Geological Survey of Victoria

General Groundwater Resources of the Gellibrand River Catchment Area: Report prepared for The Parliamentary Public Works Committee - Gellibrand River Inquiry

Roger Blake

Geological Survey of Victoria
Unpublished Report 1979/14

DEPARTMENT OF MINERALS AND ENERGY

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INTRODUCTION

The northeast flanks of the Otway Range are covered with outcropping sandy sediments known as the Wangerrip Group (see Fig. 1). The Wangerrip Group sediments are of Lower Tertiary age (Palaeocene to Lower Eocene) and contain the major confined aquifers of the Otway basin.

These outcrops are the main intake areas for the confined aquifers of the Otway basin. Hydrogeologically the intake areas can be subdivided into two main areas - the Barongarook intake area and the Gellibrand River intake area.

The Barongarook intake area

This area comprises the main outcrop of the Wangerrip Group in the Barwon Downs sub-basin. The detailed geology and hydrogeology of the Barwon Downs sub-basin has been presented in three Geological Survey of Victoria Unpublished Reports prepared for the Geelong Waterworks and Sewerage Trust (Blake, 1974 a & b; 1978).

Water intakes in the Barongarook area and flows in two main directions from intake - to the northeast and to the southwest. Water flowing to the southwest discharges through outcropping aquifer sands in the valley of the Gellibrand River. Part of the base flow of the Gellibrand River is therefore supplied by groundwater from the Barwon Downs sub-basin. The Barwon River catchment area fairly closely matches the Barwon Downs sub-basin in extent but the subsurface flow via the Wangerrip Group aquifers takes water out of the Barwon River catchment area into the Gellibrand River catchment. Figure 2 shows the inferred groundwater flow directions in the Barwon Downs sub-basin.

Pump test results show the permeability of sands in the Wangerrip Group varies from 5 to 10 m/day with an average value of about 7 m/day.

The water in the Wangerrip Group aquifers in the Barwon Downs area is of excellent quality (200 - 300 mg/l T.D.S.) tends to be high in dissolved iron and low in pH.

2/-

The Gellibrand River intake area

The Gellibrand River flows for most of its tract over outcropping Wangerrip Group sands. Between the township of Gellibrand and the coast at Princetown it flows entirely over Wangerrip Group except at two locations near Gellibrand - one just upstream and the other downstream. At the upstream location an Older Volcanic plug of basalt (dated by K/Ar at 28 million years) has forced a diversion of the Gellibrand River. The Gellibrand River has eroded a deep valley around the plug through the soft sands of the Wangerrip Group.

Downstream of Gellibrand the river flows for a short distance between another Older Volcanic plug (Bunkers Hill) and outcropping Otway Group (Lower Cretaceous) sandstones. This short portion of its course would be the only part of its entire length (after it emerges from the Otway Range itself) where intake does not take place to the Wangerrip Group sands. Both of these basalt localities have been considered as possible damsites.

The permeability of sands in the Wangerrip Group along the Gellibrand River is similar to that in the Barwon Downs sub-basin although locally much higher values will be present.

Groundwater intakes along the entire length of the Gellibrand River from just north of the township of Carlisle River to the coast. The groundwater gradients are not as well known as in the Barwon Downs sub-basin but the general groundwater flow is in a southwesterly and westerly direction away from the river. The average groundwater gradient between Carlisle River and the Coast is controlled by the gradient of the Gellibrand River and will not exceed the average gradient of the river between Carlisle River and the coast.

Local discharge or recharge may take place throughout the entire Wangerrip Group outcrop area because of the dissected nature of the outcrop.

The quality of groundwater in the Gellibrand River intake area is excellent with salinity values as low as 100 mg/l T.D.S.

3/-

The Gellibrand River intake area provides all the underground water in the deep artesian aquifers between the Otway Range and Warrnambool to the west. Figure 2 also shows a tentative groundwater flow map based on piezometric data currently available for the Port Campbell sub-basin (which contains the deep artesian aquifers). Groundwater flows in a generally west and southwest direction from intake.

The deep artesian aquifers at present provide water for the townships of Peterborough, Port Campbell and Timboon on the eastern side of the Otway Basin. On the western side of the basin the deep aquifers supply Portland, Port Fairy and Heywood in Western Victoria and Mt. Gambier and several other towns in South Australia.

In the Port Campbell sub-basin the steep confined aquifers can be considered to be virtually undeveloped with the exception of the above-mentioned townships.

REFERENCES

Blake, 1974 a. Notes on the geology of the Barwon Downs Area. Geological Survey of Victoria, Unpublished Report 1974/29.

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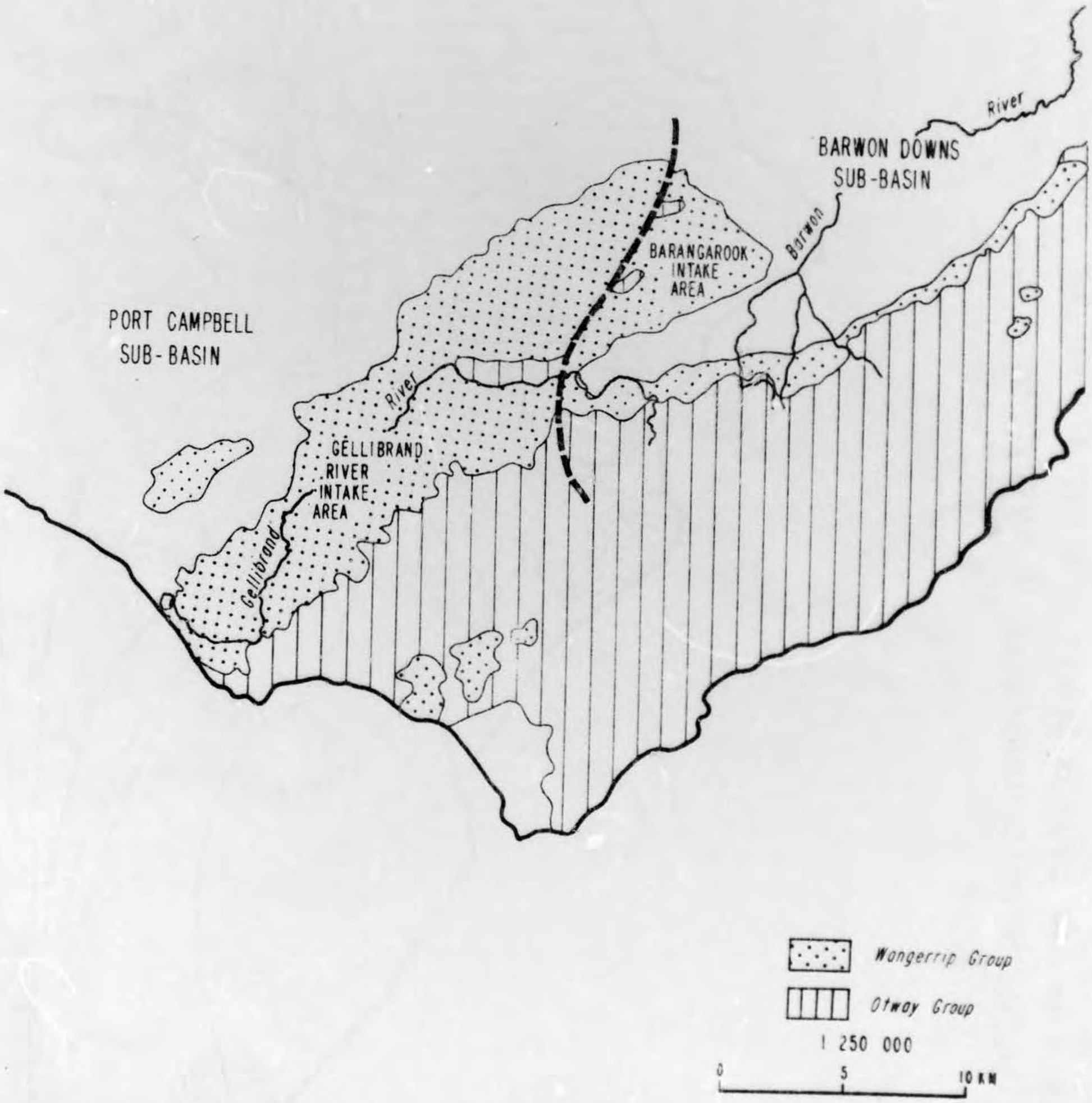

FIG. 1 GEOLOGICAL MAP SHOWING OUTCROP DISTRIBUTION OF WANGERRIP GROUP IN THE GELLIBRAND AND BARWON RIVER CATCHMENTS

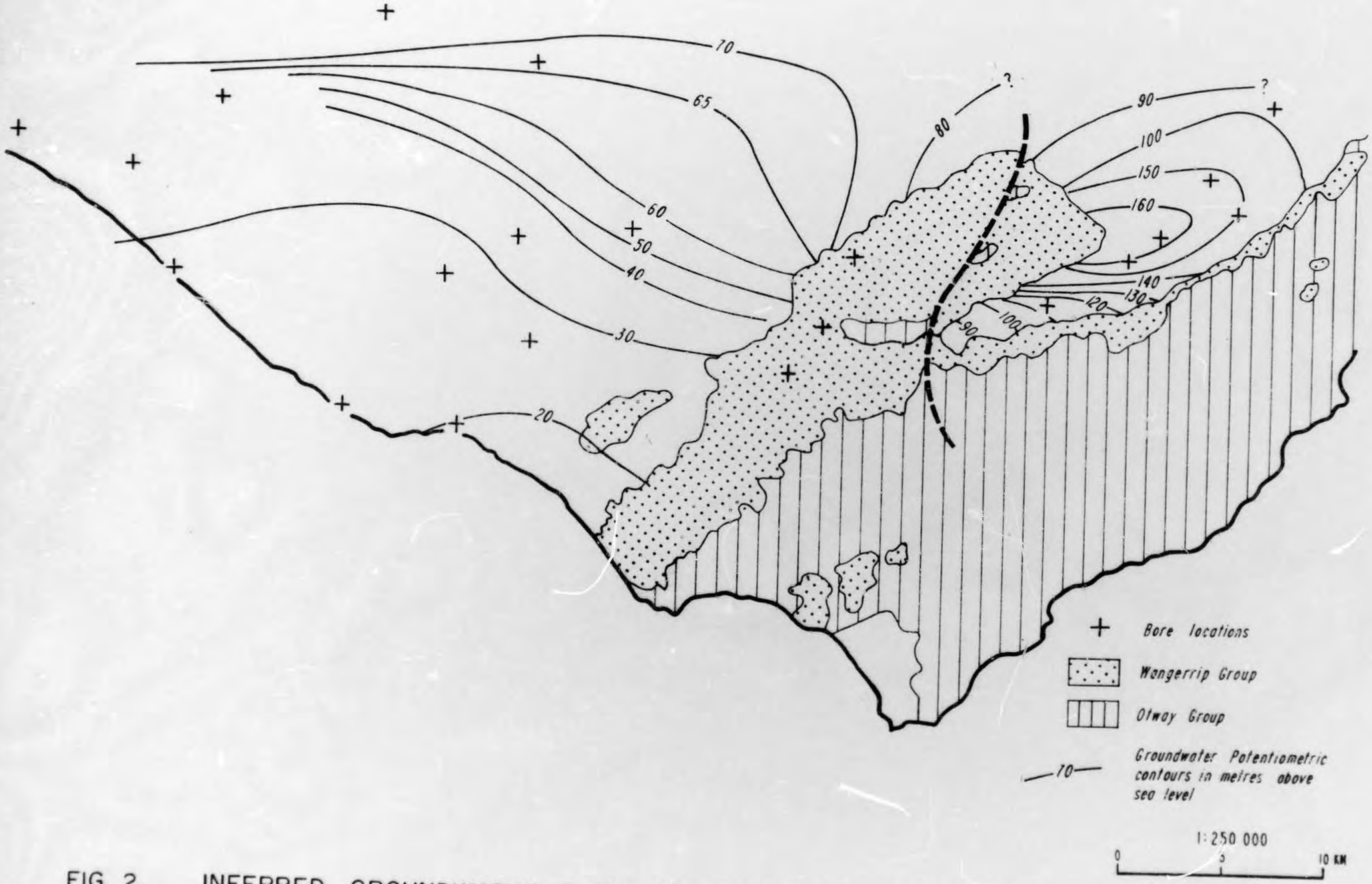

FIG. 2 INFERRED GROUNDWATER FLOW DIRECTIONS IN THE WANGERRIP GROUP AQUIFERS IN THE BARWON DOWNS SUB-BASIN AND THE PORT CAMPBELL SUB-BASIN