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WATER-RIGHTS, RINGAROOMA RIVER.

REPORT OF MR. K. L. RAHBEK AS TO THE ADVISA-BILITY, OR OTHERWISE, OF GRANTING ANY MORE WATER-RIGHTS FROM THE RINGAROOMA RIVER OR ITS TRIBUTARIES ABOVE DERBY.

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WATER-RIGHTS, RINGAROOMA RIVER.

REPORT BY MR. K. L. RAHBEK.

Office of Mines, Hobart, 25th September, 1900.

Sir,

In accordance with your instructions contained in the Secretary for Mines' letters, dated the ,27th ultimo, and the 4th instant "to report upon the advisability, or otherwise, of granting any more water-rights from the Ringarooma River or its tributaries above Derby," I have the honour to report as follows:—

In considering the above subject it is unavoidable to examine into the merits of the Ringarooma River and its main tributaries as a source of supply, and interesting reports upon this subject have already, some years back, been written by Mr. G. Thureau, F.G.S. and Mr. G. J. Burke, M.I. C. E.

In viewing the whole district drained by the Ringarooma it must be granted that this district has been favourably treated as to natural water supply. For about half its length, reckoned from its junction with the Maurice River, and down-stream, the river runs close to its western water-shed, and its tributaries from this side are comparatively insignificant, but it drains the large catchment area to the eastern side by means of several fair-sized affluents, which have their springs from the ranges running from Mt. Victoria towards the Blue Tier. In fact, as will be shown later on in this Report, the amount of water the river collects on its course from Ringarooma Bridge to Derby Bridge amounts to $l\frac{1}{2}$ times the water gathered on the combined catchment area for the Ringarooma and the Maurice rivers, reckoned above Ringarooma Bridge.

The rainfall seems to be ample: during the year 1899 there fell 48.08 inches at Ringarooma township, while the average rainfall during the last 15 years for Gould's Country amounts to 49.44 inches, and for Scottsdale it averaged 43.51 inches for the last 14 years.

If no water-rights had been granted so that the Government would have had full control of all waters of the catchment area belonging to the Ringarooma River, a grand high-level scheme, with a carrying capacity of perhaps close to 500 sluice-heads, starting from the Upper Ringarooma and tapping all the main tributaries, and in connection with one large impounding reservoir on the Upper Ringarooma and several smaller on the tributaries, where the natural configuration of the country should invite of so doing, could have been formulated and a permanent water-supply for mining, irrigation, power, domestic and other public purposes, would have been established for a long time to come, and it would have been more economical in construction and more efficient in administration than a number of smaller races constructed for private purposes. Unfortunately so many water-rights have already been granted on all tributaries of any importance emptying themselves into the Ringarooma from the Dorset to the Cascade River (both rivers included) that it would be impossible now for such a scheme as mentioned above to tap any of these affluents. We are then thrown back upon the part of the river from, say the junction of the Maurice and the Ringarooma rivers, and up-stream. Proceeding for a few miles up the Maurice River no good site for a weir, *i.e.*, for storage purposes, could be found; three to four miles from its junction it splits up into three or more smaller creeks.

The Ringarooma River, from its junction, winds its way up-stream for some distance, within close-confined river-banks, and at several places here a weir could be constructed for a moderate cost, although no proper storage could be secured here. But a couple of miles up-stream from the junction, or about $\frac{3}{4}$ mile down-stream from the Briseis Co. proposed site for dam, an exceptionally

good site for a storage weir can be found, as the river here finds its way through a gorge, the sides and bottom of which are composed of granite. The gorge is only 40 feet wide, and here immediately above, the river banks retreat, so that a good storage might be expected; a weir constructed here, say 30 feet high, would probably throw the water back for about $\frac{2}{4}$ mile, or if we made it 70 to 80 feet high we would create a sea the greater part of two miles in length. While examining the Ringarooma River I took the discharge at several places, not so much for the purpose of learning how much water was passing down any particular day, but more for the purpose of learning the true proportion of the discharge of the river at different points.

I gauged the Ringarooma River at Derby Bridge on the 4th instant, and found there were 1285 sluice-heads passing. On the 6th instant I gauged the river about 200 feet up-stream from the bridge leading to Ringarooma township, and found 494, or say, 500 sluice-heads. Immediately above the junction of the Ringarooma and the Maurice rivers I, on the 10th instant, found 221 sluice-heads in the Ringarooma, and on the same day 275 sluice-heads in the Maurice River.

On the 8th instant I gauged the Ringarooma at the Briseis Company's proposed site for dam, which is about 3 miles up-stream from the Maurice junction, and found it carried here 160 sluice-heads, and about 6 miles above the junction, and a little way above C. A. Graves' intake for his water-race, I, on the 12th instant, measured 63 sluice-heads in the river, of which 15 heads went into the abovementioned race. Taking the flow of the river at Derby Bridge as a unit, we find, then, that only 39 per cent. of that quantity passes under the Ringarooma Bridge (and, consequently, 61 per cent. enters the river from the tributaries between Ringarooma and Derby Bridges), 17 per cent. in the Ringarooma River at its junction with the Maurice, and this last-named river carries 21 per cent., while the Ringarooma at the Briseis proposed site for dam carries $12\frac{1}{2}$ per cent. and 6 miles up the river from its junction only 5 per cent. of its discharge at the Derby Bridge is running. Of the 15 sluice-heads, which on the day named passed into Graves' water-race, only about one head found its way back to the Ringarooma the other 14 sluice-heads went out into Dunne's Creek, which again empties itself into the Maurice. From the above-mentioned it appears that at the junction, the. Maurice River carries more water than the Ringarooma, namely 275 sluice-heads to every 221 passing in the Ringarooma, or, correcting the figures for the 14 sluice-heads from Graves' race, it will be 261 sluice-heads in the Maurice for every 235 in the Ringarooma, so the catchment area for the Maurice must be larger than that for the corresponding part of the Ringarooma, assuming that the rainfall for 2 places in such close vicinity would practically amount to the same. In consequence of what has been demonstrated here, it is clear that any scheme for tapping the Upper Ringarooma must include the Maurice. The main-features of any scheme from the Upper Ringarooma are then fixed. As there is no site for a storage weir available on the Maurice River, but there is on the Ringarooma, and since it is imperative to have all the water we can get from the Maurice, a communication canal from the afore-named site for weir about 2 miles up the Ringarooma from the junction, will carry the water from the impounding reservoir to a point as close as possible down-stream from the junction of the Maurice River and Dunne's Creek. A Weir or Dam here should be constructed on the best available site; it should have only a moderate height, say a couple of feet above the low river-banks, and should serve to direct the water into the high-level race which should start from here and should be able to carry 250 sluice-heads as far as Derby.

During the part of the year when rain is plentiful only a small quantity of water would be required from our storage reservoir, which would be filled in the beginning of the wet season, and all surplus water coming down after that event would escape over the weir and travel along the old river-bed. Whenever water would be needed for the race, the corresponding amount would be let through the regulators to be erected in front of the communication canal. The reservoir would probably be occasionally drawn upon nearly every month during the year; never-the-less we can safely reckon that will always get filled again during the nine or ten months, but it is especially during 2 or 3 months in the beginning of the year that it will be called upon to render active Assuming we could get our storage reservoir at an area of $\frac{1}{2}$ square mile (but I do not say service. it is so, this can only be ascertained by instrumental survey) and reckoning an average depth of water of 20 feet, this would impound, say 279 million cubic feet. On the other hand 100 sluiceheads running continously for seventy days will amount to say 244 million cubic feet, leaving 35 million cubic feet in the reservoir for evaporation, percolation, and as dead water (i.e. water lying to low to be drawn into the canal). In other words : the reservoir of the assumed capacity will continue sending forth 100 sluice-heads during day and night for 70 days, even if it does not rain during that period, or if no water whatever could enter the river above the weir. But this would not be in accordance with actual facts even if it does not rain, because there is always water entering the river-bed which has percolated through the upper permeable strata forming the catchment area. The forces which govern percolated through the upper permeable strata forming the catchment area. The forces which govern this action are so numerous and so variable for each case, that we cannot determine the result except by gauging, during several years, the particular water-course under question. It is, however, of the utmost importance for us to know something about the summer flow in the Upper Ringarooma, and while examining this locality I made diligent inquiries about this subject whenever I had a chance; but met only with slight success. Only on one point did my informers all agree, namely :--that the River is perennial. The only official document we have about the carrying capacity of the Ringa-rooma River during summer time is Mr Burke's diagram from 24th January, 1885, till 11th. October of the same year, showing the water-level at Ringarooma Bridge. Mr. Burke says in his report :----"I have made an analysis of the diagram with the following results, the period embraced being 262 days :---The minimum supply in the river was 121 sluice-heads, and for 181 days the supply ranged between this and 217.5 heads. For 81 days the river brought down a greater supply than this."

During the year 1885, Gould's Country was the only place in the locality where a meteoroligical station was erected, and the rainfall there for that particular year was 47 21 inches during 128 days, and cannot, therefore, by any means be considered wet year. If we then, in accordance with Mr. Burke's gaugings, fix the minimum supply at the Ringarooma Bridge at 121 sluice-heads, then will the proportionate discharge of the Maurice River be 65 sluice-heads, and on the Ringarooma at the weir about 39 heads, or, in all, 104 sluice-heads. From this it appears that we, with a storage reservoir of the capacity assumed, would be able to send 200 sluice-heads down the race during the driest season of the year, not exceeding 70 days. Studying the statistical table showing the rainfall for Gould's Country, it appears that during the last 16 years there have been 18 months only with a rainfall less than an inch; and if our scheme had been in operation during that time the probability is, that it would never, during these 16 years, have failed to forward a supply of 200 sluice-heads, and for $\frac{2}{3}$ of that period would have sent 250 heads down the race. In the absence of any data upon which to from a reliable estimate I would judge the probable cost of the scheme at £60,000 to £70,000.

Such then, Sir, would, under present condition, in all probability, be the merits of a high-level scheme from the Upper Ringarooma, and in carrying out this or any other scheme to the same purpose Government would continue holding in their own hands the supreme control of the most mportant part of the natural water supply for the Ringarooma district.

In case, Sir, you decide to grant water-rights, I beg for permission to draw your attention to the following, viz. :--The soil around Ringarooma township, in fact most of the land right from Derby, and at least 6 miles above the Maurice and Ringarooma Junction, consists of a rich, volcanic, agricultural soil. At present, next to nothing is cultivated, the cleared land being mostly used for grazing purposes. But there is no doubt that in time to come, when present means of commun cation have improved, most of this rich land will be cultivated, and it will by that time, no doubt, be found that irrigation will be essential for intensive cultivation of the soil. I therefore beg to recommend that if water-rights are now granted they should be allowed only for a certain number of years. As to the granting of water-rights, I beg to offer a few remarks for your consideration. There are, at the present time, applications at the Mines Department for 242 sluice-heads of water. However, of these, 42 heads are situated on different tributaries of the Ringarooma, and I cannot see any objection for granting the rights asked for, assuming the applicants know they cannot get any water at certain seasons until all prior water-rights, whether situated higher or lower on the same stream, have been satisfied.

Of the remaining 200 sluice-heads :--

- (1.) Briseis Tin Mining Company, Limited, ask for 137 sluice-heads on the Ringarooma and Maurice rivers and on tributaries of the last-named.
- (2.) The New Brothers Home No. 1 Tin Mining Company, No Liability, asks for 50 sluiceheads on the Ringarooma, about half a mile down-stream from the Maurice junction.
- (3.) C. H. F. Shearn asks for five sluice-heads on the Ringarooma at the old dam just above Derby, and
- (4.) C. A. Graves asks for 8 additional sluice-heads on the Ringarooma at the intake of his race, about six miles up-stream from the Maurice junction.

In no case will the granting of water-rights from the Ringarooma interfere with existing water-rights on the same stream, as at presant there is only C. A. Graves who has four sluice-heads at his race six miles up-stream from the junction, but I do not know enough of the land laws to say whether the granting of water-rights would interfere with any riparian rights.

Referring to the granting of water-rights :---

(1.) It would, I think, be inconvenient to grant the Briseis Company the 137 sluice-heads in the way as asked for, because no water would then be available for other parties during the dry season. Where the Briseis Company asks for a dam site the riverbanks are only five to six feet high and no storage could be obtained here, but if the site for weir about ²/₄ mile down-stream was granted to them (and I believe it is the same place where they intend to cross over the Ringarooma with their proposed race from Dunne's and the Maurice Creeks) the Company would have it in its own power to increase water available for it by storage. The granting of the 78 sluice-heads at its proposed dam site, and 8 sluiceheads from Dunne's Creek, in connection with permission for it to construct a storage weir at the oftnamed good site at

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a moderate height, subject to the approval of the Minister, is, I think, the best which, under the circumstances, can be done, in all fairness to all parties concerned. The Briseis Company would, of course, have the obligation to make good any damage on private land (if any), which at times would be subject to inundation from the impounding reservoir.

- (2.) The fifty sluice-heads asked for by the New Brothers Home No. 1 Tin Mining Co., No-Liability, on the Ringarooma, about half a mile down-stream from the Maurice, I would recommend to be granted. Under the supposition that the Briseis Company has been granted water-rights as described above, the minimum flow during the dry season would probably be only about 30 sluice-heads; at all other seasons a good deal more than 50 sluice-heads will be flowing past the site for its proposed intake.
- (3.) The five sluice-heads asked for on the Ringarooma at the old dam just above Derby, I should recommend to be granted, if the applicant will undertake to send the water back into the Ringarooma up-stream from where the Briseis Company's tailings are sent out. I need hardly mention that all water which can be had is needed for helping to scour at Derby the tailings along the river.
- (4.) The eight additional sluice-heads asked for on the Ringarooma, about six miles up-stream from the Maurice River, I beg to recommend to be granted on the condition that the water is returned into the Ringarooma or Dunne's Creek above the Briseis Company's intake.

In conclusion, I have now only the duty to mention that the granting of the water-rights to the Briseis and New Brothers Home No. 1 companies on the Ringarooma River will probably have the effect that the tailings, especially at Derby, will accumulate in much greater ratio than hitherto, as the tin-mining companies, with their improved water-power, will get through a larger amount of work per diem at the same time as the flow of the water in the river itself above Derby will occasionally be quite stopped.

This state of things cannot be helped but will probably necessitate the altering of the companies' present way of treating their tailings.

I have, &c.,

K. L. RAHBEK, M. Dan. Assoc. C.E.

The Hon. the Minister of Mines, Hobart.

JOHN VAIL, GOVERNMENT PRINTER, TASMANIA.

