

Reference SC/C/102

SOIL CONSERVATION AUTHORITY

**REPORT ON THE LAND-USE  
DETERMINATION IN THE BILLY'S CREEK  
WATER SUPPLY CATCHMENT**

Prepared for consideration by the Land Utilization Advisory Council at its 70<sup>th</sup>  
Meeting on 18<sup>th</sup> November, 1966.

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REPORT ON LAND-USE DETERMINATION  
IN THE BILLY'S CREEK WATER SUPPLY CATCHMENT

(Attached SCA Plan No. 1870)

## **PROCLAMATION OF CATCHMENT**

The Billy's Creek Catchment was proclaimed a Water Supply Catchment under Section 22 of the *Soil Conservation and Land Utilization Act* (1958) on the 1<sup>st</sup> March, 1966. The proclamation was published in the Victoria Government Gazette No. 16, dated 9<sup>th</sup> March, 1966.

## **LAND TENURE, PRESENT LAND AND WATER USE**

### ***State Forests***

About 1,589 acres

Under the terms of the *Forests (Wood Pulp Agreement) Act* 1961, A.P.M. Forests Pty. Ltd., converted so far 463 acres of this area to plantation forest. 200 acres were planted with *Pinus radiata* and 263 acres with Mountain Ash and Blue Gum.

### ***Crown Land*** (excluding frontages)

About 255 acres

### ***Freehold***

About 3,316 acres

A.P.M. Forests Pty. Ltd. The Company owns at present 1,334 acres of which 227 acres are planted with pine and 246 acres with hardwood.

Other Private Property. The balance of the catchment area, about 1,982 acres, is owned by thirteen landholders. Eight of them farm their land, the others own blocks of land which have reverted back to tussock, bracken and scrub growth.

Grazing and dairying is practised on the improved pastures which often go well down into the valley on land with slopes of up to 45%. The steeper, lower one quarter or one-third of the slopes is under bracken-scrub and scattered trees. The nature of the topography prevents cultivation for cropping except on the very narrow tops of ridges.

Excepting a number of slip areas - mostly healed over - there is no active erosion on the grazing land.

## **WATER USE**

The weir on Billy's Creek was built originally for Morwell's water supply. Since 1958 it has been used exclusively for the supply of Yinnar and farms on Hazelwood Estate, some 1000 people in all. The weir is located at Map Reference East 39.3, North 70.2 Mirboo North 1" to 1M sheet at R.L. 487 ft. The water is taken via a 10" main continuing in twin 6" laterals to Yinnar Reservoir which has a capacity of 300,000 gals. The invert level at the reservoir is 321 ft.

This year a 5 million gals capacity reservoir was constructed at R.L. 467 ft. at the new township of Churchill situated 3/4 of a mile north of Jeeralang Junction. The number of houses completed at Churchill stands at 111. There are 148 houses under construction and the contract is let for the building of a further 93. Demographers expect a population of 10,000 people by 1980.

The minimum summer flow of Billy's Creek can be as low as 0.1 cusec. In the January-April period the monthly mean flow is just above the 1 cusec. Stream flow measuring was started in 1956 by the State Electricity Commission. The recorder is situated about 4.5 M downstream of the weir in the vicinity of the Walsh's Road bridge at R.L. 260. The catchment area of this station is 15.7 sq. M, while that of the weir is only 8 sq. M. The summer monthly mean flow therefore is estimated at around the 0.6 cusecs at the weir. For a population of 10,000 this would allow 32 gals of water per person per day, which is well below the per head summer water use.

Reservoir sites are being investigated to ensure continuity of supply which otherwise would have to be met by Mondarra water estimated to cost 9 cents per 10000 gals. as against the 4 c. per 1000 gals of Billy's Creek water sold at present in bulk by the Morwell Water Trust to the Latrobe Valley Water and Sewerage Board for the supply of Churchill.

## HYDRO-METEOROLOGY OF THE CATCHMENT

### *Rainfall*

Given the points for Yinnar and Jumbuk. Yinnar is 5M north-west from the weir at an altitude of 275 ft. Jumbuk is at the southern top end of the catchment at an altitude of 1,862 ft. The station closed down in 1950.

Table 1: Rainfall record chart for Yinnar and Jumbuk for the period 1943-1948.

Table 2: Rainfall record for Yinnar for the years 1956-63.

Runoff: Measured at the SEC stream flow recorder.

Table 1: Monthly total in ac. ft. for the years 1956-65.

Table 2: Monthly maximum flows in cusecs for the years 1956-65.

Table 3: Monthly minimum flows in cusecs for the years 1956-65.

Table 4: Monthly mean flows in cusecs for the years 1956-65.

### *Peak flows and associated rainfall:*

Table 1: Showing for the period 1956-63 the maximum daily mean flows and points of rainfall for the days just prior to and following the peak flow.

### *Water yield:*

Total yield of water for the 8 yrs between 1956-65	=	54,432	ac. ft.
Average yield of water per year	=	6,804	ac. ft.
Average yield of water per acre	=	0.68	ac. ft.

Average yield of water per acre is 8 inch. This value corresponds with the average runoff per annum as shown on the State Rivers and Water Supply Commission's Plan No. 58065, representing lines of equal runoff on the map of Victoria.

*Rainfall; Table 1: Rainfall in pints at Yinnar and Jumbuk*

Month	1943		1944		1945		1946		1947		1948		1949	
	Yinnar	Jumbuk	Yinnar	Jumbuk	Yinnar	Jumbuk	Yinnar	Jumbuk	Yinnar	Jumbuk	Yinnar	Jumbuk	Yinnar	Jumbuk
Jan	253	253	84	117	216	269	443	310	141	208	52	230	192	396
Feb	245	145	51	35	221	141	530	511	303	282	76	113	245	437
Mar	83	60	313	210	121	185	521	553	612	812	147	178	586	674
Apr	623	571	439	463	61	133	284	645	361	557	323	409	83	190
May	120	235	493	570	182	340	87	10	96	109	650	1092	120	403
June	408	503	270	301	205	237	350	590	419	598	167	267	195	497
July	209	247	216	171	200	197	350	455	372	467	220	292	357	596
Aug	378	309	99	193	315	316	489	394	358	371	423	368	171	149
Sept	320	349	223	162	320	242	236	230	319	320	128	235	139	162
Oct	136	109	193	256	224	300	377	330	475	567	687	711	530	441
Nov	166	229	237	211	356	383	253	168	215	453	285	285	456	520
Dec	75	253	29 <sup>3</sup>	291	48	49	217	311	340	413	237	358	70	136
Total	3016	3263	3018	2980	2469	2792	4137	4597	4011	5157	3395	4538	3145	4601

*Rainfall; Table 2: Rainfall in points at Yinnar (Average for period: 3,271 pts)*

Month	1956	1957	1958	1959	1960	1961	1962	1963
Jan	442	43	4	70	212	120	299	515
Feb	-	157	367	276	157	169	162	137
Mar	196	392	111	209	112	408	112	183
Apr	389	161	26	108	364	276	75	44
May	377	423	516	100	858	205	247	444
June	470	245	185	215	197	328	304	178
July	286	254	419	102	470	387	294	323
Aug	647	221	522	425	255	233	375	261
Sept	429	410	318	503	284	99	413	424
Oct	281	337	529	255	234	271	293	189
Nov	500	374	346	163	471	76	113	134
Dec	296	228	264	287	41	173	293	79
<b>Total</b>	4313	3245	3607	2713	3655	2745	2980	2911

**Runoff; Table 1: Runoff in Acre Feet**

<b>Year</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>Aug</b>	<b>Sept</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Total</b>
1956	1316	127	61	119	1082	2409	1703	3731	1939	547	1600	234	14868
1957	112	41	77	101	191	340	1255	418	1243	1291	369	166	5604
1958	59	63	49	39	119	115	922	1869	773	799	280	350	5437
1959	64	44	61	45	53	141	80	467	1279	572	106	63	2975
1960	39	26	9	55	2307	1205	2447	838	589	1242	1051	98	9906
1961	64	41	83	87	127	564	1891	1229	939	206	70	65	5366
1961	64	41	83	87	127	564	1891	1229	939	206	70	65	5366
1962	64	43	32	25	137	222	865	898	905	666	119	19	4198
1963	116	71	41	67	663	513	1244	1166	1442	400	214	144	6081
1964	59	61	47	102	155	999	1920	3483	1297	1118	225	244	9710
1965	130	38	46	280	140	224	537	1374	513	194	673	336	4485
	2023	555	506	920	4975	6732	12864	15473	10919	7035	4707	1919	68627

*Runoff; Table: Maximum flow in Cubic Feet per Second*

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
1956	145	5	2	8	245	600	375	590	555	47	316	8	600
1957	4	3	7	5	10	125	550	16	425	243	24	7	550
1958	2	14	1	1	9	13	126	330	356	49	26	114	356
1959	2	4	6	1	1	48	5	65	450	52	8	6	450
1960	1	1	0	10	401	224	299	106	61	358	360	5	401
1961	3	3	16	14	9	74	273	149	218	16	2	9	273
1962	13	2	1	1	66	16	210	108	156	68	7	70	210
1963	42	11	3	34	130	64	115	278	119	62	9	6	278
1964	4	5	3	9	11	223	237	358	126	89	6	8	358
1965	7	1	4	40	6	9	95	323	36	7	70	19	323

*Runoff; Table 3: Minimum Flow in Cubic Feet per Second*

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1956	5.0	1.0	0.5	0.5	2.0	8.0	8.0	6.0	8.0	4.0	6.0	2
1957	0.4	0.3	0.3	1.2	1.1	0.8	2.6	2.5	1.5	4.5	1.8	1.2
1958	0.7	0.6	0.7	0.6	0.6	1.3	2.0	5.0	2.0	3.0	2.0	1.5
1959	0.6	0.6	0.7	0.6	0.6	0.9	0.7	1.0	1.1	1.4	0.9	0.9
1960	0.2	0.2	0.2	0.2	0.6	4.9	4.9	5.0	4.4	3.4	4.3	0.5
1961	0.2	0.2	0.2	0.3	0.6	0.7	7.0	4.3	4.4	1.7	1.0	0.7
1962	0.4	0.5	0.1	0.4	0.6	1.4	1.3	3.7	2.7	2.8	1.3	1.0
1963	0.5	0.6	0.5	0.5	0.9	2.3	3.4	3.2	4.9	2.6	1.7	0.6
1964	0.4	0.3	0.4	0.3	0.8	2.9	2.3	11.4	8.1	5.0	2.4	2.2
1965	1.0	0.5	0.2	0.4	1.1	1.8	1.6	5.0	3.3	1.5	1.5	0.5

**Runoff; Table: Monthly mean flow in Cubic Feet per Second**

<b>Year</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>Aug</b>	<b>Sept</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>
1956	21.4	2.2	1.0	2.0	17.6	40.5	27.7	60.7	32.6	8.9	26.9	3.8
1957	1.8	0.7	1.2	1.7	3.1	5.7	20.4	6.8	20.9	21.0	6.2	2.7
1958	0.9	1.1	0.8	0.6	1.9	1.9	15.0	30.4	13.0	13.0	4.7	5.7
1959	1.0	0.8	0.9	0.7	0.8	2.4	1.3	7.6	21.5	9.3	1.8	1.0
1960	0.6	0.5	0.1	0.9	37.5	20.2	39.8	13.6	9.9	20.2	17.7	1.6
1961	1.0	0.7	1.4	1.5	2.1	9.5	30.8	20.0	15.8	3.4	1.2	1.1
1962	1.0	0.8	0.5	0.4	2.2	3.7	14.1	14.6	15.2	10.8	2.0	3.6
1963	1.9	1.3	0.7	1.1	10.8	8.6	20.2	19.0	24.2	6.5	3.6	2.3
1964	1.0	1.1	0.8	1.7	2.5	16.8	31.2	56.6	21.8	18.2	3.8	4.0
1965	2.1	0.7	4.7	2.3	3.8	8.7	22.3	8.6	3.2	11.3	5.5	6.2



The data presented in the tables show that summer mean flow exceeds one cubic feet per second in:

January	3 years out of 10
February	4 years out of 10
March	3 years out of 10
April	6 years out of 10

and exceeds two cubic feet per second in:

January	2 years out of 10
February	1 year out of 10
March	1 year out of 10
April	1 year out of 10

For the same period i.e. 1956-65.

The minimum recorded daily mean discharge	=	0.1 cusecs (March 1960)
The minimum recorded total flow for one month	=	9 ac. ft (March 1960)
The minimum recorded total for three months	=	64 ac. ft. (Jan-Feb-Mch 1960)
The minimum recorded total for twelve months	=	2975 ac. ft. (1959).

Attention is drawn again to the fact that these figures relate to a catchment area nearly twice the size of that supplying the diversion weir.

#### **Water Quality:**

The question emerges now whether for an important but small catchment conversion from grass-shrub cover to plantation forest is at all desirable?

Admittedly as yet there is no Victorian data available and there are some overseas reports to show that plantation forests produced no significant effect on stream discharge after having replaced shrub vegetation, yet there is mounting evidence that summer base flows increase when forests are cleared. (References: Penman; Technical Communication No. 53 - 1963 --- Hibbert; Forest Treatment Effects on Water Yield (Coweeta) 1965 --- Douglass; Effects of species and arrangement of forest on evapo-transpiration, 1965.

There is general agreement that peak flows and sediment yields are reduced by forests by the theory that low flows are increased has not been substantiated.

#### **Water Quality:**

"Billy's Creek pipeline used to be flushed once a year (after winter flood flows) before A.P.M. operations. Since A.P.M. commenced work in the catchment it has been flushed weekly" this is the information given by the Morwell Water Trust Secretary.

Private enquiries in Yinnar resulted in very guarded answers in a number of cases. The reason behind this is twofold. First, people who were used to cart water in milk cans to their homes during the summer are now grateful to have reticulated water and second they see in the Company a provider of job opportunities.

It is anticipated, however, that the more sophisticated and for their living less A.P.M. dependent inhabitants of Churchill will demand a water supply of higher quality.

To provide this water in the absence of a sizeable reservoir there is need for a filtration plant or for the discontinuation of the present procedure followed by A.P.M. in its planting operation. The Company's approach is incompatible with water supply catchment management.

The clearing benches cut into these steep hillslopes about 1 ½ to 2 ch. Apart from ridge top right down to the edge of the stream banks resulted in the clearing of main tributary streams leaving logs piled up in their channels as well as in the blocking of a great number of subsidiary water courses with fill material to enable the dozers to cross.

The contention that these subsidiaries are not permanent streams is meaningless. Part of the year they are carrying water and are overflowing or breaching these fill blocks, adding heavy loads of sediment to the stream flow. The reasoning for clearing the vegetation from the watercourses for vermin control is also untenable in a water supply catchment.

The prescriptions formulated for the management of the land under the control of A.P.M. Forests Pty. Ltd., may appear stringent however in view of these operations being continued for a number of years to be followed in time by utilization which may be equally ruthless, they seem to be justified under the existing conditions and knowledge available.

### ***Land Use Categories***

The following categories are recommended for a land-use determination in this catchment:

#### **Category No. 1**

Land which shall be used for the protection of streams and watercourses where -

- i) No tree shall be removed or soil disturbed in any way without the specific approval of the Soil Conservation Authority.
- ii) The crossing of streams and watercourses within this category is permitted only by means of properly constructed crossings specifically approved for the particular site by the Soil Conservation Authority.

This category covers areas within a 5 ch. Radius of the offtake weir and within a minimum distance of 1, 2 or 3 chains from the banks of streams and watercourses as specified on Plan No. 1870.

#### **Category No. 2**

Land suitable for grazing or forest purposes where clearing operations for the establishment of pastures or forest plantations, forest utilization operations, the construction of roads, tracks, clearing benches or earthworks of any type on slopes in excess of 14° (or 25% or 1 in 4) shall be carried out only in accordance with management conditions made or approved by the Soil Conservation Authority.

#### **Category No. 3**

Land used or reserved for roads or other public purposes on which any changes in land-use shall be made only after consultation with the Soil Conservation Authority.

3<sup>A</sup> Land reserved for roads or other public purposes on which any changes in land-use shall be made only with the approval of the Soil Conservation Authority.

**SOIL CONSERVATION AUTHORITY  
BILLY'S CREEK WATER SUPPLY CATCHMENT  
MANAGEMENT PRESCRIPTION**

***Area***

The area the Management Prescription refers to consists of:

- a) State Forests affected by the *Forests (Wood Pulp Agreement) Act*, 1961; and
- b) Land owned by A.P.M. Forests Pty. Ltd.

***General Provisions***

The provisions of the land-use categories for the abovementioned areas are set out in the Notice of Determination of Land-use In Billy's Creek Water Supply Catchment, Plan No. 1870, as published in the Victoria Government Gazette No. \_\_\_\_\_ dated \_\_\_\_\_, 1966.

***Responsibility***

The responsibility for the enforcement and the supervision of the terms of the Prescription within the State Forests shall rest with the Forests Commission, whereas on land owned by .P.M. Forests Pty. Ltd., the Company shall be responsible directly to the Soil Conservation Authority.

***Application***

The terms and details of the Prescription shall remained in force until amended by the Soil Conservation Authority. Any departure from the Prescription shall only be with the express written approval of the Authority.

***Detailed Provisions***

1. A.P.M. Forests Pty. Ltd. shall prepare a Plan of Operations for each year and present this for the approval of the Soil Conservation Authority not later than 1<sup>st</sup> October of the preceding year.
2. All operations must conform with good forestry and roading practices with particular regard to the protection of the area as a town water supply catchment.
3. Sitings of main extractions roads, creek crossings and the location of culverts for drainage disposal shall be subject to the approval of the Soil Conservation Authority.

As far as practicable, grades shall not exceed 1 in 14 but short steeper sections up to 1 in 10 may be permitted. Approved crossings over running streams or watercourses shall be constructed by use of bridges or pipe culverts; earth-filling over logs placed in the stream bed shall not be permitted. Crossings shall be located and constructed with a minimum of soil disturbance close to the stream. Borrow pits close to streams shall be avoided. Table drains and culverts shall be provided where necessary, mainly above stream crossings and in-curves and below intercepting roads and out-curves. The spacing will vary with grade, soil type and width of road. Runoff shall be discharged at sites suitable for the water to spread and filter through vegetation before reaching the stream channel. All disturbed or bare soil near crossings is to be sown, fertilized and mulched where necessary with a seed and fertilizer mixture approved for the particular site by the Soil Conservation Authority.

Location of secondary or spur roads or unformed tracks on land with cross-slope of 25% or steeper shall be subject to the approval of an officer of the Soil Conservation Authority.

4. Snigging or cartage of forest produce through any running stream or watercourse shall be subject to the approval of an officer of the Soil Conservation Authority. Snig tracks shall avoid steep grades particularly in proximity to streams. Strict attention shall be paid to disposal of drainage to obviate erosion and the direct discharge of silt into stream channels. On completion of logging, and at the close of each logging season, all snig tracks shall be breached or barred at suitable intervals, to the satisfaction of an officer of the Soil Conservation Authority.
5. All snigging, carting, road and track construction, clearing operations (including the construction of clearing benches) shall be totally suspended from the 1<sup>st</sup> of May to the 1<sup>st</sup> of November unless otherwise specifically varied by the Soil Conservation Authority. The carting of materials and stock for planting operations is exempt from this suspension. However additional periods of temporary suspension of operations shall be observed by all during periods of heavy rain and for such periods thereafter as those operations would be detrimental to water supply interests. This is while ground conditions are soft enough for the surface to be broken by vehicles.
6. No log or pulpwood landing shall be located within ½ chain of the edge of the buffer zones running alongside the stipulated streams and watercourses.  
  
The location of all landings shall be approved by the Soil Conservation Authority. When the using of any landing is completed, and at the end of each logging season, the disturbed area shall be levelled and drained so that runoff is directed into the surrounding vegetation.
7. No fuel dump shall be located and no tractor servicing effected within five chains of any stream, all waste oils shall be removed from the catchment area.
8. Clearing, burning, forest utilisation and earthworks of any description excepting those for approved crossings, shall be excluded from the following reserved areas:-
  - a) The area within five chain radius of the diversion weir.
  - b) A strip of three chain minimum width along both banks of the main course of Billy's Creek upstream from the weir and continuing along its southern arm to the south-west corner of CA 12E parish of Jumbuk and along the north arm of the point where the main forest road crosses this arm north of CA 12F.
  - c) A strip of two chain minimum width along both banks of all major tributaries of Billy's Creek.
  - d) A strip of one chain minimum width along both banks of all specified watercourses as shown on Plan No. 1870.
  - e) The width of any strip or section thereof along a stream or watercourse may be increased where an officer of the Soil Conservation Authority considers this necessary for the effective stream protection.
9. Trees which cannot be felled and extracted without encroachment on areas (d) and (e) above, shall not be felled. Any heads or trees or logs resultant from any clearing or forest operation and which fall into either of the above areas, shall be immediately removed in a manner satisfactory to the supervising officer.
10. After planting has been completed, any soaks, drainage lines, interrupted by the construction of clearing benches, shall be opened up to allow uninterrupted flow of the water within its original course.

11. Fill slopes and track surfaces where required by the Soil Conservation Authority shall be sown down to prevent erosion.
12. The establishment on reserved forest of any sawmill or of any industry for the purpose of converting timber to manufactured products shall be provided.
13. No camps or living quarters, whether temporary or permanent, shall be established on reserved forest.
14. Adequate sanitary facilities shall be provided at all places where men are required to work and shall be located not less than two chains from the edge of the buffer zones as stipulated. Location and type of construction shall be subject to approval of the Soil Conservation Authority.

### **Summary**

The request filed by A.P.M. Forests Pty. Ltd in April 1966 with the Town and Country Planning Board under the Latrobe Valley Sub-Regional Planning Scheme 1949, Extension "A" 1964 for the clearing of C. A. 19 Parish of Jeeralang, gave urgency to the preparation of this Land Use Determination and Management Prescription.

It is obvious to all who observed the Company's clearing operations during 1960-64 that the same cannot be condoned in a Proclaimed catchment.

Unfortunately, there are no early records available to compare the change in water quality brought about by these operations. The sampling started recently by the Latrobe Valley Water and Sewerage Board show the following:- (For comparison the Mondarra Reservoir water analysis is included.)

DATE	Billy's Creek Flow cusec	Billy's Creek pH	TURBIDITY SiO <sub>2</sub> ppm		SUSPENDED SOLIDS ppm	
			Billy's Creek	Mondarra	Billy's Creek	Mondarra
25/7/66	11.7	7.7	30	11	26	10
22/8/66	31	7.1	80	9	191	10
26/9/66	14	7.3	110	12	62	7

The World Health Organization set the International Standard for Drinking Water for turbidity at between 5-25 ppm as permissible.

The above figures resulted following 12 months inactivity in the catchment. It is expected that uncontrolled clearing and road construction operations will markedly increase the already high turbidity and sediment load figures. Indeed, even under controlled operations with the already existing damage it is difficult to see how this water could be used satisfactorily without the addition of a coagulant. The Board also installed a stream flow recorder. Situated above the Jeeralang Junction bridge it is about 1¼ miles downstream from the weir. In time this station will give more representative figures relating to the proclaimed area than the SEC station.

Measurements at the Board Station show a summer flow between 0.6 and 2 cusecs. Considering that dam sites obtainable in this narrow steeply graded valley are most expensive and that by 17970 Billy's Creek will be required to supply the needs of about 5,000 persons the problem of water yield in view of the proposed changes in land-use needs very careful appraisal.

In Ohio the summer streamflow from a plantation in the first 6 years after planting exceed 5 litres per sec per sq km 90% of the time, from 12-15 year old pines the same flow was exceeded 40% of the time. (Johnson Meginnis, 1961.)

In the Coweeta catchments the stream took before cutting an average of 38 days to reach a low flow of 6 litres per sec sq km. While after cutting it took 60 days to reach the same low flow.

Mr R A Horsfall in his "City Water Supply Practice in the UK and Europe" 1964 gives his own observations in the Lake Vyrnwy pine forests as well as some of the figures of F Law's experiments in the Hodder Catchment spruce forest and concludes that "it would seem that we can no longer assume that forestry development in catchments is a good thing from the annual water production angle".

As a district officer of the Soil Conservation Authority for nine years in Gippsland I have had occasion to observe stream behaviour below pine plantations and am in agreement with these cautionary findings.

In the CSIRO Annual Report 1965-66 the Division of Soils has published the following:

"The recharge of shallow ground water beneath the Gambier Plain, north of Mt Gambier, SA has been followed each year since 1960. Already it appears that about 10% of an annual rainfall of 30 inches will infiltrate deeply enough into the soil to recharge the ground water under pasture land. Under forest the recharge is less, because forests tend to evaporate more water than pastures. When the results have been fully analysed they should reveal important principles that may guide the management of water-yielding catchments for optimum use of land and water."

In view of the above and in the interest of both quality and quantity of the water supply Council may consider that recommendation that:

Plantation forests be limited to slopes not exceeding 19° or 1:3.

In case of acceptance the wording of Cat. No. 2 of the Land Use Determination will be altered to incorporate this limitation placed on forest plantings.

A P FISHER  
Catchment Investigation Officer