

*Rainfall and Drainage Area.*

The rainfall here, and all over the Maniototo Plain, is so slight—from all information I could obtain only 13 in. annually—that it is hardly worth taking into account, as evaporation and leakage from various causes would consume it.

The drainage area at the reservoir-site is limited, and confined to the top of the low ridge on one side, and the terrace on the other, both steep to the reservoir. The creek runs out at the head of the valley, and is the under drainage of the snow. To fill the reservoir the water is almost entirely dependent on melting snow down a large gully from the summit of Mount Ida. In such a locality there is no sure or even average data to base calculation upon, as much depends on the frequency of frosts or otherwise to withhold the snow-water, or discharge it intermittently during the warm winds and rains of October and November, or, in fact, with any degree of regularity. This applies not only to the source of supply for this reservoir, but generally over the whole of the centre of Otago, and especially the Maniototo Plain.

During the end of summer, autumn, and winter months all the creeks are mere shingle-beds, with perhaps in some cases water percolating underneath. At the melting of the snow in spring they become mountain torrents, and it is then that the water on the low levels must be conserved for midsummer, autumn, and winter use. The necessity for strong dams to withstand the rush of water is obvious.

It is considered, if the dam is built, it will supply all demands for six years. Then, if claims are worked out, the water can be utilised for a complete and extended system of irrigation, or a race can be taken across to supply the Little Kyeburn and portion of Spec Gully. With the exception of the two winter months, July and August, when operations cease on account of frost, the Government race, supplemented by the Eweburn reservoir, will keep all the miners employed all the year round.

The Mount Ida Race at present supplies six heads and a half. This is barely half a supply. There is wanted from the proposed dam for about two months and a half twelve heads running night and day; and providing for future wants and extension, twenty-four heads. All the water in Spec Gully is in the hands of companies. The Government race will not reach there, and water is from other sources difficult to obtain. From year's end—March, 1897—the increase in consumption was 5·25 over that of same date in 1896.

Each elevator working by day only employs six men, and uses four heads an elevator. The elevators, in the event of the dam being constructed, could work night and day, or employ two elevators in place of one now. From the above information, supplied by Mr Murray, the water-race manager, and others, it appears that the majority of the water from the dam is likely to be consumed by the miners for elevating and sluicing, and that other provision should be made for irrigation purposes.

Mr. Browne estimates the "area enclosed by a dam 70 ft. high to be about 50 acres; and the contents of the reservoir once filled about 58,000,000 cubic feet, or 361,181,250 gallons of water, which means a capacity of thirty Government sluice-heads for sixty-six days of eight hours, or twenty heads for a hundred days; and, taking the scale at 8s. 4d. per head per day, a revenue of £883 odd, which would yield 8 to 10 per cent. on cost of construction at £10,000."

Having doubts under the conditions above stated as to the rainfall, drainage area, and dependence on the melting snow, I would recommend that the dam should be raised only at first, say, 50 ft. instead of 70 ft., provision being made on the lines laid down for the foundation for a future extension if the source of supply is found to justify the additional outlay. The water conserved would be about a third less than with the 70 ft. dam, and would supply about twenty heads for forty-four days of eight hours. The by-wash could be carried as originally designed by a tunnel or cutting through the rock round into the gulley which opens into the Eweburn at the race fluming, the outlet being afterwards raised to the required level in the event of the addition being constructed.

There is already a tunnel roughly cut carrying the water of the Eweburn into the Government race, in which the discharge-pipe would be laid in concrete for the dam. I do not think it necessary to provide for a flushing-pipe. The silt likely to accumulate in the reservoir will, from the nature of the ground, be small, and it will tend to caulk and solidify the water side of the dam.

In the method of construction I differ from Mr. Browne, who favours sluicing in the material, which is often done by miners when and where water-power is available, but in this case it involves the expense of making a small catch-water dam at a sufficient elevation and laying pipes for the purpose. All the material can be obtained and run out from the spur or terrace direct on the dam on the left bank of the creek, and there is an abundant supply of sound rock for facing the inner or water slope. The outlet will join the Government race, and from that point to Naseby the race must be enlarged to carry the additional supply of water, at a cost estimated by the manager at £500.

Having as yet no definite information as to the nature of the bottom until the result of the borings are known, any estimate for a dam as I propose, say, 50 ft. in height, can only be roughly approximate. I am of opinion, however, that it may be constructed for a sum between £6,500 and £7,000.

*IRRIGATION, MANIOTOTO PLAIN.*

The large extent of country so called is a misnomer. It may be better described as rolling downs with long, low, and flat-topped spurs running into it from the foot-hills of very irregular heights and contours, indented between, as a rule, by long, narrow, and flat gullies, or small shallow valleys containing the numerous stream-beds having sources in the surrounding mountains and hills. The water-supply is exceedingly limited, and in most cases entirely dependent on the melting snows; and six to seven months in the year at least the watercourses, after leaving the gorges, are dry above ground. There is a deep deposit of gravel and shingle in many places—as much as 10 ft., as proved