

The drainage-area is one where excessively long droughts are not likely often to occur. The greater part of it is at present forest, and this forest should be carefully preserved.

The necessary works and a plant to develop up to 12,000 b.h.p. would cost £420,000, and while power could be sold in Wellington probably quite as cheaply as from the Hutt scheme, yet as the volume of storage only gives a reserve sufficient for about one-third of the time that the Hutt reservoir would give, the scheme is, I think, not quite equal in potential value to the Hutt one. This defect will be, to some at present unknown extent, counterbalanced by the probably greater and more frequent rainfall on the Tauherenikau basin than on the Hutt. Though highly probable, this point is not yet established by observation. Also there would be more danger of failure of transmission-line crossing the Rimutaka Range than for the Hutt line.

The power-station site is most favourably situated for the establishment of factories to use large quantities of, if not all, the power without conversion into electric energy. This is an end to be sought for in all cases.

HUTT.

The information obtained regarding this river shows that a very useful power scheme can be got.

The works required are a high concrete dam, a conduit about 4 miles 30 chains long, about 700 lin. ft. of pipes, and tail-race about 35 chains long, for the most part in drive.

The power-station would be situated near the junction of the Mungaroa Stream with the Hutt River, about four miles from the Upper Hutt Station.

In view of the physical conditions which obtain in the river-basin it will be necessary to store a large volume of water, as the low-water flow of the river is at times too small to warrant the construction of any works.

The volume of flow observed during the period for which the river has been closely observed varied from about 100 cub. ft. per second to 5,000 cub. ft. per second in flood. The mean flow during this period was equal to giving 8,000 b.h.p. on turbine-shafts at the power-station, and a surplus sufficient to supplement the observed low-water flow to give the above amount of power for a period of 100 days with probably some water running to waste. The period was probably a wet one—too much so to take as a fair average.

The rainfall records for a number of years past at the Summit and at stations not remote from the river-basin do not appear to give any ground for supposing that droughts will be so long-continued as to exhaust the storage-volume of the reservoir that can be obtained by constructing the dam described below.

The Hutt Gorge about half a mile below the junction of the Pakuratahi is narrow enough to enable a dam to be built, but there is a considerable fall in this distance. The best location for a dam would have been just below the junction, but the gorge is wider and a dam would be about three and a half times longer, though not so high. The height will be about 170 ft. from river-bed to the crest of the dam, and the length about 370 ft. along the crest. At water-level the river is only about 50 ft. to 60 ft. wide and the faces of the gorge show rock, and apparently solid foundations should be got without excessive excavation.

The faces along the river-bank below the dam are very steep, and it has been assumed that it would be the better course to construct the first mile and three-quarters, or rather more, wholly in tunnel, either in one length, or in two lengths by an adit to a gully about half-way. In addition to the tunnel there would be about 1,000 lin. ft. of fluming and about two miles and a half of channel in earth. From the end of the conduit to the Hutt River there is a distance of over half a mile, mostly flat, about 40 ft. above the river-level. The water can be taken across either in pipes to a power-station on the river-bank or the station can be put near the foot of the slope and the water taken away by a suitable underground conduit. This seems the cheaper plan. The conduit would be designed to carry about 700 cub. ft. of water per second.

The intake of the top of the conduit would be at a level of 611 ft. above the datum of the survey. At the junction of the Mungaroa and the Hutt Rivers the low-water level may be taken as 287 ft., giving a total fall of 324 ft. available. Deducting height lost by fall in race, friction in pipes, and fall necessary in tail-race, about 285 ft. of effective head should be obtainable.

The maximum power to which the scheme would work up to from the above data would be 17,000 b.h.p. on the turbine-shaft for machines of high efficiency. The corresponding continuous power would be 8,500 b.h.p. There would be little probability of continuous full-power service being required. The greater part of the demand at first would probably be for eight hours' service or longer, with no doubt some proportion of full-time service.

The power in use in Wellington, Petone, and the Hutt Valley at the present time does not probably exceed 19,000 h.p., and all of this would not be converted for some time to electric power, even if there were an electric supply of power available; but much of the probable increase of power installed would no doubt be electrical, and as this increase may likely amount to 1,500 to 2,000 h.p. a year, full use for all the energy developed should be got in a few years.

The power-station would be very favourably located, being rather less than four miles from the Upper Hutt Railway-station, sixteen miles from the Lower Hutt, seventeen from Petone, and twenty-four miles from the Wellington Railway-station. If not immediately, a large amount of power would ultimately be used in the Hutt Valley for lighting, tramways, suburban railways, and in numerous industries. A very safe route for a transmission-line could be got, and the risk of breakdown would be small for a properly constructed line.

It is somewhat difficult to form a definite conclusion as to the amount of power that should be provided. It clearly would be a mistake to instal only sufficient plant to utilise the water-power in continuous working. It is unlikely that full use would be made of such an installation and financial loss would result, while it would be equally inadvisable to provide for only an eight-hours service, as the conduit and plant would become too costly.