippsland than in other parts of Victoria, but the low country between Nowa Nowa and Cann River receives most of these falls.

In summary, climate in the catchment represents no hazard to water supply interests in that it is mild and encourages rapid vegetative growth.

Table 2 - Rainfall Data - Genoa

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
1950	252	825	763	697	613	245	256	234	195	747	217	198	52.4"
1951	46	505	000	195	273	914	418	1014	708	246	329	86	47.3
1952	65	127	620	871	513	1170	282	447	159	568	684	484	59.9
1953	294	129	161	60	1028	207	134	601	104	360	340	112	35.5
1954	320	527	45	40	211	580	334	118	50	214	675	100	32.1
1955	183	154	143	23	407	250	139	88	139	511	217	532	27.9
1956	528	705	498	119	1379	1104	279	235	237	519	209	98	59.1
1957	10	123	105	119	258	334	639	538	220	217	384	214	31.6
1958	430	481	84	52	67	292	154	165	531	226	228	180	28.9
1959	122	256	339	221	77	776	934	175	551	669	331	736	51.9
1960	80	30	284	133	410	663	688	113	629	362	357	334	40.8
1961	140	281	952	117	395	524	925	435	960	220	411	534	58.9
1962 - 1966 In complete records													
1967	58	85	211	114	498	580	101	567	398	178	153	206	31.5
1968	238	000	281	164	490	295	324	288	90	83	166	500	29.2
1969	202	175	249	237	861	336	102	222	242	173	856	261	39.2
1970	391	199	607	129	639	374	116	465	521	183	550	1258	54.3
1971	1138	946	106	88	236	261	178	227	110	159	373	29	38.8
1972	361	453	103	175	155	45	183	283	296	276	177	26	25.3
Means	270	334	309	192	483	487	344	346	341	329	370	327	41.3

Table 3 - Seasonal Distribution at Genoa

Rainfall averaged over 16 years		Storm Rainfall (Rainfalls >100 points in 24 hours)		
Incidence of Storms over 16 yr period				
Season		No.	%	
Summer	Dec	3.27	15	
	Jan	2.70	8	
	Feb	3.34	17	
		<hr/> 9.31	<hr/> 40	
Autumn	Mar	3.09	16	
	Apr	1.92	7	
	May	4.83	20	
		<hr/> 9.84	<hr/> 43	
Winter	June	4.87	23	
	July	3.44	16	
	Aug	3.46	13	
		<hr/> 11.77	<hr/> 52	
Spring	Sept	3.41	15	
	Oct	3.29	11	
	Nov	3.70	22	
		<hr/> 10.40	<hr/> 48	
		<hr/> 41.32"	<hr/> 183	100%

**The Authority's Research Officer at Bairnsdale Mr B M Nicholson is at present engaged in a study of the land in East Gippsland, and a Forest Commission Officer at Bairnsdale, Mr D Buntine is making a detailed survey of timber resources in the Region. Both officers have supplied information used in this report, and of course much more information not included here.

Geology and Topography

The catchment is a mature river valley formed in Tertiary weathered granodiorite parent rocks. Prominent outcrops of this rock occur on Genoa Peak and Stony Peak and others are found along the major ridge lines and in the river itself.

Most land in the catchment is undulating to hilly, with steep areas near the boundary and near the streams where they are entrenched.

Soils

Throughout the catchment soils are derived from Tertiary weathered granodiorite, and the two main types are yellow-brown or red-brown granodiorite soils, and leached sands.

- A. Gradational soils: a representative profile of these soils is
 - 0" - 1" coarse sand, high humus content
 - 1" - 15" coarse yellow or reddish sands
 - 15" - 20" sandy loam with clay content and yellow or red colour increasing with depth
 - 20" - 30" clay loam, some mottling.

Yellowish soils are the most common in this catchment with the reddish soils in well-drained areas away from the ridge lines. Vegetation on these soils is usually a tall open forest.

- B. Leached sands: a representative profile of these soils is
- 0" - 1" medium or fine grained sand with humus
 - 1" - 12" leached medium or fine grained sand
 - 12" - 18" coarser sand, pale yellow
 - 18" - 20" slightly cemented hard pan
 - 20" - 26" coarser yellow sandy loam
 - 26" - 30" clay loam, some mottling

These sandy soils can be found throughout the catchment but are most widespread near the coast. In that area the sands are finer and the hard pan more definite. Bloodwood (*E. gummifera*) and Silvertop (*E. sieberi*) are the dominant tree species in the forests on these soils, and the dominant second storey species is *Banksia serrata*.

Soils of both A and B types are also found in swampy areas throughout the catchment, and plastic grey mottled clays are present at two or three feet depth in these situations. The dominant species there is spear grass tree (*Canthorrhoea resinosa*), with banksia species on the outer, drier fringes if the soils are sandy.

Vegetation

All land in the catchment is forested, with the main species being:

<i>E. sieberi</i>	(Silvertop)
<i>E. muelleriana</i>	(White Stringybark)
<i>E. baxteri</i>	(Brown Stringybark)
<i>E. olbiqua</i>	(Messmate Stringybark)
<i>E. cypellocarpa</i>	(Mountain Grey Gum)
<i>E. gummifera</i>	(Bloodwood)
<i>E. considiniana</i>	(Yertchuk or Prickly Stringybark)
<i>Angaphora floribunda</i>	(Angaphora)

Shrub storey species include pomaderris, hakea, banksia, wattle and melaleuca species. Various grasses and heaths provide ground cover and are particularly dense in the poorly drained depressions. Many of the major streams are deeply entrenched and vegetation there approaches a wet sclerophyll forest type, typically having a tree storey of Mountain Grey Gum in association with Messmate or other Stringybarks and with a dense understorey.

The root rot fungus *Phytophthora cinnamomi* has been found along Aerodrome Track about 2 kilometres south of the pump station, and so far several hundred acres have been affected. Silvertops and Stringybarks in this area have been killed or severely retarded, but Bloodwood and other gums are unaffected, and apparently resistant to attack by the fungus.

Erosion Hazard

In its present forested state, land in the catchment appears to be stable, with little active erosion evident. However, the streams carry in places large bed loads of coarse sand, and it is considered likely that the Trusts pondage at the pump station will have to be dredged from time to time.

Roadside erosion is serious along the Stony Peak road, particularly where it crosses depressions and where slopes exceed 5%. The coarse sandy subsoils are weakly structured, as shown by erosion on the roadside cut and fill batters. This is an indication that future roadworks in the catchment should be designed and constructed in a conservative manner in the interests of the water supply. Careless design and construction of new roads will lead to increased amounts of sand reaching the streams, and to increased turbidity problems as the yellow subsoil clays go into suspension.

Land Tenure

All land in the catchment is Unoccupied Crown Land managed by the Forests Commission.

A grazing licence is held by Mr P G Ventry over land in the Parish of Bralak, and Mr J W Bruce has a similar licence over that part of the catchment in the Parish of Betka.

These licences are issued on an annual basis by the Department of Crown Lands and Survey. The only places where stock grazing is apparent are between Aerodrome Track and the coast, and around the pump station.

3. DISCUSSION OF LAND USE

Forestry

The extent of logging or pulpwood removal from the catchment to date has been negligible. However the Commission expects that eventually there will be a demand for logs, pulpwood and wood chips from this forest area.

Approximately 60% of the catchment carries high quality stands of pure Silvertop or Silvertop/Stringybark associations. Utilization of this timber, and more particularly the roading necessary for such utilization, will present hazards to the water supply and it is primarily for this reasons that the Trust has requested proclamation of the catchment. Not that the Trust seeks to have the catchment closed to forest operations, but rather to ensure that they are carried out under suitable management prescriptions. To be effective in this situation the prescriptions would have particular emphasis on road alignment, design and construction.

In the more south-easterly parts of the catchment (downstream of Miners Track) Bloodwood becomes the dominant tree species. At present this timber is not acceptable for logs or pulpwood, so in the foreseeable future intensive forest operations are unlikely in this area.

Roads and tracks in the catchment are maintained by the Forests Commission for fire control purposes, and apparently the large influx of holiday makers to Mallacoota during the summer months gives the Commission cause for concern. Precautions have to be taken to protect the township from any fire which may start in the forest, and the job is made difficult by large numbers of people moving about in the forest.

Grazing and Agriculture

Although a large proportion of land in the catchment is covered by the two grazing licences, the effects of grazing are not noticeable. Benefits of grazing stock in forest areas are to provide revenue and to keep fuel levels down. The disadvantage of such grazing in this water supply catchment is that contamination of the water (by disease producing micro-organisms and by sediment) may result from stock camping next to the streams. There is no evidence to suggest that the present level of grazing is harmful, and steps can always be taken to have the licences cancelled if a change in the situation warrants it.

Several apiarists operate in the catchment and seven bee sites were noted during the investigations for this report. The sites have been prepared by brushing vegetation from small area 20 - 30 metres of a ridge road, and in such locations they produce no significant erosion.

There is no land in the catchment cleared for agricultural production. Substantial areas of land (by rough estimate 20% of the catchment) would be flat enough to develop for agriculture without erosion hazard, if alienation for that purpose ever became necessary. At present however there is no reason to suggest any such change in land use.

Summary

The investigations indicate that the catchment in its present condition is most satisfactory for its primary purpose of producing a town water supply. If this situation was to remain indefinitely there would be nothing to gain by proclaiming the catchment. Indications are, however, that forest products will be taken from the catchment eventually and to ensure that forestry and water supply interests in the catchment remain compatible, proclamation is recommended.

4. RECOMMENDATION

It is recommended that Council take action necessary to have the Betka River Water Supply Catchment proclaimed.

A Chappell
Senior Catchment Investigation Officer