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DEPARTMENT OF SUPPLY AND SHIPPING.

# MINERAL RESOURCES SURVEY.

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## REPORT No. 1945/26 .

(Plan No.1157).

SECOND REPORT ON THE POSSIBILITIES OF UNDERGROUND WATER AT PINEY CREEK, BLOCK 10, STROMLO DISTRICT, A.C.T.

By

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# SECOND REPORT ON THE POSSIBILITIES OF UNDERGROUND WATER AT PINEY CREEK, BLOCK 10, STROMLO DISTRICT, A.C.T.

(Report No.1945/26, Plan No.1157).

## I. INTRODUCTION.

### A. History.

On 21st November, 1944, a visit was made to the above block at the request of the lessee (Mr.G.D.C.Tanner) who had asked for advice regarding water supply.

The examination then carried out was cursory and confined to the eastern side of the block. The observations and resulting recommendations then made formed an earlier report in which it was indicated that the area examined was occupied by porphyry, in places covered by alluvium (Owen,H.B., Min.Res.Surv.Rept. 1944/46). The earlier report recommended the testing of an alluvium-filled basin which occupies part of the southeastern quarter of the block. It was estimated that the greatest thickness of alluvium would not exceed 30 feet, and that the alluvium, which contained narrow lenses of fine gravel, offered a reasonable chance of yielding a small supply of water.

Subsequently Mr.Tanner sank a well at a site about 1,000 feet south of the point indicated as most favourable. The result from this well was disappointing, but it is not likely that a very different result would have been obtained by sinking at the site suggested. The well entered weathered porphyry at 22 feet and made only about 100 gallons of water per day. This water entered the well from a narrow gravel bed at about 5 feet below the surface.

For all practical purposes it may be considered that the well has proved that the alluvium is not capable of yielding a useful supply of water at the end of a dry period, and it became necessary to consider the possibility of obtaining water from the bedrock. The present report embodies results of a further examination with this end in view.

### B. Location, Shape and Area of Block 10.

The block occupies an area of rather less than 2 square miles and is 8½ miles by road west from Capital Hill and 2 miles northwest of Stromlo Observatory. The area is approximately rectangular being about 1 mile wide from east to west by 2 miles long. It is bounded on the south by the Uriarra Road and on the north is separated from Molonglo River by a narrow strip of land along the southern river bank.

### C. Topography.

Except for Ranger Hill, with an elevation of 2263 feet above sea-level, and minor rocky prominences, the surface from the southern boundary where the average elevation is about 2050 feet, to near the northern boundary slopes at about 140 feet per mile, and then descends steeply to the river level, which at this point is about 1600 feet above sea-level.

Two creeks drain the block, Piney Creek near the eastern boundary and an un-named creek towards the western side. Piney Creek crosses the alluvial flat already mentioned and then enters

a narrow rocky gorge which, near the confluence of the creek with the river is cut to a depth of about 150 feet below the general level of the surrounding country.

## II. GEOLOGY.

A. General. The whole of Block 10 is occupied by porphyry which outcrops over a large part of the area, and in other places is masked by soil and alluvium (see accompanying plan).

B. The Alluvium.

The largest area covered by about 8 feet or more of alluvium lies in the southeastern portion of the block and amounts to more than 80 acres. At one point in this area the alluvium is known to be 22 feet thick and resting upon weathered porphyry. It is unlikely that this thickness is much exceeded elsewhere.

Piney Creek has cut its bed in the alluvium to a depth of 10 feet in places, and the exposures in the creek banks show that the deposit consists of gritty clay with thin seams of coarser grit and fine, angular gravel without admixture of clay. Two such seams observed are each about 3 inches thick and about 5 feet below the surface. In November, 1944, after prolonged dry weather these gritty bands were together discharging about 100 gallons of water per day into the creek but now have ceased to yield any water.

C. The Porphyry.

1. Description of the Rock. Several specimens collected from various parts of the block have been examined in the hand specimens only.

The porphyry does not show much weathering and most outcrops are comparatively fresh. The rock may be described as a porphyry in which phenocrysts constitute about 50 per cent. and the groundmass is finely crystalline.

The phenocrysts consist of (in apparent order of abundance), quartz, felspar (plagioclase with minor orthoclase), pyroxene, and biotite. However, the composition shows some variation; some specimens apparently contain more felspar than others, and some examples contain more biotite than pyroxene.

The colour and texture of the fresh rock also show some range. Specimens with comparatively fine-grain, that is in which few phenocrysts exceed a maximum dimension of about 2 mm., are medium grey in colour, while the commoner variety in which many phenocrysts exceed 5 mm., possess a dark grey groundmass which deepens the colour of the whole rock.

Further evidence of variation in the composition of the rock is afforded by the effects of weathering. In some places, notably near Ranger trig weathering has removed the groundmass and any felspar below the level of the quartz phenocrysts which consequently stand out as raised beads. In other places there is no such differential weathering and the exposed faces of the rock possess a generally smooth surface. In the first instance it is probable that the groundmass is predominantly felspathic in contrast to a more siliceous matrix in the second class of rock.

2. Primary Structural Features. It is believed that detailed study of the porphyry in this part of the Australian Capital Territory would show that changes in the rock occur in a systematic manner attributable to flow phenomena in the magma. The system, if it exists, probably gives rise to alternating bands of rock, with recognisable differences of composition characteristic of each band. Furthermore it is tentatively suggested that such bands exist on Block 10 and near the southern end of the block have a southerly dip. In

the absence of further details it is not considered that primary structural features of the porphyry have any bearing on the poor capacity of the rock to store underground water.

3. Secondary Structural Features. The porphyry cannot be regarded as a favourable rock from which to expect supplies of underground water and prospects must be based on the presence of more or less open channels through which water may travel. Such openings may be afforded by joints or faults.

Mapping of the most prominent joints was discontinued when it was realised that the directions of their strikes and dips embraced all points of the compass. Even the comparatively well developed joints are very narrow and short and some are filled by veinlets of quartz. In the bed of Piney Creek 2400 feet north from the well, a system of well developed parallel jointing was observed. Here numerous joints striking N30°E occur in a zone about 50 feet wide and dip west-northwest at from 30° to 50°.

Faults are probably common but difficult to detect. Faults striking north occur in the bed of Piney Creek, and one dipping 60° west, traverses the well jointed zone just mentioned.

## III. UNDERGROUND WATER.

Testing of the alluvium has shown that the thin gravel beds do not contain sufficient water to give a useful supply and it is necessary to consider the possibilities of obtaining water the bed-rock.

It has been pointed out that the rock (porphyry) which occupies the whole area of Piney Creek lease is of an unfavourable type. It is dense and impervious. Weathering is merely superficial, and with the exception of one small area, joints are poorly developed and not sufficiently open to provide channels for the percolation of water. At the one excepted locality a series of parallel joints in the porphyry are exposed in the bed of Piney Creek, at a point about 4700 feet south from the river and 270 feet above it.

The joints are strongly developed and probably continue along their strike for an appreciable distance, but cannot be traced because alluvium about 3 feet thick obscures the bed-rock on either side of the watercourse. The porphyry is very weathered in the vicinity of these joints.

It is considered that the prospects of obtaining a useful supply of underground water on Block 10 are poor, but that the above-mentioned group of parallel joints offers the best chance.

As previously indicated, the porphyry, being a dense impervious rock, is not favourable to the storage of underground water, and, unfortunately, there are other unfavourable features present in addition to this fundamental condition. The whole area presents a surface which slopes fairly uniformly and steeply to the river. This surface consists largely of bare rock, or rock under a thin cover of soil, and permits rapid run-off of surface water/, which consequently escapes to the river and has little opportunity for downward percolation.

The elevation of the greater part of the block above river level, 330 feet at the well, suggests that the depth to water will be about 200 feet or more, and it is unlikely that any water will be encountered in bores sunk in the southern half of the block at a lesser depth than the figure quoted.

A bore sunk with the intention of exploiting the system of parallel jointing showing in the bed of Piney Creek, should be sited to intersect the structure at about 200 feet below the surface, and should be drilled from a point about 180 feet west-northwest from the exposure in the watercourse.

## IV. SUMMARY AND CONCLUSION.

Block 10 in Stromlo district is occupied by granodiorite porphyry which outcrops as a dense fresh rock with only superficial weathering. Jointing in the rock is poorly developed.

The topographic form of the area and the impervious nature of the land surface combine to provide rapid run-off of meteoric water.

The conditions summarised above indicate that the prospects of obtaining a satisfactory supply of water from underground sources are poor.

The greater part of the block has an elevation of about 300 feet above the Molonglo River, and the depth to water is thought to be not less than 200 feet.

A development of parallel jointing which is exposed in the bed of Piney Creek, may offer some chance of obtaining water if this structure is intersected by a bore at about 200 feet below the surface. It is possible that other systems of joints or fractures exist under the alluvium, and have escaped notice and in these circumstances a bore sunk from an arbitrarily chosen site might by chance intersect such a feature and consequently yield a supply of water.

In view of the unfavourable conditions at the property it is believed that boring for water would be a hazardous proceeding from a financial point of view, and consideration should be given to surface conservation of water by means of a dam.

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CANBERRA, A.C.T.
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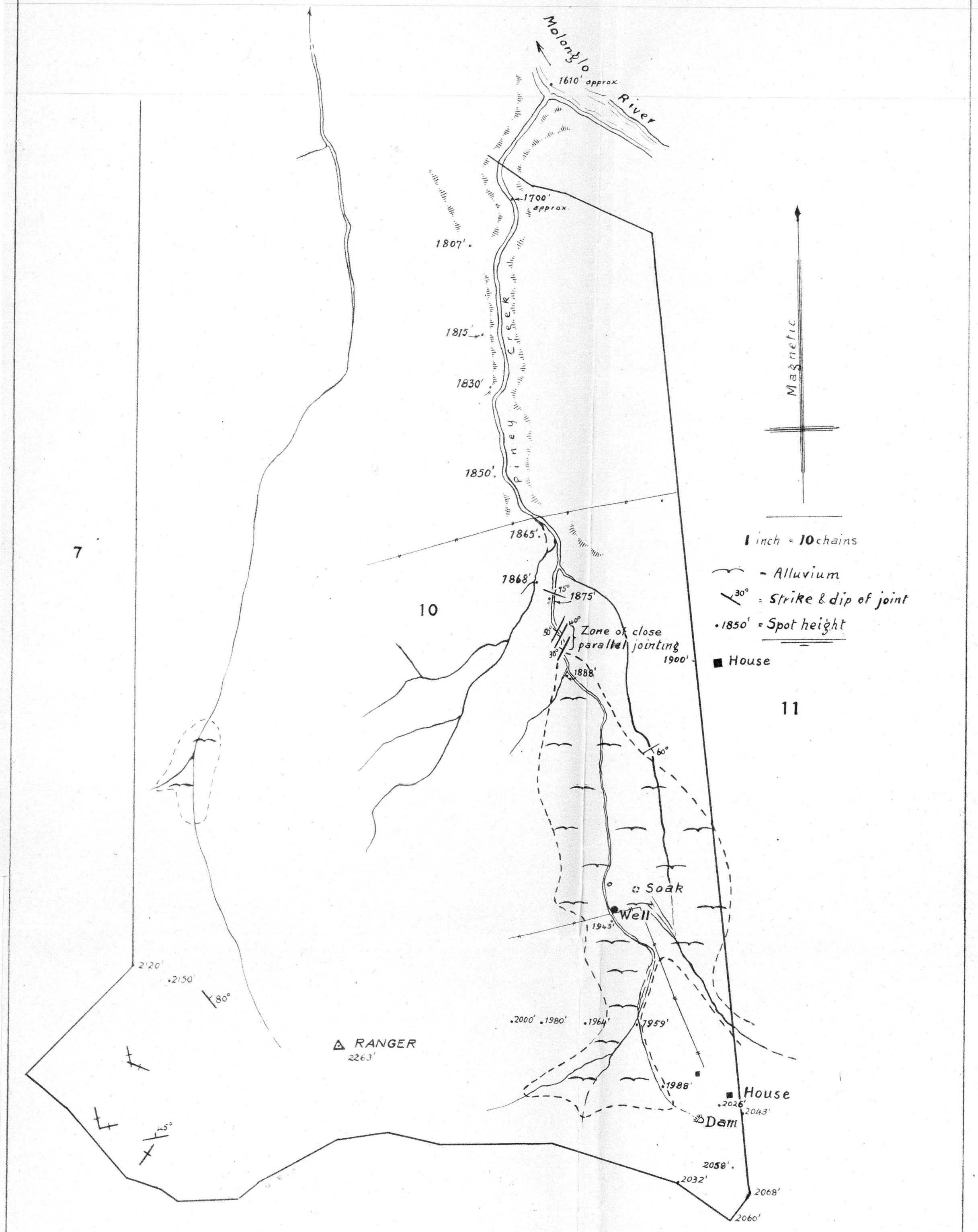


# GEOLOGICAL SKETCH MAP

OF PORTION OF

# BLOCK 10, STROMLO DISTRICT, A.C.T.

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April. 1945.

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