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TITLE: SOUTH CANNING DAM SITE -  
A PRELIMINARY APPRAISAL.

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SOUTH CANNING DAM SITE - A PRELIMINARY APPRAISAL

by

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## INTRODUCTION

The South Canning dam site is one of the several locations that are currently under investigation by the Metropolitan Water Supply Branch of the Public Works Department. The proposed dam, of earth fill design, is situated on the turn of a very conspicuous right angled bend in the South Canning River. Both straights are wide compared with adjacent channels, and are occupied by deep pools (Refer Army 1 mile to an inch Jarrahdale 227098).

Based on the examination of drive samples from six boreholes and a brief visit to the area on 10/9/62, a few preliminary observations on the site are recorded.

## DRILLING RESULTS

Fourteen auger holes were put down with a Gemco drill, and drive samples at 5 foot intervals from six of the holes were available for examination. Bore logs of all the holes were also plotted by the M.W.S.S. & D. Dept. engineers, and this information is largely incorporated in this report.

Of 12 bores situated round the bend in the river and a short distance from it, the three bores at the northern (upstream) end encountered weathered granitic material to a depth of 54-58 feet; there was weathered dolerite over dolerite at 50 feet in the next hole; the next three bores showed an undulating dolerite surface between 16 and 27 feet; and the remainder of the holes revealed high level (17 feet - 22 feet) granite. The picture thus presented indicates a dolerite dyke intruded into granite with strong displacement

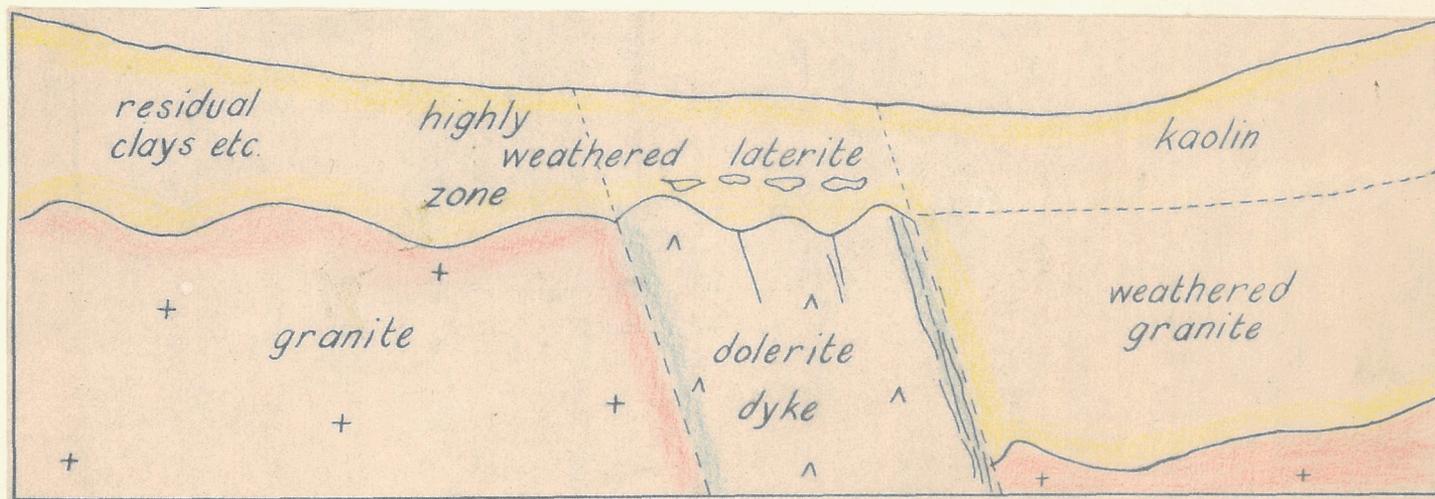


Fig. 1.

on a fault cutting the northern contact. (Fig.1). There is

a further possibility of faulting down the contact, with shattering of the adjacent dolerite, and the granite down thrown vertically.

The accelerated weathering due to a high standing but fluctuating water table has enabled the reduction of the upper portions of the rock materials to very fine sizes. Exceptionally, lateritized nodules have remained unaffected, but the feldspars, quartzes and micas have, in some instances, been taken to the kaolin stage or beyond. There is some correlation between the colour, size and strength of the residual materials, and as a rough guide it may be stated that all material with a blue or grey colouration should be regarded as suspect as a foundation material, which would involve the removal of most of the weathered soil materials down to about 20 feet below the ground surface. This would mean that solid was exposed over the down-stream half of the foundation area.

#### SITE GEOLOGY

Brief surface examination has enabled the drawing of a geologic sketch plan (Fig.2). The dolerite dyke encountered in the drill holes strikes N.E. and appears to be displaced horizontally about 120 feet by a fault that trends roughly E.W. along the second straight of the right angled bend of the river.

Following along the surveyed centre line of the dam, commencing on the right hand bank, the following sequence is observed:

- (i) exfoliating granite mass, tabular outcrops sloping to river;
- (ii) South Canning River - <sup>(fault)</sup> controlled, <sub>(joint)</sub> deep pool in granite;
- (iii) left hand bank - deep weathering, over 50 feet in granite;

- (iv) fault zone - no more than 2 feet wide deeply weathered granite;
- (v) fault zone at edge of dolerite - deep weathered dolerite;
- (vi) dolerite - high level beyond Bore Hole 9.

This means that the core wall would be founded on different materials along the centre line, and also that the downstream side of the core wall would be founded on high-level dolerite (20 feet) while the upstream side was on decomposed granite, as shown by the dotted line on Fig.1. This situation is most undesirable as differential settlement could lead to rupture of the core wall.

#### SITE APPRAISAL

It is suggested that the core wall be placed entirely on the high level granite and dolerite on the southern, or left hand bank of the river. This would involve a downstream shift of the centre line of about 80 feet, and the sequence along the proposed centre line would be :-

- (i) Right hand bank, exfoliating granite mass, possible minor dolerite dyke;
- (ii) River, granite outcrops almost continuously across bed;
- (iii) Fault, less than 2 feet wide;
- (iv) Left hand bank, dolerite dyke - undulating surface, high level;
- (v) Left hand bank, granite - high level.

The fault offsetting the dolerite will be a possible leakage path, and will have to be grouted. It is not thought likely that the affected area would be more than 2 feet wide. However, a diamond drill hole from just below 6B, at right angles to the river, and extending across underneath it, would be valuable in assessing leakage conditions.

On the massive granite of the right hand bank and river bed, and on the dolerite dyke, a concrete cut-off wall will be desirable to fit in with the core wall. The jointing pattern thus far seen suggests that there is some strong

jointing in the vicinity of the fault, but otherwise the granite is most massive. The only horizontal joints are the exfoliation surfaces, which are strong, but widely separated. A diamond drill hole from the right hand bank commencing in granite and angled underneath the river to intersect the fault say 50 feet downstream of the No. 1 hole already suggested, would provide evidence of possible leakage through any large exfoliation joints.

Future work of an investigational nature would involve accurate geological mapping and appraisal of the finally chosen site and the drilling of two diamond drill holes, each about 100 feet long at a depressed angle of  $30^{\circ}$  with full core recovery essential. It is suggested that the drilling precede the geologic appraisal to allow assessment of rock jointing and thus of remedial grouting.

APPENDIX

EXAMINATION OF BORE HOLE MATERIAL

DRILLHOLE No. 4:

35' Cream and brown coarse grained material, brown mica prominent, large quartz and decomposed feldspars, coarse grain suggests pegmatite. Rock slightly incoherent.

DRILLHOLE No. 5:

20' White and dark grey medium grained, rather soft material, consisting of abundant mica flakes, and decomposed feldspars, some 1/4" or less quartz. Granite with basic lenses.

DRILLHOLE No. 6:

10' Mixture of rusty brown, iron stained material, fairly fine grained and a mottled light blue to dark blue, very fine grained, plastic clay. In brown material occasional nodules of laterite and lateritised fragments. Transition between clay and lateritic material abrupt. Probably represents dolerite dyke material fairly close to bed rock, but highly weathered.

20' Consists entirely of dirty brown ferruginized fragments set in fine grained clay material. All fragment surfaces show moisture, near bed-rock conditions, rock probably dolerite.

DRILLHOLE No. 7:

10' Mixed grey and light-blue fine-grained, occasional white nodules, plastic material, with some 1/8" quartz fragments. Shows tree root fragments, most components within sand grain size, with mica fairly prominent. In situ weathering of basic schist lens ? 5% white nodules, which are decomposed feldspars and quartz.

- 20' White material about 50% light green blue. Fine grained and coarse grained fragments. Quartz coarse grained fraction, mica and feldspar fine grained and slightly plastic. Material medium soft.
- 30' Similar to above, feldspars less decomposed, approx. 25% light green/blue is largely micaceous. Material firm but slightly plastic.
- 40' Coarse grained, white decomposed granite, mica giving grey colour, about 10%. Quartz fragments and decomposed feldspars. Rock firm and non plastic.
- 55' Coarse grained, decomposed granite/gneiss coarse grey micaceous flakes, green staining in feldspars. Majority of rock feldspathic, not as firm as previous sample, slightly plastic, quartzes not as large nor as abundant. Retrogression probably due to composition change.

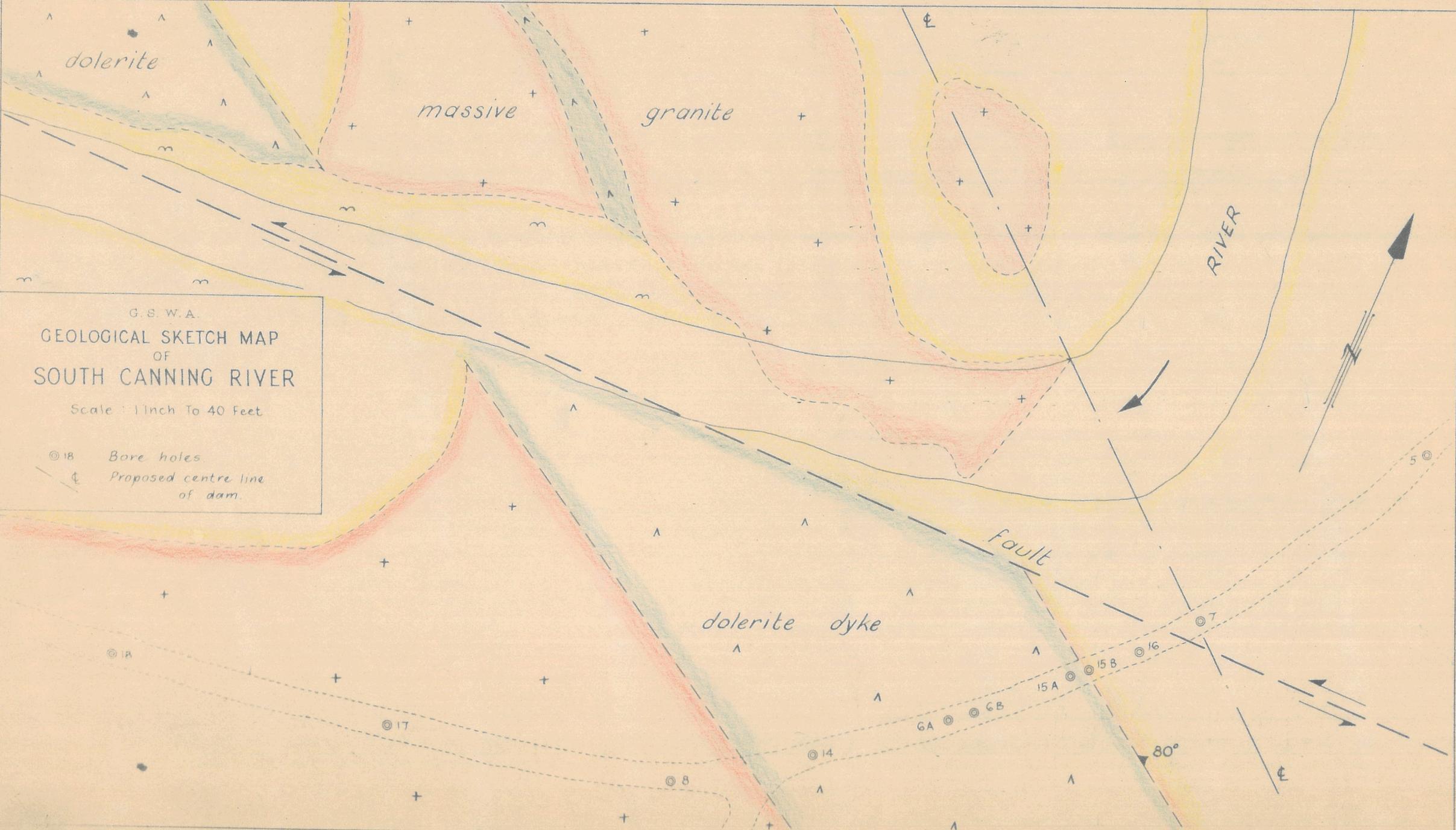
DRILLHOLE No. 8:

- 10' Dark, rusty brown and dark grey mixed material. Rusty nodules grain size up to half inch. Grey fraction fine grained plastic clay. Transition abrupt. Decomposed doleritic material ?
- 20' Dark, rusty brown and light blue material. Dark brown material small gravel sized laterite fragments and blue mixture of dark blue and white largely fine grained material occasional 1/8" nodules. Transitions are abrupt. Light blue material is plastic, the brown is non-plastic, probably close to rock. Dolerite ?

DRILLHOLE No. 9:

- 10' Mottled white, cream and red material coarse grained and decomposed granite. Quartzes 1/4" in size. Material quite firm and just plastic.

- 20' Cream to white, rusty stained coarse grained decomposed granite. Quartz up to 1/4" plus. Material non-plastic and very hard and dry.
- 25' Mixed grey and white fine grained very firm dry decomposed material, quartz 1/4" in size.
- 30' White decomposed granitic material. Quartz 1/8" -. Material very firm and dry and almost uniform white colour.



G. S. W. A.  
GEOLOGICAL SKETCH MAP  
OF  
SOUTH CANNING RIVER  
Scale : 1 Inch To 40 feet

⊙ 18 Bore holes.  
⊕ Proposed centre line  
of dam.