

Object

The special object of this survey was to ascertain the possibilities of obtaining supplies of artesian or sub-artesian water. In addition, an examination of the York Plains Coal Mine was carried out, a general soil survey was made chiefly in connection with the factors affecting irrigation, the salt pans around Tunbridge were examined, and general observations made in connection with building stones, road metals and other economic products.

Area Surveyed

The area surveyed contained approximately 500 square miles, extending from Ross in the North to Rhyndaston in the South (a distance of 36 miles) and from Lakes Sorell and Crescent on the West to Kitty's Rivulet, a southern tributary of the Macquarie River, on the East (a distance of 24 miles). This includes the districts around Ross, Tunbridge, Woodbury, Antill Ponds, York Plains, Mt. Pleasant, Nala, Andover, Parattah, Oatlands, Stonor and Rhyndaston.

Physical Features

This area includes all the comparatively flat and low country which borders the main road and railway line. To the West rise the Western Tiers averaging about 2,900 feet above sea level, and with individual peaks ranging up to 4,000 feet above sea level. In the North, the Tiers present a steep scarp which reaches to about 2,000 feet above the plains. Towards the South the scarp disappears and a spur runs eastwards from the Central Plateau, forming the high ground between Antill Ponds and Oatlands (1,400 feet above the sea). The only river of any size and which flows all the year (due to conservation at Tooms Lake) is the Macquarie, which flows into the area near Ross. The main tributaries (from the South) are the Blackmans River, which receives the York Rivulet and Curryjong Rivulet, and Kitty's Rivulet. The largest streams in the South are the Jordan and Coal Rivers.

Dryness of the Area

The comparative dryness of the area is due chiefly to the physical features of that part of Tasmania. The Central Plateau either deflects or takes most of the moisture out of the rain-bearing winds from the West, so the Midlands, with part of its potential rain supply cut off, is left with only a moderate rainfall. In addition, practically no water from the plateau reaches the Midlands, but flows through streams going in other directions. Also the Easterly spur from the Tiers forms part of the divide between the North, South and East flowing streams, hence the area is the source of some of the streams of the State, but these are only small in the Midlands. The above features which produce a moderate rainfall and a lack of large permanent streams thus make the area one of comparative dryness.

The geology of the area is comparatively simple, the following rocks and geological formations being present:-

(1) Granite

Of which a very small outcrop occurs near Ross.

(2) The Permo-Carboniferous Series

These occur around Ross in the North and along the Coal River in the South. This series is exposed to a depth of about 350 feet below the Trias Jura Series, and in the North consists entirely of fine-grained white limestones, while in addition in the South finely bedded blue limestones are seen.

(3) Trias Jura Series

This series occurs in more or less isolated areas all over the Midlands, It consists mainly of sandstones and "felspathic sandstones" with lesser amounts of shales, mudstones, conglomerates and grits. Though apparently conformable with the Permo-Carboniferous Series, there is evidence to prove that an unconformity really exists.

(4) Diabase (Known locally as "Ironstone")

This rock covers a large portion of the area and is everywhere intrusive into the above two sedimentary series. The contact effect is very small, but in many places quartzites and cherty rock types are found. The idea that the diabase of the Central Plateau is a huge sill must be given up, for the Eastern portion at any rate, for the diabase here exists as a huge intrusive igneous mass, the exact structure of which will be discussed in the full report.

(5) Basalt

This rock occurs in very small areas dotted over the Midlands, being in the form of plugs, dykes and surface flows. Two and possibly three varieties are to be found.

(6) Recent Formations

These consist of river alluvium and wind blown sand.

Approximate areas occupied by the above are:-

Permo-Carboniferous Series	1 %
Trias Jura	40 %
Diabase	50 %
Basalt	5 %
Recent Formations	4 %

Underground Water

(1). Artesian

The two main conditions in connection with an artesian basin are:

- (a) The existence of rocks sufficiently porous to be able to hold a fair proportion of

- (b) The area in question must have a suitable geological structure, i.e. the beds may have a gentle dip either to a centre or in one general direction.

The Trias Jura sandstones would fulfill the first condition, but as the figures show, they occupy only 40% of the area, while the diabase occupies 50% and is non-porous and practically impenetrable by water. Further, the diabase has intruded the sandstones and left them occupying a number of small isolated areas, so that the geological structure of the Midlands is far from that required for the existence of a large artesian basin. The conclusion has therefore been arrived at that there is no possibility of an artesian water supply for the Midlands.

(2) Sub-Artesian

The above circumstances, viz. small areas of sandstones surrounded by diabase and which have streams running through them, are very favourable to the existence of small sub-artesian basins. Rain and surface waters can penetrate the porous sandstones while the impenetrable diabase forms a natural basin for it, and further any diabase on the downstream side of the basin will act as a natural underground dam. Thus the basins will be filled to at least the level of this dam, while as a matter of fact, the water level may rise above this level as it always follows the surface levels but in a modified manner, i.e. the water level rises with high ground, but not to such an extent as the ground does.

Such basins exist around Oatlands, York Plains, Tunbridge, Mount Pleasant, Mike Howe's Marsh and Ellenthorp. The exact boundaries of these will be indicated in the full report.

Quantity of Water

The Oatlands basin is the most typical and the one in which calculations can be fairly reliably applied. The following are the figures for this basin:-

Total Drainage Area	24 square miles
including Sandstone	17 " "
Diabase	7 " "

Annual Rainfall - Minimum ..14 inches
Average ..21 "

The rainfall on an area is distributed as follows:

Run-off (by surface streams)	20 %
Evaporation and used by vegetation ...	55 %
Percolation through rocks	25 %

1 inch of rain per square mile = 2,323,200 cu. feet.

.∴ quantity of water entering Basin =
 $\frac{25}{100} \times 14 \times 24 \times 2,323,200$ cubic feet
= 195,148,800 cubic feet

or roughly 1,200,000,000 gallons per year.

Thus the basin should be capable of giving an annual quantity of 1,200,000,000 gallons.

There are numerous wells in the Oatlands district at present, the deepest being 62 feet 6 inches and the greatest depth to water level 30 feet. These wells are in the region where the water level will fluctuate during the wet and dry periods, and so some go dry in dry seasons. To draw on this basin to a larger extent, the wells would have to be much deeper. The best method of utilising the water of this sub-artesian basin will be fully discussed in the final report. Similar calculations and recommendations will also be made in that report in regard to all the other basins.

Quality of the Water

Very few of the wells are regarded as yielding good water, the objection being that it is hard. Of two wells within 12 yards of each other and sunk to the same depth, one may be regarded as good and the other bad. Also wells which were once considered good. Underground water will naturally contain some salts in solution, but with rocks like the Sandstone series, the water should be of very fair quality.

Many of the present wells have never been cleaned out and this may be causing much of the present trouble. With clean wells and a large quantity of water being drawn from them, the quality of the water should be fair and possibly improve in quality with use.

Coal

The York Plains Coal Mine is a small one and has an output of only 25 tons per week. The seam is slightly over 3 feet thick and is an anthracitic coal, being used in breweries and places requiring a smokeless coal.

The estimation of the quantity available is very difficult due to the complicated geological structure of the coal area. The absolute maximum quantity would be in the region of 50,000 tons but is probably a small proportion of this.

Irrigation

Samples were taken of soil and sub-soil typical of the various rock types in the area and these will be tested for porosity. General remarks on the nature of soil, sub-soil and bedrock and other factors relating to irrigation will be made.

Conclusion

Although, therefore, this investigation has shown that there is no artesian water in the Midlands, yet the satisfactory conclusion has been arrived at that there exist definite sub-artesian basins in certain localities from which appreciable quantities of very fair quality water may be drawn. This underground water has been practically neglected up to the present, but the locations of the sub-artesian basins will enable this valuable asset of the Midlands to be utilised.

The investigation has also given data from which valuable conclusions can be drawn as to the conditions affecting irrigation which will be discussed in the full report.

P.B. Nye
Assistant Government Geologist.

Launceston,
9th October, 1920.