

**RUNNING CREEK
WATER SUPPLY CATCHMENT
(HURSTBRIDGE WATERWORKS TRUST)
PROPOSED PROCLAMATION**

A Report Prepared for the Consideration of the
Soil Conservation Authority, and the
Land Conservation Council

Catchments Section
Soil Conservation Authority

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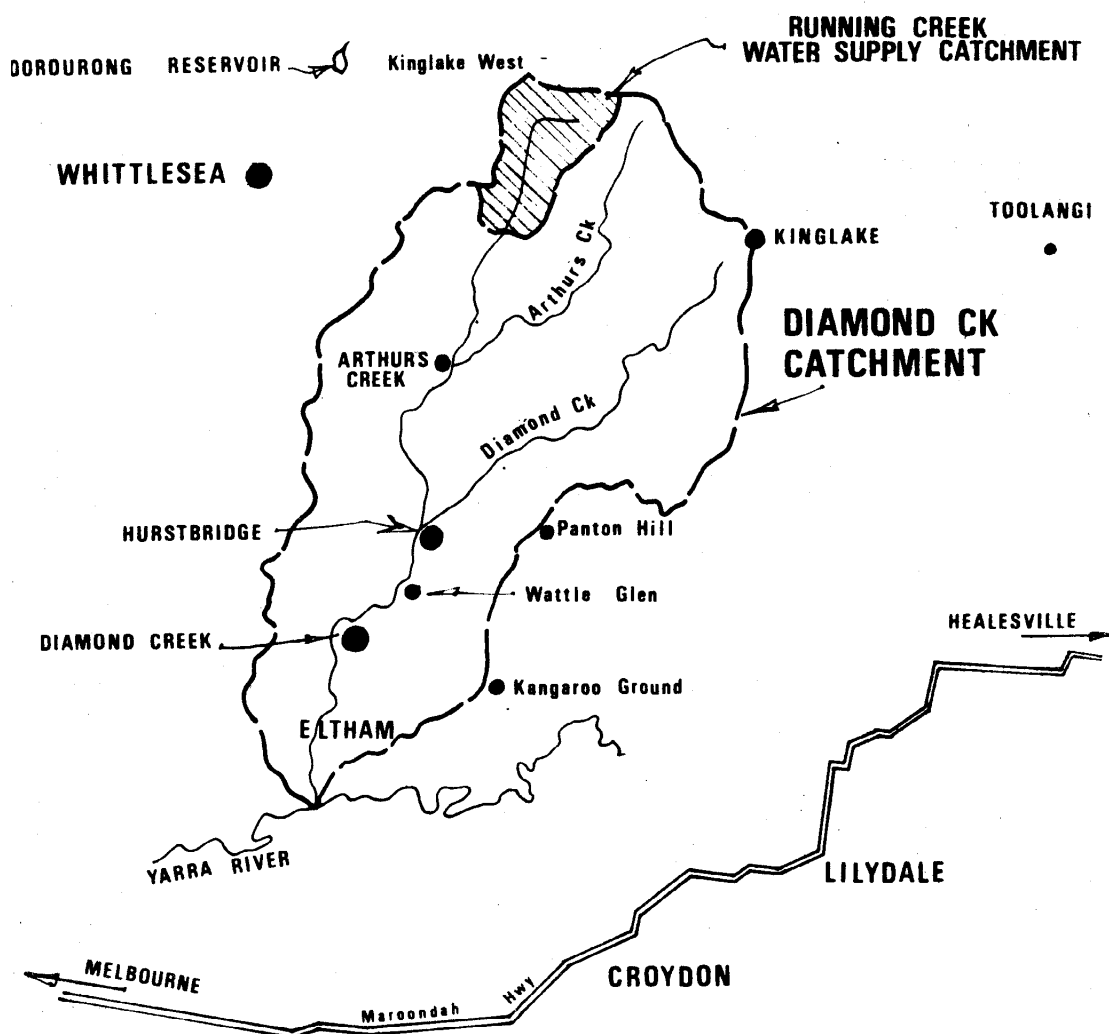
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Running Creek Water Supply Catchment

LOCALITY PLAN



RUNNING CREEK

"When you drink from the stream, remember the spring" - Chinese proverb**

1. INTRODUCTION

In 1974 following the unusually heavy rains of April and May severe deterioration occurred in the quality of water received from the catchment to Hurstbridge Waterworks Trust storage. The situation was referred to the Soil Conservation Authority and joint inspections and discussions occurring the catchment were held with Hurstbridge Waterworks Trust Officers, Consulting Engineers and Authority Officers. The basis of these discussions was to initiate action for improved management of catchment land.

Several proposals, including proclamation of the catchment, were put forward during this period. Subsequently the Trust made a formal request to have the catchment proclaimed under the provisions of the *Land Conservation Act* and the *Soil Conservation & Land Utilization Act*. In May 1974, Council requested the Authority to make an investigation and prepare a report.

At that time it was considered that the immediate opportunity for improvement in catchment management on particular properties should be taken without the need to await formal proclamation of the catchment. The Authority therefore embarked on a program of upgrading development and management techniques on a co-operative basis with those landholders known to have specific land management problems.

2. SUMMARY

Investigations into land use within this catchment have been carried out by officers of the Soil Conservation Authority since June, 1974.

In co-ordination with planning authorities and by direct contact with landholders, attempts have been made to achieve improvements in the condition of the catchment in the short term.

Maintenance of stable catchment conditions in the longer term will be facilitated by proclamation, and this report recommends that this step be taken. No proposals are made for the Authority to issue a Land Use Notice or make a Land Use Determination at this stage. The need for such action in future will depend on the extent of the changes in land use which are proposed in the next few years, and the Authority's effectiveness in dealing with the catchment in an advisory, rather than regulatory, capacity.

Additions and changes to the water supply system are likely within the next few years, and policies of catchment management may have to be changed accordingly.

3. THE SUPPLY SYSTEM

Construction of the Trust's main storage on Running Creek was completed in late 1964. The 273 ML dam is located within the western section of the Kinglake National park. From the storage, water gravitates via a 300 mm diameter pipeline to a 4.5 ML service reservoir situated at Hurstbridge. From there, supply is reticulated to the expanding outer suburban areas of Wattle Glen and Hurstbridge.

Water from the pipeline is also taken to service Arthur's Creek and is raised some 59 m to provide supply in Panton Hill and Kangaroo Ground from service tanks.

At times there may be only minimal detention of catchment waters before use at Arthur's Creek, Panton Hill and Kangaroo Ground. Consequently deterioration in catchment conditions can be reflected in supply to these centres, emphasising the need for improvements to be made in the quality of supply.

In all, approximately 4,500 consumers are supplied. The greater proportion of these are domestic users with stock and industrial taking the balance.

Water analyses are made regularly and the observed condition supports the point that water quality deteriorates after heavy rains. No general trends have been noted in the bacteriological or physical analyses since they were commenced in 1972.

* Copyright: Bunch of Dates Thursday Dec 9th 1976.

Hurstbridge Waterworks Trust is at present considering alternative proposals to augment the supply. Each of these includes the provision for full treatment of the water.

4. THE CATCHMENT

4.1 *Locality*

Running Creek, Arthur's Creek and Diamond Creek provide the main source of perennial flows within the Diamond Creek sub-catchment of the Yarra Valley and these waters enter the Yarra at Eltham. The Running Creek Water Supply Catchment with a total area of approximately 2,000 ha is situated within the headwaters region of this Diamond Creek sub-catchment (see Locality Plan). The general locality of the catchment is considered to be Kinglake West.

Running Creek Reservoir is situated adjacent to Allotments 90 and 93 in the Parish of Linton. From this point the catchment extends some 6 km upstream to the main Kinglake-Whittlesea Road which traverses the Great Dividing Range in this area. Roads also border the eastern and western boundaries for almost all their length.

For all practical purposes the catchment falls within the Shire of Whittlesea and covers part of the Parishes of Kinglake and Linton, in the County of Evelyn.

The catchment terrain ranges from the gently undulating plateau country in the north to the steep gorge-like valley of Running Creek. The rugged nature of the catchment is typical of the southerly slopes of the Divide in this region where stream grades are high, having reached bedrock in many situations. Main topographic features are Mt. Sugarloaf (with lookout) and Mason's Falls in the National Park.

4.2 *Climate*

(Ref: Climatic Survey of Region 10: Port Phillip, Victoria)

Climatic data is presented in Appendices A & B.

(i) *Precipitation*

There is a predominant westerly component of weather enhanced by the steep rise in elevation from the lower foothills to the plateau surface accounting for the pattern of rainfall on or about the plateau.

At Toorourong Reservoir (244 m elevation), some 8 km west of the catchment, the annual rainfall reaches 800 mm. Kinglake (541 m elevation), a similar distance east of the catchment, receives 1,200 mm annually. In effect, there is a sharp gradient in average annual rainfall from south-west to north-east. By interpolation of this rainfall gradient, an annual rainfall of 1,000 mm could be expected at Running Creek reservoir and some 1,200 mm could be expected at the catchment boundary in the north-east (530 m elevation).

Kinglake West is in an area of reliable rainfall.

Typically, winter and spring are the wettest seasons. There is more than a 50% chance of receiving more than 50 mm of rain each month, and the same chance of receiving over 250 mm each season except summer (for which there is approximately 46% chance).

(ii) *Temperature*

Temperature data is available for Toolangi, 50 km to the east of the catchment, but also situated on the southern edge of the Great Dividing Range (602.9 m elevation). It is expected that the trends observed in the temperature data at Toolangi (refer Appendix A) approximate that of Kinglake West. The highest temperature can be expected in February and the lowest in July. Temperatures become lower with increased elevation, but there is probably little difference due to elevation in this catchment. Similarly frost incidence increases with elevation but is also greatly influenced by the local topography (i.e. more prevalent in highland valleys). The Potato Research Station at Toolangi has recorded about 20 frosts annually in this area.

(iii) *Growing Season*

The probability of receiving effective rainfall and maintaining plant growth within the catchment has been interpolated from recording stations at Kinglake, Toorourong and Toolangi and is tabulated in Appendix B.

For the catchment area there is no break in the growing season based on a calculation of effective rainfall. However, monthly mean temperatures below 10°C occurring on the average between May and September, retard plant growth over these months.

Considering all factors affecting the growing season, plant growth could be expected for 8-9 months, with restricted growth due to cold conditions during the months of June, July, August and September. In the case of pasture development, local farmers have commented that good autumn rains are critical to enable some carry-over growth into the cold winter months.

4.3 Geology and Topography

The bedrock of the area forms part of the great Central Victorian belt of Silurian/Lower Devonian sediments. These consist mainly of closely folded marine deposited siltstones and claystones.

The main topographic features are the undulating plateau to the north (the Kinglake Plateau) and the steep erosional escarpments bordering this plateau in the south. The catchment is bordered on the west and east by two narrow spurs, extending southward from the plateau. These exhibit the basic terrain characteristics of the gently undulating plateau of the northern section of the catchment.

Jointing is also highly developed in the thickly bedded siltstone/claystone sediments and Running Creek is an example of local drainage control by jointing. Southward flowing streams have developed very steep gradients as they flow from the plateau over the steep escarpment, and Running Creek has developed a gorge-like valley upstream of the reservoir in this deeply incised area on the western border of the Kinglake National Park.

4.4 Soils

The plateau surface exhibits basically yellow and red gradational soils within the catchment. The red soils in particular are widespread over the plateau country. Characteristically, their structure is suitable for cropping but due to acidity and low natural chemical fertility, under intensive cropping conditions heavy fertilizer inputs are needed.

Yellow gradational soils have formed on lower elevations (southern areas of the Kinglake plateau) and generally have a more sandy surface which grades with depth to a medium clay. Structure is often poor but permeability and water holding capability are moderate. They are also acidic with low natural fertility.

Shallow stony soils occur in erosive situations in hilly country. They show stony profiles (loamy surfaces with light clay subsoils) and are frequently less than 30 cm in depth. They exhibit weak structure, high permeability, low water holding capability, and acidic reaction throughout the profile and are of very low natural fertility.

4.5 Vegetation

The better soils of the Kinglake Plateau generally carry a mountain ash/messmate stringybark association and this grades into a moderately tall (28 - 40 m) open forest of messmate stringy bark and mountain grey gum on the lower elevations of the plateau. These species, with some narrow-leaved peppermint, broad-leaved peppermint and manna gum constituted the basic overstorey species of the plateau country including that within the catchment. Most of this country has now been cleared for agricultural development and the native vegetation replaced by crops or introduced pasture species.

In the steeper country leading to the foothills the dominant species are still messmate stringybark and narrow-leaved peppermint in association with candlebark, broad-leaved peppermint and manna gum in the valleys. The steeper sections of the catchment frequently have shallow soils and this is reflected in the poor form and greater openness of the canopy. Here red stringybark occurs in association with broad-leaved peppermint, long-leaved box and red box. Ground cover is more sparse consisting of low shrubs and native grasses. Messmate stringybark may also occur in these dry areas in a stunted condition. Generally ground cover is adequate for catchment protection under the present land use regime.

A fuller account of the native vegetation expected on and about the catchment is described in the relevant sections of the Land Conservation Council's "Report on the Melbourne Study Area", produced in December, 1973.

4.6 Land Tenure

(a)	Public Land	
	National Park	700 ha
	Unalienated Crown Land	200 ha
(b)	Freehold Land	1,100 ha

Crown land comprises a forested area in the south-west of the catchment, taking in portion of allotments 90, 91 and 93 adjacent to Running Creek. Council has proposed in its recommendations for the Melbourne Study area that this land be included in the Kinglake National Park to be managed by the National Parks Service.

A further point relating to Crown land concerns the road reserve passing through the park from north to south. In 1963, the then National Parks Authority suggested to the Crown Lands Department that this road be closed. Although the Country Roads Board raised no objection, the Whittlesea Shire objected on the grounds that (i) it provided alternative access from Arthur's Creek to the plateau, and (ii) a stock route could be developed when funds became available. Since that date the area has been developed as a domestic water supply catchment and with alternative access from Arthur's Creek to the plateau possible via Bowden Spur Road these objections may now have little relevance.

In any event, land disturbance is likely to affect water supply quality, as the proposed alignment crosses slopes of 40-50% with numerous gully crossings. This will be investigated further to determine the present situation.

5. PRESENT LAND USE IN RELATION TO WATER PRODUCTION

5.1 *Freehold*

Land use on and about the Kinglake Plateau is traditionally associated with cropping, horticulture and forestry. There is no Reserved Forest within the catchment and past clearing operations have removed the best stands of merchantable timber. Forestry operations are now confined to the remaining areas which have yet to be developed for agricultural purposes. These areas are bordering on the steeper escarpment country on poorer soils south of the Kinglake Plateau.

There is a need for planned clearing operations to ensure water supply interests are considered.

Significant clearing of land has taken place since the Trust's storage was constructed in 1964, both before and following the introduction of the Melbourne & Metropolitan Board of Works planning controls. This period coincided with a stimulus to expand existing or develop new farming enterprises, modified to a large degree however by the knowledge that the new controls prohibited the clearing of native vegetation. (MMBW Extension Area No. 1 Clause 13).

There have been several examples of undesirable clearing of steep slopes and drainage lines, and subsequent neglect of these lands has led to pronounced soil losses from sheet and gully erosion. The large sediment deposit at the entry of Running Creek to the Trust's storage would in part be the result of this erosion.

Originally, development has been basically confined to land where red soils of the plateau predominate or about the catchment perimeter. Since 1964, other lands with a lower productive potential (due principally to topographic and soil limitations) have been applied in the establishment phase.

A combination of economic constraints, loss of fertility, erosion of topsoil and overgrazing has in some cases resulted in poor establishment of pasture cover. These are the situations in which the Soil Conservation Authority has been involved since 1974.

Grazing, as a separate enterprise or in combination with cropping, is the predominant use of land developed to date, and this is unlikely to change within the foreseeable future. Providing a high level of management is maintained, this land-use would not be expected to be a significant source of sediment or turbidity in the water supply.

In the majority of instances grazing stock do not have direct access to the main stream, although there is a potential for faecal contamination within the tributaries of Running Creek.

The predominant crop is potato growing which was previously confined to the better soils of the plateau. As farming enterprises expand cropping is now being undertaken on poorer marginal country, with a longer pasture phase in the rotation. Other cropping is restricted to initial fodder crops on newly developed land. Irrigation of these crops in many instances is highly developed and large water storages for this purpose are common.

From a water quality aspect the small amount of farmland subdivision is of little consequence as these are scattered about the catchment perimeter, generally away from hazardous land. Of greater concern are the forty 0.2 hectares lots being developed on the eastern ridge. Runoff from this area is consequently increasing in volume and suitable provisions will need to be made in roadside table drains to handle these flows. There has been a history of inadequate provision for drainage in this area resulting in scouring of table drains.

Elsewhere in the catchment land use and management have been controlled to a certain degree by the presence of the National Park and the lack of direct access through the catchment. Roding does not produce the level of problems shown in other water supply catchments, and it is considered that a major hazard from such use is unlikely within the foreseeable future.

5.2 *National Park*

Although reserved for passive recreation purposes, conflict may well arise between National Park and water supply interests in the management of the park.

The concentration of visitors at the picnic area adjacent to Running Creek offers little protection to the water supply as Running Creek, Mason's Falls and the walking tracks adjacent to the creek comprise the principal attractions in this section of the park. The problems of bacterial contamination is probably best controlled by the introduction of water treatment and this is consistent with a policy of multiple land-use within the catchment. Of equal concern is the problem of turbidity and sedimentation arising from the picnic area. It would be appropriate when these facilities are being extended to include measures for protection of the stream from runoff from this area. The provision of such measures will be taken up with the National Parks Service.

6. **DISCUSSION AND IDENTIFICATION OF THE PROBLEM**

There is little doubt that this catchment is capable of producing a considerable quantity of acceptable quality raw water. It is situated within a zone of high and reliable rainfall. Due to the topographic form of the headwaters region, a large section of the groundwater resources of the plateau are shed into Running Creek catchment giving supply a perennially not always shared by adjacent catchments.

6.1 *Nature of the Problem*

The main problem centres around the development of country inherently unsuitable for agricultural production. A certain amount of sedimentation is already occurring however, as some loss of topsoil is associated with the cultivation practices and the existing agricultural uses of the development land.

Subdivisions have not created undue problems at present although development of the residential areas on the eastern ridge and associated provision for runoff and effluent disposal will need to be supervised. Similarly, the potential conflict between the development of recreation facilities in the National Park and production of suitable quality water will require Authority involvement.

6.2 *Solutions*

Development within the catchment has not reached the stage where stream capacity is insufficient to cater for above-average storm events, and the retarding effect of the remaining native vegetation can be expected to control such occurrences. Retention of this vegetation on freehold land would therefore be desirable and in many instances necessary, to maintain a stable catchment condition.

A worsening of stream sedimentation will also be prevented by controlling the areas which are to be developed. Areas of steep slopes exhibiting shallow, infertile and stony soils are inherently unsuitable for agricultural development and should remain timbered.

Management of existing cropping land can be upgraded so that soil losses are reasonably reduced. It is also in the farmers' interests to prevent gross breakdown of soil structure and soil loss after heavy rains so that this land resource is conserved and available for use on a long-term basis. These problems may be best overcome by education and an extension approach.

6.3 *Reasons for Proclamation*

Proclamation of the catchment will open the way for future investigations to be made by Authority officers into land use, and will provide a stronger basis for their advice to landholders concerning land use and management. The mitigation of erosion can best be achieved by these means.

The Authority will also have more opportunity to comment on proposed changes in land use, including subdivisions, mining operations and extractive industries.

7. RECOMMENDATIONS

That the Running 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*.

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Appendix A - Mean Temperature

Site	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1953 - 1974 Toolangi (Potato Research Station)												
Mean Max	23.1	23.5	20.5	16.1	11.6	9.6	8.6	9.7	11.8	15.6	17.5	20.5
Mean Min	11.0	12.3	10.6	8.6	6.2	4.5	3.6	4.0	4.9	6.7	7.6	9.5
Mean Monthly	17.05	17.9	15.55	12.35	8.9	7.05	6.1	6.85	8.35	11.15	12.55	15.0
Kinglake West (form interpolation of temperature map)												
Mean Max	23			17.5			10.5			17.5		
Mean Min	10			7.8			3.3			6.1		
Frosts: First frost would be expected about mid-March and the last in the first ten days of October. Approximately twenty frosts can be expected each year.												

Appendix B: Rainfall Data - Mean Rainfall (mm)

Site	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1896 - 1969 Toolangi (Potato Research Station)													
Mean Rainfall	73	76	83	101	107	111	111	115	111	118	105	98	1209
Median Rainfall	55	67	61	81	90	99	105	119	103	110	98	81	1069
Mean number of Raindays	8	8	10	12	14	16	17	16	14	14	12	10	151
Probability of receiving effective rainfall (%)	69	68	73	95	98	100	100	100	99	93	95	78	
Kinglake West (form interpolation of temperature map)													
Mean Rainfall	54	57	58	67	70	65	65	72	74	81	69	67	799
Median Rainfall	48	44	42	59	63	57	63	68	68	78	62	57	709
Mean number of Raindays	8	7	9	11	13	14	16	16	14	14	11	10	143