

water-race, with fluming, iron pipes, and water-motors, it would amount to £86,000; but irrespective of the cost I would not recommend so high a weir as this to be constructed, as the risk of damage in time of floods is too great when hundreds of kauri-logs are coming down the river.

After examining the river at this point, it was suggested that a weir 50ft. in height across the bed of the Kauaeranga River would be sufficient, but, seeing that this river sometimes rises to a vertical height of 10ft. and 12ft. in times of flood, bringing down hundreds of kauri-logs, necessitating a large expenditure in its construction, without giving a compensating benefit. Wherever high weirs are constructed in rivers, unless they are made remarkably strong, they are always liable to be damaged in times of high floods; and in the case of a weir 50ft. high in the Kauaeranga River, the kauri-logs coming down would considerably increase the liability to damage.

The reason given for a dam at this particular place is, that there is a large branch creek joining the Kauaeranga River between this point and the head of the County Water-race, in which there is said to be always a large supply. At the place where the County race lifts the water from there is always a considerable quantity going down the river-bed amongst the shingle; the head of the race is merely taken into a water-hole, and no provision made to stop the water from getting through the shingle. If a concrete wall were placed across the river at this point there would always be a plentiful supply of water even in dry seasons. It is possible that there might be such a thing as thirty sluice-heads going over this weir if constructed near the Kauaeranga Valley Hotel in dry seasons, but in ordinary weather there would be a very large supply. However, as it is for motive-power for pumping, an intermittent supply of water would be of little use, therefore the minimum quantity should only be taken. Taking all the available head that could be got, after deducting the fall for the water-race to convey the water down to near high-water mark, it would not exceed 140ft., and this would only be $\frac{140 \times 60 \times 62.5 \times 80}{33,000} = 478$ theoretical horse-power; and the water-motor would only give about 70 per cent. of this, or 334.6-horse power, for generating the electricity, therefore, deducting the percentage of the power lost in the dynamos and motors, as well as in transmission on the line, there would not be sufficient power to be of much use to pump the deep levels.

In regard to taking the water from the Billy-goat Falls: these falls are situated in a branch creek joining the Kauaeranga River, about 15 miles up from Parawai. The bed of the river at this point is 800ft. above sea-level, and the top of the Billy-goat Falls is about 1,300ft., therefore the falls are about 500ft. in height; but there would be very little water coming over them in dry seasons, possibly not more than two sluice-heads. There are other falls about four miles up the Kauaeranga River, with about the same quantity of water in dry seasons, and they are said to be about the same height; but we did not go up to them, as we would not have been able to return the same night to the Thames, and there was no place of accommodation to stop at. The Billy-goat Falls would give, with two sluice-heads of water, 113 theoretical horse-power, which would not be sufficient to put up an electrical plant for the transmission of power, the distance being nearly 20 miles.

The only way of getting power from the Kauaeranga River would be to construct a water-race from the falls up the Kauaeranga River, and pick up the different branches of the river on the north side, returning the water into the river at the head of the County Water-race. By this about twenty sluice-heads of water could be lifted in dry weather, and there would be an elevation at the terminating point of the water-race of about 350ft. This would give as follows: $\frac{20 \times 62.5 \times 60 \times 375}{33,000} = \frac{75 \times 375}{33} = 852$ theoretical horse-power, and to take 70 per cent. of this, it gives 596-horse power available for driving the dynamos.

In regard to the cost of the latter proposition, it would be difficult to give an approximate estimate without a survey. The country appears very broken in places, and, unless the line of conduit were actually traversed, one could form no idea whether an open conduit could be constructed for the whole of the distance, or whether fluming would be required. Judging from the character of the country, a contour line would be about 10 miles in length; but if the work of prospecting the deep levels was decided on, this scheme should be further investigated. I think it possible that if a water-race were actually surveyed, there might be an available head of 400ft., and that would give 909 theoretical horse-power; the water motor giving 70 per cent. of this, 636-horse power would be available to generate the electricity. On the supposition that 60 per cent. of this can be transmitted as available power to work machinery, 381.6-horse power would be available, and the expense of working this would be about £35 per week, exclusive of the interest on capital, and sinking fund for depreciation.

Any scheme for getting a large amount of power from the Kauaeranga River will entail works of considerable magnitude; and, on a cursory view of the ground, the same as Mr. Fletcher and myself had, it would be presumption on our part to give anything purporting to be a clear approximate estimate of the cost; surveys, levels, and cross-sections would have to be taken before arriving at anything reliable.

I have, &c.,

HENRY A. GORDON, Assoc. M.Inst.C.E.,

Inspecting Engineer.

The Hon. the Minister of Mines.

No. 4.

THAMES SCHEME.—MR. FLETCHER'S REPORT.

A PROPOSAL to obtain power from the Billy-goat Falls, at the head of the Kauaeranga Valley, and from the Kauaeranga River, for mining purposes at the Thames.

On the 16th May, 1893, in company with Mr. Gordon, Inspecting Engineer, I visited the Billy-goat Falls, at the head of the Kauaeranga Valley here. Although a magnificent fall as far as height