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Water Supply for Proposed Correctional Institute near Saltair - Geological reconnaissance of proposed diversion dam sites on Bannon Creek and some additional notes on ground-water possibilities

### INTRODUCTION

A geological reconnaissance was made of several proposed dam sites on the north and south forks of Bannon Creek, in connection with a water supply scheme for a proposed Correctional Institution near Saltair, Vancouver Island. (See small location map). Two 1-day trips were made by the writer to the Bannon Creek area. I was accompanied by Mr. R. Sorokoski on the 30th September and by Mr. T.A.J. Leach and Mr. Sorokoski on the 6th October. The proposed sites that were inspected are shown on the attached map of Bannon Creek. (scale 600 feet to 1 inch). Details of the individual sites are given in the appendix attached to this memo.

The north fork of Bannon Creek lies approximately 3 miles south of Ladysmith. The north and south forks of Bannon Creek "drop" from 1700 feet down to about 675 feet at the fork junction - over 1000 feet.\* Below the junction, the river makes a marked turn to the south and follows the western boundary of a prominent low ridge. Possibly this feature is a moraine ridge deposited along the margin of moving ice, and this ridge has subsequently prevented the creek taking a more direct route to the sea.

### SUITABILITY OF SITES SELECTED (See appendix for details of individual sites)

The portion of the south fork of Bannon Creek, which is shown on the attached map upstream from site #3S, flows through a prominently notched "V" shaped valley. The floor of this valley reach is many times wider than the creek channel. This ratio of channel width to valley floor width is also found in many reaches further downstream on the south fork and is found to some extent on the low level sites on the north fork. This factor has consequently allowed the creek channel a certain amount of lateral movement between the two sides of the valley, and has enabled the creek in certain reaches to abandon its old channel and cut down a new channel elsewhere, into the coarse alluvial deposits of the valley floor. The river has also swung into the sides of the valley and exposed the bedrock at certain locations. At other places, the river has been able to branch and form islands around the coarse gravels and boulders which at one time or another have formed the bed load of the creek at high discharges. If a diversion dam site is to be selected within these previously mentioned reaches of the north and south forks of Bannon Creek, then this general behaviour and movement of the creek channel may present some difficulties and may necessitate the construction of more expensive diversion dam structures.

\* on the area covered by the attached map.

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On the north fork of Bannon Creek - upstream from the reach covered by contours on the attached map - the valley is not nearly incised as deeply as on the upper south fork, and the valley itself exhibits a sinuous pattern. This is in sharp contrast to the "V" notched, deeply incised valley of the upper south fork. The upper reaches of the forks then are morphologically entirely different.

From the high level site on the north fork (site # 5N) and downstream to below the low level falls, the creek has cut a ravine into the bedrock. In places, a veneer of colluvium and till covers the bedrock. The gradient on this reach of the creek bottom varies considerably in longitudinal profile.

There are several suitable sites for a diversion dam within this bedrock reach of the creek. Sites 3N and 4N are situated within this reach and both appear suitable for diversion dam sites. A suitable access route could probably be made into these sites. There are other locations within this same reach that are almost as suitable for dam sites but the access is poor in many cases.

To conclude then, I would recommend that the best available sites for a diversion dam exist within the above reach, where the valley floor is limited to the width of the narrow rock channel cut by the creek. This appears to be the case at sites # 3N and 4N. However, additional trenching should be done to determine the depth to bedrock beneath overburden higher up on the right abutments at both these sites. Also debris and bedload alluvium is liable to be swept through this reach during high discharges, and this material may have to be cleared out periodically from behind the dam. In the other creek reaches that I have inspected on both forks, the valley floor is many times the width of the creek channel, and it will consequently be more difficult to build a permanent low cost diversion dam and to control the creek channel.

#### ADDITIONAL SITES FOR INVESTIGATION

Downstream from the junction of the two forks at localities A and B (see attached map) the valley floor width from aerial photographs appears to be considerably constricted and the valley sides appear much steeper. These two locations should be investigated in the field if a very low level dam site can be considered in this scheme.

#### MATERIALS

Brief notes are included in the appendix on the location of some sand, gravel and till deposits observed during the field investigation. No detailed reconnaissance for such deposits has, however, been made in the area, and no samples have been taken for analysis.

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GROUND WATER

The area surrounding the proposed institution site and also the north and south forks of Bannon Creek is from the geological information available, generally speaking unfavourable for a ground-water supply. Bedrock outcrops are close to the surface in many areas and a variable thickness of till blankets much of the area. Sand and gravel have been reported in wells to the east of the Institution site, but the yield has been only a few gallons per minute. There are, however, likely to be small areas which, on closer inspection, may yield a ground-water supply.

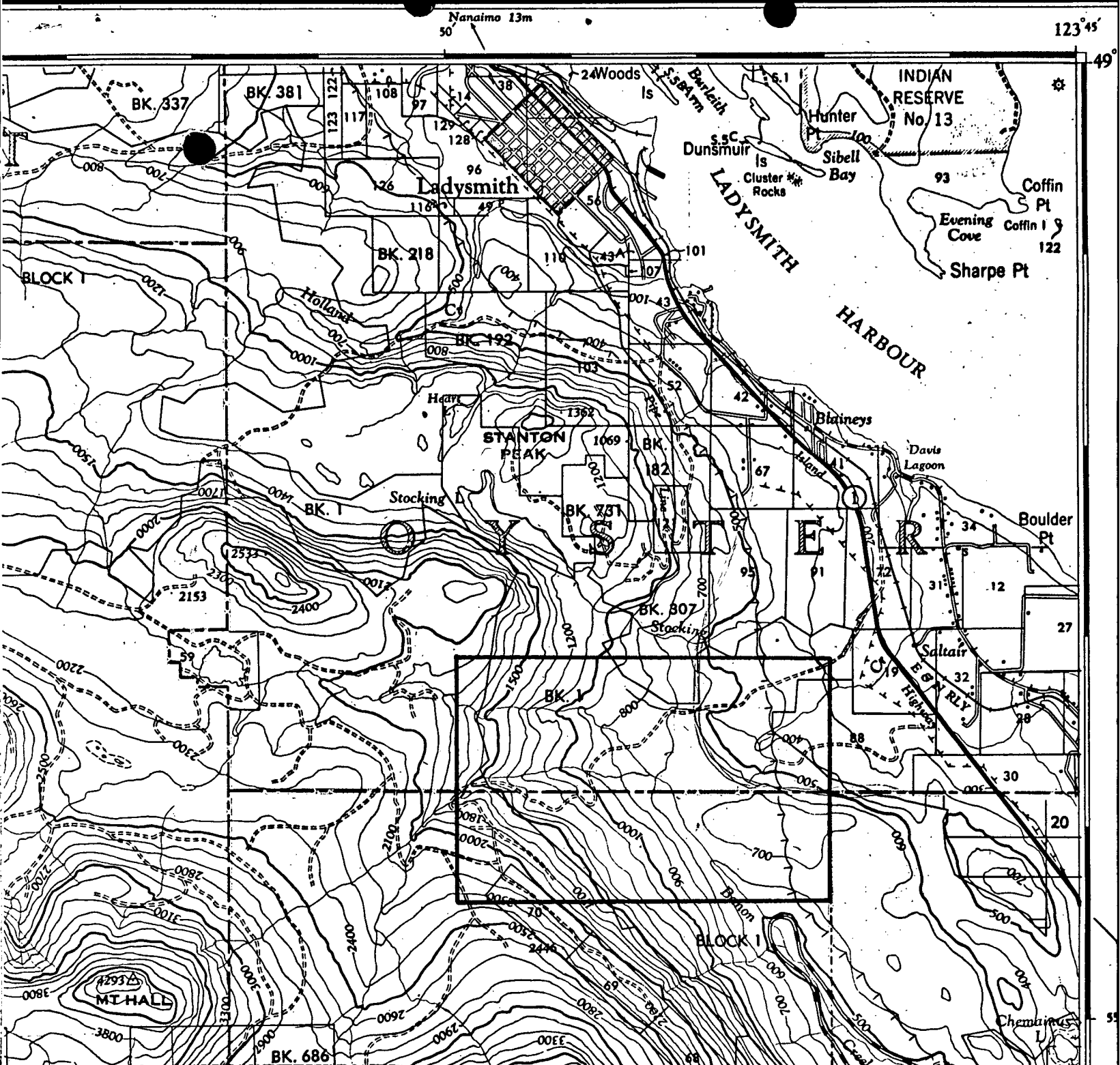
From the Aerial photographs, the low level diversion site on the south fork (Site #1S) is near the top of an alluvial fan which spreads out downstream from this point (see shaded area on map) and this fan may possibly yield a ground-water supply. Mr. Leach and Mr. Sorokoski made the interesting observation that the discharge of the north fork was noticeably less near the downstream end - the end where the creek enters this alluvial fan area. Possibly the creek is replenishing a ground-water supply in this area?

A further field inspection should be made of this area, if a ground-water source is to be considered for the proposed Correctional Institution.

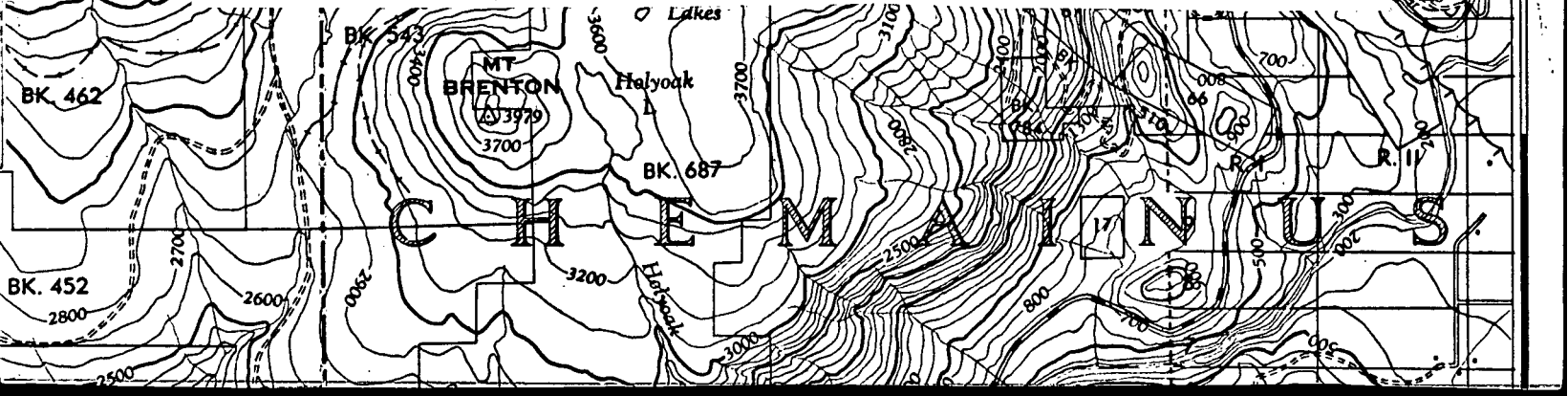
J.C.F.

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Location Map - Bannan Creek Area. Scale 1:50,000



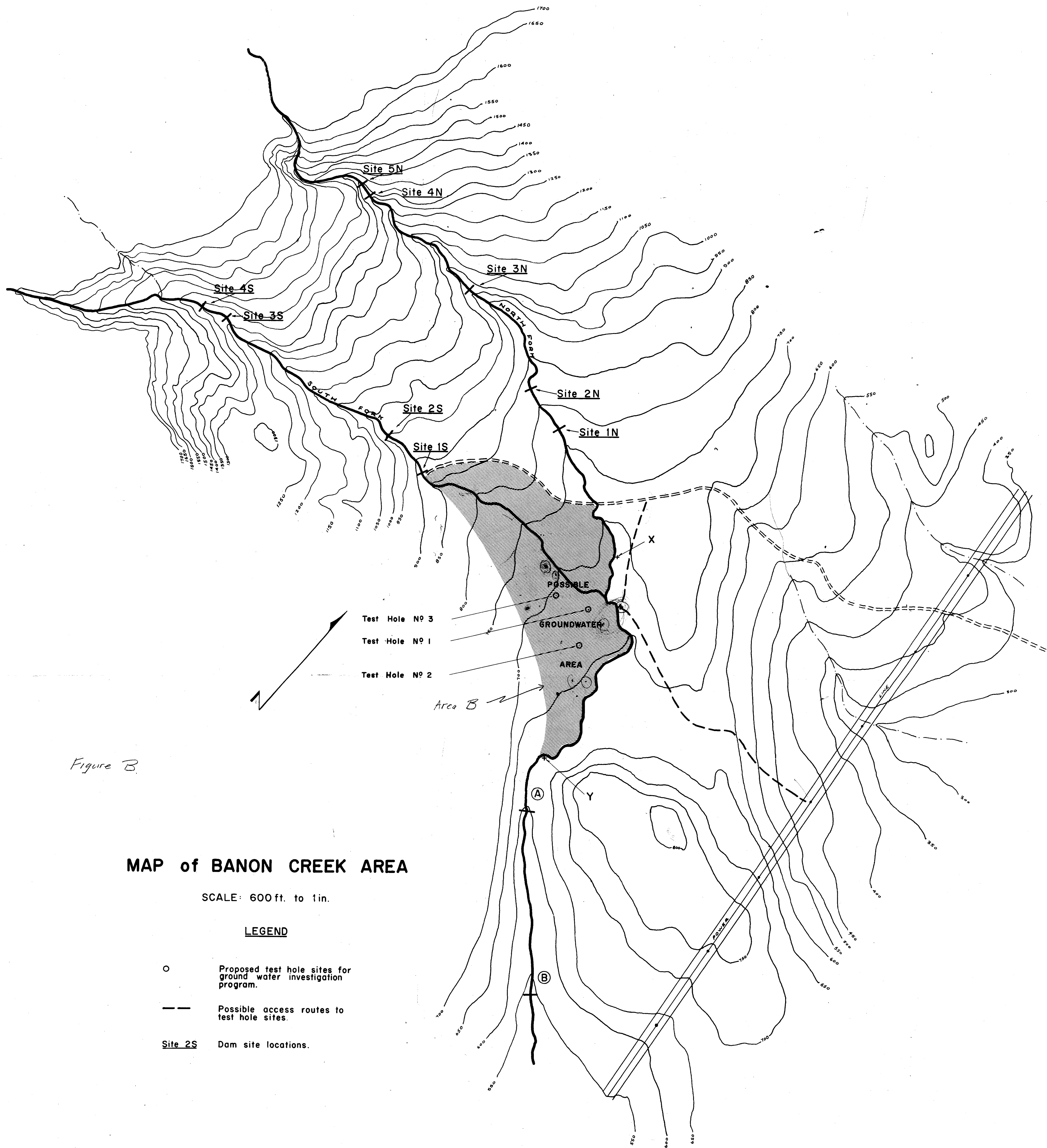


Figure B

**MAP of BANON CREEK AREA**

SCALE: 600 ft. to 1 in.

**LEGEND**

- Proposed test hole sites for ground water investigation program.
- Possible access routes to test hole sites.
- Site 2S Dam site locations.