

OTAGO.

No. 2.

MOUNT IDA WATER SUPPLY.

Mr. D. L. SIMPSON to Mr. J. BLACKETT.

Dunedin, 22nd July, 1872.

SIR,—

I have the honor to report upon the proposed scheme of water supply for the Mount Ida District, in so far as it relates to the sludge channel for drainage of tailings, and supply of water for flushing purposes, from the Kyeburn watershed.

My examination of the district, and surveys instituted hitherto, have been mainly confined to this section of the whole scheme, the result of which is contained in the drawings prepared and forwarded, comprising plan and section of sludge channel, longitudinal section of flush race, and sketch plan showing relative position and direction of channel and race, and giving other information, which I considered would better elucidate the subject under consideration.

I may premise by stating that the weather was extremely unfavourable during the concluding half of my survey operations, and in a great measure prevented me from acquiring information of a supplementary character useful to the scheme, such as the mode of operation of the St. Bathans channel and the general inclination of tail races; but I believe that the merits of the contemplated works in so far as the sludge channel is concerned, will be apparent from a glance at the longitudinal section, assuming fall to be the most important requisite.

The present channel for discharge of tailings was opened by the Extended Company some time ago, and, as originally constructed, was in length a little over three miles, the discharging point being at 2 miles 65 chains; but in consequence of the absence of a proper discharge area, the tailings accumulate to such an extent as to interfere with its proper working at the lower end, and although efforts have, and are now being made to keep this part of the channel open, it is evident that they must eventually prove abortive.

At the present discharge point, viz. at 2 miles 40 chains, the bed of the channel is considerably elevated above the original level of the ground, to the extent of four or five feet, and this will go on increasing as the tailings accumulate.

The proposed line of sludge channel, as shown by the red line on the plan, was determined upon as being the most direct, consistent with economy in construction; and with a view to the channel being made available for the drainage of tailings from the prospective workings along the bed of the gully, the bed level is closely approximated to the depth required.

I have shown the channel to terminate at a point ten miles distant from Naseby, it being, in my opinion, the only part where there is an efficient discharging area, and where it may reasonably be expected that its proximity to the Taieri River will not cause any accumulation to be so formidable as to interfere with the satisfactory working of the channel.

The branch channel follows more or less the line of the bed of a small gully, now filled with tailings to the extent of 10 or 15 feet above the original level. It is necessary for the drainage of the contiguous workings that a communication should be opened with the main channel. It is more expedient that this should be done when it is understood that the present level of the tailings at peg No. 2 is 3 feet above the street at the intersection of Earn and Seven Streets, and this height may go on increasing, to the detriment of the township, unless the branch is opened.

The branch channel will have a fall of 190 feet per mile.

The main channel commences with an inclination of 1 in 44, terminating at the rate of 1 in 125, or 120 feet and 42.2 feet per mile respectively.

The existing channel has an average fall from peg O to termination, at 2 miles 40 chains of 88 feet per mile. The sectional area, when workings are in full operation, is 5 square feet; the mean velocity, 492 feet per minute, and consequently discharge about 2,500 cubic feet per minute, equal to twenty-seven Government heads.

According to the proposed form of new channel (see cross section) the sectional area is 28 square feet, and hydraulic mean depth 2 feet.

Taking the full sectional area as representing the flow in floods, the mean velocity will be at the discharging point, 715 feet per minute; and discharge, 20,020 cubic feet per minute.

Again, assuming that the ordinary flow will be 100 Government heads to 9,200 cubic feet per minute, the depth of section at the point of discharge will be represented by about 26 inches; the sectional area will therefore be 15.7 square feet, and hydraulic mean depth 1.4 feet, and accordingly the mean velocity will be close upon 600 feet per minute, equal to 10 feet per second, as against 8.2 feet per second, the present velocity of discharge of existing channel. The present channel has the following defects:—

1. It is irregular in cross sections, thereby increasing the friction and reducing the mean velocity.
2. The supply of water in the shape of tailings is intermittent, causing the gravel and sand to cake, which is afterwards difficult to remove, and consequently leaves the bed irregular in fall.
3. There is no proper area to receive the tailings; hence the velocity of discharge is lessened, and the tailings deposited in bed of channel.

Notwithstanding the two first defects, repeated observations have proved that the channel acts its part well for the first mile and a half.

In the appended estimated cost of the work I have provided for the channel being pitched on the bed and partly up the sides. This plan, I think, should be adopted, in order that a smooth and uniform surface should be presented to the tail water in its course. The extra expense of construction would be more than counterbalanced by the saving in maintenance in a few years.

In my remarks upon the proposed sludge channel I have assumed that there will be a constant flow of at least 100 Government heads, and I think this may fairly be looked upon as the minimum