UNDERGROUND WATER INVESTIGATION.
ROSEBUD-SORRENTO AREA.

PARISHES OF FINGAL, NEPEAN AND WANNAEUE.
(First Progress Report.)

INTRODUCTION:

As directed, this report has been prepared to outline proposals for further drilling in the Rosebud-Sorrento area.

It is suggested that consideration be given to the following points:

(1) The necessity for locating Selwyn Fault as the eastern boundary to the artesian basin.

(2) The exploration of the useful waters down to approximately 300 feet and an estimation of safe yields before over pumping becomes a problem in the area.

(3) An investigation of the shallow aquifers with a view to using them as a winter storage for excess water from the surface supply of the water supply authority.

Area Defined.

The area under investigation consists of the Nepean Bay Bar, the Cups, the Tootgarook Swamp and the drainage basin of the Drum Drum Alloc Creek. With the exception of the upper reaches of the Drum Drum Alloc and other minor streams this area is on the down throw of Selwyn Fault.

Previous Bores.

Parish of Fingal.

Bore No. 1 - One the upthrow side of Selwyn Fault this bore penetrated the Older Basalts where the Rosebud-Flinders road crosses Main Creek and is outside the area of investigation.

Bore No. 2. - Approximately half a mile south of the Boneo State School, this bore to a depth of 212 feet provides little direct information regarding underground water but may be of value later as an assistance to correlation.

Bore Nos. 3-21 - All these bores, for limestones, were less than 100 feet deep and provide little information regarding underground water.
Parish of Nepean.

Bore No. 1 – A bore drilled at Sorrento in 1910 to a depth of 1,696 feet. This bore finished in Tertiary (Balcombian) sediments and indicated the possibility of a further considerable thickness of Tertiary sediments below. No information regarding underground water was recorded in the log of this bore.

Bore Nos. 2-28 – Shallow bores drilled during the investigation of dune limestones and not providing information relevant to the present investigation.

Bore No. 29 – The first bore drilled by a Hydromaster for the present investigation. This bore was drilled at Sorrento to test the Cainozoic deposits for water. At a depth of 2,017 feet, the local limit of the Hydromaster, whilst still in Tertiary marine sediments (Janjukian), the bore was capped and left to be deepened later when the recently acquired rotary plant is available for this area. Shallow waters were encountered in this bore but were not tested as they had been cased off as drilling proceeded.

Bore No. 30 – This bore was drilled several chains from the previous bore to test the shallower waters. Drilling ceased at 745 feet. Increasingly saline waters were encountered with depth, the most saline being 41,000 p.p.m. total salts. Pumping tests indicated that yields of the order of 2,000 g.p.h. of water of total salt content up to 1,000 p.p.m. could be obtained in the vicinity from bores drilled to approximately 100 feet. This yield was unsatisfactory as a source of water supply to augment the local surface supply and the bore was abandoned.

Parish of Wannaeue.

Bore Nos. 1-3 – These bores vary in depth from 101 feet to 121 feet and are of little value in the present investigation.

Bore Nos. 4-5 – The depths of these bores were 282 feet and 286 feet respectively. Although little information was gained regarding underground water the bore logs may be of value for future correlation of strata.

Bore Nos. 6-10 – All shallow bores of little value for present purposes.

Bore No. 11 – At the Rosebud High School, this bore was drilled to provide water for development of the school grounds. Drilling ceased at 326 feet in Pleistocene sediments. With a screen set between 269 feet and 289 feet the bore yielded
18,000 g.p.h. of water with total salt content of 810 p.p.m.

Bore No. 12 – In the pine plantation in Boneo Road this bore was drilled to test for deeper waters in the Rosebud area. Casing problems prevented the bore exceeding a depth of 1,152 feet whilst still in Tertiary marine clays and marls. With a screen set between 253 feet and 273 feet the bore yielded 20,000 g.p.h. of water with a total salt content of 730 p.p.m. The bore has been capped and is available to the water supply authority if required.

Bore No. 13 – The site for this bore was selected in the pine plantation on Jetty Road, approximately one mile closer to Selwyn Fault, to again test for deeper waters. At a depth of 1,433 feet casing problems were again encountered and the Hydromaster employed on the hole has been withdrawn. A Failing "1500" will be used to deepen this hole. All waters encountered were cased off and tests have not yet been made.

Private Bores.

No concerted effort has yet been made to tabulate the private bores in the area. Whilst in the area and engaged on work connected with departmental drilling activities the following bores were noted.

"Jacksons" In allotment 4, parish of Wannaeue, on the upthrow of Selwyn Fault, this bore was in progress at 180 feet on 23rd April, 1955. Sludges available from this depth indicated Jurassic sediments. A sample was submitted to A.N. Carter for micropalaeontological examination. Carter assigned (Unpublished Reports, 2nd May, 1955) a Jurassic age for the strata from 130 feet to 180 feet and discounted the likelihood of any Cainozoic marine rocks above. From an examination of the log submitted later by the contractor (J. Tuck), when the bore had reached 204 feet in grey mudstone, it would appear that weathered Jurassic sediments were encountered at 77 feet. Overlying the Jurassic were Cainozoic deposits consisting of sands to 50 feet preceded by yellow clay down to 77 feet.

"Sullivans" In allotment 9, section A, parish of Fingal, Mr. Sullivan has had three bores drilled. The first was to 74 feet and being fitted with a wind-mill is used as a stock bore. The second bore was drilled to 55 feet and yields between 6,000 and 7,000 g.p.h.. The water analyses 520 p.p.m. total salts and is used for spray irrigation of pastures. The third bore is 75 feet deep and tested at 1,750 g.p.h. for a 2 inch drawdown. Details of this test have yet to be
obtained from the contractor. A pump has not yet been installed in the bore.

These bores draw water from the Pleistocene dune deposits in the Cups.

**Quality of Waters Encountered at Rosebud.**

Bore Nos. 11, 12 and 13, parish of Wannaeue, have all encountered waters of total salt content between 500 p.p.m. and 800 p.p.m. down to depths of about 360 feet.

In Bore no. 12 there was an increase in salinity to approximately 2,000 p.p.m. in the waters encountered between 350 feet and 420 feet, but between 500 feet and 550 feet there was an improvement to just under 1,000 p.p.m.. The last water encountered and sampled in this bore was between 750 feet and 800 feet with a total salt content of about 850 p.p.m..

In Bore No. 13 there was no water observed at depths between 350 feet and 420 feet. Water sampled between 580 feet and 620 feet averaged 550 p.p.m.. The only deeper water encountered was at 1,272 feet with a total salt content of 2,460 p.p.m..

**Future Bores.**

Experience in the use of the Hydromaster in the Rosebud-Sorrento area indicated that this plant could be best employed in drilling holes to depths of not more than 1,000 feet.

With a view to following the three points suggested in the introduction to this report it is tentatively proposed that bores be put down to depths of approximately 300 feet to 400 feet on a grid of about 1 mile as shown on the attached plan. Sites 1, 6 and 7 will not be accessible until summer. As drilling proceeds certain bores may be required to depths of up to 1,000 feet to test for deeper waters and to elucidate structure.

Should a bore not be required for water supply purposes it is suggested that, before casing is pulled, a spear point and pipe be inserted in the bore, to be used later as a means of observing movements in the water table or the piezometric surface.

(W.A. Esplan)
Geologist.
23rd July, 1957.
1. Parishes of Wannaeue and Fingal

Large supplies of underground water have been shown to occur in these parishes in the area to the west of Selwyn's Fault. East of the fault the Palaeozoic and Mesozoic bedrock or Lower Tertiary Volcanics are at or close to the surface and small yields only can be obtained.

The high yielding aquifers in Wannaeue are sands and gravels of post-Balcombian age encountered at depths between 200 and 300 feet. In Fingal Bore 22 the water came mainly from strongly jointed basalt at 215 to 477 feet. The highly productive bores are listed below:

Parish of Wannaeue

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Parish of Fingal

Bore No. 22 Yield 15000 g.p.h. Total Solids 640 ppm.

Thus, the total yield from four bores is 67,000 g.p.h. The sand and gravel aquifers are expected to extend westwards towards the parish of Nepean, and it is further thought that large supplies could be obtained.

At "Sullivans" in the northwest of the parish of Fingal, supplies of the order of 6-7000 g.p.h. occur at about 50 feet and are used for spray irrigation.

2. Parish of Nepean

The only deep bores in this parish are at Sorrento where small supplies of variable quality waters were encountered in the sands and sandstones overlying the thick marl sequence. Small supplies occur at shallow depth throughout the parish. It is possible that the high-yielding aquifers of Wannaeue and Fingal extend westwards into Nepean, but further drilling would be necessary to establish this.

3. Other Possible Aquifers

Nothing is known of the stratigraphic sequence beneath the marls and calcareous clays known to occur over the whole area west of Selwyn's Fault. However, the possibility that aquifers may be present beneath the marls is worthy of consideration and a large capacity rotary plant would be necessary for their exploration.
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