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by

N. O. JONES.

INITIAL GEOLOGICAL REPORT ON THE WIGLEY'S GORGE DAMSITE

NORTHERN TERRITORY.

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DAMSITE, NORTHERN TERRITORY.

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SUMMARY

The Wigley's Gorge damsite is on the Todd River approximately 5 miles north of Alice Springs. The gorge has been formed in Precambrian gneiss along the trend of a dolerite dyke. Preliminary examination suggests that the rocks at the site are strong and relatively impermeable. Further testing will be required if the topographic survey is favourable.

INTRODUCTION

Wigley's Gorge is in the McDonnell Ranges on the Todd River approximately 5 miles north of Alice Springs, and one half mile east of the Stuart Highway. The proposed damsite was examined on 12th and 25th January, 1957, but the area had been visited by the writer on earlier occasions. The topographic survey of the area is being made by the Department of Works. Until this survey is complete, the damsite can be discussed only as being within the limits of the gorge.

GEOLOGY

The area surrounding Wigley's Gorge is composed of metamorphic and igneous rocks, generally regarded as belonging to the Arunta Group, of Precambrian age. Soil cover is patchy and thin.

The following rock types have been distinguished in the area. Their distribution is shown in Plate 1.

- (1) Gneiss with strongly marked foliation which is accentuated by the alternation of bands of differing grain size and composition. South of the damsite is an area in which schists, and probably amphibolites, are interbedded with the gneiss.

- (2) Gneiss with a less marked foliation and of more consistent composition. This type forms the walls of Wigley's Gorge.

Both types of gneiss have been extensively intruded by quartz stringers and small pegmatite and aplite dykes. There is some evidence of granitisation.

- (3) The "Amphibolite" is an altered basic igneous rock. It is not certain how much of the alteration is due to surface weathering and localised shearing (as at the eastern end of the rock mass). The amphibolite is cut by pegmatite dykes.
- (4) The dolerite dykes range from five to fifteen feet in width. The dolerites appear to intrude all other rock types in the area.

The gneisses are complexly and tightly folded and have been considerably sheared. However, openings within these rocks are probably confined to the joints. Generally the dolerites are massive but within Wigley's Gorge the western margin of the dyke is sheared.

A major (probably thrust) fault is present south of the damsite but its dip is believed to be sufficiently steep to take it far below the site.

THE DAMSITE

Wigley's Gorge is narrower, and has higher walls, towards the northern end. The eastern wall is considerably steeper than the western. The floor of the gorge has considerable exposed rock and there is no possibility that any depth of sand is present.

The walls of the gorge are formed of gneiss in which the foliation does not appear to be a pronounced plane of weakness. The outcrop pattern of the gneiss is controlled by jointing but few of the joints are continuous for a great distance, and no zones of brecciation were observed. Most of the joints are probably "tight" at shallow depth.

The trend of the gorge is controlled by the dolerite dyke, 10 to 15 feet wide, which forms the eastern part of the floor of the gorge. The floor of the gorge is three to six times the width of the dyke, the remainder of the floor being underlain by gneiss similar to that forming the walls, but with slightly closer spaced jointing.

The walls and floor of the gorge are formed of rocks which are likely to be strong and durable. These rocks will be permeable only along fractures and most of these are probably closed at depth. The weakest zone is the western margin of the dolerite dyke where north-south shearing is evident. Another small, and parallel, shear lies approximately 30 feet west of the dolerite dyke.

In the field it appears that a subsidiary wall will be required to the west of the river. Two possible sites for this wall are shown on the geological map. The site on the present course of the tributary creek is on gneiss similar to that in the gorge while the site on the old creek channel is on the banded gneiss. The foundation of the second site would probably not be as strong as those at the first site, but should be adequate for the structure required.

RESERVOIR AREA.

The reservoir area has young to mature topography. The channels of the main streams are incised and have moderately steep gradient. This suggests that the storage within the stream channels will not be large for the height of the dam wall. Storage within the more open valleys, in which the channels are incised, will be larger but relatively shallow.

The rocks of the reservoir area are similar to those of the area surrounding the damsite. Seepage from the reservoir should be slight.

The area is being actively eroded, and there appears to be considerable movement of sand along the river channel. The possibility of serious silting of the reservoir requires investigation.

No economic mineral deposits are known within the probable reservoir area, apart from two small gravel pits.

CONSTRUCTION MATERIALS

Sand: A considerable quantity is available in the bed of the Todd River below the damsite, but its content of mica and fines could be excessive.

Aggregate The dolerite should provide excellent aggregate but may be difficult to obtain in quantity. Some of the gneiss may be suitable for aggregate but its properties would require very thorough investigation before use.

Rock and Earth Fill. The soils are shallow and the best prospects appear to be relatively deep weathered zones in the softer schists and amphibolites. These materials have been extensively used for road gravel. Both would probably have significant permeability.

Clay: Deposits of clay are not likely to be found near the site.

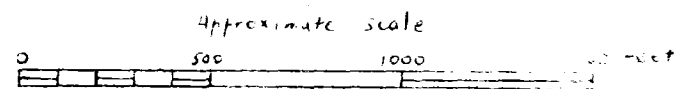
CONCLUSIONS

From the inspection made, it appears that the site is suitable for the construction of the proposed dam. The foundation and wall - rocks appear to be strong and durable, and fractures in them are likely to be relatively tight at shallow depth.

However, the area is structurally complex and detailed mapping and test drilling will be required before a final decision is made on the site.

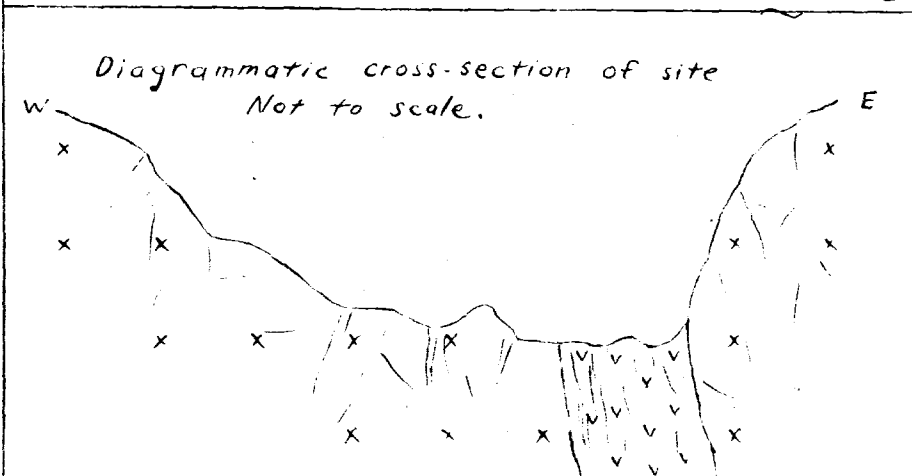
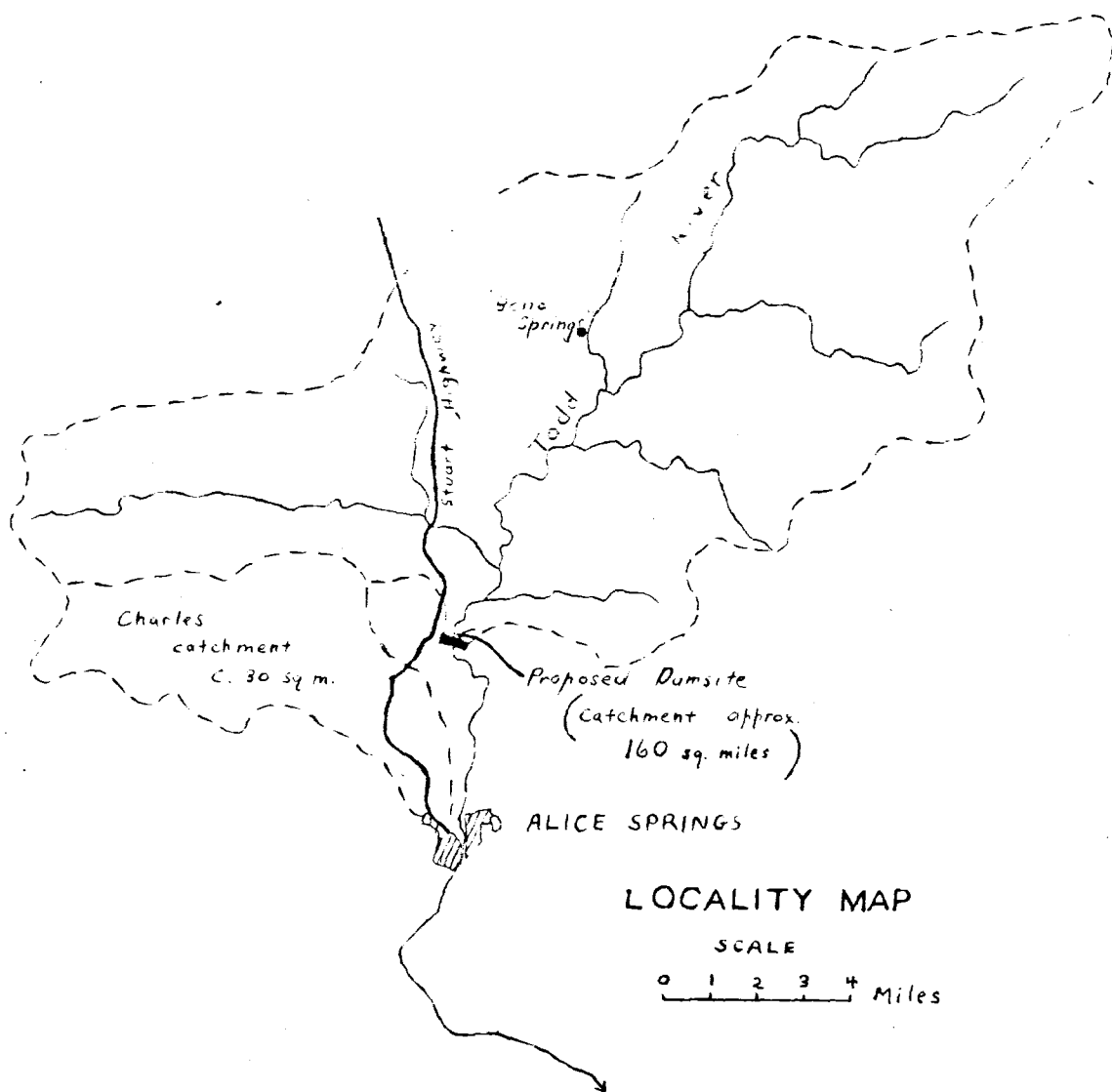
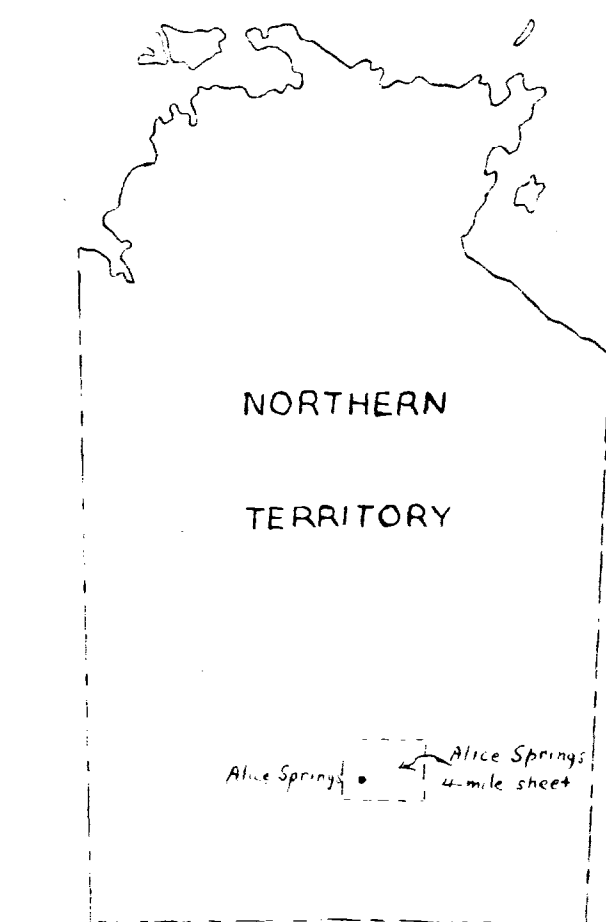
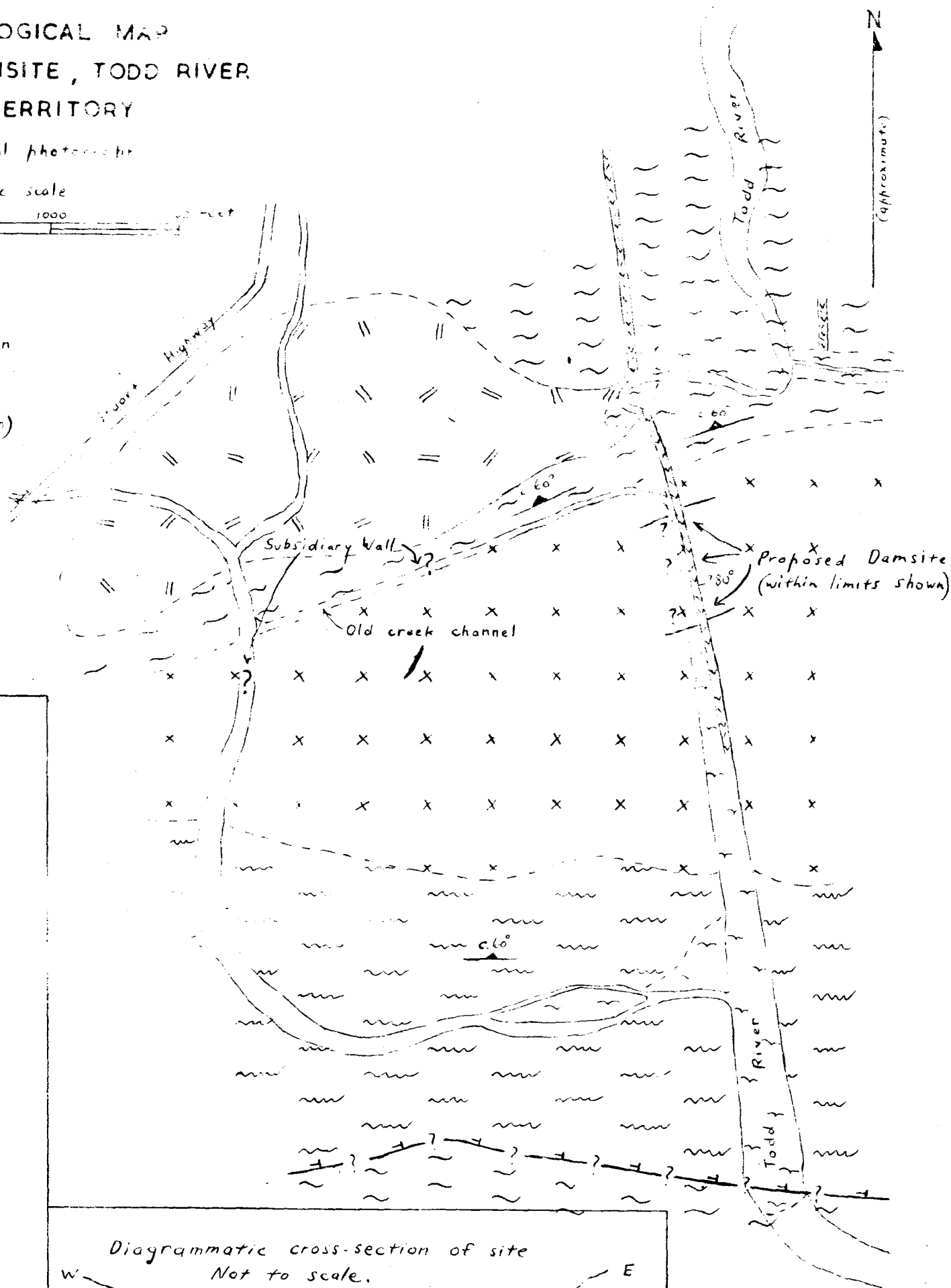
SKETCH GEOLOGICAL MAP WIGLEY'S GORGE DAMSITE, TODD RIVER NORTHERN TERRITORY

Enlarged from aerial photograph



Reference

- Strike and dip of foliation
- Probable thrust fault
- Gneiss (strong foliation)
- Gneiss (weak foliation)
- Schist and gneiss
- Amphibolite
- Dolerite



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