

quantity, if the channel is to perform its functions and be useful in the further development of the district as a medium for the discharge of tailings.

I have gradiented a course for a flush race, commencing at the level of peg O and following the contour of the hill slopes to the Little Kyeburn. The section shows the fall for the first two and three-quarter miles to be at the rate of 11.2 feet per mile, and for the remaining distance at the rate of 8.8 feet per mile, with a break in level at the crossing of the Stranraer Hill range of 61.17 feet, this height being equal to what I considered would be absorbed in following the contour line shown by red dotted line.

The difference in level between the junction at Kyeburn and peg O at Naseby is 276 feet, the terminating peg  $2\frac{1}{2}$ , on west bank of Kyeburn, being 28 feet above creek.

The line, as laid off, is very circuitous, the distance in a straight line not exceeding seven miles, which gives a proportion of 1 to  $3\frac{1}{4}$ ; but this proportion is considerably less than would have been the case had tunnels not been adopted. The actual contour would have resulted in a total distance of forty-five miles, and the difference in level increased to 90 feet.

The ground is all good, and favourable for construction, with the exception of about one mile, part of which distance is in the approach to and from Deep Creek, and part in close proximity to the junction with Little Kyeburn. The tunnelling, from external appearances, will be through cement-gravel, and will not be a very expensive operation.

The dotted lines on sketch plan show the course the race would have taken had tunnelling not been resorted to. Between Milkman's Gully and the Kyeburn Creek I have shown an alternative course, which would involve a tunnel half a mile long, but would otherwise be of considerable advantage in reducing the total distance, and consequently the loss from absorption.

The difference in cost would be trifling, and on that account the alternative course can be open without employing any additional outlay should it subsequently be adopted.

I find that on gauging the various streams met with in the course, only four, leaving out the Little Kyeburn, afford a constant supply, viz., Deep Creek, north branch of same, Big Flat Creek, and Buster Creek, the aggregate supply from which would not exceed in ordinary seasons six Government heads of the Little Kyeburn. At the time of my last visit, and from periodical examination previously, I find that not more than five Government heads could be relied upon, nearly all of which consisting of tail water from Clarke's Diggings at Mount Buster.

Relative to the races now in existence, and which derive their supplies from the tributaries of the Little Kyeburn, the combined supply they are entitled to would be, according to tabulated statement on sketch plan, sixty-six Government heads, but the races, as cut, have only a carrying capacity of about eighteen heads, hence the remaining number granted, I am reliably informed, can be declared forfeited. The greatest portion of the supply from the Little Kyeburn tributaries is used in sluicing at Surface Hill, the tailings from which flow into the present Sludge Channel, so that nothing would be gained by the purchase of the existing right.

The only course to be pursued would be to store up the flood waters of Deep Creek and the other creeks in the line of the proposed race; so that a constant supply of something like twelve to fifteen Government heads could be available when required for flushing. It is not necessary that there should be a constant flow of flush water into the channel. Its useful effects would be when the flow of tail water was at a minimum, and this may be considered at from 6 p.m. until 8 in the following morning.

The reservoir I propose, at two and three-quarter miles of flush race section, is capable of storing 600,000 cubic feet. This quantity, with the constant supply from feeding race, would admit of a considerable body of water being brought to bear upon the channel at any time.

In the estimated cost of providing water for flushing purposes, I take it for granted that the only permanent source of supply from the Kyeburn watershed will be by supplementing that obtained from the creeks; and this can only be accomplished by constructing dams at Deep and other Creeks having a combined capacity of say 10,000,000 cubic feet; but although giving an estimate of the cost of the works necessary in accordance with the views above enumerated, I do not wish to be understood as thoroughly approving of the Kyeburn flush-water scheme, not so much on account of the uncertainty of supply, as the heavy cost the carrying out of the works will necessarily entail.

It might probably be judicious to postpone consideration of the Kyeburn watershed supply until the survey is completed of country between Naseby and the head waters of the Manuherikia (instruction to undertake which I received from the Honorable the Resident Minister some time ago), as it is very possible that a good and constant supply might be obtained from that source at a cost not much in excess of that from the Kyeburn.

The conclusions that I have arrived at are these: the channel scheme is perfectly feasible, and if carried out will be a work of considerable utility, and cannot fail to be the means of advancing the interests of the district and extending its resources.

The scheme of water supply from the Kyeburn is practicable but expensive, and I would therefore suggest deferring further consideration of it until the Manuherikia watershed has been examined and reported upon.

I have, &c.,  
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