

REPORT ON POSSIBILITIES OF OBTAINING UNDERGROUND
WATER SUPPLIES AT STANLEY

The examination of the Stanley district was carried out at the request of the Stanley Tourist and Progress Association. This Association desired to know the possibilities of obtaining supplies of water on the Nut, this locality being chosen on account of the fact that water supplies obtained there would lend themselves readily to a gravitation scheme for the township of Stanley.

The Nut is a flat-topped hill rising to heights of approximately 400 feet above the sea, and forming the promontory known as Circular Head. The area of the flat top is approximately 80 acres. The township of Stanley lies on the eastern flank of the Nut at altitudes between sea-level and 100 feet above.

The Nut is composed wholly of volcanic rocks. Wherever outcrops are visible around the base, the rock is a completely decomposed basalt (locally termed "clay"). A few hard kernels of unweathered rock remain and prove it to be a fine grained amygdaloidal basalt.

The upper surface of this decomposed basalt is uneven and ranges up to 40 feet above sea level. Overlying this rock is a layer of fresh, dense, fine-grained basalt. In contrast to the lowest flow this rock is very fresh and does not contain amygdules. The thickness of this layer could not be determined owing to the steep nature of the cliffs but it approximates 100 feet.

The remaining upper part of the Nut is composed almost entirely of the rock described by Twelvetrees and others as "trachydolerite". The trachydolerite is a medium to coarse grained rock generally resembling some of the coarser varieties of the Mesozoic diabase. In hand specimens, augite and felspar can be detected together with a small amount of a white zoolite mineral in vesicles. Under the microscope it has been found to contain augite (diopside), felspar (labradorite), olivine, and apatite, together with analcite probably derived from nepheline. Under Hatch's classification this rock type would be a nepheline basanite. The jointing (platey) and general occurrence of this rock suggest that it was a lava flow, the thickness of which would be approximately 300 feet.

In association with the basanite, small outcrops of olivine basalt occur at two localities at least. One is just below the summit on the eastern fall of the Nut. The other is near the well on the southern fall of the Nut.

The whole of the above rocks represent ancient lava flows, which in correlation with other flows in Tasmania probably occurred during the Tertiary era. From the above field evidence at least four flows occurred.

In connection with possible water supplies from the Nut, two schemes have been suggested:-

(1) Surface water on the summit of the Nut

Under this scheme the source of the water would be the rain which falls on the surface of the Nut. Though the area of the top is about 80 acres, the water from the whole does not all drain into one catchment area. A survey would be necessary to determine the maximum area that would be considered in such a scheme. An area of 40 acres would be a reasonable figure to adopt for general purposes of calculation, but is probably too large. The average annual rainfall at Stanley is 34.66 inches. The usual figure used in surface water supply schemes is the average of three consecutive dry years, which is equivalent to approximately 75% of the average rainfall. Thus 26 inches would be the figure used. The rainfall would be distributed approximately as follows:- run-off 25%, evaporation and absorption by vegetation 60%, and percolation 15%. The amount of water available would therefore be $6\frac{1}{2}$ inches (25% of 26 inches) over an area of 40 acres, which is equivalent to 1,475,000 gallons per annum.

To carry out this scheme a dam would have to be constructed to conserve the surface water. From a body of water on the top of the Nut, which is without shelter and therefore exposed to all winds, the evaporation would be considerable, and the above quantity would have to be considerably reduced. Assuming 1,200,000 gallons were available, this would provide the population of 500 people with $6\frac{1}{2}$ gallons per head per day. A water-supply on this basis would be inadequate and such a scheme is not to be recommended.

It must be remembered that the above figures are only general ones and are to be considered as such. The essential figure of any such scheme would be the maximum catchment area which could only be determined by survey.

(2) Underground water supply

On the southern edge of the Nut, a small flat occurs at an altitude of 100 feet below the summit. A well has been sunk in this flat a depth of 20 feet, and the water was standing at a level of 4 feet below the surface. As far as could be ascertained the well was sunk through completely decomposed vesicular basalt. It was stated that a supply of 2000 gallons per day was drawn from this well during the construction of the breakwater.

On the cliff face below the well, numerous springs issue from the trachydolerite, the main one being some 200 feet above the sea. Two pipe lines collect the water from the springs, one leading to the butter factory and the other to tanks from which water is carted in tanks, the surplus water in the latter pipe-line being used in a saw-mill.

The well, and the springs have been taken as indications that good supplies of underground water could be obtained from the Nut. They do prove the existence of small quantities of underground water but not necessarily a sufficient supply for the town-

ship of Stanley. The Nut is composed almost wholly of the fresh unweathered rocks - trachydolerite and basalt, which are not porous types. Water could only exist in them in the cracks, joints and other fractures which are present. Under such conditions, it would not be expected that large quantities of water could be obtained from them. It must be pointed out that the well is in decomposed basalt and that the supplies might possibly be greater in any areas of such rock.

It is impossible to state the quantities of water likely to be obtained from a bore-hole 100 to 200 feet deep on the Nut, and this figure could only be determined by a trial bore.

In addition to the Nut, there are of course other possibilities of underground water supplies. The Nut forms a promontory on the eastern side of a peninsula which terminates in North Head. The backbone of this peninsula consists of a low range of hills (Green Hills) composed of vesicular basalt. This rock would yield slightly greater supplies of water than those on the Nut. Some supplies, e.g. that of Highfield are also drawn from wells in this basalt. Any wells sunk in the basalt would however, be from 40 to 60 chains distant from Stanley and so would involve long pipe lines.

Between the Nut and Green Hills, there is a tract of low lying land, apparently composed mainly of sand. The rocks (sand etc.) in this tract are of recent origin and were probably deposited between Green Hills and the Nut when these were islands. This tract is widest (about half a mile) to the west of Stanley and narrows to the south. One well has been sunk in this formation at the railway station and is said to yield a good supply of water. The sand is one of the most porous of rocks and likely to yield the greatest quantity of water. The quantity would have to be tested by a trial bore.

In whatever scheme was adopted it would be probably necessary to have a small reservoir on the western fall of the Nut. Two sites occur along this fall and are at a convenient height above the township. These represent depressions in the hillside formed by old landslips. The sites could not be recommended as they are geologically unstable, but in view of their natural shape and general absence of other sites, it is probable that they would have to be used.

Conclusions

In connection with the provision of a water supply for Stanley there are several possible schemes but it is recommended that the one which should be tried first is the possibility of obtaining underground water from the tract of flat country to the west of the township. While it is known that supplies would be obtained from this locality it would be a necessary preliminary procedure to put down a trial bore-hole. This would enable the quantity of water from such a hole to be measured and would also give samples which could be used to determine the quality

of the water.

The site of the bore-hole could be in any convenient place near the township. If the scheme was proceeded with, it would require:-

- (1) One (or more) bore-holes (depending on the yield from the trial one) to give the required amount of water for the supply.
- (2) A pumping plant with deep well pump and power plant (windmill, internal combustion engine or electric motor).
- (3) Small reservoir on the western fall of the Nut.
- (4) Reticulation system.

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