

**REPORT ON THE
HONEYSUCKLE CREEK WATER SUPPLY CATCHMENT
(VIOLET TOWN WATERWORKS TRUST)
PROPOSED FOR PROCLAMATION**

Prepared for consideration by the
Soil Conservation Authority and the
Land Conservation Council

TABLE OF CONTENTS

1. INTRODUCTION.....	23
2. SUMMARY	23
3. SUPPLY SYSTEM.....	23
4. THE CATCHMENT	34
4.1 Locality.....	34
4.2 Climate	34
(i) Precipitation	34
(ii) Temperature.....	34
(iii) Growing Season	34
4.3 Geology and Physiography.....	45
4.4 Soils	45
4.5 Vegetation	45
4.6 Land Tenure	45
4.7 Present Land Use.....	56
(i) Grazing and Agriculture	56
(ii) Forestry.....	56
4.8 Hazards to the Water Supply	56
(i) Freehold Land above the Forested Area.....	56
(ii) Forested Area	56
(iii) Freehold Land 2 Km Upstream of the Forested Area.....	67
(iv) Freehold Land 2 Km Upstream of the Reservoir.....	67
5. DISCUSSION	67
6. RECOMMENDATION	67

LIST OF TABLES

Table 1 - Average Rainfall in mm.....	78
Table 2 - Average Rainfall per Wet Day (mm).....	78
Table 3 - Average Daily Mean Temperature (°C)	89
Table 4 - Length of "Frosty Period"	89

1. INTRODUCTION

After conferring with the State Rivers and Water Supply Commission, the Violet Town Waterworks Trust made application to the Land Conservation Council in June, 1975, to have the catchment to their reservoir on Honeysuckle Creek proclaimed pursuant to section 5(1)(b) of the *Land Conservation Act*, and section 22 (1) of the *Soil Conservation and Land Utilization Act*.

The catchment is mainly freehold agricultural land and grazing animals coupled with unstable soils and steep slopes have helped produce a long history of sedimentation and contamination of the water supply. Stock access to Honeysuckle Creek and the reservoir is specifically mentioned by the Trust as an important contributing factor leading to the high bacterial counts found in the reservoir by the State Rivers and Water Supply Commission.

In trying to improve the quality of their water supply the Violet Town Waterworks Trust has had problems implementing a number of Acts which are not closely inter-related or widely understood. For instance, the *Health Act*, *Land Act* and *Water Act*, all contain sections relevant to the prevention of pollution of watercourses, but there are difficulties in policing these provisions.

During the preparation of this report some investigation of other streams in the areas was made to see if alternative sources of water were possible.

Honeysuckle Creek itself is fed from springs arising in the Strathbogie massif. The catchment is larger than the adjacent river valleys and could be expected to have higher yield than alternative catchments.

Water quality in the catchment of Honeysuckle Creek is poor, but indications are that adjoining streams are at least as bad, if not worse. Problems associated with soil types, slope and livestock occur to the same extent in alternative catchments, and some have dairy farms which constitute an additional hazard. There are also no significant sections of main road running through Honeysuckle Creek catchment, while there are in adjoining catchments.

Hence the conclusion was reached that there are no nearby streams which would have higher yield or better-quality water than Honeysuckle Creek.

2. SUMMARY

The conclusions of this report may be summarised as follows:

- i) Honeysuckle Creek is the most suitable water supply source for Violet Town.
- ii) Disinfection has been recommended by the Health Department and a chlorination system is presently being installed by the Trust. State Rivers and Water Supply Commission have approved a long-term loan to the Trust to cover the cost of the chlorination system.
- iii) Formal consent is needed from the Lands Department so that the Water frontage reserve along Honeysuckle Creek may be proclaimed a Crown Land reserve, with the Trust as the responsible Committee of Management. This reserve will need to be fenced, and preferably planted to trees, because previous experience in this country has shown that buffer zones of pasture are difficult to manage.
- iv) If the catchment is proclaimed, mitigation of erosion may be further enhanced by the implementation of conditions under the provisions of Section (23) of the *Soil Conservation & Land Utilization Act*.

3. SUPPLY SYSTEM

The main storage reservoir was opened for use during 1973. It consists of an earth wall dam of 120 ML capacity within Crown Allotments 63B, 76A and 76B, Parish of Boho. Some land surrounding the reservoir has been purchased by the Trust so that cattle from surrounding properties can be fenced out.

The old Honeysuckle Creek reservoir, north of Crown Allotment 63, has silted up and as a consequence of this it has been closed. A diversion weir adjacent to Crown Allotment 33D was ordered to be closed in 1975 by the Health Department. The diversion weir used to deliver water by gravity through a 150 mm concrete main to a small service basin holding 0.2 ML. This was connected to the Violet Town reticulation system which serves 500 people. Water is now taken directly from the new weir and connects with the reticulation system at a point directly below it.

As a result of bacteriological tests carried out by the State Rivers & Water Supply Commission, the Health Department also requested that a program of disinfection be undertaken urgently. The Trust has conferred with their consulting engineers, Scott &

Furphy, and steps are now being taken to install a chlorination system with the assistance of a loan from the State Rivers & Water Supply Commission.

4. THE CATCHMENT

4.1 Locality

The catchment covers 25 sq. km and is discernible on the 1:100 000 Euroa topographic mapsheet. It extends from the new reservoir, 6 km south of Violet Town, across undulating forest and grazing country to the north-east ridge of the Strathbogie plateau.

Being an established agricultural area the catchment is well served with roads and can be circumvented by following the Boho South road along Harry's creek (to the west of Honeysuckle Creek), and the Boho Road along the eastern ridge of the catchment.

Violet Town Shire is responsible for the area and the catchment is mostly within the Parish of Boho, except for the southern tip, which is in the Parish of Marraweeny.

Additional data for the following sections describing the catchment area may be found in the following publications:

1. Land Conservation Council North-Eastern Study Area, District 2 Report
2. Resources Survey of the Upper Goulburn Region (1951) - Central Planning Authority
3. A Study of the Land in the Catchment of the Broken River - Rundle and Rowe (1974), Soil Conservation Authority.

4.2 Climate

Figures for precipitation and temperature are set out in Appendix A.

(i) Precipitation

The catchment receives a gradual increase in rainfall with elevation as one moves south from Violet Town to Boho South which is in the higher areas of the Strathbogie massif. The area in the vicinity of the new reservoir (300 m elevation) receives an annual mean of around 890 mm, while areas above 600 m elevation can expect up to 1200 mm annually.

There is a marked seasonal rise in precipitation in winter with June the wettest month. February is the driest month and only the high plateau areas receive more than 50 mm per month in the summer.

The highest rainfall intensities occur in summer and autumn, when most of the rain falls in localised thunderstorms. Air streams in the winter are cool and moist and come from the south-west and north-west. They generally cover a wide area and do not produce intense rain. Snow falls are normal winter occurrences in the highlands but uncommon in the lowlands.

(ii) Temperature

The only reliable sources of temperature data are Euroa and Benalla, both representative of the lowland area. Extrapolation of this data to include areas of higher elevation indicates that growth would be severely restricted from May to September in the highland areas but only during the winter months of June to August in the lowland areas. January and February are the warmest months and July the coldest. Mean temperature for July is about 8°C over lowland areas and under 2°C over much of the highland country.

Frost occurrence is tabulated in Appendix A. Areas above 300 m elevation would have a mean annual frequency of five to 20 severe frosts. However, local topographic features cause marked changes in minimum temperatures and cause variations to this number. There may be upwards of 25 frosts annually in the foothills (up to 50 in suitable localities) and above 100 in the highlands.

(iii) Growing Season

Figures for selected areas in the vicinity of the catchment which show the percentage chance of receiving effective rainfall for each month and for each quarter are tabulated elsewhere (refs 1 & 2 above). The growing season is calculated as the number of months when the percentage chance of receiving effective rainfall is greater than, or equal to 50%. On this basis the growing season ranges from about seven months in the lowland areas, nine months or greater in the foothills (the majority of the catchment

area) and up to 12 months in the highland areas. However, these periods are modified by low winter temperatures, as discussed above, so that the majority of the catchment areas has a growing season which begins with the autumn break in March, produces restricted growth during winter and then finishes with suitable conditions until late October or early November.

The growth period is also altered by soil moisture storage, the farm management and the type of vegetation. Perennial grasses and trees with larger root systems have an advantage in dry conditions over shallow rooting species and should respond to summer showers.

4.3 Geology and Physiography

The parent material in most of the catchment is Upper Devonian rhyodacite/rhyolite acid volcanics. Devonian/Silurian mudstones, siltstones and sandstones overlie the volcanic material in the high country at the southernmost tip of the catchment near Boho South.

The maturely dissected, steep-sided valley in the vicinity of the new reservoir flattens out about 8 km upstream into a broader river valley to the Honeysuckle Creek, and eventually to the gently undulating plateau country of the Strathbogie massif. The Honeysuckle Creek develops from three main spring areas in this plateau country. Each of these develops into a well defined drainage line susceptible to the same sedimentation and contamination problems existing in the steep-sided valley adjacent to the lower reaches of Honeysuckle Creek and the new reservoir.

4.4 Soils

The Upper Devonian acid volcanics give rise to friable brownish, reddish and yellowish gradational soils. These are friable, porous, well drained, deeply weathered and highly susceptible to erosion. Some profiles, as in the forest area, exhibit little texture change with depth, and when the native vegetation is removed they are particularly prone to soil loss. This loss of soil stability after clearing is also clearly evident on steep slopes.

4.5 Vegetation

A discussion of the native vegetation is presented in the Land Conservation Council report (2). Little native vegetation remains in the cleared freehold areas and even the composition of the Reserved Forest area has been influenced by logging activities in the past.

Pasture species are predominantly annuals (sub-clover, capeweed, storks-bill, barley grass) that have volunteered after superphosphate dressing. However, several farmers in the flatter plateau country have been able to work their land and establish a perennial based pasture by sowing a rye grass, phalaris/ocksfoot, sub-clover mixture.

The good timber was selectively logged from the forest areas which now consist of a thin stand of Narrow-leaved Peppermints, Broad-leaved Peppermints, Red Stringybark, Long-leaved Box and Red Box. Associated species include Blue Gum, Manna Gum, Yellow Box, Grey Box, Candlebark and Brittle Gum. Understorey species are predominantly grasses and bracken with ferns in the moist areas. Narrow-leaved Peppermint Gum and Candlebark are associated with moist areas and Broad-leaved Peppermints, Brittle Gum and Red Stringybark with drier areas.

The native forest of the southern section of the catchment in the plateau country consisted of a Messmate. Stringybark/Narrow-leaved Peppermint association but this has been mostly cleared, although some remains in the high reaches at the very top of the catchment. In this area, associated species are Blue Gum, Manna Gum, Candlebark, Red Stringybark, Broad-leaved Peppermint and Brittle Gum. Understorey species include Silver Wattle, bracken and native grasses. Fern layers are common in the drainage lines.

4.6 Land Tenure

Freehold 20 sq km (80%)
Reserved Forest sq km (20%)

There are no current mining leases or licences applicable to the catchment area but if the catchment is proclaimed any future applications for such leases or licences will be referred to the Soil Conservation Authority for comment.

It should be noted that the area has potential for farmlet subdivision, as much of the steep hilly areas are not a viable farming proposition. Subdivision of similar country has taken place outside the catchment but as yet the freehold land within the catchment is wholly owned by bona-fide farmers. If the catchment is proclaimed, any proposed plans of subdivision referred to State Rivers & Water Supply Commission would normally be forwarded to the Soil Conservation Authority for comment.

4.7 Present Land Use

(i) Grazing and Agriculture

The freehold land that has been cleared is predominantly used for livestock production although nearby enterprises out of the catchment include orchards and some dairy farms east of the headwaters of Boggy Creek.

Traditionally the land was used for wool and lamb production, but in recent years cattle numbers have increased dramatically. The impact of these animals on creeks and springs is discussed below.

Hilly areas in the lower reaches of the catchment have been heavily toppedressed with superphosphate and some flatter areas have been sown down to improved pasture species (sub-clover, phalaris/ocksfoot and rye grass) where the ground can be worked.

(ii) Forestry

There are 5 sq km of Reserved Forest to the east of Boho South which is not being utilised at present by the Forests Commission. Some ten years ago a program of selective logging was implemented but no deliberate reseeding was undertaken and the forest area today consists largely of cull material, and, in places, a sparse understorey. There is no pine conversion intended for the catchment area although there are conversion operations east of Boho South. Use of the area during the next few years is likely to be limited to the cutting of posts and firewood.

4.8 Hazards to the Water Supply

The results of the water sampling undertaken by the State Rivers and Water Supply Commission and the Soil Conservation Authority are summarised in Appendix B. As mentioned in the introduction, the most obvious hazards to the water supply are caused by steep slopes and unstable soils in association with the clearing of native timber, establishment of improved pasture species and management of the grazing livestock.

The rhyodacite/rhyolite-based soils are inherently susceptible to rilling and sheet erosion. These soil types exist throughout most of the catchment and the erosion hazard on them is clearly evident in the steeper country surrounding Honeysuckle Creek. In this deeply dissected country, overland flows are soon channelised with the consequence that runoff soon reaches scourable velocities and carries much sediment into the main drainage lines and the reservoir.

In the cleared areas a well established, deep rooted perennial pasture is needed if the soil is to remain on the slopes but there are difficulties in establishing such a pasture. In the upper reaches of the catchment the ground cover is good but on the steeper, lower area, the incidence of bare ground increases. This may be an initial failure in establishing the pasture or in overgrazing by livestock.

(i) Freehold Land above the Forested Area

There are several main spring areas located at the head of the catchment, which form a series of well defined drainage lines about 2 km downstream. These drainage lines produce a substantial portion of creek flow and appear to be a major source of pollution. The depressions have a floor several metres wide filled with waterlogged silt and there are many secondary springs emanating through the sides and through the silt. Consequently the floor of each depression is extremely wet and soft and, because they are all readily accessible to stock, have become badly pugged and the vegetative cover is kept poor and tussocky. Faecal bacterial pollution would be expected to originate from these areas.

To improve water quality at the reservoir it is essential that these spring areas and their associated drainage lines be fenced out to totally exclude stock. Farm water storages in this areas are sparse, but because the springs are permanent it is assumed that much reliance is placed upon them for year-round stock supply. Alternative watering sites would have to be provided in conjunction with the fencing out of these descriptions.

(ii) Forested Area

The forested area could reasonably have been expected to provide a buffer effect against a deterioration of creek quality produced in the freehold land above it. However over the past couple of years, and in particular Spring 1975, the creek system, and major tributaries within the forested area have suffered considerable damage. The District Forester attributes this largely to the severity of the flows and the accumulation over many years of deep deposits of silt. Culverts have been damaged and washed out as a result of overtopping of roads and, in places, the creek floor has dropped one to one and a half metres.

(iii) Freehold Land 2 Km Upstream of the Forested Area

Immediately below the forest for a distance of 3 km the catchment is wide with slopes in the vicinity of the creek of 5 - 15%. This area is grazed extensively and contains a number of tributaries and springs which contribute significantly to creek flow. There are numerous small creek flats where silt has built up to a depth of more than a metre and the creek has been planted to willows and other assorted tree varieties to provide areas of shade and shelter for stock. The banks in this section have been scoured for many years and again it would be necessary to have these sensitive areas fenced off to effect any reduction in the siltation and bacterial levels in the water supply.

(iv) Freehold Land 2 Km Upstream of the Reservoir

This includes the land surrounding the reservoir. There the catchment is a narrow, steep sided valley with slopes of up to 30% - 40%. The main problems occurring in this area are overgrazing of the steep hills and access of stock to the creek.

The coliform count peaks immediately after heavy rains because runoff washes effluent directly into the creek and reservoir. The fenced out buffer surrounding the reservoir is not in a satisfactory condition and has not proved stockproof because of soil slips, broken fences, cattle being herded over the dam wall and gates being left open.

The buffer zone is in places too narrow and has little filtration effect. In the areas where perennial pasture was established some years ago, lack of careful grazing management has led to an increase of annuals and weeds. An attempt has been made to grow trees within the enclosure and should be persisted with.

There is a 20 metre water frontage reserve either side of Honeysuckle Creek abutting allotments 33, 33D, 75, 76B, 76 and 77 in the Parish of Boho. No licence has been issued by the Lands Department to enable these lands to be grazed, but it has been accepted policy in the past to allow landholders adjacent to the stream to continue grazing such reserves. There is no power in the *Land Act* to force these landholders to fence the reserve. The Lands Department has not granted the request of the Waterworks Trust that it be issued with a licence over the water frontage reserve but has suggested that it could be proclaimed a Crown Land reserve and placed under the control of the Trust as Committee of Management. The Trust would then be able to fence the reserve or come to an agreement with the landholders on the sharing of costs.

5. DISCUSSION

The major factors in improving water quality are the elimination of stock from the creek and sensitive spring areas, and the implementation of carefully planned erosion control measures. It would seem impractical to fence out specific sections of the creek as this would only transfer the problems from one localised area to another. Alternative stock water supplies must be provided in conjunction with any fencing program because apart from some storages at the head of the catchment there are no alternative watering sites.

As disinfection of the water supply has been requested by the Health Department it will be possible to continue using the water for domestic purposes. Proclamation of the catchment per se will do very little to overcome the problems being experienced by the Violet Town Waterworks Trust in its efforts to supply water of a satisfactory standard, but will at least enable the Soil Conservation Authority to carry out the successive steps needed to effect some improvement to the quality of the water.

A Determination of Land Use by the Soil Conservation Authority would be aimed at preventing any further deterioration of the catchment and if possible, reducing the sediment load and turbidity of the raw water so as to reduce the cost of treatment.

6. RECOMMENDATION

That the Honeysuckle Creek Water Supply Catchment be proclaimed pursuant to section 22(1) of the *Soil Conservation and Land Utilization Act* and section 5(1)(b) of the *Land Conservation Act*.

S. HANDASYDE
Catchment Investigation Officer

G. DAVID
Conservation Officer

APPENDIX A

Table 1 - Average Rainfall in mm

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Yearly Total
Euroa (Standard Period) (Elevation 178 m)													
1931-1960	57.1	34.3	50.3	54.1	56.6	65.5	71.4	67.1	54.6	66.5	48.0	32.0	637.5
1883-1963	36.0	31.8	44.7	45.7	63.8	80.0	67.1	69.9	59.7	62.5	43.2	37.3	641.6
Violet Town (Elevation 152 m)													
1931-1960	40.6	35.6	48.8	54.9	54.1	68.3	78.0	66.8	55.1	65.0	50.8	35.3	652.3
1883-1963	36.1	32.3	42.2	45.5	60.1	79.8	70.6	67.6	57.2	60.5	42.4	40.1	635.0
Strathbogie North (Elevation 600 m)													
1931-1960	58.4	42.7	78.5	80.5	109.2	132.3	134.1	109.7	98.3	103.4	81.3	50.8	1079.2

Table 2 - Average Rainfall per Wet Day (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Benalla	10.41	9.86	10.76	6.63	6.07	6.43	5.79	4.93	5.49	6.17	6.60	6.40
Euroa	9.27	8.59	10.06	7.72	6.30	5.97	5.49	5.16	6.07	6.65	6.86	5.33
Strathbogie	11.43	11.13	13.56	10.65	8.26	10.57	8.86	8.20	8.41	8.71	7.98	8.13

Table 3 - Average Daily Mean Temperature (°C)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Yearly Total
Benalla	22.9	23.4	20.3	15.6	11.9	8.8	8.3	9.6	12.4	15.7	18.8	21.5	15.8
Euroa	21.8	22.5	20.0	15.3	11.8	8.9	8.2	9.6	11.9	14.6	17.6	20.3	15.2

Note: Plant growth is severely restricted below 10°C and prevented entirely below 5.6°C.

Table 4 - Length of "Frosty Period"

	1st Light Frost	1st Severe Frost	Last Severe Frost	Last Light Frost
Lowlands	April/May	Mid June	Late Aug/Early Sept	November
Foothills	Early April	Late May/Early June	Late Sept/Early Oct	December
Highlands	May have light frosts throughout year	March	November	

At elevation above 500 m the first light frosts would be expected in early March.

APPENDIX B

E. coli counts for the new reservoir at the spillway on Honeysuckle Creek. Regular testing commenced in July 1967 by State Rivers & Water Supply Commission.

Date	<i>E. coli</i> (organisms/100 mL)	Weather Conditions
24.7.67	22	
25.8.67	62	
10.1.68	136	
16.1.68	120	Dry
25.3.68	60	Recent rain after long dry spell
25.6.68	40	Recent rain
24.9.68	52	
16.12.68	64	
24.3.68	74	Heavy rain in recent weeks
24.6.69	20	
23.9.69	360	Recent rain
16.12.69	540	Fine. Cattle at water's edge
23.3.70	290	3-4" rain in last 4 days
22.6.70	240	Recent rain
21.9.70	32	Fine
14.12.70	214	Dry
22.3.71	10	Dry
21.6.71	44	Wet
10.9.71	90	Light rain
16.9.71	No result but coliforms	
	5400+	(Recent rain)
20.9.71	270	Recent rain
30.9.71	560	Rain 28.9.71
21.12.71	140	
22.3.72	16	Fine
19.6.72	36	
20.9.72	12	
18.12.72	34	
19.3.72	16	
10.4.73	6	
28.5.73	280	Recent rain
25.6.73	320	Raining
16.7.73	410	Heavy rain
18.9.73	70	Fine
1.10.73	42	Fine
27.11.73	16	Fine
14.1.74	84	Recent rain
8.4.74	360	Heavy rain over weekend
9.7.74	112	Raining
9.10.74	880	Heavy rain
13.1.75	8	Fine, dry
15.4.75	4	Fine, no recent rain
7.7.75	84	Raining
16.7.75	920	Recent rain
25.7.75	48	Fine, no recent rain

Results of water samples taken 16/10/75 - weather fine after recent rain.

Sample	<i>E. coli</i> (Organisms/100 mL)	Notes
Drainage line to Reservoir, 30 m for FSL	600	High count
Drainage line 70 m upstream of (1)	168	
South of Reservoir	166	
100 m upstream of FSL	270	
Drainage line 400 m from Reservoir	298	
Honeysuckle Creek 500 m from FSL of Reservoir	190	
Approximately 1 km upstream of FSL	198	
Major drainage line west side of catchment (carcass in drainage line)	360	

Results of samples taken 16/12/75 - weather fine after heavy rain (75 mm) two days previous

Sample	<i>E. coli</i> (Organisms/100 mL)	Notes
Honeysuckle Creek 200 m upstream of Boggy Creek	270	
Honeysuckle Creek 20 m upstream north west spring	310	
Half way along watercourse from north west spring	450	
North west spring	64	Source of spring difficult for stock to penetrate
Boggy Creek - upstream of stock dam	420	
Boggy Creek - downstream of stock dam	360	