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DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS.

RECORDS.

1962/21

WATER SUPPLY : BATHURST ISLAND MISSION

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SUMMARY

An inspection of the area around Bathurst Island Mission was made to pick a bore site for domestic water for the Mission.

The Mission is on a low, flat laterite plateau, that has developed on Cretaceous mudstone. The mudstone is at least 1,000 feet thick and is a poor aquifer, so that the underground water supply will be restricted to the laterite, which is slightly more than ten feet thick in most places.

The existing wells should be deepened, and radial horizontal holes should be drilled in the hope of intersecting more water-bearing cavities in the laterite.

Pollution is an important problem in this area. All abandoned wells should be filled in and the wells that are in use should have a concrete curb around the top and should be tightly covered.

INTRODUCTION

The present domestic water supply for the Bathurst Island Mission comes from several shallow wells and from rain water that is collected on some of the buildings. In September 1961, the Resident Geological Staff was asked to examine the area to site a bore. Oil Development N.L. had drilling equipment on the island, and had offered to drill the selected site. A map (Plate 1) showing the relative locations of all the wells was made by compass and tape, and all the wells were examined. A brief report was prepared at the time.

Acknowledgement is made to Mr. P. Bollen of Oil Development N.L. for his help in the mapping and for his knowledge of the geology of the island, and also to Mr. M. Bracewell of Water Resources Branch, Northern Territory Administration, for discussions on the problems of pollution in the laterite aquifer.

GEOLOGY

The Bathurst Island Mission is situated on a very flat laterite plateau, approximately 25 feet above sea level. The laterite has developed on a dark grey mudstone of Cretaceous age (P. Bollen, pers. comm.). The greatest thickness of laterite exposed in the wells is 18 feet. The mudstone is exposed in outcrops along the beach at the Mission and in the wells.

Although the Cretaceous mudstone has a thin band of fine-grained glauconitic sandstone at the top, and some irregular lenses of fine-grained sandstone within the sequence, it will not yield any appreciable amount of water. Two bores drilled by Oil Development, both about 20 miles west of the Mission, were approximately 1,000 feet deep and failed to reach the bottom of the mudstone (P. Bollen, pers. comm.).

Approximately 20 miles north-west of the Mission a bed of Tertiary sandstone has been found to overlie the Cretaceous mudstone (P. Bollen, pers. comm.), and this bed may be a good aquifer. Its areal extent is unknown, and it may be found nearer to the Mission. If it is found near enough, it may be practical to drill a bore into this sandstone and pipe the water to the Mission. It would, however, require further field work, and test drilling, to determine the extent of the Tertiary sandstone. For the present this cannot be considered a practical source of water.

The laterite, therefore, is the only practical source of underground water for the Mission. The top few feet of mudstone beneath the laterite are jointed, so that it also forms an aquifer and has properties similar to those of the laterite.

A total of 16 wells has been dug into the laterite; one of these, the Horse Paddock Well, is actually only a shallow hole into which a small amount of water seeps. It is not a source of domestic water for the Mission, although it is used for watering stock.

WELL	TOTAL DEPTH	WATER LEVEL	DEPTH TO CRETACEOUS MUDSTONE
Main Well	18' 0"	15' 0"	18' 0"
Old Windmill Well	14' 6"	13' 6"	---
Yellow Tank	18' 5"	16' 8"	---
Shower Well	17' 7"	14' 8"	---
Camp Well	11' 10"	11' 3"	---
Boys' School Well	23' 3"	22' 3"	13' 0"
Banana Patch Well	13' 2"	13' 1"	---
Near Swamp Well	9' 0"	---	9' 0"
Windsock Well	16' 6"	16' 0"	11' 6"
Gzell Gardens Well No. 1	10' 8"	10' 0"	10' 8"
Gzell Gardens Well No. 2	9' 10"	9' 10"	9' 8"
Goanna Pit Well	13' 0"	---	13' 0"
Jubilee Park Well	12' 0"	---	12' 0"
Airstrip Well	12' 0"	---	---
Garden Tool Shed Well	10' 0"	---	---
Horse Paddock Well	4' 0"	2' 6"	---

The main water supply comes from the Main Well and the Camp Well. The Boys' School Well supplies approximately 70 gallons per day; the Old Windmill and Yellow Tank Wells are equipped but are rarely used; and the Shower Well was not equipped at the time of the inspection, although the Mission staff hoped to have it equipped soon. The remaining wells are either not used or used only occasionally by natives who live near them.

A laterite aquifer has a high transmissibility, but a low storage coefficient and specific yield compared to a sandstone or a gravel aquifer. The jointed top of the mudstone will also have these characteristics. This means any well or bore will intersect few water-bearing cavities, possibly none, but the flow of water from the cavities that are intersected may be large. The cavities in such an aquifer are not necessarily well connected, so to increase the total supply it would be necessary to intersect more cavities.

There is no practical method of locating such water-bearing cavities except by a "hit or miss" method. In this area it is suggested that the wells be deepened to at least six or eight feet below the top of the mudstone, and that radial horizontal holes be drilled as far as is feasible. These horizontal holes should be drilled both in the laterite and in the mudstone near the contact between it and the laterite. This will increase the possibility of intersecting a water-bearing cavity.

The wells that seem the most promising are the Main Well, Camp Well, and Shower Well. These three, with the Boys' School Well, form the major source of water for the Mission at present. In addition, the Banana Patch and Near Swamp Wells may be suitable for development, although neither was being used at the time of the inspection. Both should be cleaned out and deepened. The wells in Gzell Gardens and in Jubilee Park should be cleaned out and deepened if they are to be used at all.

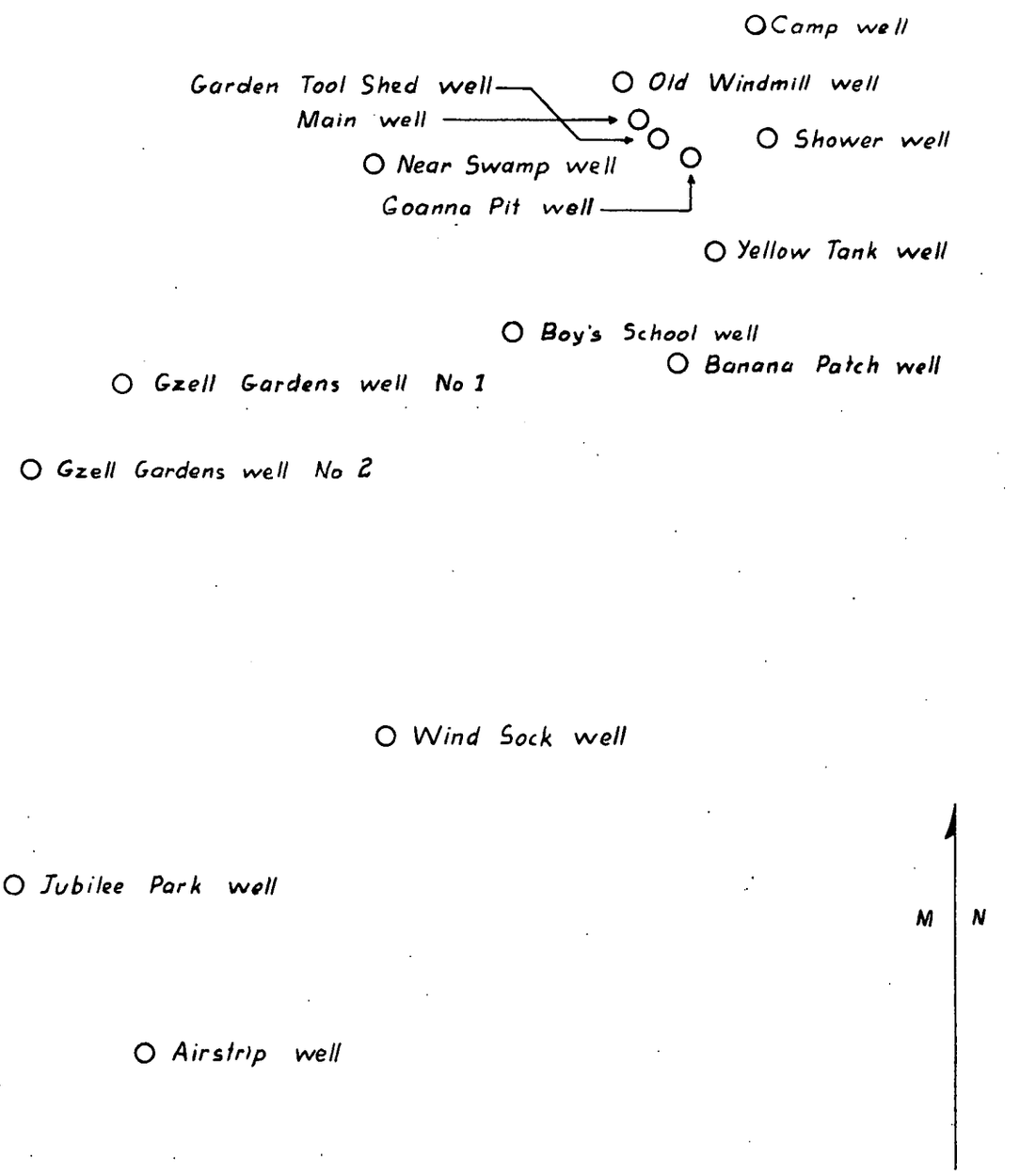
POLLUTION

Pollution in this type of aquifer is an important problem. In a sandstone aquifer any bacteria in the water will be screened out within a short distance; in a lateritic aquifer, however, bacteria are capable of travelling distances measured in miles. It is therefore important to keep polluted material from entering the aquifer.

At the Bathurst Island Mission the wells themselves are the points at which polluted material, primarily dead organic matter, is most apt to enter the water supply. The abandoned wells are particularly critical, since they are not regularly inspected for cleanliness. At the time of the visit most of them contained much rotting organic matter.

All the wells that are not being used should be filled in to prevent material from accumulating in them and polluting the water supply. All of the wells that are to be used should be enclosed by a concrete curb extending about one foot above the surface of the ground and about three feet below it. This will prevent material from being washed into the wells. They should also be tightly covered to prevent material from being thrown into the wells, and should be inspected regularly and frequently to be sure they are clean.

PLATE 1



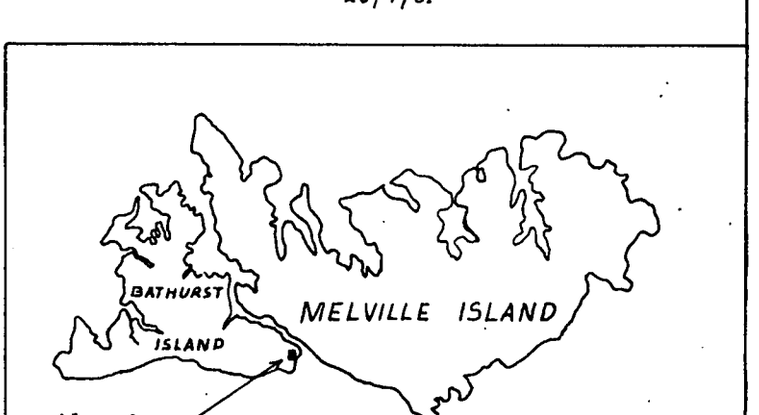
RELATIVE POSITIONS

BATHURST ISLAND MISSION WELLS

SCALE

0 500 1000 1500 feet

P. Dunn and P. Bollen
20/9/61



Horse Paddock well