results are surprising. Only a small part of the Acheron flow is regulated by Lake Lyndon, while all the Coleridge outflow is regulated by the lake. Mr. A. D. Dobson, M. Inst., C.E., thinks it probable there may be a leakage from Lake Coleridge, besides the overflow. An examination of the slopes between the lake and the Rakaia, and at the upper end of the lake failed to discover any stream flowing that would account for the lowness of the outflow. Further investigation as to the reason for the low flow from Coleridge is necessary.

Many combinations of the four rivers may be made to form a scheme. Of these the following five are the most important to investigate, a draw-off tunnel at a sufficient depth below the present lake-level being assumed in each case :—

(*a.*) All the water of Acheron and Harper to be diverted into the lake. No dam on Coleridge.
(*b.*) Same, with a dam, say, 30 ft. high across Coleridge-outlet.
(*c.*) All the water from Acheron, Harper, and low-water from Wilberforce diverted into Coleridge. No dam on Coleridge.
(*d.*) Same as (*c*), with dam 30 ft. high across Coleridge-outlet.
(*e.*) Dam built across Wilberforce to divert Wilberforce and Harper into Coleridge. This may be of various heights.

I think (*a*) might fail seriously in years of remarkably low rainfall, such as 1895 and 1896 were at the Bealey. It would give about 17,000 b.h.p. ordinarily.

To test the value of (*b*) in the absence of measurements of flow of the several rivers extending over a considerable period, computations have been made of the probable fluctations in the level of Lake Coleridge due to a rainfall equal to the Bealey rainfall for the thirteen years from 1890 to 1902, both inclusive. A coefficient of run-off equal to 85 per cent. of the total rainfall is assumed as a fair value for steep slate country. With a draw-off equal to 720 cubic feet per second, the lake-level would attain a level slightly higher than it started with, the range of level being about 58½ ft. The attached diagram shows the variations in lake-level as computed. The investigation may be taken to show that with a range in lake-level of, say, 60 ft., it would probably have been possible to equalise the flow of wet and dry years for the period dealt with, for a rainfall equal to that at the Bealey. The Bealey is only about three miles outside of the drainage-area at the nearest point, and not more than twenty-four miles from the furthest point. Even if the actual average rainfall on the basins of the Harper, Coleridge, and Acheron were different from that at the Bealey, the curve of fluctuation would probably have considerable resemblance to that given, as the average yearly rainfall would probably vary in a similar manner each year over the combined areas as at the Bealey. The assumed mean flow-off would give 29,000 b.h.p. continuously, or 58,000 b.h.p. for a plant working twelve hours a day full power.

The scheme (*c*) would probably give, say, 41,000 b.h.p. if the Wilberforce were good at all seasons for a flow of 600 cubic feet per second.

The scheme (*d*) would probably give, say, 53,000 b.h.p. on the same supposition as for (*c*).

The scheme (*e*), with a dam across the Wilberforce diverting both that river and the Harper, would probably give much greater power than the last scheme. There would probably be loss of flood water frequently, even with a dam 40 ft. above the present lake-level. The maximum power to be obtained may for the present be taken at 70,000 b.h.p.

The works required for (*a*) would be a weir across the Harper 30 chains long, and a new channel 85 chains long; also a race 2 miles 30 chains long to divert the Acheron. The diversion of the Harper would be somewhat costly, and perhaps difficult to maintain. Cost for these works, say, £45,000.

The works required for (*b*) would be the same as for (*a*), the new channel for the Harper being a little shorter, with the addition of an earth dam across Coleridge-outlet. The length of dam would be 5,350 ft., and its cost £125,000 at least. A concrete dam would be much more costly. The cost of these works would be, say, £170,000.

The works required for (*c*) would be the same as for (*a*), with weir across the Wilberforce and a conduit about four miles long. As the Wilberforce is a wide shingle river, about a mile wide at the intake, the diversion of its water would be a serious problem to undertake. The cost of these works would be, say, £345,000.

The works required for (*d*) would be the diversion-works outlined above for the Acheron, Harper, and Wilberforce, with a dam across Coleridge-outlet. The cost of these works would be, say, £475,000.

The works required for (*e*) would be the diversion-race for the Acheron and a concrete dam across the Wilberforce. This would be over half a mile long (44 chains), and, assuming good foundations to be got about 20 ft. below the river-bed, the cost would be over £1,000,000 to dam the water to a level of 40 ft. above the present level of Lake Coleridge. The cost of these works would be £1,050,000.

The above works are in each case for diversion of water into the lake, or for that purpose and storage. The cost of works for sluices, draw-off tunnel, pipes, &c., are not included in the above estimates.

To utilise the lake for storage of water, the draw-off tunnel must be placed at a considerable depth below the surface of the lake. The exact depth would be fixed when complete information is available. This will necessitate some under-water excavation for approach-channel. It also involves the execution of a considerable amount of work by means of a coffer-dam or otherwise in connection with the tunnel end, sluice-gates and their gear, &c. The cost of these works will be considerable.

The cost of the scheme (*b*), to give 29,000 b.h.p. continuously, delivering in Christchurch, say, 17,400 b.h.p., would be, in round figures, £760,000, and to give 58,000 b.h.p. for twelve hours each day, £1,200,000. These figures are given as approximations on the information available, to give some idea of the magnitude of the works involved. The gross revenue obtainable if all the energy could be sold, in either case would be about £200,000 a year. The scheme (*b*) is the only one worth considering at present, the height of dam and depth of tunnel being adjusted to make cost a minimum.