which could be closed by a timber or earth dam. The lake-level is about 520 ft. above the junction of the Poutu with the Waikato, and the slopes of Pihanga Mountain appear to be quite favourable for the construction of a flume or concrete channel. The distance from the lake to the Waikato River is about six miles, and there would be this length of conduit to construct. The volume of flow in the Poutu was not gauged. Taking it as proportional to the Taupo outflow, its mean value should be about 260 cubic feet per second, but when I saw it there was not this volume of water flowing. There may be local conditions here, as at Coleridge, which cause an abnormally low flow.

Taking the mean flow as above, and allowing for loss of head in race, there should be about 11,000 b.h.p. obtainable for continuous working in a power-station at the junction of the Poutu and upper Waikato, and as the water can be stored, a much larger power—22,000 b.h.p.—for full power twelve hours each day. It should be possible to greatly augment the power from the lake by leading water from the nearest streams flowing from Tongariro or from Ngauruhoe, or perhaps from the upper Waikato itself, into the lake.

Waikaremoana Lake.

This lake is situated at an elevation of 2,015 ft. above the sea-level, as determined by triangulation. Its drainage-area is 143 square miles, and the area of the lake a little over twenty-one square miles. It is surrounded by high mountainous country. In addition to the area of Waikaremoana, Waikareiti Lake has an area of 2·72 square miles, the combined lake-area being nearly twenty-four square miles. The rainfall at the lake-outlet at Onepoto for six years averages 53½ in. The flow measured in the Waikaretahaki River, which flows from the lake, was 772 cubic feet per second, giving about 5·4 cubic feet per second per square mile. This flow would require a mean rainfall of about 73 in., all running off. It is probable, therefore, allowing for evaporation and other losses, that the mean rainfall on the lake-basin is somewhere about 90 in., more or less. The flow is a little greater than the flow per second per square mile from Taupo. This may be due to rainfall-variations merely, or it may arise from a relatively greater proportion of mountainous country in the drainage-area. If allowance be made for the loss of water through the overflow-channel, the mean flow from Waikaremoana is likely to be between 7 and 8 cubic feet per second per square mile.

The lake has numerous underground outlets. The three principal ones are estimated to discharge over 60 per cent. of the whole flow: there is also a fourth outlet of some size. The lake rises and overflows through a small channel for some months, more or less, during wet winters. At the time the river was gauged the lake-surface was level with the bottom of the overflow-channel, and it is said to fall about 3 ft. below this level. It is not likely the low-water flow will vary by more than a few per. cent. from the volume of flow measured. Also the flow from the underground outlets should only be a few per cent. greater when the lake is at its highest level, but of course the flow will then be increased by the discharge through the channel, which, however, can never be very great except in exceptional cases.

The three principal outlets issue from the ground at depths of 55 ft., 58 ft., and 85 ft. below the lake-level. All the streams unite about 37 chains from the lake, and at a depth of about 400 ft. below the lake-surface. At a distance of a mile and a half from the lake the stream is 760 ft. below the lake; at two miles, 1,070 ft.; and at four miles, 1,420 ft. below the lake-level.

The proper point to take the water from the river appears to be the common junction of the streams, rather than from the three principal outlets, though a greater fall is obtained. More power could be got at the first of the above points (a mile and a half from the lake) by taking the water from the outlets, but less at the second (two miles from the lake), and much less at the third (four miles from the lake).

At the three points where altitudes of the Waikaretahaki were taken, at distances of, say, a mile, a mile and a half, and three miles and a half from the junctions of the streams, the power obtainable would be, say, 24,200 b.h.p., 44,900 b.h.p., and 67,500 b.h.p. respectively. The country has not been closely examined to determine how a conduit could best be constructed, but assuming the most expensive plan of carrying the water the whole distance in pipes had to be adopted, the costs of conduits for the three schemes may be taken to be £105,000, £264,000, and £480,000, and there would be in addition considerable expenditure required for excavations, trestles over creeks, &c., which can only be determined after a careful survey has been made.

A tunnel conduit parallel to the stream, or as nearly so as circumstances would permit, should not cost more than £20,000 per mile if in sandstone or papa. With a fairly straight tunnel conduit, and on certain assumptions as to the length of pipes required from the end of the tunnel to the power-house in each case, the cost for conduits by tunnel and pipes should be, say, £70,000, £210,000, and £340,000 as against the corresponding costs for pipes alone. Even if a tunnel conduit should depart considerably from the straight, and its length be increased, it would still be cheaper than pipes in view of the subsidiary works required for the latter in addition to the costs given above. There would, besides, be greatly diminished maintenance charges. A tunnel conduit carrying lake-water should be practically everlasting, while pipes rust in a comparatively short time.

Considering the relatively advantageous conditions of the lake, as regards fall obtainable in a short distance, it is interesting to compare the probable amounts of energy that could be got if the lake were successfully dammed with the similar amounts obtainable by taking the water from the junction of the streams to the points A, B, and C on the plan, a mile and a half, two, and four miles from the lake.

At least one fill of the space between the low- and high-water levels of the lake, 12 ft. in height, may be reckoned on as available in each year. This would give over 250 cubic feet per second over the whole year. Adding a small quantity for increased flow through underground channels when the lake is high,,and for flow through overflow-channels, the flow per second for the lake if dammed may