where leakage is likely to occur, the canal is lined with cement concrete. These works are of considerable magnitude.

The Waiohine would give about 50 per cent. more power at its probable minimum flow than the Kern River at its minimum flow, but not so much at its ordinary flow. The ground along which the Kern River canal is cut is much easier than the hillsides along the Waiohine Valley.

Otaki.

The maximum drainage-area of this river available for power purposes is 112 square miles. It drains the western slopes of Mounts Crawford, Hector, and Alpha, and the flow of water should generally be considerable. The river would probably be best utilised by building a dam in the best site in the canyon about a mile or more below the Waitapia junction. Some additional height would thus be got; and some storage, sufficient probably to store two or three weeks' minimum flow, should be obtainable. I think 4,000 b.h.p. for continuous working is the limit of the power that could be got from this scheme. The race would be three and a half or four miles long, and would be on the right bank of the river. The sides of the gorge are rough, and a race would be expensive, and a part of its length would be likely to be in drive. Some approximate sections of the canyon in the gorge were taken, and show that the cost for a dam would be relatively high per brake horse-power. Further search might disclose a better dam-site. No gaugings of the minimum flow of water in the river have been made.

Another scheme would be to put a power-station at the junction of the Waiotauru with the Otaki and bring races to this point to take water from the Otaki and Waiotauru. I have not been able to get sufficient data to formulate a scheme for this alternative. About eighty square miles of the best part of the drainage-area would be available for this scheme, water being taken from the Otaki below the Denan Creek, and from the Waiotauru at about a corresponding height, or higher if thought best.

Though they do not promise very well I think these Otaki schemes are worth investigating further to ascertain definitely their worth. A power-station on the Otaki would be valuable for various reasons.

Tauherenikau.

This river rises in the ridge between Mount Alpha and Mount Hector, 4,400 ft. to 5,000 ft. high. The upper valley is encircled by hills from 2,000 ft. to 5,000 ft. high. There are no intervening mountains to screen these peaks from the moisture-laden winds coming from either of the prevailing directions in this district. The rainfall at the Summit Railway-station has averaged 93½ in. for the past nine years, and there is certainly a greater rainfall in the Upper Tauherenikau Valley.

For power purposes the water would be taken from the Tauherenikau at the junction of Smith's Creek. The drainage-area above this point is twenty-seven square miles, and the actual fall to the railway-crossing of Abbot Creek, near Featherston, is nearly 500 ft. The effective fall obtainable should be about 440 ft. It is possible to take the water by race from the above point to a suitable point on Abbott Creek near the railway-crossing, the direct distance being just under five miles. The race would be longer than this. A drive would be required at the head of Boar Bush Gully to get the water on to the ridge between this gully and Abbott Creek, whence it would be taken down the hill in armoured concrete and in steel pipes to the power-station.

A concrete dam could be built across the Tauherenikau Gorge at Smith's Creek junction to store water. Above this point there is a narrow flat in the valley-bottom about 50 chains long. The gorge is rather wide to allow full advantage to be taken of this flat so as to give a reservoir large enough to store all surplus water for power purposes.

At the time I inspected the river the flow at Smith's Creek was slightly over 150 cubic feet per second, and from all the information I could get and having seen the stream at this point on previous occasions, it was at about its ordinary level, as it was also said to be at the railway-bridge by the Railway Maintenance staff. This quantity of water would give at a power-station at Featherston about 6,000 b.h.p. continuously. With storage to average the ordinary flow over several weeks, there should be no difficulty in getting, say, 10,000 or 11,000 b.h.p. for continuous full power working for eighty-four hours or more a week. This would be a very serviceable scheme.

It is likely the low-water flow may be less than the above quantity, but by how much and for how long it lasts it is not possible to say. The rainfall records at the Summit show a continuous period of about four months of low rainfall during the nine years for which the records are available, and, of course, a longer period than this might also occur. There might be a similarly long period of low rainfall in the Tauherenikau, and there might not. The higher elevation would tend to more frequent rainfall.

The question of storage in a river-valley such as this cannot be discussed without somewhat extensive surveys. A small reservoir at Smith's Creek junction, supplemented by several rock-fill dams at successive points of vantage up the valley, might give much better results than a single expensive dam at Smith's Creek. Rock-fill dams with the interstices filled with small rock, clay, &c., to stop leakage could be built for much less than concrete dams, and might be found to give much better results for a given expenditure. The materials for such dams are on the ground, and little else but plant and materials for draw-off pipe and its fittings would have to be taken up the valley. If all the water could be stored it would, I feel certain, be possible to get much more power than I have given above.

A smaller scheme is possible by taking the race down the left bank of the Tauherenikau to Tait's Creek, near the mouth of the gorge. This would give only about 60 per cent. of the power obtainable at Featherston.