RINGAROOMA HIGH-LEVEL CANAL SCHEME.

THIS Report has been prepared in accordance with instructions received from the Honorable the Minister of Lands and Works, who was desirous to have the opinion of a Hydraulic Engineer on the leading features of the scheme prior to according sanction for the employment of survey parties. It is the result of a careful reconnaissance of the whole district through which it is proposed to run the canal; a preliminary inspection, in which the natural features of the country had to be observed as well as possible, in the absence of an accurate series of levels, the only safe guide for an Engineer.

The object of the scheme is the diversion in whole, or in part, of the water of the Ringarooma River, and the construction of a high-level canal on the left or western bank to carry this water and maintain a constant supply to the alluvial tin mining district between the upper part of the Ringarooma and the country about Mount Cameron. It has been already reported upon by Mr. G. Thureau, F.G.S., Inspector of Mines, who gave much interesting and valuable information, principally on the geological character of the district.

The first and most important point in any water scheme is, of course, the quantity of water available for the purpose of the scheme. As regards the Ringarooma River there can be little doubt that for about eight months in the year an ample supply exists, and that the question is, what quantity flows during the summer months when the river is low? Desirous as I was to see the river in its low state, I was fortunate in the time of my arrival at Upper Ringarooma, on January 22nd. The weather had been very dry and hot for some time preceding, and I was informed by the best local authorities that the river was then at its lowest state. A heavy downpour of rain on the 26th caused a rise; but meantime I had fixed a gauge-rod and taken the discharge of the river. On January 24th, with a reading of 2·10 feet on the gauge-rod, the discharge of the river at Upper Ringarooma Bridge was 126 "sluice-heads." Daily readings of the height of water continue to be taken by Mr. Gorey, the constable at Ringarooma.

I may here make a few remarks regarding the quantity of water in a Tasmanian "sluice-head," expressed in the ordinary units employed by Hydraulic Engineers. These units are cubic feet per second, usually adopted for the measurement of the flow of rivers, and gallons per minute, hour, or day, adopted in such cases as water supply for towns, discharges of pipes, capacity of pumps, &c. In the different mining countries various local units are generally adopted, and Tasmania is no exception to the rule; the sluice-head in use in this country being the quantity of water that flows through a horizontal rectangular orifice 16 inches long and 1 inch wide, with a head of water of 6 inches over the orifice. A single sluice-head delivers 9038 gallons per hour, and is, within a very minute quantity, the equivalent of two-fifths of a cubic foot per second.

Having proceeded so far discussing matters of fact that will pass without discussion, and before entering into debatable questions, upon which my conclusions, being matters of individual opinion, are open to exception, I wish to state clearly what these conclusions are.

(1.) That a high-level canal from the upper part of the Ringarooma River, proceeding down its left bank round the western flank and northern base of the Mount Cameron Range to Gladstone, is free from engineering difficulty, and can be constructed at a moderate cost per mile.

(2.) That such a canal should have its intake at the highest point practicable, *i.e.*, close to the junction of the Maurice and Ringarooma Rivers.

(3.) The canal supply should be derived, in the first instance, from the Ringarooma and its affluent creeks; but, should it be necessary, such supply can be supplemented by means of storage reservoirs.

2/6

On the important question of a site for the intake, I am decidedly of opinion that it is most essential to select one as high up stream as possible. The highest point that can be reached is obviously the junction of the Maurice and Ringarooma Rivers ; and I think subsequent investigation will show that some point immediately below this junction will be found most suitable. At first sight I thought it possible that it might be found desirable to have the intake much lower down the river, but further enquiry led me to adopt my present opinion, as it showed that the command of a large extent of tin-bearing country down as far as Moorina would be lost by the selection of a low-level intake, and that one of the principal objects of the scheme—the delivery of water at high pressure—could not be attained.

The works required at the intake,—weir, regulating sluices, by-washes, &c.,—would not present the slightest difficulty, as all would be simple in design and cheap in construction. The foundation for the weir is all that could be desired ; the bed of the river consists generally of shingle mixed with coarse gravel and sand, with rock reefs cropping up at intervals. The ultimate selection of a site for the weir will consist in the adoption of the best of many good ones.

I have marked on the map attached to this report a red line showing the general route which the canal would probably follow, and now propose to describe its general features. It will be observed on looking at the map that the river runs throughout—except in the vicinity of Mount Cameron—very close to its western watershed, its catchment basin lying principally to the east, from which side also the main affluents flow ; the drainage area on the west being so small, the creeks that drain this area are small likewise. Between the head and Branxholm the high land is not reached until we proceed some distance from the river ; but between Branxholm and Moorina the land rises abruptly from the river to a height of 200 or 250 feet in some cases, and beyond this crest of the hill there is an extensive plateau stretching towards the west.

Down to about 3 miles north of Moorina the surface consists of rich chocolate soil, decomposed basalt, that supports a dense vegetable growth, the whole country being heavily timbered, and having a dense undergrowth, except in places where the land has been cleared. Below this the aspect of the district suddenly changes, and the granite country is entered ; the chocolate earth is no longer seen, but instead a poor soil resting on the granite drift ; the dense forest of the upper region being succeeded by a comparatively open country, in which the trees are small, with a low undergrowth of ferns. The country down to Gladstone presents this appearance without further change.

Adjoining the boundary of the basalt and granite district there is a sudden change in the general level of the country, which in a short distance falls very considerably towards the north. This will, I should think, as a matter of certainty, render it impossible to construct the canal with continuous flat gradients throughout ; and a series of falls will probably be necessary to carry the water from the high level of the basalt to the low lying granite. I think it will be found that the canal will be divided into 3 sections,—1st, that from the intake to the northern limit of the basalt ; 2nd, a short length, in which the sudden fall will occur ; 3rd, the length between the end of the second section and the tail of the canal at Gladstone.

The first section, commencing at the intake, will follow the river closely as far as the road from Kay to Krushka (Upper Ringarooma). It will then turn to the left and cross the Legerwood and Fencker's creek. From the latter the North Brothers' Home Company derive their low-level supply, and the proposed canal would probably pass close to the head of their race, within a few chains from the point where the road crosses the creek. From this the canal would generally follow the course shown on the map, and, judging from aneroid observations, would, at the North Brothers' Home mine, have an elevation a little above that of the high-level race of that company which runs from Boyd's Creek, but would not attain the level of the crest of the hill behind. It would then follow the course of the hill down to the north of Moorina. So far it is a comparatively easy matter to trace roughly the route, but it is quite another thing when the limit of the first section is reached, and I do not feel justified in entering into details concerning the second section with the scanty information at my disposal. I, however, may say that it is quite possible that a series of artificial falls may be found unnecessary, as the survey may show that the first section of the canal could be tailed into one of the creeks, from whence the water might be drawn at a lower level for the supply of the third section.

On the third section, which ought to be kept at as high a level as possible close to the watershed, I anticipate no difficulty; but it is probable, owing to a depression in the ground near the flank of Mount Cameron, that either an inverted syphon or a length of fluming will be required to carry the supply across, and that a further source of expense will be found in passing along the base of the flank of the mountain, which, for a distance of about a mile or so, consists of bare granite. Beyond this point on the Gladstone the country presents no cause of increased expense.

I have given much consideration to the questions—How far is it practicable? and if practicable, whether or not is it desirable to construct reservoirs?—these reservoirs to impound water when the flow was abundant, which water would be used during the season of scanty supply.

(3)

3/6

05-059

PLAN
OF
PROPOSED WATER SCHEME
VICINITY OF
North East Tasmania

Scale 2½ miles to an inch.

Drawn by T. Gerrard April 1885

5 cm

STRAIT

BASS

RINGAROOMA BAY

RINGAROOMA

BOOBYALLA RIVER

TOMAHAWK RIVER

EASTERN BRANCH BOOBYALLA R.

Proposed Canal

Line of RINGAROOMA RIVER

FILGUMENA

GLADSTONE

HARDEN'S RAVINE

Mt. Cameron

Mt. Cameron Go. M.R.

The Nut

The Nut

1st Sugar Loaf

2nd Sugar Loaf

Cube Rock

GREAT MUSCLE HOLE RIVER

EAST BRANCH

Mount William

GREAT FORESTER RIVER

Little Mt. Horror

Mount Horror

PEARLY BROOK

BOUNDARY CREEK

MOORINA

BRANXHOLM

Billycock Tier

KAY

FRENCH'S C.

PARRS RIVER

ARNON RIVER

HENGE RIVER

HOGARTH RIVER

DORSET

KRUSHKA

NEW RIVER

MAURICE

Mt. Maurice

ALBERTON

Mt. Victoria

Mt. Albert

WELDBOROUGH

The Blue Tier

LOTTAH

GROON RIVER

NORTH GEORGE

SOUTH GEORGE

GEORGE'S RIVER

ANSONS BAY

ANSONS RIVER

LAST RIVER

POWER'S RIVULET

GOLDEN FLEECE RIV.

CONSTABLES CO.

GEORGE'S BAY

Office of Mines
April 1885.

Reservoirs in connection with such a scheme as this would consist of 3 classes :—1st. Those constructed above the intake ; 2nd. Those constructed below the intake, involving a break of continuity in the line of level of canal, but whose impounded water would be available for augmenting the canal supply lower down,—*i.e.*, if on the line of the canal at a certain point a suitable site was found and a reservoir constructed, the canal water could flow in and fill this to the level of water in the canal ; but in order to utilize the impounded water the canal should on the down stream side of the reservoir be at a lower level than it had at the point of delivery. The ordinary case of a house cistern with a supply pipe from the main at the top, and a discharge pipe to the house from the bottom, supplies an apt illustration. 3rd. Reservoirs supplied from the canal, but from which the water cannot again be drawn into the canal, which would flow on without a break in its general line of level.

In connection with reservoirs of the 1st class I made a careful examination of the Ringarooma for a distance of about 6 miles above the proposed intake. In this distance there are several places well suited for the construction of dams, one in particular about ¼ mile above some deserted huts built some years ago by the Great Ringarooma Mining Co., and about 2 miles from the junction of the Maurice. The river here runs through a narrow gorge between two high granite spurs. Above these spurs the valley opens out again, and if a high dam was constructed, closing the mouth of the gorge, a large quantity of water would be impounded. Judging by aneroid observations, a dam with 80 feet height of water on its face would form a pond extending 2 miles up the river. This is decidedly the best site I came across here, and one of the best I have ever seen when searching for dam sites in rivers of somewhat similar character.

Reservoirs of the 2nd class could not with advantage be constructed on either the 1st or 3rd sections, as on either it is so essential to keep to as high a level as possible. It would, however, be most important if the 2nd section, where I anticipate the sudden fall will occur, could be laid out so as to include a reservoir of this class. I do not offer an opinion as to the probability of being able to do so, as my present information is too limited, but at the time of survey attention should be paid to this point.

Reservoirs of the 3rd class differ from those of the other two, inasmuch as they may be said to be of purely local utility, the water which they would secure not being again available for the general purposes of the canal. They would be constructed in valleys crossed by the canal, and the water held by each one would only be used at workings lower down in that valley. On the 3rd section many good sites will probably be available. Works of this class might be constructed with advantage by private persons, as to a certain extent they are independent of the general scheme. In such a case Government might supply water to these private reservoirs at a lower rate than that charged to proprietors of mines who were only prepared to take water during working hours.

The feasibility of constructing reservoirs there can be no doubt about. Whether it would be advantageous to do so, taking into account their cost and the return they might be expected to yield, is a problem that can only be settled at some future time when materials for making estimates are available. It will be most important to examine this question carefully hereafter, as much water must be wasted at the time of full supply in case there are no means of conserving it. A long canal is in itself a small service reservoir, the level of which would be steadily lowered during working hours, and again raised when the demand ceased. Large reservoir space would, however, make the supply at all seasons regular ; and the importance of such space cannot be overrated, if obtainable at a moderate cost.

Taking the work as a whole, it is, in my opinion, very free, not alone from difficulties, but from causes that would entail much increase of expenditure at particular points : the second section and the works referred to on the third are the only ones that I foresee. If numerous falls have to be constructed, an ample supply of good material is found close to hand. All the work would be made of logs, which could be had for the cost of cutting.

In case the canal is constructed, much loss from leakage need not be feared immediately, as the chocolate soil in the upper section holds water well ; and I am informed that although some races in the granite country when first filled lost a good deal from leakage, that this soon ceased. This agrees with my own experience, as I have frequently seen channels that in the first instance lost a large proportion of their supply, but which became perfectly water-tight in a few weeks.

There is no doubt that, in the course of time, much trouble will be caused in the thickly timbered country by the decaying roots of trees leaving passages for the flow of water from the canal. This is an unavoidable evil which cannot be met in the first instance, but which must be remedied as occasion arises hereafter.

The conservation of existing water-rights and the method of dealing with private races which may be interfered with, such as the North Brothers' Home race, is not one to be entered into in a general report like the present, but must be considered in case a definite scheme is ever proposed.

5/6

As one with many years' experience of canal administration, I may be permitted to remark that the primary right of Government in the water supply of the country is one that should be most jealously guarded; and it will be found that schemes like the present, embracing a whole district, constructed and managed by Government, will prove more economical in construction, more efficient in administration, and of greater advantage to the community as a whole, than a number of minor works undertaken for private objects alone. Works like this will enable Government to maintain the public right to the water supply of the country, and prevent the many evils that must arise when such right is alienated.

The length of the canal as measured on the line showing its general direction is 33 miles. Making allowance for the minor windings which would not show on this map, I do not think it would be safe to say that its probable length would be less than 60 miles.

The quantity of water which the canal should carry is not a question for me to enter into, as it will of course be determined by the proper authorities, who have information regarding the probable requirements of the district, and the means at the disposal of the Government to satisfy these requirements. I have, however, calculated the discharge capacity of a canal of medium size for mining purposes, and note the dimensions and slope, as it may be useful to have some data on the subject available when the matter is being considered. It must be remembered that the mines are only worked 8 hours out of the 24, so that the capacity of the canal must be multiplied by 3 in order to get the quantity that can be delivered at the mines during working hours.

To carry 300 sluice-heads, the canal would be 10 feet wide at surface of water, 6 feet wide at bottom, depth of water 5 feet, and have a longitudinal slope of 4 feet 6 inches per mile.

Respecting the survey for the scheme, I would advocate that all this part of the work should be most carefully done. No money is more usefully spent than that in securing really reliable data, and any so expended is certain to be amply repaid owing to increased economy in the work of construction. I have ever been of opinion that attempting undue economy in fixing the scale of survey parties is the surest means of piling up expense afterwards. If the work is to be done at all it should be done thoroughly, and in such a manner that its results can be relied upon with confidence.

I cannot conclude without an acknowledgment of the great kindness universally shown to me throughout the district while I was making my inspection for the purpose of preparing this report. From all sides the greatest anxiety was shown to assist me in every way and smooth down any difficulties I might meet with. Especially are my thanks due to those who at personal inconvenience piloted me so well through the district. At Upper Ringarooma I was most fortunate in having such an experienced guide as Constable Gorey. Between that and Branxholm I was accompanied by Mr. W. C. Lade, from whose local knowledge I derived much benefit. During a former visit to the district I learned much from Mr. W. Pearce, who on the present occasion again placed his time at my disposal, and in whose company I travelled from Branxholm to Gladstone, and gleaned all I could from his unrivalled knowledge of the whole district.

G. J. BURKE, *M. Inst. C.E.*

Collins-street, Hobart, 16th February, 1885.

WILLIAM THOMAS STRUTT,
GOVERNMENT PRINTER, TASMANIA.

PLAN SHEWING
MINERAL LANDS NEAR GLADSTONE
IN THE VICINITY OF THE
MOUNT CAMERON HYDRAULIC TIN MINING COMPANYS WATER RACE.

Scale. 40 Chains to an inch.

TO PORT RINGAROOMA

2560 ac: Grant to W.H. Brewer

Lot 115. 625 ac. John Foster Purchaser

Lot 118. John Taylor Pur.

APPROXIMATE POSITION OF PROPOSED CONTINUATION OF WATER RACE

SHAFT 56 FEET DEEP.

LINE OF SHAFTS IN TIN BEARING GRAVEL

A

C

SEVERAL SHAFTS

ABERFOYLE Co

2500 AC: LEASED FOR TIN MINING PURPOSES

IMPERIAL TIN Co

MOLLISON & MOORE

SCOTIA Co TIN MINING

GLADSTONE

FILUMENA

HARDENS RAVINE

BSK TIN MINING Co WATER RAC.

DAM SITE

RINGAROOMA RIVER

DEEP CREEK

MT CAMERON Co WATER RACE

DAM

MUSCLE ROE RIVER

GREAT ISLAND

EDINA Co DAM

EDINA Co RACE

ABOUT 700 AC. LEASED FOR TIN MINING PURPOSES

APPROXIMATE POSITION OF PROPOSED RINGAROOMA WATER RACE NOW BEING SURVEYED

PEAKS OF MOUNT CAMERON

CUBE ROCK

Not reported on by Mr Thureau

RINGAROOMA RIVER

LEASED FOR TIN MINING

GRANITE

AMBER CREEK

BRANCH OF Mt CAMERON H.T. Mg Co RACE

MIDDLE HUTS

PORTION OF MOUNT CAMERON HYDRAULIC TIN MNG COMPANYS WATER RACE

OLD CHAIN CREEK

MUSCLE ROE Co WATER RACE

EDINA Co DAM

Office of Mines, Hobart
August 1885.
G.F. Lovett del.

REFERENCE

Stanniferous or Tin bearing land reported on by G. Thureau F.G.S. shewn thus +++++

5 cm