PROCLAMATION AND LAND-USE DETERMINATION

FOR THE

STONY CREEK WATER SUPPLY CATCHMENT

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SOIL CONSERVATION AUTHORITY &
LAND CONSERVATION COUNCIL

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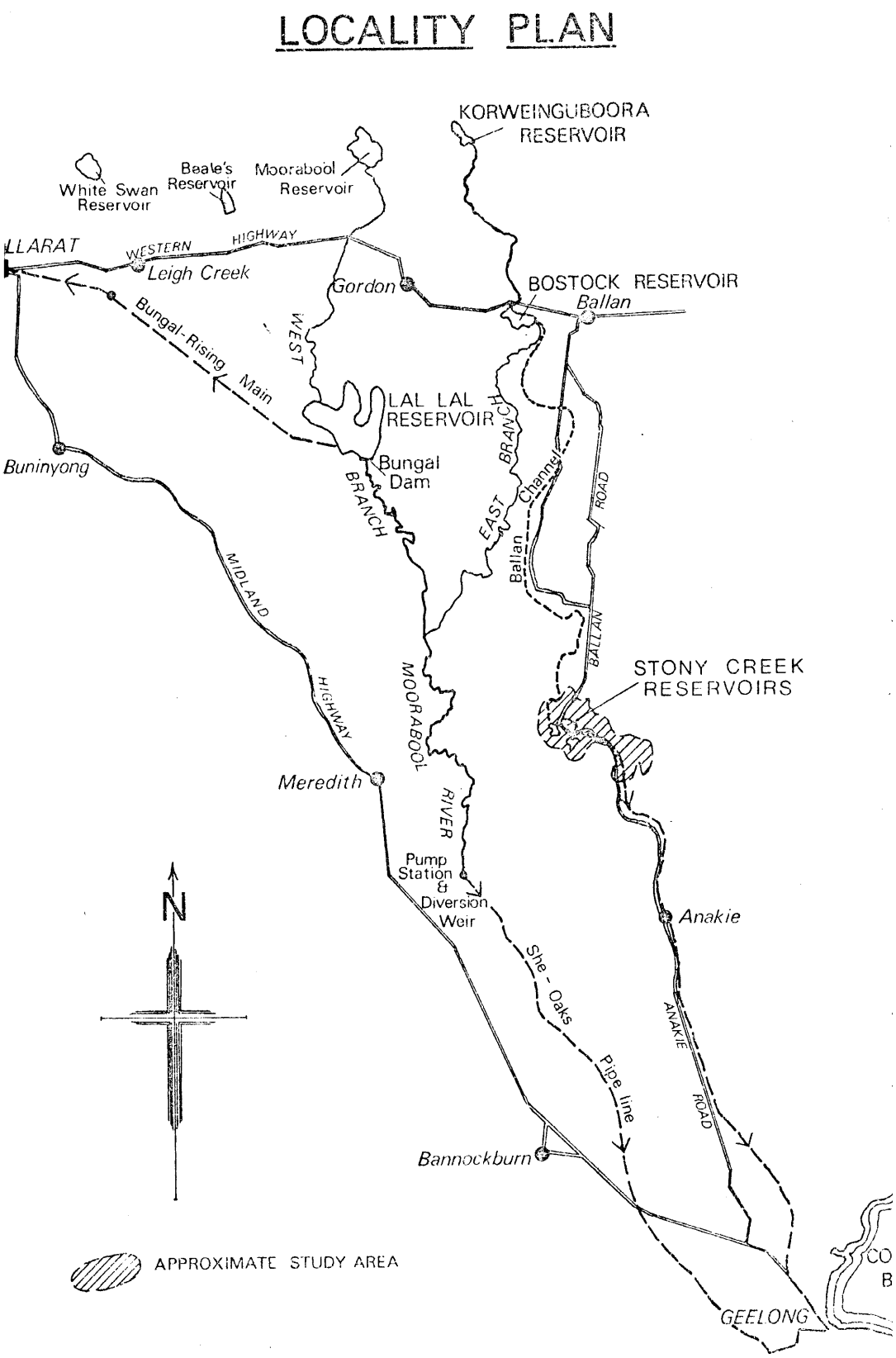

1. INTRODUCTION

The Stony Creek Reservoirs are part of the water supply system for the City of Geelong. The system of four reservoirs and several swamps interconnected by open channels and tunnels, is located on the Ballan-Geelong Road between Ballan and Anakie. Two of the reservoirs, east of the main road, were constructed in 1872, and were considered to be major construction works of their time. The two reservoirs west of the road were originally swamps until earthen banks were constructed around them in the early 1900's.

Water enters the system of reservoirs and swamps both from the local catchment area and from Bostock Reservoir and Korweinguboora Reservoir, to other reservoirs in the Geelong supply system. The local catchment area to the Stony Creek Reservoirs was vested in the Geelong Waterworks and Sewerage Trust in 1872 and has since then been managed for water supply protection purposes. Until 1977, the Trust was satisfied that they had sufficient control over the catchment area and there was no need to utilize the provisions of the *Soil Conservation and Land Utilization Act*, 1958.

However, in the Final Recommendations of the Land Conservation Council's Melbourne Study Area, the situation appeared to change. Part (e) of the recommendations for the Brisbane Ranges State Park, states that "the catchments of the Upper and Lower Stony Creek Reservoirs be proclaimed, and the National Parks Service consult and co-operate with the Soil Conservation Authority and the water supply authority regarding the location, timing, and type of management activities in the catchments (with the exception of land in the buffer strips[1] to be defined around diversion works and the full supply level of the reservoirs)".

The recommendations state further that the Brisbane Ranges State Park should be permanently reserved under Section 14 of the *Land Act* 1958, and managed by the National Parks Service.

In addition, two Reference Areas are to be located in the catchment to the Stony Creek Reservoirs. These Reference Areas are referred to as Durdidwarrah and Stony Creek (see Plan 1). Draft management plans have been prepared for these areas by the National Parks Service.

These recommendations are to some extent conflicting because the Reference Areas are within the area which was decided to be reserved as a buffer zone managed by the Geelong Waterworks and Sewerage Trust. In addition the entire area being reserved as a buffer zone means that the catchment would not really be an additional portion of the Brisbane Ranges State Park.

The objectives of this report are to:-

(a) enable proclamation of the catchment area to the Stony Creek Reservoirs;
(b) determine the most suitable uses of land in the catchment.

2. AVAILABILITY AND USE OF WATER

1. Water Supply

The Geelong Waterworks and Sewerage Trust is authorised under its Act to supply water to all the area which lies within an 8 km radius of the Geelong Post Office. Water is collected from both the Moorabool and Barwon Rivers.

The Moorabool system consists of the 2100 ML Korweinguboora Dam on the Eastern Moorabool; the Bolwarrah Weir (6.4 km downstream) which diverts water in to the Ballan Channel; Bostock Reservoir (6600 ML) constructed across the Eastern Moorabool below its junction with Paddock Creek, and the Stony Creek Reservoirs. The Ballan Channel is capable of transmitting 55 ML of water per day into the storages at Stony Creek. A 9 km aqueduct connects the Bostock Reservoir to the rest of the East Moorabool system.

In addition to the storages on the Eastern Moorabool, Geelong is supplied with water from the Bungal Dam (60,000 ML) on the Western Moorabool near Lal Lal. Water is released from this dam and flows down the river to Sheoaks, where it is pumped from a weir into the Geelong system.

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[1] The report states in the Water Production Section, that "the buffer should be wide enough to prevent direct pollution, to filter overland flow of the water, and to control access. Its width will vary to suit differences in ground slope, soil type, vegetative cover, adjoining land use, and type of facilities available for treating the water." Once a Land Use Determination is made, the storage areas, diversion works, associated facilities and buffer strips, should be "permanently reserved under Section 14 of the *Land Act* 1958 for water supply purposes and be managed by the Water Supply Authority".

The main storages in the Eastern Moorabool system are the Stony Creek Reservoirs which have a total capacity of 10,000 ML. There are four reservoirs; three at Upper Stony Creek and one at Lower Stony Creek. Upper Stony Creek No. 1 Reservoir was formed in 1870 by constructing an earthen bank across Stony Creek. This embankment is 380 m long and 26 m high and impounds 3,400 ML. Reservoirs No. 2 and 3 were formed west of the main road by constructing banks around natural depressions. They contain 2300 ML and 3600 ML respectively when filled to a depth of 6 m.

The concrete dam at Lower Stony Creek was constructed in 1872 and when filled to a height of 13 m. stores 640 ML.

Water from Upper Stony Creek runs through an open brick lined aqueduct, 10.5 km long, to the Anakie Pipe Head Basin. From there it is piped to Geelong (24 km away) in two mains 350 mm diameter and 375 mm diameter. There is very limited detention in Service Basins at Lovely Banks.

Water from the Lower Stony Creek Reservoir is piped through Anakie Gorge in a 375 mm diameter main and joins the outlet pipes from Anakie Pipe Head Basin, downstream from the Basin.

The total storage of all the Trust's reservoirs and service basins, excluding Bungal Dam, is 61,000 ML supplying a population of about 122,000 in Geelong and district. The storage capacity of the Eastern Moorabool system is therefore approximately 30% of the total supply capacity - and this water is delivered to Geelong totally untreated. The total consumption by the population is approximately 31,000 ML per year. The supply system is such that it is almost impossible to divert water into the North Geelong supply from the Barwon system, so it is crucial that the Eastern Moorabool system is protected from bacterial or viral contamination.

The contribution of local runoff to the storages is not known, but must be quite small. The streamflow in Stony Creek is kept almost constant by releases from the four storages. Streamflow data for Stony Creek averaged over five years is given in Figure 1.

2. Water Quality

The water from the Stony Creek Reservoirs is generally of a high standard and compares favourably with the rest of the Geelong system.

Water is sampled monthly for most physical and chemical parameters and twice weekly for *E. coli*. There is a significant deterioration of quality as water passes from the Upper Stony Creek Reservoirs to the lower concrete dam (Table 1).

High colour levels are a problem, but this is largely attributed to "kino" from eucalypts. The Trust attempted to overcome the problem of excessive colour by planting a fairly large area of pines. However, little response was found. Water is run through swampy areas in an endeavour to improve water quality, but the amount of improvement is not known.

Most parameters measured have levels lower than the standard set for drinking water by the Work Health Organization. However, the recommended Iron level of 0.3 mg/l is exceeded by even the lowest recorded levels. High Iron levels may cause taste problems and brown staining in laundry. A recommended level of 15 F.T.U.'s for colour is also consistently exceeded and may lead to public acceptability problems. The other parameters indicate a high level of suitability for domestic supplies.

As the water is untreated there should be no *E. coli* allowed to be present in the raw water. However, occasionally moderate levels are found which may be attributable to high wild life populations and occasional illegal penetration of catchment by people. Increasing human pressure on the Lower Stony Creek Reservoir could soon lead to a public health risk.

The creation of an extended State Park adjacent to the catchment will increase the likelihood of people entering the catchment. At present, the Ranger and Trust employees quite often find people swimming in the Lower Stony Creek Reservoir during summer.

For public health reasons people must be excluded from the catchment until the water is treated by either chlorination or ozonation.

The Geelong Waterworks and Sewerage Trust has no immediate plans to treat the water from this part of their supply system. Recent EPA licensing restrictions have forced the Trust to upgrade Geelong's sewerage treatment facility. Most of their available finance will be directed to this need over the next few years and it is unlikely that funds could be directed to treating the domestic water supply.

The provision of buffers to protect the water supply and the areas of scientific interest in this catchment must, in the Authority's opinion be extended to incorporate the whole catchment area.

Figure 1 - Average Streamflow in Stony Creek (M1)

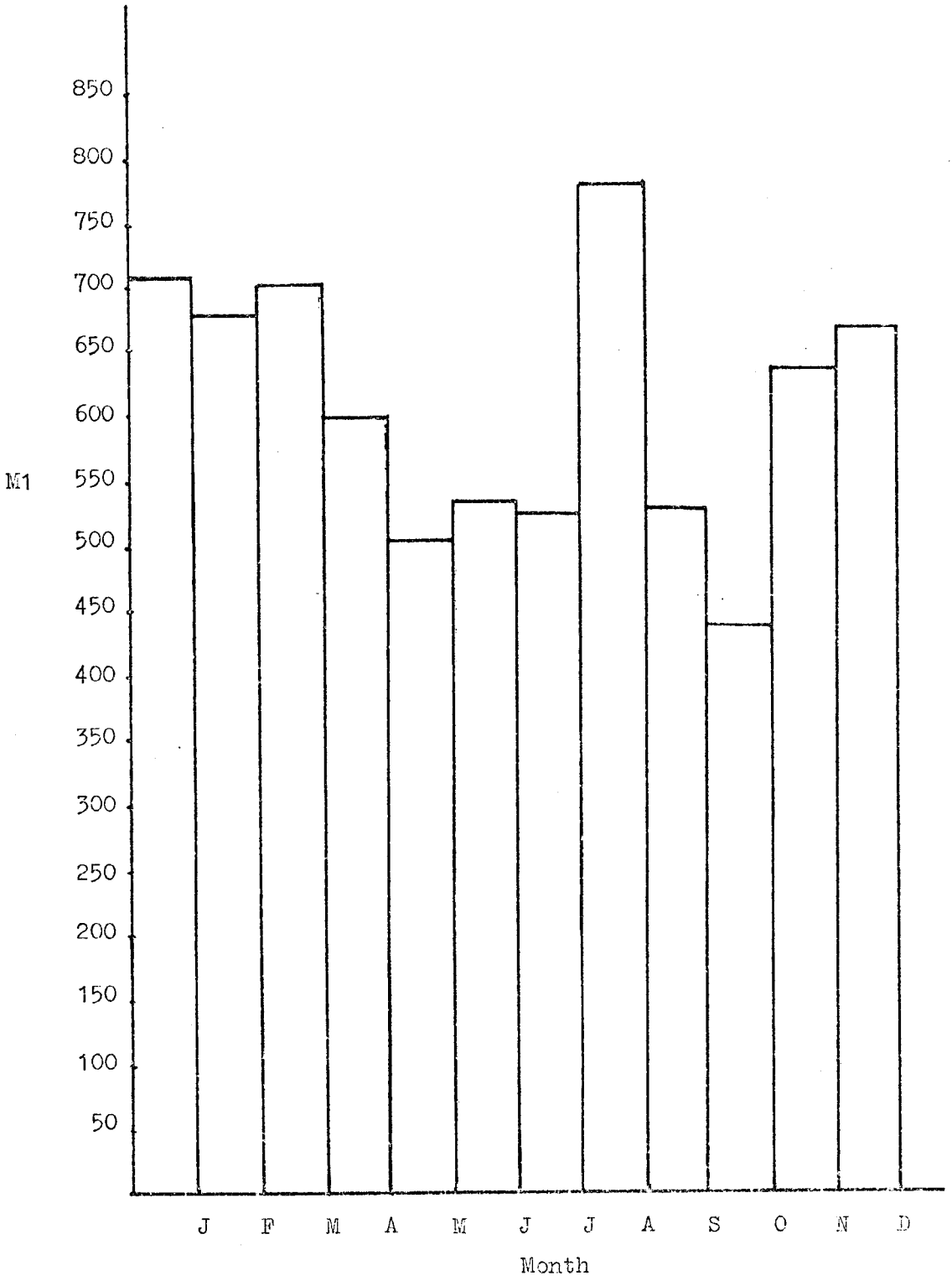


Table 1 - Geelong Water Supply System - Water Quality - Range of values over 1975/76

Indicator or Parameter		Water at Source				Water supplied to Consumer			
		Korweing-uboora	**Bostock**	**Stony Creek**	**Concrete Dam**	**Moorabool River She-Oaks**	**Ex Highton S. Basin**	**Ex Montpellier S. Basin**	**Ex Lovely Banks S. Basin**
TDS as NaCl mg/l	Av mg/l	58	142	119	140	238	83	121	124
	L	37	100	105	110	86	67	77	81
	H	140	210	150	180	530	95	210	160
	Samp. Freq	M	M	M	M	D	M	M	M
Turbidity F.T.U.	Av	8.7	5.8	3.8	5.1	7.7	9.2	8.4	6.5
	L	1.9	1.4	1.6	1.8	0.6	4.0	2.6	3.2
	H	37	13	10	23	340	17	24	12
	Samp Freq	M	M	M	M	D	M	M	M
Total Hdness as $CaCo_3$ mg/l	Av.	26	54	49	55		34	54	54
	L	12	39	38	40		29	31	36
	H	64	75	70	70		50	58	85
	Samp Freq	M	M	M	M		M	M	M
Chloride as Cl mg/l	Av.	32	70	60	71		35	51	60
	L	17	46	51	54		30	30	39
	H	70	109	72	85		42	88	91
	Samp Freq	M	M	M	M		M	M	M
Sulphate as SO_4 mg/l	Av						5	5	3
	L						1	1	1
	H						10	11	6
	Samp Freq						X	X	X
Total Iron as Fe mg/l	Av	1.76	1.27	1.07	1.41		1.27	1.28	1.33
	L	0.46	0.61	0.58	0.84		0.56	0.47	0.76
	H	7.01	2.06	1.65	2.02		2.06	3.00	2.03
	Samp Freq	M	M	M	M		M	M	M
pH Units	Av	7.15	7.12	7.04	7.01		7.18	7.38	7.19
	L	6.4	6.5	6.4	6.6		6.2	6.7	6.6
	H	8.0	7.6	7.6	7.6		8.4	8.7	8.3
	Samp Freq	M	M	M	M		M	M	M
Colour Pt-Co Units	Av	67	64	42	68	41	32	29	42
	L	45	40	10	25	15	15	10	15
	H	100	150	65	170	210	55	60	85
	Samp Freq	M	M	M	M	D	M	M	M
E. Coli (membrane Orgs/100 mls)	Av			2.1		30	0.2	0.3	0.2
	L			0		0	0	0	0
	H			59		890	5	14	3
	Samp Freq			T		W	T	T	T

Sampling frequency: M = Monthly, W = Weekly, T = Twice Weekly, D = Daily, X = Occasional

Water Quality Criteria adopted by WHO and Australian Cities and Recommended Derived Working Levels by B. T. Hart (Compilation of Australian Water Quality Criteria)

	T.D.S.	**Turbidity**	**Total Hardness**	**Chloride**	**Sulphate**	**Total Iron**	**pH**	**Colour**	***E. Coli* MPN Coliforms per 100 ml**
W.H.O.	1500 ppm	25 ppm	125 ppm	600 ppm	400 ppm	1.0 ppm	6.5-9.2	50 ppm	90% <10 100% <20
Australian Cities	1500 ppm	25 ppm	125 ppm	250 ppm	250 ppm	1.0 ppm	6.5-9.2	50 ppm	90% <10 100% <20
B. T. Hart	-	<5 J.T.U.	500 mg/l	200-600 mg/l	<250 mg/l	0.3 mg/l (dissolved)	6.5-9.0	15 mg/l	3 satisfactory 3-10 auspicious >10 unsatisfactory

BIOPHYSICAL DESCRIPTION OF THE CATCHMENT

(1) General

The Stony Creek Reservoirs store water from the Eastern Moorabool Catchment as well as from the local catchment which is part of the Little River Catchment. The immediate catchment to the reservoirs is about 26 km^2 in area and is completely forested. The catchment is about 9km long and 3 km wide and is at an elevation of 300-400 m above sea level. The catchment to the Upper Stony Creek Reservoirs is about 14.8 km^2 and the catchment to the Lower Stony Creek Reservoir is about 11.1 km^2.

Of the total area of 2567 ha under the control of the Geelong Waterworks and Sewerage Trust, 230 ha will be occupied by Durdidwarrah Reference Area and 260 ha by the Stony Creek Reference Area. The Reference Areas will also require a buffer zone around them to exclude exotic species and to prevent access.

The catchment area is practically surrounded by fences, and people have been excluded from the area for many years; largely because the water from the Reservoirs is supplied to Geelong untreated.

Employees of the Trust occupy two residences in the catchment and must have regular blood tests. There is a main road through the north end of the catchment and along the south-west edge of the catchment. There is also a new road built for the National parks Service, which services a picnic area below the Lower Stony Creek Reservoir and runs along the eastern edge of the catchment. The present system of fences and roads makes patrolling the area fairly simple. The Trust employees investigate any cars which are parked along the road to see if anyone has entered the catchment area without permission.

(2) Geology and Physiography

The Stony Creek Reservoirs are located on the steeply folded Palaeozoic strata constituting the Western Highlands. The surface of these Highlands, in part covered by thin, late Cainozoic sand and gravel or newer volcanic lava flows, forms an uplifted plateau deeply incised by the Moorabool, Leigh and other rivers. This plateau may be regarded as a southerly extension of the Ballarat Plateau with its covering of newer volcanic lava flows from many vents and cones. The eastern margin of the Western Highlands physiographic unit is clearly delineated by the Rowsley Fault Scarp on the edge of the Brisbane Ranges; the southern boundary is less abrupt.

The area is at an elevation of 300-400 m and is drained to the south by a number of rivers and creeks. Stony Creek in the north-eastern corner of these Highlands drains to the east into the Little River and then into Port Phillip Bay.

During most of the Palaeozoic, the area was part of the north-south trending Tasman Geosyncline which occupied most of eastern Australia. Tectonic movements affected both deposition at various times through the Palaeozoic as well as intrusive igneous activity. Ordovician siltstones, slates, sandstones and mudstones outcrop around Meredith and form the main rock types of the Western Highlands. These Ordovician strata are strongly folded along north-south trends and are locally faulted.

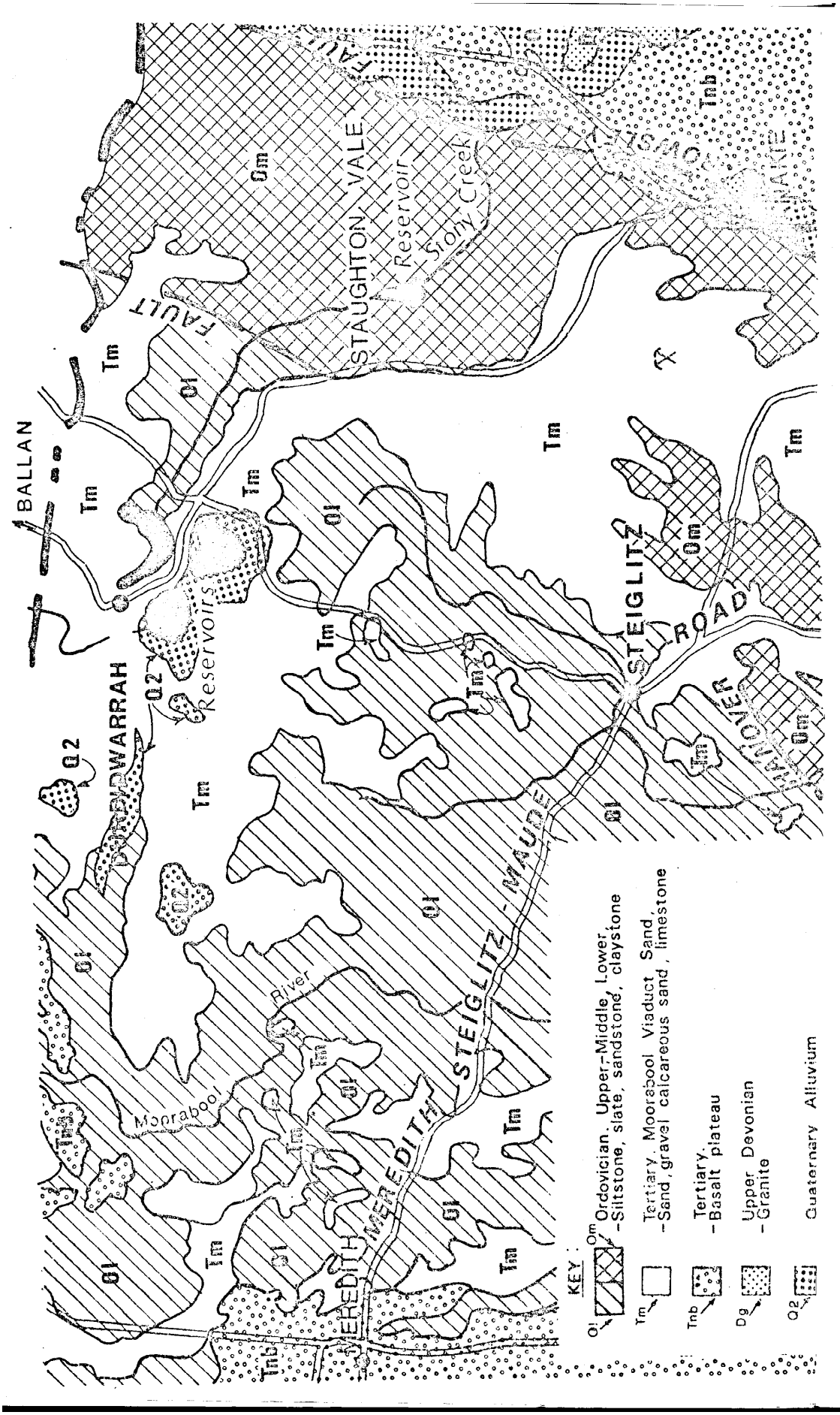
The Upper-Middle Ordovician sediments outcrop to the east of the Hanover Fault, while the Lower Ordovician are found to the west. Most of the rocks show graded bedding indicating that the original sediments were shelf deposits subsequently re-deposited in subsiding geosynclinal troughs by turbidity currents. These graded beds may be simple, from sandstone to slate, or complex, in which case the base is a coarse sandstone or conglomerate grit with oriented clasts of siltstone, and the main bed a siltstone grading into a slate top.

Large scale faults disrupt the major folds of the Ordovician sediments and cut out zones in the fossil sequence. The two major faults in this area are the Rowsley Fault and the Hanover Fault. The Rowsley Fault is considered to be an ancient high angle thrust on which later Quaternary normal faulting occurred. It is marked by a strong east-facing escarpment. The Hanover Fault joins the southern and eastern boundaries of the Steiglitz goldfields and is, itself, highly mineralized, an auriferous. From the Moorabool River the fault has a north-easterly strike, but near the Steiglitz Anticlinorium it curves around to the east and then sharply to the north. The northerly strike is maintained until the fault is obscured by Tertiary sediments. The Hanover Fault separates the Steiglitz Anticlinorium on the east and the Darriwil Synclinorium.

Relatively thin Tertiary deposits cover the Ordovician sediments between Anakie and Durdidwarrah. In the late Miocene to Pliocene the sea had regressed and there was a brief period of non-deposition and minor erosion. Calcareous shallow marine and associated continental sediments were deposited in the western part of the Otway Basin and in the north-eastern part of the Port Campbell Embayment into which the sea advanced from the Port Phillip Basin. It was this latter deposition which gave rise to the Moorabool Viaduct Sand, deposits of sand, ferruginous sand, gravel and calcareous sand. The Moorabool Viaduct Sand disconformably overlies the Gellibrand

Marl and is best exposed along the Leigh and Barwon Rivers. Its maximum recorded outcrop thickness is 23.5 m, north-west of Inverleigh.

Figure 2 - Geology of the Durdidwarrah Area



In the last glacial period of the Pleistocene the sea dropped well below its present level (100,000 to 7,000 years ago) initiating erosion of the higher land surface. From the Pleistocene through to Recent times deposition has taken place in low depressions near the Stony Creek Reservoirs.

These sediments consist of alluvium, silt, mud, sand, gravel and peat formed in still existing swamps, some of which have been used to create the storage reservoirs.

A map of the surface geology in the area is given in Figure 2.

(3) Climate

Average annual rainfall, evaporation and excess of rainfall over evaporation are given in Figures 3, 4 and 5. For some reason there is a great deal of discrepancy in figures quoted for Durdidwarrah. Data supplied by the Geelong Waterworks and Sewerage Trust gives the annual rainfall as 809 mm, the Meteorological Bureau's Climatic Averages of Australia 684 mm and the Barwon Regional Resources Survey as 682 mm. The Land Conservation Council's Melbourne Study Area Report gives the average annual rainfall as 675 mm.

Effective rainfall is the minimum amount of rain required after the dry period to start and maintain plant growth and is calculated by the Prescott formula from evaporation data. The growing season is defined as the number of months for which the probability of receiving effective rainfall exceeds 50%, plus one month. The additional month makes allowance for storage of moisture in the soil. The growing season may also be limited by low temperature. The usual limit for active growth is 10^{o}C mean monthly temperature, and no significant growth occurs below 5.5^{o}C. Given these criteria the growing season at Durdidwarrah is eleven months due to available moisture, but growth is restricted for five months due to low temperatures.

Rainfall intensity over a 24 hour period is highest in February/March, but has never exceeded 115 mm. However, as the 24 hour rainfall does not reflect actual rainfall intensity it can only indicate when the heaviest falls occur. At nearby Little River, falls of 14 mm in half an hour have been recorded.

Average and extreme temperatures for Durdidwarrah are given in Table 2, for a time span of 41 years. Generally, only two to four days per year are hotter than 38^{o}C and twelve to sixteen days hotter than 32^{o}C. These days are possibly the days of greatest public health risk in the catchment.

Durdiwarrah experiences about eleven severe frosts (minimum temperature below 0^{o}C) and about twenty six light frosts per year (minimum temperature between 0^{o}C and 2.2^{o}C). The frost free period is about six to seven months. The annual hours of sunshine are about 2100 to 2200 hours, and the monthly total are highest for December and January.

(4) Land Systems and Soils

Although no detailed study of the Land Systems has been made for this area, the broad scale mapping for Victoria has isolated two separate Land Systems. These separate the Ordovician parent material and the Tertiary sands and gravels.

Land System 343221, on Tertiary parent material, is an undulating plain with the Savannah woodland vegetation association described in the next section.

The soils are mottled duplex yellow soils with a sandy loam A1 horizon and strongly leached A2 horizon. A heavy clay pan and ironstone concretions may restrict drainage leading to seasonal water stress. Permeability is generally quite low. Average depth of soil is about 1.5 m, and there is a low hazard rating under the present use. (Refer to Figure 6).

Land system 313133 on the Ordovician sandstone, siltstone and shale may be divided into five separate components (refer to Figure 7). All of these components have a high erosion hazard and form the most fragile part of the catchment.

The main soil types found in this land system have duplex or gradational profiles. On the ridges and spurs there are shallow, often skeletal, stony, red gradational soil with minor outcrops of rock present. The main soil type on the slopes is a red duplex soil found in the lower swales and fans and a yellow gradational soil which is much younger in the upper swales.

More detailed mapping would probably delineate a separate Land System for the Quaternary deposits in the depressions. The soils in these depressions are probably similar to those on Tertiary sediments except that they have a higher organic content in the A horizon and are generally deeper.

Figure 3

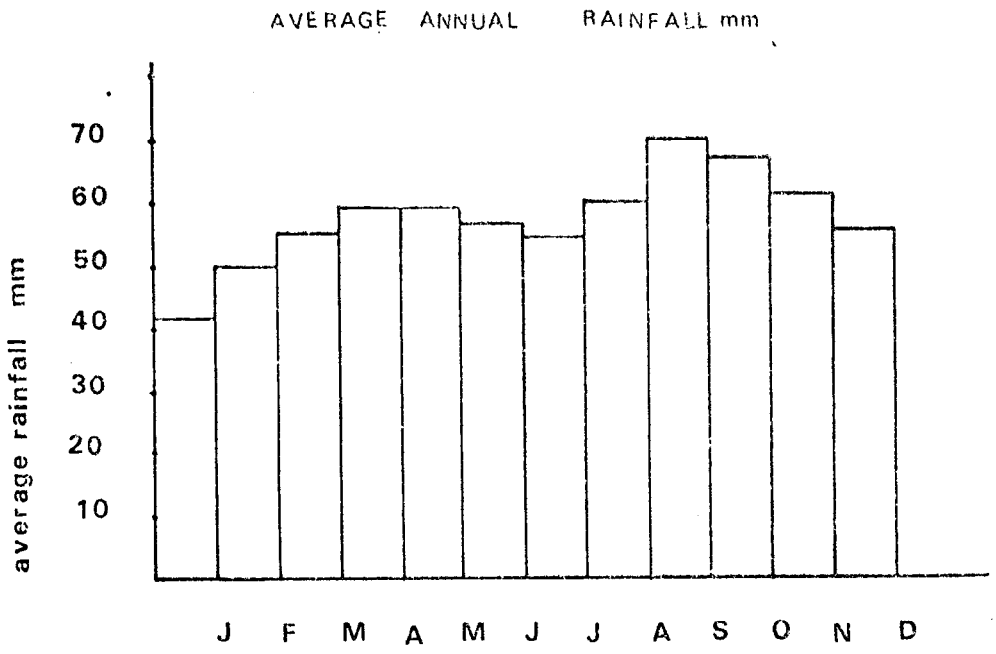


Figure 4

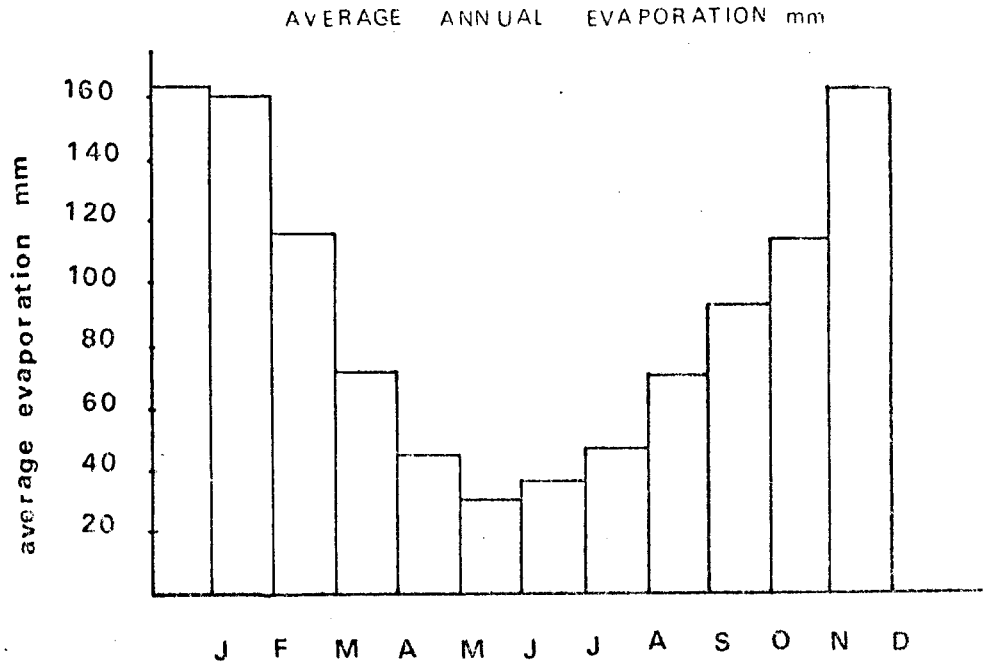


Figure 5

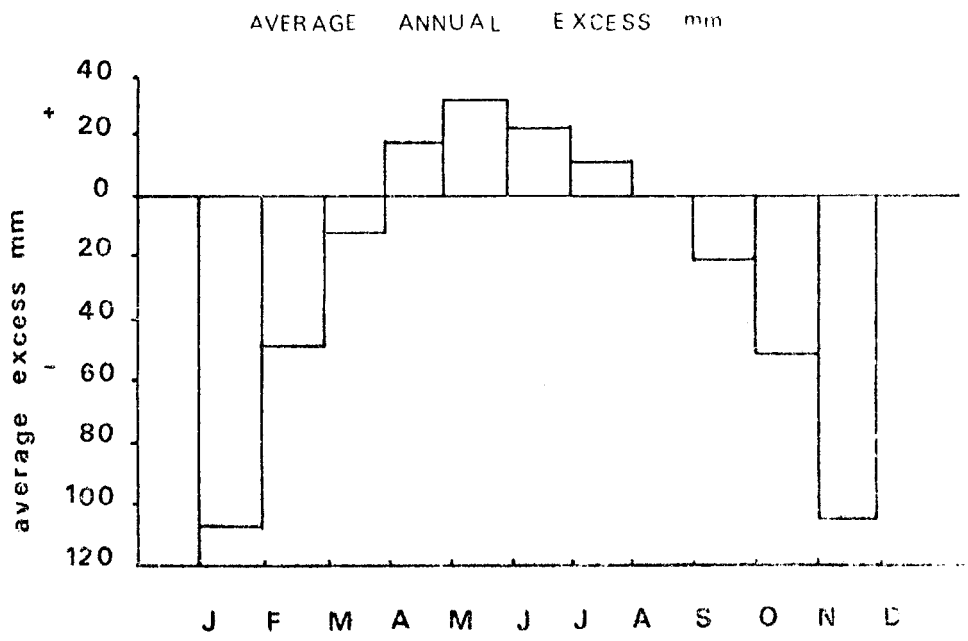

AVERAGE ANNUAL EXCESS mm
average excess mm
+
-
40
20
0
20
40
60
80
100
120
J F M A M J J A S O N D

Table 2 - Average and extreme temperature at Durdiwarrah

	J	F	M	A	M	J	J	A	S	O	N	D	Year
Average Maximum Temperature (^{o}C)	23.8	23.6	21.2	16.7	13.6	10.7	10.2	11.4	14.0	16.6	19.4	22.3	16.9
Average Minimum Temperature (^{o}C)	11.0	11.5	10.4	8.3	6.4	4.6	4.0	4.4	5.6	7.0	8.4	10.0	7.6
Average Mean Temperature (^{o}C)	17.4	17.5	15.8	12.5	10.0	7.7	7.1	7.9	9.8	11.8	13.9	16.1	12.3
Highest Temperature (^{o}C)	42.5	38.9	38.1	31.9	28.3	19.4	17.8	21.8	29.0	33.3	36.7	39.2	42.5
Lowest Temperature (^{o}C)	2.3	2.8	1.6	-0.6	-2.9	-3.0	-3.3	-3.3	-2.2	-1.6	0.6	1.1	-3.3

Figure 6

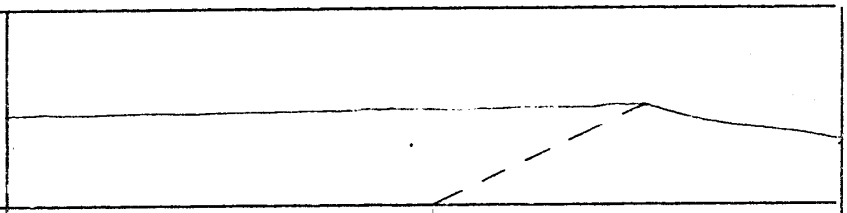
LAND SYSTEM: 343221		
COMPONENT	1	2
Proportion %	95	5
CLIMATE (Av.)	Annual rainfall: 600-650 mm	
GEOLOGY	Tertiary gravel, sand, silt and clay	
TOPOGRAPHY:		
Land form	Undulating plain	
Position	Plain	Drainage line
Av. sideslope°	3	2
NATIVE VEGETATION:		
Structure	Woodland	
Association	Messmate, manna gum, broad leaf peppermint, narrow leaf peppermint, swamp gum	
SOIL:		
Group	Mottled duplex soil with ironstone	
Surface texture	Fine sandy loam	
Permeability	Low	
Av. depth m	1.5	0.4
PRESENT LAND USE	Mainly timbered - forestry, nature conservation, recreation, grazing	
HAZARDS	Low sheet erosion	Low gully erosion

Figure 7

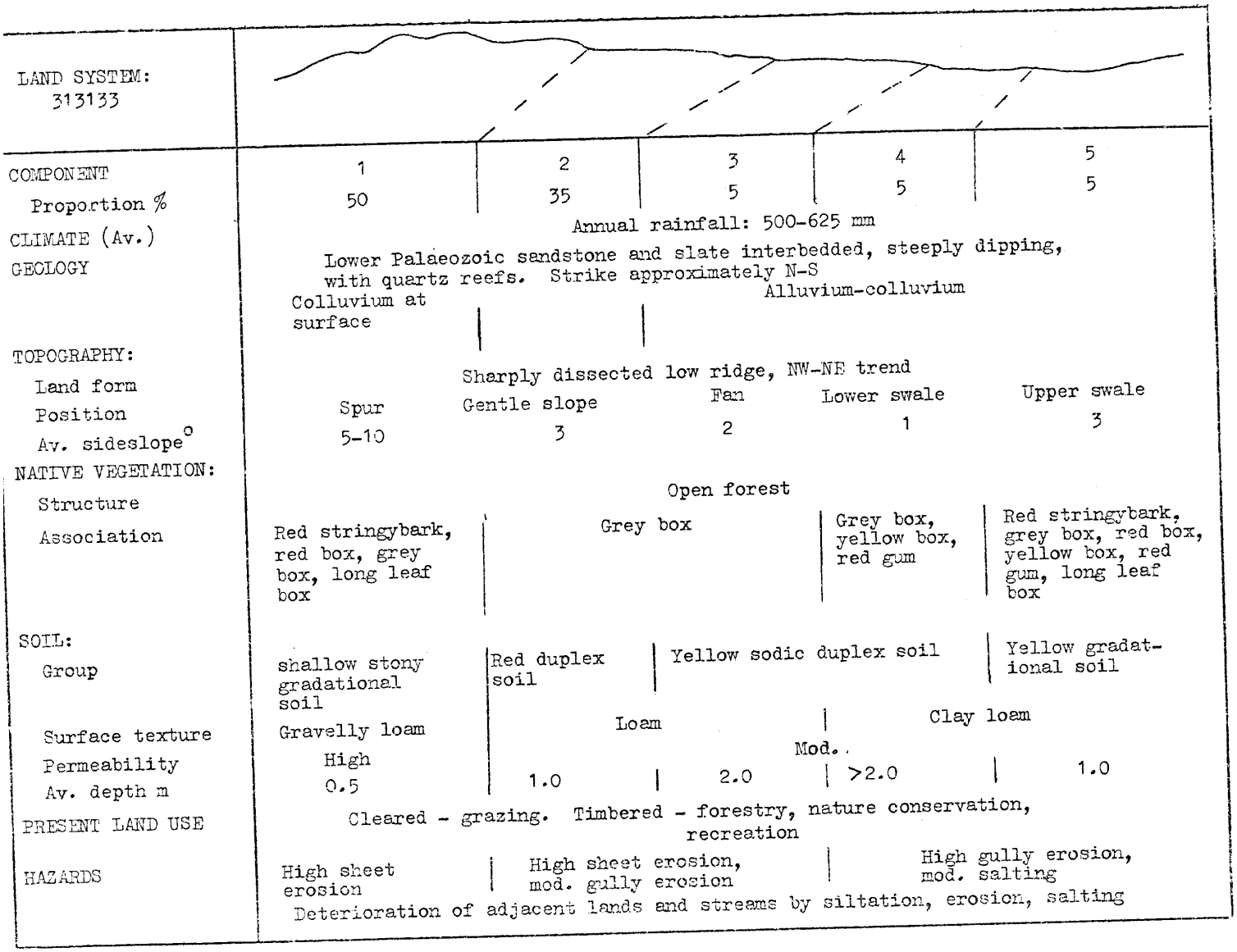

LAND SYSTEM: 313133
COMPONENT
Proportion %
CLIMATE (Av.)
GEOLOGY
TOPOGRAPHY:
Land form
Position
Av. sideslope°
NATIVE VEGETATION:
Structure
Association
SOIL:
Group
Surface texture
Permeability
Av. depth m
PRESENT LAND USE
HAZARDS
1
50
2
35
3
5
4
5
5
5
Annual rainfall: 500-625 mm
Lower Palaeozoic sandstone and slate interbedded, steeply dipping, with quartz reefs. Strike approximately N-S
Colluvium at surface
Alluvium-colluvium
Sharply dissected low ridge, NW-NE trend
Spur
Gentle slope
Fan
Lower swale
Upper swale
5-10
3
2
1
3
Open forest
Red stringybark, red box, grey box, long leaf box
Grey box
Grey box, yellow box, red gum
Red stringybark, grey box, red box, yellow box, red gum, long leaf box
shallow stony gradational soil
Red duplex soil
Yellow sodic duplex soil
Yellow gradational soil
Gravelly loam
Loam
Clay loam
High
Mod.
0.5
1.0
2.0
>2.0
1.0
Cleared - grazing. Timbered - forestry, nature conservation, recreation
High sheet erosion
High sheet erosion, mod. gully erosion
High gully erosion, mod. salting
Deterioration of adjacent lands and streams by siltation, erosion, salting

Figure 8 - Durdiwarrah Reference Area - Flora

(5)

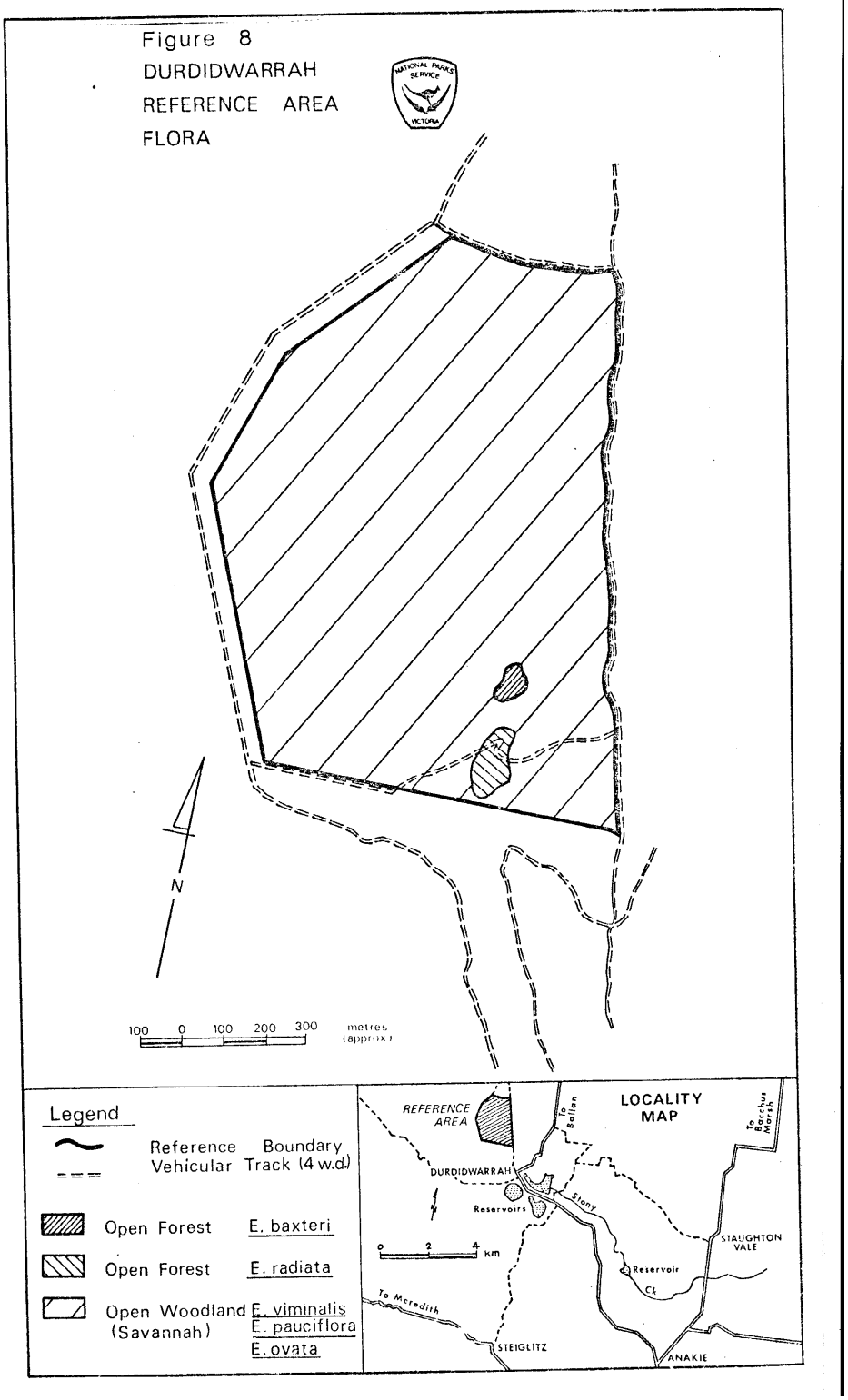
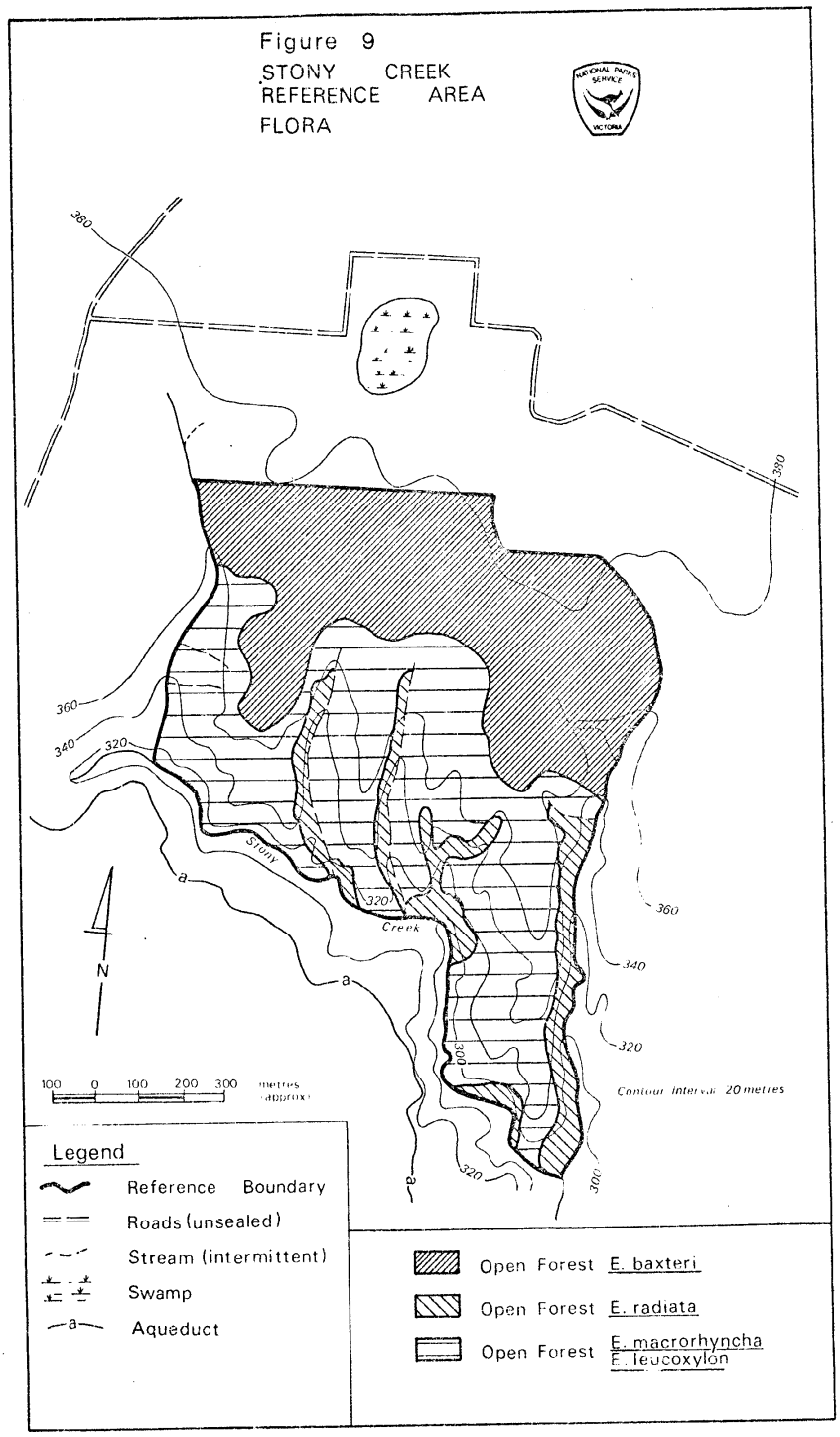


Figure 9 - Stony Creek Reference Area - Flora



(6) Vegetation

The Durdidwarrah Reference Area consists of a uniform open savannah woodland of *Eucalyptus ovata, E. pauciflora* and *E. viminalis.* Small stands of *E. baxteri* and *E. radiata* can be found in the south eastern corner. The presence of *E. pauciflora* is of considerable significance because it is more usually associated with an alpine environment. The understorey is sparse and varies accordingly to slight differences in drainage. Species present include a variety of grasses, *Drosera* spp., *Banksai marginata, Acacia dealbata, A. melanoxylon* and occasionally *Pteridium esculentum*.

There are indications that this type of woodland will revert to an open scrub bushland of *Banksia marginata, Acacia pycnantha* and *Casuarina* spp. unless burned on an approximately seven year rotation.

Surrounding this reference area are the plantations of *Pinus radiata* which were introduced into the catchment, to prevent the problem of gum exudates colouring the water. Eventually these plantations will be phased out and replaced with native species.

A number of different plant associations can be found in the Stony Creek Reference Area.

The northern portion of this bushland, on Tertiary sands and gravels is dominated by an Open Forest of *E. baxteria* and a healthy understorey containing *Xanthorrhoea australis, Correa reflexa, Leptospermum* spp. and *Acacia aspera*. Some *E. Obliqua* is found in the moister head of gullies.

Further towards Stony Creek the Open Forest is dominated by *E. macrorhyncha* with some *E. leucoxylon*. This forest may be stunted along the dry rocky ridges. The understorey is composed of grasses and herbs including *Poa* spp., *Asperula* spp., *Cymbonotus preissianua* and *Dichondra repens*. Eastern aspects, particularly in the gullies, have an overstorey of *E. radiata* and a grassy ground flora. Limited *E. ovata* and *Acacia melanoxylon* can be found in the creek beds.

Phytopthora cinnamomi has infected the northern portion of this Reference Area and has lead to dieback symptoms in the understorey (particularly *X. australis*).

Rough plans of the vegetation in the Reference Areas are given in Figures 8 and 9. These were drawn up from field notes of the officers from the National Parks Service for the Draft Management Plans.

4. LAND USE AND LAND CAPABILITY

The catchment area is completely covered with good stands of native and introduced trees. As the area has been vested in the Trust for over a hundred years, there has been little land disturbance. Probably, the greatest disturbance was during the 1950's pine plantation establishment. Since then there has been limited extraction of dead trees for firewood and some scientific experimentation. Maintenance of access tracks, water supply facilities, and firebreaks are the other activities which may affect water quality.

The Geelong Waterworks and Sewerage Trust's policy is for public exclusion and limited access to scientific workers and others, until there is a change in the water treatment situation. The wildlife population may at times exceed a safe level and should, from time to time, be cropped by the Fisheries and Wildlife Department. Extreme Wildlife populations may cause overgrazing leading to sheet erosion as well as contributing to bacterial contamination.

Areas of management policy which still require resolution are the treatment of firebreaks (slashing and ploughing) and controlled burning of the Reference Areas. However, neither of these issues are seen as major barriers to successful co-operation between the parties concerned.

In this catchment, water supply must be regarded as the primary product until the water treatment is upgraded or can be upgraded. The capability of the area for scientific reference must also be given high priority, as two areas of scientific interest have been already identified in the catchment. It is unlikely that there is much conflict between these two uses.

It must be recognized that the catchment does have a high capacity for recreation, but at the present time, this would severely conflict with both the water supply and reference area interests. Some compensation for exclusion of the public from the area can be made by developing the picnic area below the lower concrete dam, and providing a public viewing point for a view over the Reservoir.

The capability for forest production is low and suitable only for firewood and fence posts. However, even this level of production could conflict with protection of the water supply and Reference Areas. The capability for agriculture

is low, but bee keeping is an occasionally suitable use. Generally bee keeping would not conflict with the primary uses.

The catchment is small, consists of fragile and important ecosystems, and is dissected by water supply storages and diversion facilities. Small buffers of 20 metres to 40 metres width would not protect the water supply. To prevent access to the water supply thus protecting public health, it is necessary to regard the entire area within the fence line as a buffer. This offers a practical method of patrolling the catchment and preventing public access to the water supply facilities. Narrow buffers could not be patrolled on the steep Ordovician land system around the Lower Stony Creek Reservoir, and they would dissect the remainder of the catchment into many small areas. Virtually no contiguous areas of significant size would remain which would be worth adding to the State Park.

The Geelong Waterworks and Sewerage Trust have an established works team responsible for protection of the area as a water supply catchment. Two employees are resident in the catchment and can patrol the area on weekends and public holidays, the times of highest risk of contamination of the water supply.

5.

(1) Conclusions

As recommended in the Final Recommendations of the Land Conservation Council's Melbourne Study Area report, the catchment to the Stony Creek Reservoirs shown in Plan 1 should be proclaimed by the Governor-in-Council.

At virtually the same time, a Land Use Determination should be gazetted, in which the most suitable uses are water production and areas of scientific interest. Other permissible uses are existing roads, limited forest production (logging of pine plantations and firewood, outside the Reference Areas), bee-keeping and wildlife protection. The two residences for Trust employees will be permitted to remain, but no further residences may be constructed in the catchment.

A Consultative Committee is proposed to determine the management policies for the Reference Areas within the catchment. Management prescriptions approved by the Consultative Committee should be attached to the Land Use Determination as conditions under Section 23(4)(a) of the Act. The policy of public exclusion from the catchment will continue until circumstances change. Facilities should be provided for recreation outside the catchment area.

(2) Recommendations

1. That the Land Conservation Council should take the necessary steps to proclaim the areas defined in Plan 1, as the Stony Creek Water Supply Catchment.

2. That the following proclamation of the catchment, a Land Use Determination be published in the Government Gazette under Section 22(1) of the *Soil Conservation and Land Utilization Act*, 1958.

    (a) The land uses determined to be the most suitable in the public interest are:

        (i) domestic water supply
        (ii) scientific reference

    (b) Other permissible uses are as follows:

        (i) existing roads and access tracks
        (ii) limited forest production (logging in pine plantations and some firewood cutting).
        (iii) bee keeping
        (iv) wildlife conservation
        (v) existing residences

    (c) General Provisions

        That the public access be denied except for approved scientific or other purposes.