(No. 67.)

INSPECTION OF THE RINGAROOMA RIVER, FROM BRANXHOLM TO BOOBYALLA.

Hobart, 8th November, 1901.

SIR,

ON the 25th June last you instructed me to inspect the Ringarooma River, from Branxholm to Boobyalla, with a view of ascertaining whether it is practicable to improve the river's carrying capacity to forward the large quantities of tailings sent out into it from the various alluvial tin mines situated on the Ringarooma and its tributaries, and also to ascertain, approximately, what public or private interests, if any, would suffer in case the Ringarooma River was declared a sludge channel from, say Black Creek to Boobyalla. You also instructed Mr. M. J. Griffin, Inspector of Mines, to assist me, and that gentleman, consequently, accompanied me whenever his other official duties would allow him to do so, and I thus benefited by his extensive local knowledge.

As to the Inspection of the River, I have the honour to report, as follows:—

From the Mineral and Agricultural Maps I find the distance along the river, from Branxholm to Boobyalla, to be 62 miles. The distance, in a straight line as the crow flies, between the two points is only 21½ miles, so the route along the winding river is nearly three times longer than a direct line. I inspected the river by walking along one of its banks, close to the water's edge, and in this way examining both banks, as well as the river itself. As the scrub for the greater part of the distance along the river was dense, I could not progress faster than two men could clear a path. I was not supposed to make any surveys; but in places here and there I took a few levels with the Clinometer, a few measurements with the tape, or found the surface-velocity of the moving waters.

I started my inspection at the Arba Mine on the 28th of June, and finished at Boobyalla on the 30th July.

The Arba Mine.—The tailings deposited on the 185 acres easement, bought by the Government for the use of the mines, have not gone over the boundaries, except, perhaps, a couple of feet here and there. It will, however, be necessary for the mines to construct a small embankment at the N.W. boundary, as, otherwise, the tailings here will soon spread themselves on private ground. The Manager of the Arba Mine informed me he expected to sluice 4500 cubic yards per week. The water in the Ringarooma, just above the Arba Mine, is only slightly laden with silt, and only a little discoloured.

The River from Black Creek to Derby Township.—Some tailings may be seen in this part of the river, but not to any serious extent. If a few heaps of logs and drift timber accumulated here and there were taken out of the channel, I am confident the river for this distance would be able to forward the present amount of silt discharged into it.

On the map accompanying this Report, and at a place marked with the letter "a," I measured the surface-velocity of the flowing water on the 29th June, and found it to be 2.58 feet per second. It would not, perhaps, comparatively speaking, be so very costly to deviate the river as shown on the map at "A," and whereby the river would be shortened by, say, 54 chains; but, so far, I doubt if this expenditure would be justified, because it seems to me, as already stated, the river is quite able to forward its burden, if only its channel is not stopped by driftwood or other obstructions.

The River at Derby Township.—On the accompanying Plate 1, over a part of Derby Township, there is shown the position of an old rubblestone dam across the river, the remnants of which ought to be removed, as they obstruct the flow of the water. The stones and timber left in this dam can probably be removed for an expenditure of, say £60.

New Brothers' Home No. 1 Tin Mine.—At this mine it is intended to "stack dry" 50 feet in depth of the over-burden and of the next 100 feet, the upper 75 feet will be sluiced into the river. The Manager expects, in a few months, to sluice 7000 to 8000 cubic yards per week.

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The Briseis Tin Mine.—It is intended to send the whole of "the big face" down the new tunnel into the Cascade River, from which it will eventually travel into the Ringarooma. The fall of the Cascade from the tunnel, and until it empties itself into the Ringarooma, I should judge to be fully 50 feet, the distance being at least 15 chains. Therefore, any slight flood in the Cascade will certainly send all tailings out into the Ringarooma. A training-wall should be constructed at the mouth of the Cascade, for the purpose of turning the current from the Cascade into the Ringarooma downstream.

The Manager thinks that when the new water-race is finished this mine will be able to work 7 nozzles, and sluice, say 30,000 cubic yards per week.

The gratings in use at the time of my visit (1-7-'01) were composed of iron bars placed parallel with each other, with a distance of two to three inches. The length of the gratings, however, was much too short, and a great deal of matter (stones and pieces of basalt) were, by the force of the water, sent over the whole length of the grating, and then, ultimately, into the river. It would, perhaps, be better if the gratings were made of iron plates, with circular holes not with larger diameters than $2\frac{1}{4}$ inches, and the area of the gratings so large (length, say, 25 to 30 feet), that no hard substance could, by the force of the water applied, be sent over the whole length of the gratings, but that all of the matter intended to be sent into the river should be passed through the circular openings. That it is of the utmost importance that stones, or pieces of hard substance above a certain size, should be vigorously excluded from the river, I shall show later on in this Report.

There is another subject I wish to mention. As the working capacity of some of the largest mines on the Ringarooma will shortly be increased considerably, and more especially the Briseis Mine, which is by far the largest in weekly output, it seems to me to be more than probable that the mines will have to stop work during a part of the dry season, not perhaps on account of want of water for sluicing, purposes, but of want of accommodation for sending their tailings away.

When the Briseis new water-race is in operation, all water from the Upper Ringarooma and Maurice Rivers will be sent down that race, with the exception of 20 sluice-heads, and these, together with the quantity of water that may come down the tributaries of the Ringarooma, between Ringarooma Township and Derby, is all the water which will be available for forcing the large quantities of tailings sent out from the Derby mines, and which will be something like 40,000 to 50,000 cubic yards per week. The result will, no doubt, be that the river during the driest period will be totally unable to forward these large quantities of tailings, the river will be blocked, the mines cannot discharge their tailings, and work will be stopped.

No doubt the Briseis and the New Brothers' Home No. 1 Mines must extend their present tail-races for some distance, and, in addition to this, I would suggest that the Briseis Mine, instead of sluicing the over-burden into the river, should stack a great part of it on the large area where their present tail-races are carried along. It would not, perhaps, be necessary to stack it dry, which is the more expensive way; I think it is quite practicable to sluice it. This would necessitate that a sufficiently strong retaining-wall should be built to meet the tailings, while, of course, slime and water would drain into the river. As there is a great heap of stones close by, it would not be a costly undertaking to construct this dry rubble-stone wall. The other works required would consist of a covered drain to be constructed before the tailings are stacked, and a special tail-race for sluicing. It may be worth while for the management of the Briseis Mine to consider if it would not pay the mine to face these extra expenses at once, thereby making it probable for the mine to be able to work through the dry season; whereas, if 30,000 cubic yards a week are sent into the river from this mine alone, there can be no doubt that work will be stopped for a time.

The Ringarooma Tin Mine.—The Manager for this mine thinks that he will be able to sluice 4000 cubic yards per week.

Through the Fern Tree Creek, which empties itself into the Ringarooma a few chains down-srteam from the Cascade River, but on the opposite side of the river, a great quantity of stones, &c., are coming down into the river from this mine. This ought to be discontinued.

Ringarooma River, from Derby Bridge to Moorina.—There is a very sharp bend in the river a few chains up-stream from the Cascade. It would no doubt have been a great improvement if a deviation of the river could have been made here. The piece of ground, however, where this deviation would be carried through, is being filled up with tailings from the Ringarooma Tin Mine, and it would be difficult to find another place as a dumping-ground for this mine; furthermore, as a river deviation here would direct the water close by the foundation of the Ringarooma Mine's chimney stack, extra work for securing this foundation would add materially to the cost of the river deviation. A dredge has, for some considerable time, been stationed in the sharp bend of the river, and made it more difficult for the river to discharge its water through the bend, the result being, that the river between Derby Bridge and the bend had the appearance of a small lake in which the water could hardly be seen moving, and, consequently, a great deal of tailings from the Arba and other mines must have been deposited there. However, when I, on the 1st of August, passed through Derby, the dredge had been moved up close to Derby bridge, and it is to be hoped that successive floods will be able to scour this part of the river. From where the Cascade enters the river to the western boundary of W. Krushka's Lot, No. 8185 (820 acres), the river is confined between steep granite slopes. At the Cascade the river has probably silted up to a depth of 8 to 10 feet; but the width of the river here is scarcely more than 70 feet. The width of the river where the Ringarooma Tin Mine's syphon crosses it is, as measured, 155 feet. I should think that the original width of the river here had been, say, 100 feet, but, as the bed of the river is lifted by deposit of silt and tailings, the width increases. As shown on Plate 2, it may be possible to deviate the river just above its junction with Main Creek. A plain is formed up-stream for a length of a quarter of a mile from the creek, and, where tailings have been deposited to some extent, the water, spreading itself over the plain, loses velocity, and, in this way, facilitates the deposit of tailings which occurs. The length of the deviation will be about 17 chains, but, at the up-stream end, a wing-wall, say 200 feet long will be required for the purpose of forcing the water into the deviation. In the absence

of any survey, I judge it possible that the deviation can be made for a cost of, say £4500. By this deviation five feet in fall would be gained, but without an exact longitudinal section of the river it is impossible to know for what distance this increased fall would increase the river's carrying capacity.

Proceeding down-stream, it is noticeable that tailings are deposited here and there on both sides, but not to any great extent, except where the river, from its northern direction, turns into an easterly direction, and where, on Mineral Section No. 4614, on the left river bank, there is a deposit of tailings as sketched on Plate 2; but it should be mentioned that a part of this covered area is composed of a lagoon.

About half a mile up-stream from Moorina bridge the river turns round in a sharp horse-shoe bend, and where, by making a cut only 3½ chains in length, a fall of about 6 feet would be gained. However, the deepest part of the cut would be about 40 feet, and, as it is probable that a great part of the cutting would consist of solid granite, the cost, which I think may be, say £8000, is prohibitive. The free flow of the water is partly obstructed by rocks and great boulders in the river bed for a distance of 15 chains up-stream from Moorina bridge; the river bed is narrow, confined as it is here between steep granite walls. The expenditure of a small amount of, say £70 to £80, would clear some of the most obstructive rocks.

On the section of the river from Derby to Moorina the free flow of the water is further obstructed by logs and driftwood, in places accumulated in great heaps. It is clear that the very first step in improving the river must be to remove this class of obstruction, stack it on the river bank at such altitude that it would be out of reach of subsequent floods, and then burn it during the next dry season. This work, the "snagging" of the river from Moorina up-stream, has already been started.

Ringarooma River, from Moorina to the Pioneer.—The river from Moorina Bridge, for one-mile-and a-half down-stream, is confined within steep granite slopes. The river for this distance must have a great fall, as there are several rapids.

At a distance of 4 to 5 chains from the bridge (marked "b" on the map), an obstruction is placed across the river, and the difference in water-level above and below this bar, and reckoned for a length of one chain, is 1·7 feet. In fact, for 10 to 15 chains down-stream from the bridge, the river is a great deal obstructed by rocks. Three to four chains below the above-named obstruction, and marked "c," there is another drop of 12 to 15 inches; at "d," say, 45 chains from the bridge, there is a drop of 2 feet; at "e" there is a large drop of 6·5 feet; and, at "f," a drop of 2 feet. Besides the efficient inclination of the river bed between these "drops," I should estimate that 13·5 feet additional efficient fall for the river could be obtained if the different rocky bars on the mile-and-a-half of the river were blown up. It is possible that an expenditure of £800 to £1000 on this part of the river would remove the obstructing rocks.

Just below "f," where the river turns round a sharp bend, the steep granite walls, which, for the last two or three miles have confined the stream, retreat, and a plain is formed about half-a-mile in length along the river, and from 5 to 15 chains in width. The water has spread over this plain and deposited a great deal of tailings. Nearly the whole of this area is on Mineral Sections Nos. 3209-93M and 3210-93M, Tasmanian Tin Dredging Co., Limited. At a place marked "g," I measured the surface-velocity of the flowing water on 8-7-'01, and found it to be 3 feet per second.

The width of the river where the Pioneer Tin Mine's syphon crosses over is, as measured, 152 feet from water edge to water edge, and at the bridge which leads over to the Garibaldi Tin Mine the width is 123 feet, and the average depth of water only 15 inches. I was informed that the Garibaldi bridge was constructed about 17 years ago, and at that time the bridge was 15 feet above water-level. As it is now only about 3 feet above water-level, the river has, therefore, at this place, silted up to an extent of 12 feet. The width of the river at the Pioneer Mine's second syphon, close to the township, is 130 feet, and the surface-velocity here I measured on the 2-7-'01, I found to be 2·8 feet per second. An old resident informed me that during the last 20 years the highest flood known in this part of the river would amount to about 10 feet above its present water-level, also, that a flood does not come down suddenly, but takes a few days before reaching its maximum height. In the part of the river from Moorina to the Pioneer, I noticed only a few heaps of logs in the river channel.

Ringarooma River, from the Pioneer to Ogilvie's Bridge, at Gladstone.—From the Cascade River, and for a distance of two miles down-stream from the Pioneer, the Ringarooma is confined, more or less, between steep river banks, in places, by nearly perpendicular granite walls, with the exception of the few places already named, where tailings have been deposited on a larger area; but, about two miles down-stream from the Pioneer, the river enters a large flat, where the heavier parts of the tailings brought down from all the mines up-stream have been deposited.

The area covered with tailings here (see Plate 3) is so large, that I could not get a proper idea about its size and form by inspection only, so I contoured the western boundary by tape and compass, whereas the eastern boundary, which is all on unoccupied Crown land, is only sketched. It is nearly impossible, on this flat covered with tailings, to see where the original river bed is, or has been, because the river is split up, and follows several new beds, but the main body of the water travels not far from the western boundary line. From the point where the Corduroy Rivulet empties itself into the river, it follows again its old bed. On Plate 3 is shown the area covered with tailings, but I must remark that several "oases" have been left here and there; these, however, will, eventually, all be filled up.

A river-deviation here, as shown on the sketch, would have a length of close on two miles, and would not probably be carried out for a cost of less than £10,000; but it is quite possible that it would be the best policy to leave this part of the river as it is, in fact, to proclaim as large a part of this flat as would serve as a settling basin for tailings. Later on, in this Report, I shall return to this subject.

At the place marked "h," on Plate 3, a temporary embankment has been constructed across the river, the drop erected in this way amounts to 2·2 feet. The embankment will no doubt be carried away by the next flood coming down the river, but a part of it, sticks and stones, may remain and make

a permanent obstruction. The embankment was constructed, I understand, by the Ringarooma Dredging Company. From here for a mile down-stream the river is a good deal blocked by trees fallen and trees felled into the river.

The Ringarooma Dredge Co.'s dredge I found at work on Mineral Lease No. 4331, as marked by the letter "i." All the stuff, including all sizes of stones, had been sent into the river, and blocked it to half its width. The Manager informed me he was going to move the dredge farther inland, that he intended to fill up behind the dredge, and that no more stones would be sent into the river. He also said he would destroy the dam mentioned above, as he intended to take the water from the river at Corduroy Creek without any dam.

The width of the river for the next three miles down-stream, from the dredge to Campbell's Creek, is only 60 to 70 feet wide, but the water depth has increased to 2 to 3 feet, the surface-velocity being, on an average, 3 feet per second. The river is obstructed by drift-timber and, in two or three places, by rocks in the river bed, and the river has for this length a total drop (from rapids) of 5·2 feet.

From the junction of Campbell's Creek, and for about three miles down-stream, and where the river runs most closely to Mount Cameron, the river bed is again very rock-bound, and a number of rapids and small falls are to be seen here. At the junction of Campbell's Creek there is a rapid which, for a length of, say 4 chains, has a drop of 3·6 feet. At the place marked "l," and for a length of only 2·5 chains, there is a fall of 8·8 feet.

At Simpson's syphon, two chains below the falls, at "l," the river has a width of 42 feet only, with a surface-velocity of 4·89 feet per second. At "m" there is a rapid amounting to 1·9 foot drop, and two chains from "m" another rapid amounting to 1 foot drop. For the last 10 to 15 chains the width of the river has increased from 60 and 70 feet to 100 to 120 feet.

At Kennett's Creek there is a small fall of 1·1 foot, and at the place marked "n" there is a rapid which, for a length of, say two chains, gives a fall of 1·6 feet, and another rapid about six chains below "n," and with a length of, say, five chains, gives a fall of 2·7 feet.

At Ogilvie's bridge the river is 95 feet wide, the average depth being 2½ feet, and the surface-velocity of the water being 2·65 feet per second on the 17-7-'01. The highest known flood here has been about 2½ feet above the deck of the bridge, or 14¼ feet above water-level on the 17-7-'01.

The river channel from Campbell's Creek to Ogilvie's Bridge is not much obstructed by timber, nor are there many tailings to be seen; this is on account of the velocity of the water. The total drop of the different rapids and falls, as described, to be found from Campbell's Creek to Ogilvie's Bridge, amounts to 20·7 feet; this is, of course, in addition to the efficient inclination of the river between the two named points.

The Ringarooma, from Ogilvie's Bridge to the Eastern Fence of Lot 115—*purchaser, John Foster*—A good deal of tailings are to be seen below Ogilvie's Bridge, both in the river bed itself, as well as on adjacent low-lying ground, but these tailings have, in my opinion, not come from the mines of the Pioneer and Derby, but from local claims. A local resident complains that it is difficult to discharge the tailings from Mining Lease No. 1324 and adjacent blocks, on account of the Esk dam, at Gladstone, backing the water to a height of six feet.

As the Esk dam is over 20 feet high, and is only about three miles down-stream from this locality, it is most probable that the permanent low-water level here has been raised a few feet, and there can be no doubt that the removal of the dam would improve the river's transporting power for several miles. At Ogilvie's house, on Lot 9130, high-water mark from the severe flood from November, 1889, was pointed out to me, and I found it to be just 14 feet above water-level in the river on the 19-7-'01.

At the place marked "q," I found the surface-velocity to be 2·55 feet per second, and at "r," only 1·80 feet per second; but, as "r" is about half way between the Esk dam and "q," the reason for the difference in velocities is evident.

The Esk dam was constructed, I understand, some 14 or 15 years ago and is said to have been built of timber crib-work, with stone filling, and, from different measurements given to me by a local resident, I have computed that the dam contains some 4500 cubic yards of stones. These quantities are exclusive of what amount of stones there may be in a gutter to be found in the bottom of the river.

I was told that several years ago the department objected to having the Esk dam destroyed, for fear that the large quantities of accumulated tailings kept back by the dam would silt up the lower part of the river, and more particularly the great flats to be found close to Boobyalla. Assuming that the depth of silt at the up-stream face of the dam is 20 feet, the river width, on average, 100 feet, and, further, assuming that the water and silt have been backed up to a distance of four miles, then, the total quantities of tailings deposited and held in check by the dam would be, say, 800,000 cubic yards. If the whole of the dam was removed, the next fresh in the river would carry a quota of these quantities, and deposit them again at suitable places, *i.e.*, wherever the currents decrease sufficiently; and subsequent floods would sluice away more, but something would always be left. But, even assuming that all of the 800,000 cubic yards should be sent down the river, these quantities would only represent 16 weeks' output of the Derby mines, not to reckon what the Pioneer and the other mines would send into the river during the same time. As the dam itself forms one of the most serious obstructions in the Ringarooma, and its removal would be beneficial to the river's transporting power (of tailings, &c.), for several miles, it, therefore, seems to me that there can be no valid reason for keeping the Esk dam intact. As far as I know, the dam does not, at present, serve any interests whatever.

I estimate that the dam can be removed for an expenditure of £1000; that is, all the stones forming the dam, with the exception of the above-named gutter part, to be removed and stacked outside the river channel. On the right side of the river (walking down-stream), and where a water wheel was established, there would be room for stacking a large part of the stones, but all the rest would have to be lifted up and stacked outside the river's sectional area. The work could only be done in a profitable way by means of a steam-crane, and might be contract work. If it is considered that £1000 is too large an amount to sacrifice for this purpose, it will be possible to remove the upper half of the dam only. It

would scarcely pay to use a steam-crane for this work, but the work may be carried out in the following way:—the dam is opened from the top, in the middle, for, say, 20 to 30 feet in width, so that the small summer flow can pass through there. The rest of the top will then be dry, while the top of the dam, in its entirety, is removed. As the work progresses, the opening in the middle of the dam must be increased in depth. The greater part of the stones should be deposited in the above-named wheel-pit. When the dam, in its entirety, has in this way been lowered, say, 10 feet, then the opening in the middle should be increased as much as possible, both in depth and width, and any further demolition be left to subsequent floods during the coming wet season. This work should be done by day labour, and, I think the expenditure could be kept down to £250 to £300. A light movable crane, a couple of trucks, and a few hundred feet of track would be required as plant. The work should, in both cases, be undertaken only during the driest season, when the smallest quantity of water is coming down the river.

On the 19-7-'01 the clear "drop" of water at the Esk dam was just 20 feet; a couple of chains down-stream from the dam there is a rapid amounting to a drop of 3·3 feet. On the day in question about 615 sluice-heads passed over the dam. The dam itself is not watertight; through the curtain of muddy water falling over the dam can be seen, in numerous places, the white clear water which has forced its way through the body of the dam, and has been partly purified in doing so.

For a distance of a couple of miles above the dam the width of the river would be from 120 to 140 feet, and at the foot-bridge, a few chains below the dam, the river width as measured from water edge to water edge was only 61 feet.

About a quarter of a mile down-stream from the dam, at the place marked "s," the river width was about 80 feet, and the surface-velocity of the water was only 1·38 feet per second. At Bell's Bridge the river is 66 feet wide.

At "t" the surface-velocity of the moving water was 2·98 feet per second, and at "u" it was 2·18 feet per second on the 20-7-'01.

On the 22-7-'01 I measured the velocity of the flowing waters at the places marked "v," "w," "x," and "b," and found it to be, respectively, 2·65, 3·86, 3·85, and 3·31 feet per second; but, it must be noted, that on account of heavy rain during the 21-7-'01, there was a fresh in the river the next day, otherwise, I do not think that the velocities as stated would have been so large. At the place marked "a" a great deal of drift-wood has accumulated. To deviate the river as shown at "e" would probably cost £7500; and at "f," £4000.

The expenditures are far too heavy in comparison to the benefit derived; a fiftieth part of these amounts would clear the river channel of drift-wood and other easily removable obstructions a distance of several miles.

At a place marked by the letter "g," the surface-velocity of the water was found, on the 24-7-'01, to be 2·82 feet per second, and the next day the velocity at "k" was 2·61 feet per second, the river width here being 70 feet.

The Ringarooma, from the Eastern Fence of Lot 115 *to Boobyalla.*—From the eastern fence-line of Lot 115—purchaser, John Foster—the river enters the large flat which stretches from here to Boobyalla. The hatched part on the map shows the approximate size of the flat, which is all private property. The river continues its winding course even over this flat, and deviations, or rather, rectifications, as shown at "G," "H," "J," and "K," would have a total length of about 1¾ miles, and would probably cost, say, £24,000. If, after a permanent survey had been carried out, and after careful consideration of all points involved, it should be found that the cost for river regulations at the above-named four places would be anything like the amount named, this project would scarcely be carried out. I may, perhaps, be permitted to remark here, that the river regulations, as a rule, are among the most expensive of engineering works. Where large interests are involved, and large quantities have to be treated, this is done, if on a large scale, by means of new, improved, and efficient mechanical appliances (steam-navvies, &c.), and, by the aid of which material may be excavated for the expenditure of a few pence a cubic yard. It is otherwise, where, as in the present case, the quantities are moderate, and by their relative smallness exclude the use of costly machinery, and where, therefore, the more expensive muscle-power has to be employed. For the distance that the Ringaroma crosses this great flat, the river banks themselves are a couple of feet higher than the adjoining part of the flat, and the river banks fall about 1 in 40 towards the flat for a distance of one or two chains. The Ringarooma is under tidal influence, which extends to a short distance above Horse-shoe Bend. With the exception of the convex parts of bends, no tailings, or, only very little, are to be seen in this part of the river.

By casually examining the large flat, I gained the following impressions:—On the southern quarter part of the flat, and for a distance of, say, 5 to 15 chains from the river, fine sand has been deposited, more thickly close to the river, and more sparsely at larger distances; and, in places, the grass vegetation has suffered severely. On the middle half of the flat along the river, and, say, for a width of 10 to 15 chains, sand and silt have been deposited, but without completely suffocating the growth of grass and the farther away from the river, less is the damage done. On the northern quarter part only slight harm, if any, has been done by silt deposit; sand, I did not notice here; as a matter of fact, I did not notice anywhere here that the grass vegetation had suffered. By turning up a few sods, where grass was growing in profusion, I found in places a compressed layer of silt of a thickness of 1½ to 2½ inches. I assume, then, that this silt must have been basaltic, as it really seemed to act as a fertilizer. At the northern extremity of the flat, another enemy threatens it, namely, the fine Düne sand, fine as flour, blown in from the beach, and which, like a solid avalanche, is pressing forward in a south-easterly direction, and has already covered a part of the flat.

When I, on the 29-7-'01, was levelling at Boobyalla Township to ascertain the height of the tide, it was low-water, and, being informed that water-level used to fall one foot lower than it was at that particular time, and taking this into consideration, I found that the height between ebb and spring tides would amount to 7½ feet; perhaps, then, the difference between ebb and ordinary tides will be 5½ or 6 feet.

(No. 67.)

Résumé.—The different layers of flowing water have never the same velocity. A mass of water follows the inclination of its surface by the force of gravitation. If it met no resistance, it would continue to accelerate, and its velocity would become every moment greater. As it meets resistance, which increases with velocity, a point will be reached at which the two opposing forces balance, and acceleration will cease, and the velocity of the mass will, at the same locality, remain a constant quantity. The resistance to the movement of water following its declivity within a channel arises from the bottom and sides, and appears as friction between a solid and liquid. Therefore, those particles of water nearest to the bottom and sides are subject to the greatest resistance, and those farthest from them to less resistance. It follows, therefore, that whatever the velocity of the current be at the bottom, it must in some manner increase with the distance until the surface be reached, where the maximum velocity is obtained. This can readily be seen in any watercourse when the water is somewhat clear, and has a velocity of 3 to 4 feet a second, where it will be noticed that pebbles and small stones carried along the bottom have a very much less velocity than the surface water. Any foreign body submerged into water loses as much in weight as a volume of water having an equal cubic content. Silt, sand, gravel, and stones lose, therefore, considerably in weight when sent into the river; they are, therefore, comparatively speaking, easily moved, and the more their specific gravity approaches that of water, the nearer their velocity approaches that of the current.

All that which has been stated here is amply proved by what can be seen to take place in the part of the Ringarooma River under consideration. At certain points of that watercourse large quantities of tailings, consisting of silt, sand, pebbles, and stones, are continuously discharged into its waters. As long as there is an ample supply of water in the river (for, given any inclination, the velocity of water increases with its depth, hence, the increased speed in case of flood), the velocity is large enough to transport the tailings to certain parts of the river where the velocity decreases, and a corresponding part of the heavier tailings are deposited, by reason of the transporting power of the current having decreased. The rest of the tailings are carried away until another place is met with, where, perhaps, the velocity is yet further decreased; another portion of the tailings is deposited, and now, perhaps, only fine sand and silt is carried on. The specific gravity of these is very near that of water, and, by examining the waters of the Ringarooma River, it will be seen that these, the silt more especially, are to be found as well in the surface water as in all the layers of the moving waters. This silt, then, together with the finest of sand, give the water its colour, even after the heavier parts of the tailings have been deposited, and they get no chance of being deposited, except in case of floods, when large volumes of water travel down the river and arrive at the great flat at Boobyalla. Here the waters overflow this large area, thereby losing all velocity, and for the first time give these light bodies, which are held in suspension, a chance of settling to the bottom, or on the surface of the flat; but, only a part of it is deposited here, the rest is carried out into the bay and the sea, and only here, in deep water, where the commotion of the waves do not reach, these light bodies of silt and the finest of sand get a chance of settling down for good.

Having thus tried to follow the wanderings of the different parts of tailings, there only remain to be shown that there is a marked difference in the way the different parts of tailings are carried along by the moving waters, namely, that bodies such as silt and very fine sand, having nearly the same specific gravity as water, are held in suspension, and are travelling with the same speed as the water, and cannot settle down until the water has ceased moving; but large-grained sand, pebbles, and stones have a larger specific gravity than water; these are not held in suspension, but are moved along only by the transporting power of the water, and their velocity is always less than the moving waters, and only a certain velocity of the waters will be able to move pebbles and stones of a certain size. The French Chief Engineer, Sainjou, made observations in the River Loire, in France, as to the transporting power f flowing water, with the following results:—

Velocity in feet per second equals	1·64,	3·28,	4·92,	6·56;
Diameter of stones in feet equals...	0·034,	0·134,	0·325,	0·56;

and from which it will be readily seen that the transporting power of moving water increases in a much greater ratio than its velocity. Consequently, in trying to improve the river's transporting power of tailings, our aim would be to make the velocity of the moving waters as great and as uniform as possible, and this can be achieved only by the removal of present obstructions in the river channel, and by equalizing the river's natural inclination; that is, if the cost of the necessary works for this purpose will admit of their being carried out.

Considering the evidence as obtained from the inspection of the Ringarooma, it seems that the river has a good natural fall. Irrespective of those velocity measurements taken while a "fresh" prevailed in the river, and striking an average of the rest, I find that during the time of inspection the average surface-velocity was about 2·5 feet per second. The relations between the bottom current and the mean current to the surface current vary, not only in the different parts of the river, but for the same surface current their relations vary with the width and the depth of the channel's sectional area; but the bottom and mean current can only be measured directly by means of special instruments (current meters). On the other hand, the surface-velocity is easily approximately ascertained, and gives in spite of all, a very good clue to the existing circumstances. It must be clearly understood that it is only an assumption when I say that from the 2·5 feet surface-velocity I would reckon the mean current at 1.75 feet per second, and the bottom current at one foot per second. In whatever way this subject is considered, it is known, as a fact, that under all circumstances the mean current is equal to the half sum of the surface and the bottom currents. It appears, then, that with a bottom current of one foot per second, only silt, sand, and pebbles or stones not larger than one third of an inch in diameter, will be transported, and only when the velocity comes up to close on four feet per second (that is, during a "fresh" in the river), can stones of 2 inches or 2¼ inches be transported along the river-bed.

With regard to fixing the size of the gratings used at the mines, and where the mine's and the river's interests are opposed, it must be granted that due allowance has been given to the former, by fixing the circular openings for their gratings at 2¼ inches, and it is clear that stones larger than this measurement should not be allowed into the river.

I have already explained that, as far as I learned from the inspection, the river has silted up somewhat uniformly from Derby Bridge to a couple of miles down-stream from the Pioneer, where there is a great flat, and where a large part of tailings have already been deposited. I am under the impression that by far the largest part of the heavy tailings travelling as far as this flat are deposited here. As shown on Plate 3, the tailings already deposited cover an area one and a half miles long, and about half a mile wide. The water struggling over this flat loses the greater part of its velocity, and deposits a large part of the tailings, and, the more I consider this subject, the more do I feel convinced that it would be most advantageous to use as large a part of this flat as would serve as a dumping ground for the heavier parts of the tailings coming down from all the mines above. With the exception of 55 acres, it is all Crown land. The soil seems inferior, a great part of it being peat, and I have been informed that, so far, it has not shown itself to be rich in tin.

For the purpose of improving the river's carrying capacity from, say Black Creek to this flat, I beg to recommend as follows, for your consideration:—

1. The river channel should be cleared of drift-wood, and stacked in such a way that it is not reached by successive floods (this work has already been started from Moorina towards Derby), and it should be made an offence for anyone to fell trees into the river channel, to build dams across any part of its course, or in any other way cause obstruction to the free flow of the water.
2. The remnants of the stone dam at Derby township should be removed.
3. Unless that public or private interest gains considerable benefit from river-dredging, this should be discontinued. The dredges themselves, when working in the river channel, are obstructions to the free flow of the water; and the nature of their work, viz., making holes here and hills there, all in the channel itself, is antagonistic to the river considered as a water-way.
4. If it is desired that further improvements should be made to the river then it will be necessary to make an exact survey, not only of the part of the river channel to be operated upon, but also for a distance of two to three miles above and below. The surveys should consist of executing (*a*) a traverse-survey of the river; (*b*) exact levels to be taken, with permanent bench marks to be established for every quarter-mile, for the purpose of being able therefrom to draw an exact longitudinal section of the river channel; (*c*) cross-sectioning the river, especially at places where improvements are contemplated; (*d*) velocity measurements of the flowing water; and (*e*) examinations to ascertain the probable cost of raw materials required at the different places. When such a survey has been made, it can be ascertained to what extent the improvements, as mentioned earlier in this Report, would benefit the river's carrying capacity, together with their costs. What has been said of the part of the river from Black Creek to the proposed dumping ground at the Pioneer, as specified under 1, 2 (referring in this case to the Esk dam), 3, 4, holds equally good for the part of the river from the Pioneer to Boobyalla; but the first-mentioned part of the river is the more important.

I desire to point out that the different amounts named in this Report as to the probable cost for the various river improvements must not be considered as estimates; they can only serve as a guide to the probable relative magnitude of the different works.

At the present stage of investigation, I shall state my impression as to the merits of the different river improvements already described.

A. (See map.) I doubt that a deviation here can be justified.

B. If it should be found from the river's longitudinal section that the additional fall to be gained by this deviation would improve the river's transporting capacity for some considerable distance above, the expenditure for river-regulation here would probably be justified.

C. I feel confident that this deviation will be too expensive in proportion to the benefit obtained.

C¹. I think it likely that the expenditure in removing obstructive rocks for 10 to 15 chains up-stream from Moonah, as well as at "b," "c," "d," "e," and "f," would increase the river's transporting power considerably.

C². It is probable that the construction of a few groynes here would cause the current to keep in one channel.

D. To embank the river here is too expensive. There can be no doubt that the best policy would be to make this flat a dumping ground for tailings. Contour-levelling will disclose how large an area can be had here for the purpose; the levels will also disclose if the Main Road (Pioneer-Gladstone), would be likely to be submerged. Otherwise, I do not anticipate that any works would be required to be carried out here, except, perhaps, a low weir to effectively prevent any heavy tailings wandering farther down the river.

D¹. From Campbell's Creek, and, for, say three miles down-stream, it seems more than likely the river could be greatly improved by removing rock in the river bed, which is all under water; but, until it is known what quantities of rock have to be treated, and until we know, from the longitudinal river section, for what distance these Regulations would affect the river, little can be said for or against improvements here.

D². Probably two small regulation works could be effected at "o" and "p."

D³. Without a doubt the Esk dam ought to be removed, either completely, or partially.

E. This deviation is too expensive, and should not be carried out.
F. This deviation is too expensive, and should not be carried out.

G, H, J, and K. River Regulations at these four places are much too expensive; but, perhaps, an amount of, say, £500 could, with advantage, be expended in taking the worst bends out of the river at "Snake Island."

The Ringarooma River as a Sludge Channel.—During my inspection of the river, I also considered what interests, public or private, might suffer in case the Ringarooma River was proclaimed a sludge channel from, say, Black Creek, at the Arba Mine, to Boobyalla.

The lower 50 miles of this river channel is, and has been for the last 10 to 15 years or more, virtually treated as a sludge channel, inasmuch as during that time numerous mines have sent their tailings into the river, with the result that the channel has silted up, as already described in this Report. It is, therefore, idle now to speculate over what course might have been taken if the river was yet in its virgin state, unpolluted from the efflux of mines. The river must be dealt with in the state in which we find it to-day. I also understand it is not intended to declare the Ringarooma a sludge channel in the usual sense of the word, but that the intention is only to make it lawful for the different mines situated on the Ringarooma and some of its tributaries to send their tailings, under certain restrictions, into the river channel; but, that stringent precautions will be taken in order to prevent any further obstructions to the free flow of the water being placed in the river.

With respect to public interests, I do not think they will suffer to any extent by declaring the part of the river, as specified, a sludge channel. Crown land is covered here and there by tailings, but I take it that the value of the land in these different parts is infinitesimal in comparison with the probable expenditure for preventing the silting up of such land, always assuming that the mining interests are of sufficient importance to allow any tailings to be sent into the river.

The soil of nearly all the Crown land in question is poor from an agricultural point of view, and its area so small in comparison with available Crown land in the same localities, that the State could probably not use it to better advantage than here, where it may help to solve a difficult question related to the mining industry.

As to individual mining companies, there are three or four which will suffer to only a slight extent by having the part of the river as above-named declared a sludge channel, namely, the Tasmanian Tin Dredging Company, Limited, have got tailings deposited on some of their Mineral Leases, viz., on No. 1650-93M, about 1½ miles down-stream from Moorina.

The Ringarooma Dredging Company, No Liability, has tailings deposited on part of claims (see Plate 3), Nos. 3769-93M, 4338-93M, 4337-93M, 4336-93M, and 4335-93M. W. Spinks and C. H. F. Shearn have some tailings deposited on their Mining Leases (see Plate 2), Nos. 4614-93M and 4873-93M; and C. Hunt on Mining Leases Nos. 4627-93M and 4628-93M, and which are situated about one mile, in a straight line, down-stream from Ogilvie's Bridge. In this last case the tailings have evidently come from local claims. The harm done to Mineral Leases, by having tailings deposited on them, I assume, can only be measured by the additional over-burden the mines in such case have got to treat, and which can increase the working cost only to a slight extent. I do not think that any of the claims named are worked at present.

Damages for injury to private land are likely to prove more serious, especially so on the lower part of the river. In describing the different places where private interests are involved, I propose to start from Black Creek, and travel down-stream. I only wish to add that it is not for me to assess any value for damages. I understand my duty is only to record impartially all circumstances as they appear to me.

Beginning from Black Creek, the first place I notice is about a quarter of a mile down-stream on the left river bank, following three lots belonging to E. T. Scott and others, 99 acres; H. Forrest, 97 acres; and A. H. Boyd, 198 acres. The lower parts of these lots being only a few feet above summer water-level, are liable to be flooded, and must always have been subject to floods in the Ringarooma River. But, while the flood water before the mines had started to work must have been comparatively pure, it is now mixed with some tailings, although not nearly to that extent which is the case below the Derby mines.

On Plate 1 is shown the height of the flood from June this year, and how it affected the township of Derby. It can be clearly seen which allotments were affected, and to what extent they were covered with the flood waters. The first private lot on which the flood encroached belongs to T. Weir, and he informed me, himself, that his garden had not been damaged by the flood. The flood then touched the north-eastern corner of M. V. Davern's allotment. Lots Nos. 8 and 9, belonging to W. Cochrane, were submerged, and this owner thinks he has suffered great hardships by the flood, on account of the water going into a stable standing in the south-western corner of Lot No. 8. However, more than the half of these two allotments can be of much use, as they are very low-lying, and must always have been subject to even moderate floods. The owner of Lot No. 3, D. Fraser, considered that he had not suffered by the flood. T. Norton, owner of Lot No. 4, I did not see; his ground has not suffered more than Lot No. 3. Allotments Nos. 10 to 14 belong to the Tasmanian Tin Dredging Company, Limited.

About three miles down-stream from the Pioneer there are two lots of a total area of 55 acres, purchaser, J. Simpson, which have not been touched by the tailings. But, if it should be decided to use the large flat here as a dumping ground for tailings, they may be covered in the future.

Lots 9130 and 9131, a little over 48 acres, purchasers, J. and C. A. Ogilvie, have suffered a deal from tailings deposited on that part of the land which is very low-lying, and part of which contains a swamp. The tailings have, in my opinion, for the greatest part, come from neighbouring claims.

Lot 8949, purchaser, G. R. Bell, has suffered only slightly from tailings, probably partly sluiced out from an old claim on this property.

We come now to the great flat at Boobyalla. On the accompanying map is shown the approximate extent of the flat which is liable to be covered by flood waters, but the hatched parts, as shown, do not by any means illustrate how large a part has suffered by the deposition of silt and sand. I have already, earlier in this Report, described to what extent it seemed to me the flat had suffered, so far, from silt. If

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it is intended that the exact area shall be known, then, a proper survey of the flat will have to be made, and such a survey should also disclose how large a part of the area is covered by lagoons, ti-trees, and scrub, and how large a part of the rest has suffered from silt, and, approximately, how large a part of the original flat the Düne sand has covered. If I should name any proportion, I would hazard the opinion that about a quarter to one-third part of the area, as shown on the map, had suffered from silt deposited by floods; but it must be understood that what I state here are only impressions, they are not calculations based upon the results of exact surveys.

It may be asked if the flood waters could not be prevented from entering the flats, and thereby saving them from destruction? The answer would be, that, from an engineering point of view, this can be done by constructing embankments on both sides of the river, which, in that case, would be regulated, more or less, as shown by the letters "G" to "K." The embankments would, of course, have sufficient height to prevent any flood from over-topping and breaking them. I also believe it would be possible to drain, say, the southern half-part of the embanked flat, by means of self-acting sluices through the embankments. But the northern half is more low-lying, and here pumping would have to be resorted to for the purpose of sending the drain-water away, and pumping operations would add materially to the costliness of this undertaking. If all of the soil forming the flat had been of first-class quality, and if a market had been near, so that the products could readily have been disposed of at remunerative prices, then it is quite possible it would have paid to embank the flat; but, under existing circumstances, I am almost quite sure it would not prove a good business undertaking. I was informed that flood waters would, at times, cover the flat for a period of from four to five days, and to a depth of nearly six feet. As the flood height would increase if the water were confined between the embankments, these would, perhaps, have an average height of 12 to 14 feet, and a total length of, say eight miles. So, considering the probable cost of River Regulations over the flat, and expenses for constructing embankments, sluices, and many miles of irrigation and drainage channels, this project, if carried out, would scarcely prove remunerative.

I am, therefore, reluctantly forced to the conclusion that the flat should be left to its fate, which will probably be, that during several decades of years a portion of the southern part will be covered with silt and sand, while the northern part of the flat will be destroyed by an ever on-marching avalanche of Düne sand.

I have the honour to be,
Sir,
Your obedient Servant,

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

The Honourable the Minister of Mines.

JOHN VAIL,
GOVERNMENT PRINTER, TASMANIA.

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PLATE No 1

SKETCH PLAN SHEWING HEIGHT OF FLOOD IN JUNE 1901 AS IT AFFECTED THE TOWSHIP OF DERBY.

SCALE OF CHAINS

5 cm

Remnants of Old Stone Dam

RINGAROOMA RIVER

SHORT ST

MAIN STREET

BELL ST

BRUCE STREET

DAVERN STREET

FREDERICK ST

CHARLES STREET

CHRISTOPHER STREET

ESPLANADE

MAIN

POUND RESERVE

RECREATION RESERVE 5.0.0

1.2.7 ADDITION TO RECREATION RESERVE

COURT HOUSE RESERVE

POLICE

RESERVE 0.2.10

Bridge To Mooring

Briseis T.M. Lim:

Height of Flood in June 1901.

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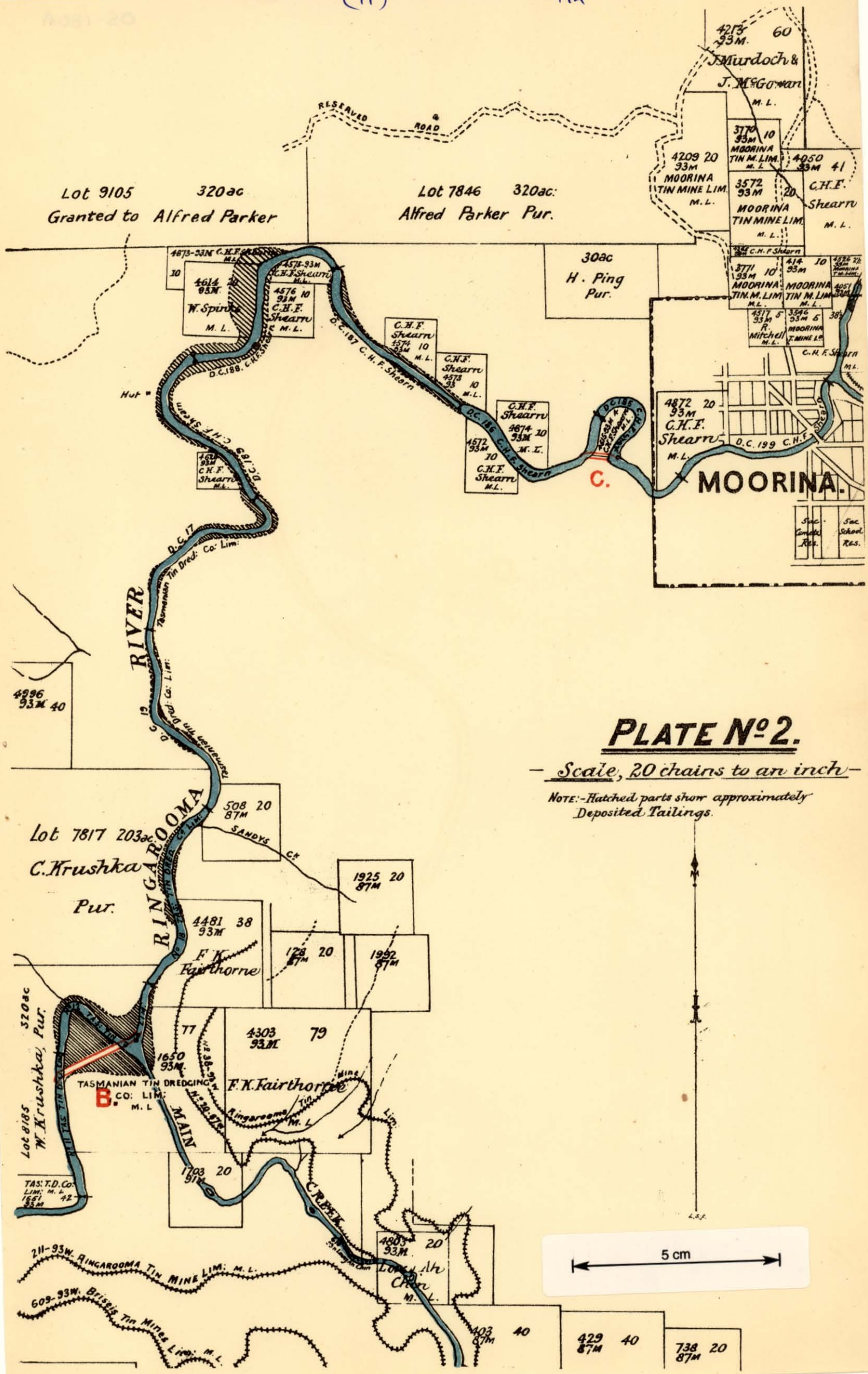
PLATE No 2.

— Scale, 20 chains to an inch —

NOTE:- Hatched parts show approximately Deposited Tailings.



(12)

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1513 87M | 565 87M 20 | 564 87M | 1514 87M 20 | 679 93M 5 | 1385 20 91M

W.R. No 150-91W.

4331 20 93M RINGAROOMA DRED: Co No L/A

1517 87M

4332 20 93M RINGAROOMA DRED: Co N.L.

972 6. 30 John Simpson Pur.

34 87M 40

4333 20 93M RINGAROOMA DRED: Co No LIA.

153-91W J. Simpson M.L.

CORDUROY RIVULET

4334 40 93M RINGAROOMA DRED: Co No LIA

55 87M 30 | 56 87M 20 | 1396 91M 20

572M

4335 20 93M RINGAROOMA DRED Co No LIA

573M

4336 20 93M RINGAROOMA DRED Co No LIA.

4337 93M RINGAROOMA DRED: Co No LIA.

D.

1651

2081 91M 20

4336 40 93M RINGAROOMA DRED: Co No LIA.

3769 93M 40 RINGAROOMA DRED: Co No LIA

3767 20 93M. RINGAROOMA DRED: Co No LIA

3768 20 93M DAM RINGAROOMA DRED: Co No LIA.

444 87M 80

2163 87M.

1359 87M 20

1294M. 20

3329 80

246-91W

645 87M 20 | 808 87M 20 | 806 87M 20 | 807 87M 20

492 87M

151 87M PIONEER T. M. Co L/A W.R.

2 O.S.

M.S. Co L/A

TIN

WR No 3330 52 PIONEER

MAIN ROAD MOORINA TO GLADSTONE

RINGAROOMA RIVER

PLATE No 3.

— Scale, 20 chains to an inch —

NOTE:- Hatched parts show approximately Deposited Tailings.

5 cm

Lot 115 John Foster

2149 87M

2106 20 91M

2089 80

2108 20 91M

1339M

Govemment Reservoir No1

327 87W

Water Right No. 175 W. 172-87W

Govt Race

80 87W

132 91W

Line of Pipes

132 91W

150 93M

132 91W 5

40

2090 40

618M

165 87M 80

(Sketched)

Northern Extension of Mount Cameron Water Race

148 91W 5

2083 80

2078 40

1229M 20ac

1201M 40

1097M

2495 87M

1554 87M 80

3732 20 93M You Hen M.L.

1202M

1200M 40

11 93M 20 You Hen M.L.

3922 91M F 20

4473 93M 75

556M

D.L. Crawr & S Ottoway M.L.

2814 40

1553 87M

2496 87M 20 G.B.B. Elliott M.L.

2001

2812 20

J.R. Lock E

1699 80

818

1663M 20

868M.

330 87M 20

673M

452 87M 20

1361M 20

3137 87M 20

770

164 87M. 20

453 87M 20

505 87M 20

706M 20

312 87W 7

2301

2673

1242 91W 20

362-87W

362 87M

176 93W 9

176-93W

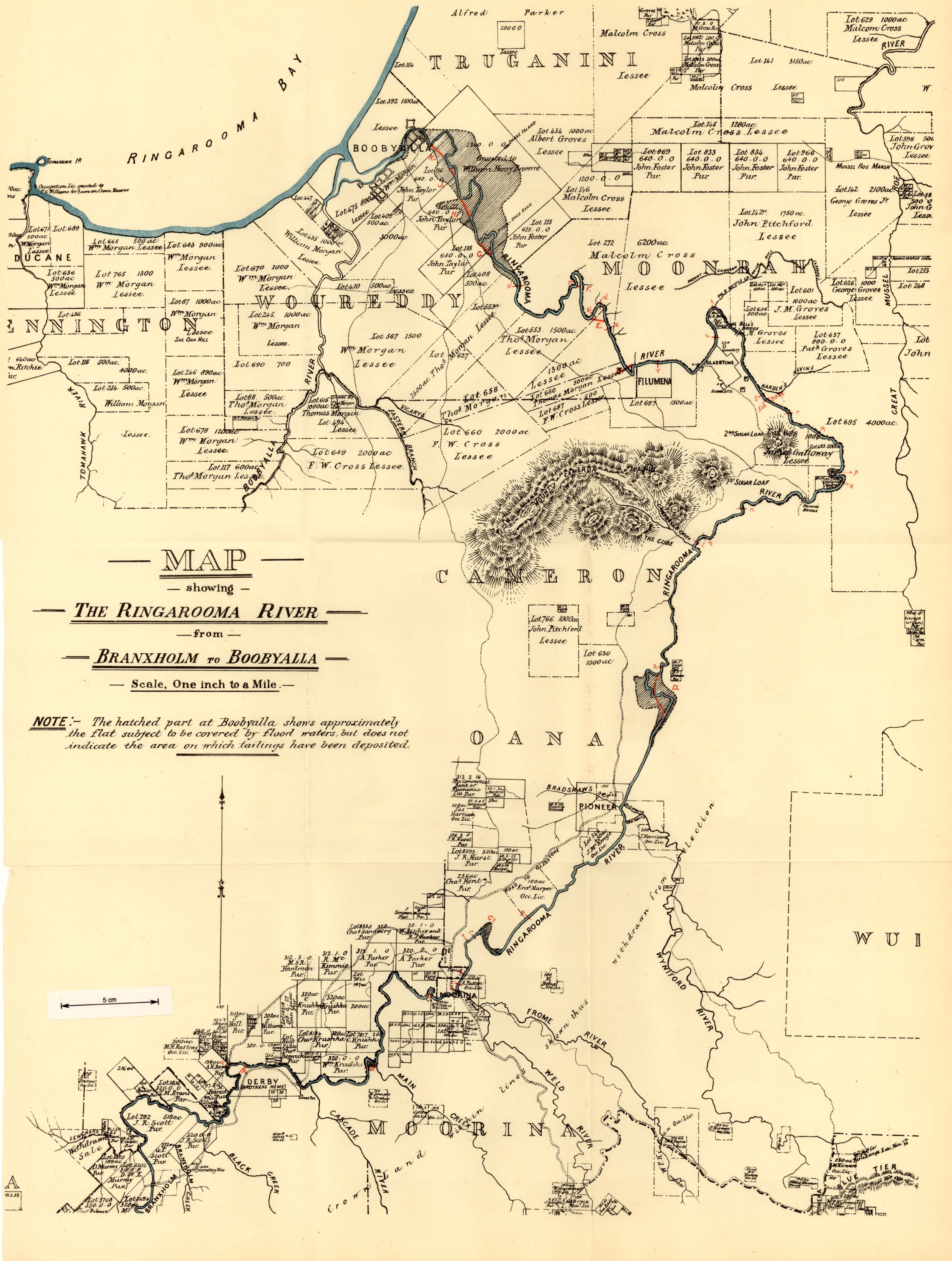
Intake

PLATE No. 4.

— Scale, 20 chains to an inch. —

5 cm

(14) 14/14


MAP
showing
THE RINGAROOMA RIVER
from
BRANXHOLM to BOOBYALLA
Scale, One inch to a Mile.
NOTE:- The hatched part at Boobyalla shows approximately the flat subject to be covered by flood waters, but does not indicate the area on which tailings have been deposited.
RINGAROOMA BAY
Tomahawk Id.
Occupation Lic. granted to T.G. Williams for ½ acre on Crown Reserve
BOOBYALLA
TRUGANINI
WOUREDDY
DUCANE
ENNINGTON
MOONRAH
CAMERON
OANA
MOORINA
WUI
Alfred Parker
Malcolm Cross
Lot 629 1000ac Malcom Cross Lessee
Lot 141 3150ac
Lot 145 1280ac. Malcolm Cross Lessee
Lot 434 1000ac Albert Groves Lessee
1360.0.0 Granted to William Henry Browne
Lot 869 640.0.0 John Foster Pur.
Lot 833 640.0.0 John Foster Pur.
Lot 834 640.0.0 John Foster Pur.
Lot 966 640.0.0 John Foster Pur.
Lot 598 John Groves Lessee
Mussel Roe Marsh
Lot 146 Malcolm Cross Lessee
Lot 142 2100ac. George Groves Jr. Lessee
Lot 142a 1750 ac. John Pitchford Lessee
Lot 115 625.0.0 John Foster Pur
Lot 272 6200ac. Malcolm Cross Lessee
Lot 392 1100ac Lessee
Lot 114
Lot 475 800ac Lessee
Lot 409 500ac.
Lot 116 640.0.0 John Taylor Pur.
640.0.0 John Taylor Pur.
Lot 118 640.0.0 John Taylor Pur
Lot 408 500ac
Lot 435 1000ac William Morgan Lessee
Lot 447
Lot 671 500ac W. Morgan Lessee
Lot 689
Lot 665 500ac Wm. Morgan Lessee
Lot 643 900ac Wm. Morgan Lessee.
Lot 656 500ac Wm. Morgan Lessee
Lot 765 1300 Wm. Morgan Lessee.
Lot 670 1000 Wm. Morgan Lessee.
Lot 410 500ac Lessee
Lot 436.
Lot 87 1000ac Wm. Morgan Lessee
She Oak Hill
Lot 245. 1000ac Wm. Morgan Lessee.
Lot 567 1500 Wm. Morgan Lessee
Lot 627 2500ac. Thos. Morgan Lessee
Lot 553a
Lot 553. 1500ac. Thos. Morgan Lessee
Lot 115 500ac.
4000ac.
Lot 214. 500ac. William Morgan
Lot 690 700
Lot 246 890ac Wm. Morgan Lessee
Lot 88. 500ac. Thos. Morgan Lessee.
Lot 616 1000ac Thomas Morgan
Lot 494 Lessee
Lot 658 Thos. Morgan Lessee 1300ac
Lot 680 500ac Thomas Morgan Lessee
Lot 687 500 F.W. Cross Lessee
Lot 697 1500ac
FILUMENA
GLADSTONE
Bell's Bridge
M. Groves Lessee
Lot 601 1000ac J.M. Groves Lessee
Lot 626 1000 George Groves Lessee
Lot 637 800.0.0 Patk. Groves Lessee
Lot 213
Lot 248
Lot 695 4000ac.
2nd Sugar Loaf
James Galloway Lessee
1st Sugar Loaf
Ogilvie's Bridge
Lot 660 2000ac. F.W. Cross Lessee
Lot 649 2000ac F.W. Cross Lessee.
Lot 678 1200ac Wm. Morgan Lessee.
Lot 117 600ac Thos. Morgan Lessee.
Mount Cameron
The Nut
The Cube
Cameron Creek
Lot 766. 1000ac John Pitchford Lessee
Lot 630 1000ac
RINGAROOMA RIVER
BOOBYALLA RIVER
TOMAHAWK RIVER
EASTERN BRANCH
VICARYS CK
GREAT MUSSEL ROE RIVER
Harden's Ravine
BRADSHAWS
PIONEER
Old Mouth
New Mouth
Road to Gladstone
Lot 545 450ac J. McKenzie Occ. Lic.
J. Harrison Occ. Lic.
313 2 16 The Commercial Bank of Tasmania Ltd. Pur.
Lot 8593 320ac J. R. Hurst Pur.
256ac Chas. Kent Pur.
100ac Eras. Harper Occ. Lic.
withdrawn from selection
WYNIFORD RIVER
FROME RIVER
WELD RIVER
MAIN CREEK
CASCADE RIVER
BLACK CREEK
BRANXHOLM CREEK
MOORINA
DERBY (BROTHERS HOME)
BRANXHOLM
Lot 8338 320 Chas. Sandberg Pur.
311.1.0 W. Ritchie and R.J. Parker Pur.
312.3.0 M.S.R. Hardman Pur.
312.1.0 R. McKimmie Pur.
313.1.0 A. Parker Pur.
320.0.0 A. Parker Pur.
320ac C. Krushka Pur.
Lot 8184 Chas. Krushka Pur.
Lot 7817 C. Krushka Pur.
320.0.0 Wm. Krushka Pur.
Lot 8610 242ac Thos. Beswick Pur.
200ac M.H. Rattray Occ. Lic.
198ac A.H. Boyd Pur.
Lot 3816 320.0.0 T.M. Evans Pur.
Lot 292 518ac J. R. Scott Pur.
320.0.0 J. R. Scott Pur.
272ac G.T. Scott Pur.
Lot 3820 199ac D. Murray Pur.
Lot 3502 318.0.0 D.W.L. Murray Pur.
Lot 3768 320.0.0
Withdrawn from Sale
Fenckers
Crown Land within lines shown thus
BLUE TIER
250ac M. Kirwan Occ. Lic.
POIMENA