The race, which would pass through open and suitable country, presents no great difficulties of construction, and, excepting at the intake, very little, if any, fluming would be required. As the banks of the Waiwawa are of a gravelly nature, it would be necessary to erect several chains of covered-in or box-fluming to lift the water out of the river. This fluming would have to be of a pretty solid construction to resist floods, and the large kauri-logs that might come down during a heavy fresh.

The fall of the river from the proposed intake to Gumtown is about 90ft.; thus, allowing 25ft. fall for race, and say 15ft. for rise of river in flood-time and clearance for turbine, an effective pressure of 50ft. could be obtained at the generator site. To bring the water from race to the turbines about 15 chains of 30-inch diameter iron piping would be required for each turbine. Allowing 70 per cent. efficiency for the turbines, the effective power obtainable at Gumtown for driving the electric generators would be, (1) 250·2-horse power, and (2) 332·9-horse power respectively. The distance from Gumtown to Kuaotunu in a direct line is about sixteen miles, but owing to unavoidable deviations that would have to be made, and the undulatory nature of the country, the power-line in all probability would be not less than twenty miles in length. By keeping well up the hill-sides a very suitable route could be obtained, and the bush almost if not entirely avoided. The whole route from Gumtown to Kuaotunu seems to be comparatively easy of access, so that the erection and maintenance of the present line would not be a serious undertaking. The next and perhaps most important question to be considered is the method of distributing the power at Kuaotunu. A considerable expenditure is necessary in the first place for the construction of a water-race to obtain power from the Waiwawa, there being no sudden fall in the river that could be used; and the power obtained is not large, considering the distance it has to be transmitted and the purposes for which it is required. If the object of the scheme (the supply of cheap motive-power) is to be successfully accomplished, the most efficient and economical methods of distribution must be employed, or, in other words, the more the plant can be centralised at Kuaotunu the less will be the cost at which the power can be supplied.

The existing battery-houses at Kuaotunu are all within a radius of about three-quarters of a mile, and the present number of stampers does not exceed fifty. There would be no great difficulty in establishing a crushing-plant on a site generally convenient for the existing mines; and then, if it was found that they could not employ all the available power, and the development of the field warranted it, a second crushing-plant might be erected at some other spot more centrally situated to the other mines that might then exist. As an alternative, each company could have its own electric motor at their works; but, unless the whole power were taken up by three or four companies, such a course could not be recommended, as a number of small electric motors would considerably complicate the scheme, decrease the efficiency of the plant, and add also to the first cost of installation, subsequent maintenance, and supervision. The method of transmitting the power to Kuaotunu, and distributing it there, would be by what is known as the alternating current system. The electricity would be generated at Gumtown by alternating current dynamos, at a comparatively low pressure or electro-motive force, and then, by what are called "step-up" transformers, it would be converted or "transformed" into an electric current of high pressure (about 10,000 volts) but small quantity, before entering the line before transmission to Kuaotunu. At Kuaotunu the current would pass into a set of "step-down" transformers, which would transform it back again to a current of low electro-motive force or pressure, before being distributed to the electric motors. By the use of the alternative current system, the economy of light-pressure current transmission is combined with the convenience and safety of low-pressure generation and distribution—it being, in fact, the only practical means of transmitting large amounts of power to long distances. The various losses that occur in the electric plant are here given:—

	No. 1. Horse-power.	No. 2. Horse-power.
Power given to electric generators	250·267	332·90
" lost in electric generators	25·027	33·29
" given to step-up transformers	225·24	299·61
" lost in step-up transformers	11·262	14·98
" given to line	213·978	284·629
" lost in line	21·398	28·463
" given to step-down transformers	192·58	256·166
" lost in step-down transformers	9·629	12·808
" given to electric motors	182·951	243·358
" lost in electric motors	18·301	24·36
Effective or actual brake horse-power given out by electric motors	164·65	219·02

Percentage of power given by turbines, lost in generators and motor	17·30
Percentage of power given by turbines, lost in transformers	8·34
Percentage of power given by turbines, lost in line ...	8·55
Percentage of power given by turbines, given out by electric moters	65·78
	99·97