

Confining the consideration then to alternatives one and three, it will be seen that the former is the more costly, but promises a larger water supply, and, being shorter by 6 miles, it would be somewhat cheaper to maintain. This latter consideration, however, would be almost, if not quite neutralized, if the proposed catchwater race is constructed, as that would make the length the same in both cases.

Were there 10 heads of water always available in the Otekaike, there would be no object in going to any extra expense to get more; but I doubt if there are always 10 heads in it. At the time I saw it, there was about that quantity, and it is said to diminish very little in even the driest weather; but I doubt if it could be safely reckoned on for more than 7 heads at its minimum, and the Maerewhenua, with the aid of catchwater race, would, I think, supply the other 3 heads.

If 7 heads is worth £12,000, 10 heads would be worth £17,143, so that on that basis it would seem that the first alternative, estimated to cost £16,000, has a slight advantage.

The advantage on that score is so very slight, however, that taking into consideration the disadvantage of the tunnel, which would take longer to construct than any similar length of contour race, and also taking into consideration that the contour race commands more of the country believed to be payably auriferous, I would recommend the latter, namely, Alternative No. 3, as being the best to undertake.

Regarding its prospects then, and taking in this case, as there is some foundation to go upon, a reasonable mean, instead of a maximum and a minimum as in first case analysed, the financial aspects of the question would probably be about as follows:—

I estimate that the cost of maintenance and management would be about £700 per annum.

Assuming that there would be on the average an available supply of 8 heads of water from all sources, this would be equivalent to 24 heads per day of 8 hours, and reckoning on two-thirds of this being constantly sold at, say, 30s. per head per week, the gross revenue would be £1,248 per annum, and the net revenue £548 per annum.

On this basis it would seem that the undertaking would only return $4\frac{1}{2}$ per cent. interest on its cost (£12,000), without anything for sinking fund; but I think I have rather under estimated than over estimated the probable results, as it is probable that more than 8 heads will be frequently available, and even an occasional extra supply of that sort might possibly be sold for irrigation purposes, if not for mining. It is possible, also, that the one-third of total quantity which I have reckoned upon as running to waste continuously through cleaning up of claims, &c., might also be disposed of for irrigation; and, if this were so, there would probably be a net revenue sufficient to pay 5 per cent., with a slight margin over.

As to the length of time during which the auriferous ground commanded would support such a race as the one proposed, it is of all the items which have to be estimated the most difficult one to arrive at; but, judging from enquiries which I made on the ground, and from observations of the workings done up to date, I should say that it would be well within the mark to estimate that the ground in this case would support the proposed race for fifteen or twenty years to come.

With regard to the levels which I have proposed for the races, as indicated by figures in corresponding colors alongside them on the map, it may be held by the miners interested that these are susceptible of improvement, and such is very probably the case, as the time at my disposal did not admit of my going into each race in very great detail; but any such probable alteration of level will not materially affect either the cost or the length of the races, as the creeks from which they take their source are so steep, that a considerable difference of level up or down is attained in a very short distance.

The levels stated on map, with the exception of those at trig. stations which were obtained from Survey Department, are all from barometer readings, so may not be absolutely correct; but they were taken with every reasonable care, and referred to a stationary barometer, so that I do not anticipate that any of them are very seriously in error. The heights are in all cases from sea level.

The fall estimated for races is 10 feet per mile throughout, except in the case of the syphon pipe across south branch of the Maerewhenua, where a fall of 10 feet in 10 chains is allowed.

In estimating the cost of the races, I have assumed that they would be cut all in the solid, as that has been the custom in all such works with which the Government have been in any way concerned. I find that in the locality in question, however, the most of the existing races are only partially cut in solid, the remainder of depth required being attained by building up on low side with sods, &c. This, of course, considerably reduced the cost, so that if constructed on that basis, the proposed races would cost less than I have estimated them at; but it is not a class of work which I should recommend, the saving in first cost being generally soon compensated for by heavier expense in maintenance.

In addition to the plan above alluded to, I enclose also a section of the Ben Lomond Saddle, through which the long tunnel was proposed to pass, in order that the length of a tunnel at any other level can be approximately ascertained if desired.

The Engineer-in-Charge, Middle Island.

I have, &c.,
C. Y. O'CONNOR.

No. 2.

MIKONUI WATER-RACE.

C. Y. O'CONNOR, Esq., to the UNDER-SECRETARY for GOLD FIELDS, Wellington.

SIR,—

Government Buildings, Wellington, 23rd May, 1882.

I have the honor to forward herewith a report by Mr. Martin, District Engineer for Westland, on the subject of the above race, and containing the information which Hon. Mr. Rolleston desired to be procured for him when in Dunedin a short time back.