

# FURTHER PAPERS

RELATIVE TO

## WATER SUPPLY ON GOLD FIELDS.

(OTAGO).

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PRESENTED TO BOTH HOUSES OF THE GENERAL ASSEMBLY, BY COMMAND OF  
HIS EXCELLENCY.

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WELLINGTON.

1872.



## FURTHER PAPERS RELATIVE TO WATER SUPPLY ON GOLD FIELDS.

### No. 1.

MEMO. FOR HON. W. REEVES *re* WATER SUPPLY MOUNT IDA DISTRICT, OTAGO GOLD FIELDS.

THE peculiar circumstances of the Mount Ida District, which were well known to me, both from personal investigation and official information, induced me to form the opinion that the provisions of the "Public Works and Immigration Act, 1871," with regard to assistance by way of subsidies to works for the supply of water, would fail to meet the difficulties encountered in the development of this important mining district.

Having in view also the various schemes which from time to time had been brought before the Provincial Government and Legislature, in order to prevent an aggregation of the serious evils which threaten the very existence of this gold field as a remunerative field of labour, I deemed it right; having first fully possessed myself of all the information, documentary or otherwise, at my disposal, to request Mr. Warden Robinson to come to Dunedin for the purpose of consultation with me as to the present existing state of things, and the possible remedies suggested upon the spot by experienced miners, and other parties interested. Upon his arrival, after several conversations, I placed before him the following Memo., upon which he favored me with Reports A. and B. appended hereto.

"Memo. for Mr. Warden Robinson.

"The question of water supply to the Mount Ida gold fields district having received the serious attention of the Colonial and Provincial Governments, the information up to this time available is placed in the hands of Mr. Robinson, who with the aid of his immediate personal and local knowledge, will be good enough to advise generally upon the subject; more especially as to the point whether the exceptional circumstances of the district would render the taking advantage of the published regulations with regard to subsidies impracticable or highly inconvenient.

"Dunedin, 15th February, 1872.

C. E. HAUGHTON."

It will be seen upon perusal that these documents are of a very exhaustive character, and deal with the various subjects at issue in a most lucid and precise manner. The papers attached (and upon which Mr. Robinson to some extent bases his reports) comprise the whole correspondence between the various local bodies; miners committees, at intervals constituted; and the Provincial authorities; and also the very valuable reports of Mr. Warden Pyke, and Mr. Barr, Chief Engineer of the Province of Otago, upon the questions specially referred to them; the most important of which would appear to have been the feasibility of a construction of a main sludge channel in order to allow of the disposal of the tailings from the ordinary workings, and the bringing in of a sufficient quantity of water to flush the said channel, and to be available for working at a higher level than is now accessible by the present supply.

In the present Memo. it is not necessary to enter into the question of the physical conformation of the country which necessitates a particular form of mining. It will be sufficient to state that it may be taken as proven that the construction of a main tail race or sludge channel is essentially necessary to the working of the ground already occupied, for the further development of the auriferous deposits, which are known to exist, and that, as a natural sequence to such construction, a supply of flushing water for the channel must be provided. These are works beyond the reach of private enterprise, not so much from the estimated cost, which is not excessive, but from the fact that very grave difficulties lie in the way of fixing the tenure of, and securing the rights of the property when constructed. It would, indeed, be impossible without a special Act of Parliament to provide either for the payment to the proprietors of fair dues by the parties availing themselves of the channel for the discharge of their tailings, or for regulating the maintenance of, and the water supply from the head race. I take it for granted, therefore, that whilst the construction of the works indicated would be of immense and immediate advantage to the district, that such construction is not possible under the regulations which provide for subsidies to registered mining Companies undertaking works for the supply of water with a view to wholesome dividends upon the invested capital. The question then resolves itself into this: Is the case sufficiently urgent to justify the Government in undertaking the works themselves? I am inclined to think that it is so. The Mount Ida gold field now carries a large population, and yields considerable returns of gold, and I have no hesitation in affirming that both would be doubled were a main sludge channel supplied with sufficient flushing water constructed.

Mr. Warden Robinson in his Report A (clause 8) remarks:—"With regard to the scheme for bringing in flushing water in connexion with the main channel, it is important to notice that this is clearly a work that would never be attempted by private enterprise, although it would be of immense advantage to the Hogburn diggings. There would be no way for a company undertaking such a work to make it return a profit. But the effect of a supply of flushing water, especially in connection with a main channel, would be to enable miners to work much good ground that they cannot now get at; to

render the diggings far more permanent by indefinitely postponing the blocking up of the outlet, and thus to maintain one of the most productive gold fields in the province, in at least its present prosperity, for many years to come. If something of the kind be not soon done, it is to be feared that the mining population will, as the claims now held get worked out, take their departure probably to other provinces if not to other colonies."

The question of cost and management is dealt with in the same report, and with regard to the latter, I think Mr. Robinson's suggestion well worthy of consideration, he says (in clause 8):—"I would therefore most earnestly recommend that if found by the Engineer's report to be practicable, the flushing water race be constructed by the Government with the least possible delay. I am unable to give any reliable estimate of the probable cost, so much would depend upon the amount of tunnelling, and the hardness of the ground to be gone through; but assuming the length of the race to be 15 miles and the cost per mile to be even £200, the work could be done for £3000, which would be cheap considering the advantage to the mining interest.

"But I would propose that this work should be done in connection with the 'main channel,' and with it, placed in the hands of a local trust empowered to levy rates (on a system similar to the main tail race plan as applied at St. Bathans). If that were done the trust would derive an income from persons taking advantage of the channel and flushing water, and the Government would not only be at no expense for maintenance but would probable in course of time be recouped for great part of its outlay."

I may remark upon this that the St. Bathans trust, referred to in the report, has no legal *status*, but exists and performs its functions solely by agreement with the persons who avail themselves of the channel. I do not think there would be any practical difficulty in constituting a similar trust at Mount Ida, possibly without the delay and trouble of an appeal to Parliament. Summarising the above matter, I would desire to express my opinion:

- 1st. That it is desirable that the construction of a main sludge channel at Hogburn, in the Mount Ida district, and of a head race from the lower Kyeburn River to the Hogburn, for general and flushing purposes, should be undertaken by the Government.
- 2nd. That such works are practicable, and could probably be executed for less than £10,000.
- 3rd. That the question of management after construction may be disposed of without insuperable difficulty.

I would further refer the Hon. the Resident Minister to the papers appended hereto, especially reports by Mr. Warden Robinson marked A and B, report by Mr. Warden Pyke upon the accumulation of tailings in the Hogburn, Mount Ida district, report by Mr Barr, C.E., upon proposed main channel at Hogburn, Mount Ida, and a sketch of the Mount Ida district, marked ⊕

C. E. HAUGHTON.

February 28, 1872.

### Enclosures.

Mr. Warden ROBINSON'S Report (A) upon a Water Supply at the Mount Ida District.

SIR,—

Dunedin, 10th February, 1872.

I have the honor to acknowledge receipt of your Memo, of 5th instant, requesting me to advise upon the subject of water supply for my district, more especially as to the point whether the exceptional circumstances of the district would render the taking advantage of the published regulations with regard to subsidies impracticable or highly inconvenient.

2. In replying to this Memo., I must ask your indulgence if I repeat, in writing, some of the statements and arguments which I have already had the honor to bring under your notice in the personal interview with which you have favored me.

On looking over the regulations referred to, I see that they are framed in contemplation merely of the lending of money to companies requiring advances. But there are some circumstances in connection with the district under my charge which would, I think, warrant the Government in incurring some expense in ways not provided for by the regulations.

At the more recently opened Marewhenua diggings there are several enterprises which may need some help to bring them to completion, and for these the regulations will, I think, sufficiently provide. But at the Hogburn, as in almost all the older mining districts, nearly all the water that can be expected to be brought in by private enterprise has been taken up for races already constructed. The few possible sources of supply that remain are so remote, or difficult of access, that it is highly improbable that anything will be done with them unless the Government make the first move.

3. Confining my remarks for the present to the Hogburn District, I may mention that there are three possible sources of additional supply, viz., the water sheds of the Mount Ida Range, the Kakanui Range, and the Hawkden Range.

With regard to the first, it is from the water shed of the Mount Ida Range that the supplies of water for the Hogburn diggings are drawn, and it may be taken as a fact that the races at present bring in almost all the water that can in the ordinary way be got on such levels as to recommend the workings. But it would be possible, in my opinion, to bring in a race from the Little Kyeburn, to start at a lower level than any of the races referred to, which, by fluming across some gullies and travelling through one or two spurs, would save distance, and therefore economise fall, and thus probably deliver water at such a height as to be available for sluicing. On the accompanying tracing I have indicated the line of such a race approximately thus ————. A race made on this line would pick up the water of the creeks at a lower level than the present races, and would thus, without interfering with their supplies, intercept all water that in times of plenty would pass the heads of those races, as well as the constant quantity accruing to the creeks in the interval. This constant quantity

PLAN OF THE

# MOUNT IDA DISTRICT

REFERRED TO IN

*Mrs. Helen Robinson's*

— **B B P O R R** —

Scale: 2 miles to One Inch.

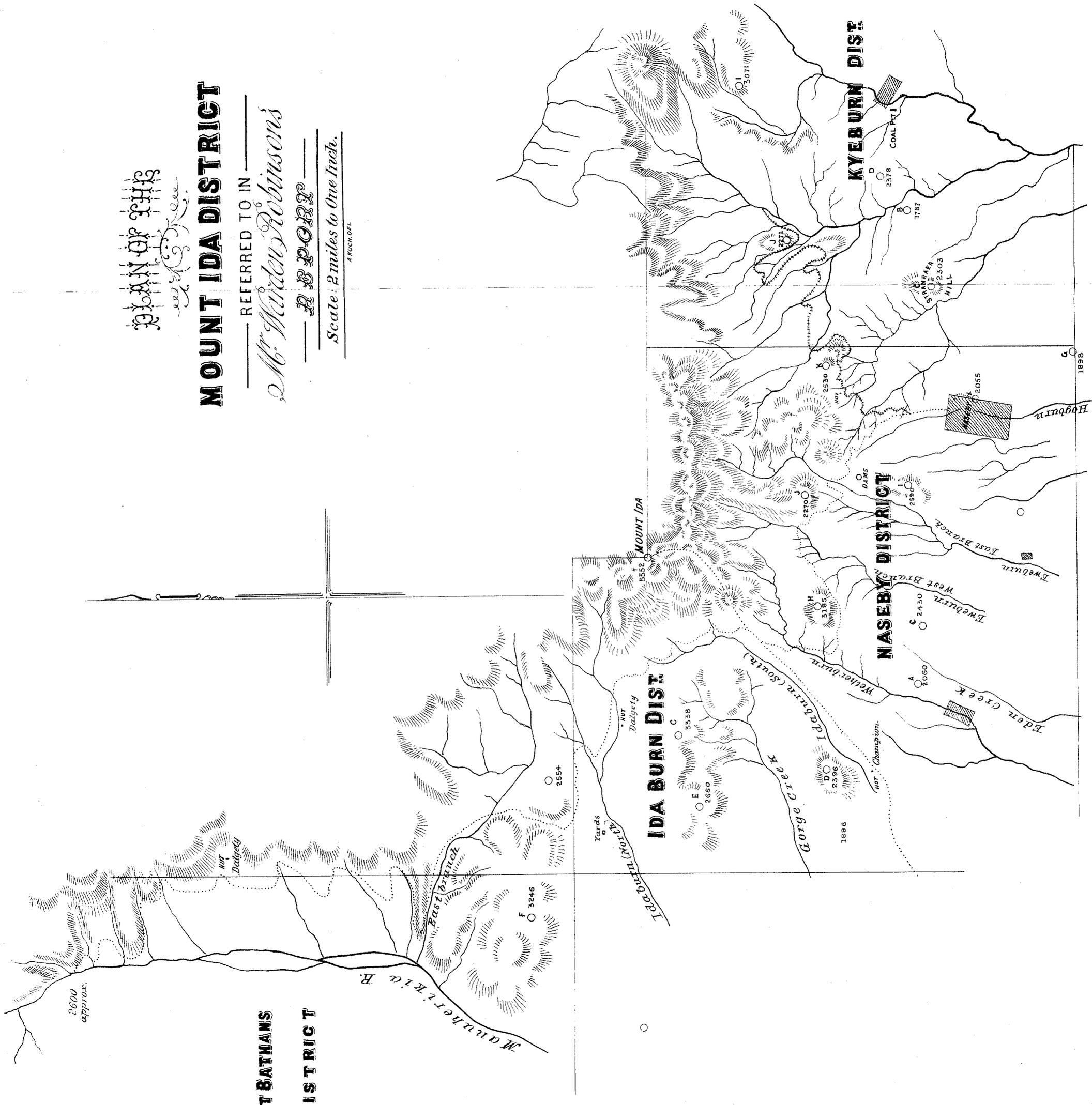
A 17000-021

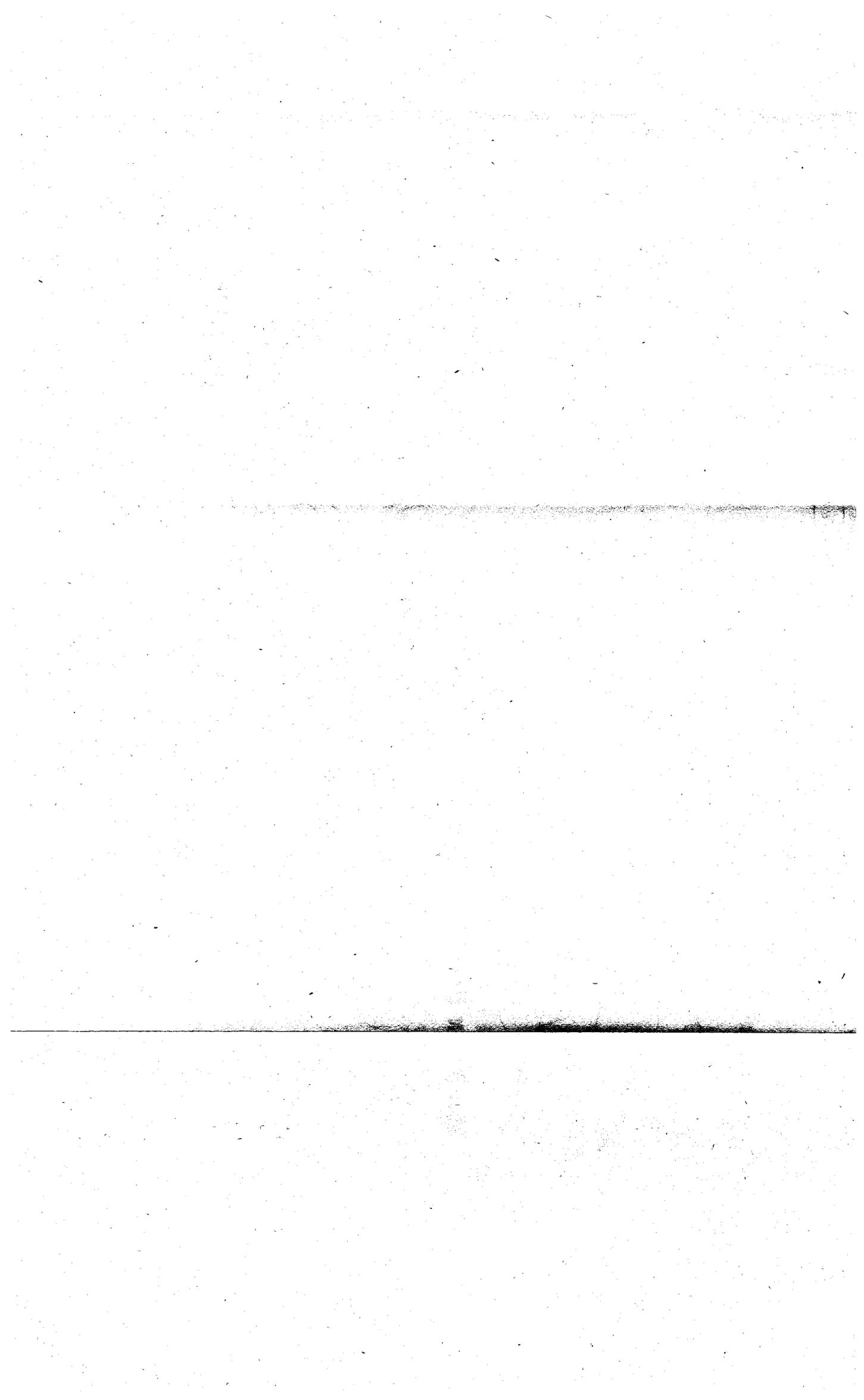
**ST BATHANS  
DISTRICT**

**IDA BURN DIST.**

**NASEBY DISTRICT**

**KYEBURN DIST.**





would perhaps be small, but, by the construction of some good-sized dams, a large amount of water could be saved which now runs to waste whenever the gullies are a little better supplied than usual.

4. But even if the water from this source could not be, without too much expense, brought in at a cost to be serviceable for sluicing, it would, I believe, be found comparatively easy to bring in a supply at such a level as to serve for flushing the proposed "main channel" for carrying off tailings. I have made the main channel the subject of a separate report, but I may here remark that, without a proper supply of flushing water, no channel of the kind could be of much service. I would also point out that a race to catch water for the flushing only, as it could be made at a lower level, could intercept a larger and more regular supply of water than one formed immediately below the lowest of the present races.

5. From the streams flowing out of the Kakanui Range it might be possible to bring in a supply by fluming across the Kyeburn, but the work would most probably be found too costly in proportion to the quantity of water to be obtained. Even the Kyeburn itself could be brought in, but as there are a number of races heading from that river, it would most likely be found that enough water to be worth making a race for could not be taken without injury to the interests of the owners of these races.

6. The next possible source of supply is the Manuherikia River. It has often been purposed to attempt to bring in a race to Naseby from the Manuherikia, but the undertaking has appeared too formidable, and nobody has ventured to incur the heavy expense that would have to be gone into for surveys to determine whether the scheme is practicable or not.

On the accompanying tracing I have marked by a plain red line the probable course of the race. This race would head from a point on the Manuherikia where, by approximate observation, the level of the river is 2,600 feet above the sea. The Trig. Section X on the spur overlooking Naseby is 2,055 feet above the sea, thus shewing a fall of 545 feet. The actual distance is 22 miles, but the length of a race between the two points would probably be between 50 and 60 miles. Assuming the length to be 60 miles, this would give a fall of 9 feet to the mile. But by fluming and tunnelling the race could be shortened. This race, coming along the contour of the ranges, could be made to intercept the waters of several streams, and it might probably be found advisable to increase its carrying capacity as it neared Naseby.

In reference to this race, it should be observed that there is every reason to believe that besides the immediate advantage to the Hogburn diggings, a large race brought along the bases of the Hawken and Mount Ida Ranges would command a great extent of ground which, for want of water, has not yet been tested, but which it is almost certain would pay for sluicing on a large scale.

7. But although I am sanguine that additional supplies of water could be brought in from all the sources I have indicated, I would by no means be understood to say that the Government should hastily enter upon any very large expenses. In the first instance I should advise that a sum of say £400 be set aside to defray the cost of proper surveys and estimates to determine the practicability of the schemes, viz.:—1st. To bring in water from the Little Kyeburn and other streams for flushing. 2nd. To bring in a large race from high up the Manuherikia River.

8. With regard to the scheme for bringing in flushing water in connection with the main channel, it is important to notice that this is clearly a work that would never be attempted by private enterprise, although it would be of immense advantage to the Hogburn diggings. There would be no way for a company undertaking such a work to make a return a profit. But the effect of a supply of flushing water, especially in connection with a main channel, would be to enable miners to work much good ground that they now cannot get at, to render the diggings far more permanent by indefinitely postponing the blocking up of the outlet, and thus to maintain one of the most productive gold fields in the province in at least its present prosperity for many years to come. If something of the kind be not soon done it is to be feared that the mining population will, as the claims now held get worked out, take their departure probably to other provinces, if not to other colonies.

8a. I would, therefore, most earnestly recommend that if found by the engineer's report to be practicable the flushing water race be constructed by the Government with the least possible delay. I am unable to give any reliable estimate of the probable cost. So much would depend upon the amount of tunnelling and the hardness of the ground to be gone through; but, assuming the length of the race to be 15 miles, and the cost per mile to be even £200, the work could be done for £3,000, which would be cheap, considering the advantage to the mining interest.

But I would propose that this work should be done in connection with the "main channel," and with it placed in the hands of a local trust empowered to levy rates (on a system similar to the main tail race plan as applied at St. Bathans). If that were done the trust would derive an income from persons taking advantage of the channel and flushing water, &c.; the Government would not only be at no expense for maintenance, but would probably, in course of time, be recouped for great part of its outlay.

9. As regards the scheme for bringing water from the Manuherikia, I would propose that the report of the engineer be made public, and I believe that if the report be favorable a company may yet be formed to carry it out. Such a company would, of course, come within the scope of the regulations respecting advances.

10. In conclusion, I would most respectfully urge upon the Government the great claim of the Mount Ida district for a reasonable share of the assistance the Government is empowered to afford. The Hogburn is the most populous of the Otago mining localities, and, with the assistance I propose, might for many years to come continue to contribute largely to the revenue of the country.

The Marewhenua is but now in course of being opened out, but gives every promise of being a sluicing district of the first order, and it will be a wise policy to deal liberally with such applications for aid as may come from that quarter. The other parts of the district are, as a rule, not in a position at present to derive any advantage from works for additional water supply, all the known available sources being already taken up under water licenses. The only exception that I can think of at present is Macrae's Flat, where a main tail race is wanted. But as this subject will probably be

## FURTHER PAPERS RELATIVE TO

brought under your notice by a petition from the miners and others resident at Macrae's, I refrain from more than this casual mention of it as a work likely to lead to the opening up of some valuable ground not at present workable.

Chas. E. Haughton, Esq.,  
Under Secretary for Public Works for Gold Fields,  
Dunedin.

I have, &c.,  
H. W. ROBINSON,  
Warden.

Mr. Warden ROBINSON's Report (B) upon Main Flushing Channel at Naseby.

SIR,—

Dunedin, 10th February, 1872.

In returning to your hands the plans and papers relating to the proposed main channel for carrying off tailings from the Hogburn diggings, Naseby, I have respectfully to request your attention to some remarks and suggestions.

2. In another report, in reply to your Memo. of 5th inst., which accompanied the papers I now return, I have gone into the general subject of water supply at some length. In that report I have urged the importance of a race being brought in to furnish flushing water to assist to carry forward the tailings, which, by their accumulation, threaten before long to bring sluicing to a standstill. I purpose now to point out the necessity for the construction of a main channel, and to show how it can be made to work in with the plan for bringing in flushing water.

3. The want of a main channel at the Hogburn is no new fangled idea. Years ago it was felt and it was foreseen that as time crept on the evil would increase, while the difficulty of coping with it would every year become greater. As long ago as May, 1868, complaints upon the subject of tailings were made to the Government, but those complaints were not made until the nuisance had begun to be felt as intolerable.

Without recapitulating all the arguments that have from time to time been brought forward, I may simply say that the nuisance is greater than ever. The tailings continue to accumulate, and in doing so to cover up large areas of ground known to contain gold. If a channel were made so as to make the best of the available "fall" of the gully, most of the ground I refer to might even yet be worked to profit. The effect of this would be not merely to benefit those miners now resident at Naseby, but to make room for many more. I have no doubt that many even who have left the Hogburn years ago, would come back if they knew that a main channel was in course of construction.

4. I have perused the reports of Messrs. Pyke and Barr, and as regards the construction of the work I have nothing to add to the very careful report of the latter gentleman.

5. But I desire to offer some suggestions as to how the flushing channel and the main tailings or sludge channel may be made to work together, and to return some interest on the outlay. I would propose that the rights of the Dead Level Company to the large tail race now held by them at the Hogburn, be bought by the Government; that a main channel be then constructed as proposed by Mr. Barr; and that both channels and flushing race be then vested in a local Board of management or Trust. Mr. Pyke in his report stated that at the time he wrote the Dead Level Company were willing to sell the exclusive right to use of their tail race for £500, they to retain, however, the sole right to all gold that might be found in it. It would, in my opinion, be better to buy their whole right if possible. In that case the Board of management would be able to derive a revenue not only from a charge for running into the channel, but from gold obtained by washing it up, as has been done at St. Bathans.

6. "My proposition is that the board consist of seven members, three to be elected by the miners, and four, including a treasurer, to be nominated by the Government. As the duties of the board would be onerous and responsible, they should receive some remuneration for their services. A special regulation should be made under section of the "Goldfields Act, 1866," for the constitution of the board, giving them power *inter alia*: 1st. To charge a rent upon all tail races discharging into the main channel. 2nd. In case of the channel needing repair or enlargement, to levy special rates upon the owners or occupiers of all claims from which tailings and tail water flow into the main channel. 3rd. To hold the exclusive right to all gold found in the channel. 4th. To stop all persons from running water or tailings into it when necessary for washing up and repairs. 5th. To regulate the hours during which the channel shall be used and the mode of employing the flushing water. 6th. To determine at what inclination tail races shall be allowed to discharge into it. 7th. To sue for and recover (through their treasurer) all rents, rates, and penalties. 8th. To defray out of funds in the hands of their treasurer all necessary charges for repairs, enlargement, labor of washing up, and other expenses of management. 9th. To pay over to the Colonial Treasurer from time to time the balance of money remaining in the hands of their treasurer.

7. I am not in a position to furnish an estimate of the amount that would be requisite for these works. Mr. Barr estimates that £6,000 would be wanted to complete the channel, and Mr. Pyke could have bought up a certain interest in the Dead Level race for £500. I, myself, think it probable that the main channel can be made for less than Mr. Barr's estimate. I believe it would be found in practice that the channel need not be made for the whole three miles at first, and that in some parts the Dead Level race could be taken advantage of.

8. In case it should not be found practicable to agree with the Dead Level Company for the absolute surrender of their race, it would be necessary to fall back upon the arrangements suggested by Mr. Pyke, and to which, at the time of Mr. Pyke's visit, they were willing to accede. This was to pay them £500 to give up the exclusive right to their tail race, and to expend a sum of £1,000 in enlarging it, but to allow them to retain the right to any gold that might find its way into the race. That the race as at present made can, by a little management, be made to carry more than what the Dead Level Company themselves run into it is proved by the fact that the company has recently been allowing several parties to run in for a small weekly charge. This has proved a great convenience as

regards the claims now in work, and will continue to be so for the higher lying ground. But to enable the low ground to be worked, the race must be brought up at a lower level, and this the Company will certainly not do at their own expense.

9. If this plan (Mr. Pyke's) is preferred, I would advise that a new agreement be made with the Dead Level Company, as I believe more advantageous terms could now be obtained. In any case it would be necessary to secure the rental, with rating power, &c., to the Board of Management.

Chas. E. Haughton, Esq., Under Secretary for  
Public Works for Gold Fields, Dunedin.

I have, &c.,

H. W. ROBINSON, Warden.

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Mr. BARR's Report upon proposed Main Channel at Hogburn, Mount Ida.

Roads and Works Department,

Dunedin, 13th March, 1871.

SIR,—

In accordance with instructions of 15th September, 1870, I have the honor to report upon the petition of miners and others at Naseby in the matter of the damages caused to the lower parts of that township by overflow of tail water from the workings. In order to gain all the necessary information upon the point, I have had levels taken by the District Engineer, and have myself visited the locality, inspected the different workings, and conferred with residents in the district upon the evils complained of.

The town of Naseby is situated on a spur dividing Roach's Gully from the main gully, the chief damage being caused by the workings in the former. In the main gully the owners of "Dead Level No. 1" exercise the right of having a tail race for about 6 miles of its length, from which they have the power of excluding the tailings of all other parties, the consequence being that they have maintained a well-defined channel for about 4 miles of the gully, having the sides sodded up, and the tailings from other claims banked up to considerable heights, whereby the fall from the side spurs into the natural bed of the creek is destroyed. Much ground is thus rendered unworkable, both by the accumulation of tailings from the higher portions, and by the impossibility of getting sufficient fall from these after the deposit has attained considerable height, but I consider this evil is less than had the exclusive rights of the Dead Level Company not existed, for then the *debris* would have spread over the whole floor of the gully, blocking up the water-course, or cutting it into numerous small rills, whereby its power for scouring purposes would have been much less than where directed in one stream as at present. This is evident in many places where a stream carrying forward gravel and shingle of considerable size becomes so weakened by being spread over a wider surface as to allow fine tailings to be deposited in its course. In Roach's Gully the disadvantage of allowing a water bed to be filled up indiscriminately is evident upon a large scale, and is really the chief cause of the evils for which a remedy is presently sought. Here the different workings have been allowed to distribute their *debris* into any part of the lower grounds, the consequence being that they have now accumulated to such an extent as to be in some places 16 to 18 feet in depth, and having their surface elevated above the streets of Naseby. In ordinary weather, and with the usual quantity of water running down, the diggers are able to prevent that doing damage to the stores and other buildings in the township by lines of tussocks and sods, but, in the event of a flood such means will be quite inadequate to save the townspeople from annoyance and loss of property. Unfortunately, the danger is still increasing as the workings progress, and, unless some means be adopted, it will be a question, in time, as to whether the workings upon the spurs draining into Roach's Gully or the township will have to be abandoned.

As either result would be a misfortune to the district, it becomes a matter of considerable importance that steps be taken without delay to avoid both evils. So far as the damage to Naseby by floods is concerned, I may leave the main gully above the township out of consideration, and confine myself to the subject of Roach's Gully and that portion of the main gully below the crossing of the Dunedin road.

In the first place, then, I find that, so far as the natural fall of both gullies is concerned, there is no obstacle to the success of a sludge channel, properly constructed and maintained, to carry off so much of the solid matter as to prevent a dangerous elevation of the ground in the neighborhood of the workings; for I find that tailings consisting of sand and clay are presently moving upon a gradient of 1 in 99, while the average fall of the main gully for 3 miles below the Dunedin road is 1 in 61, so that if taken proper advantage of there can be no doubt that with the ordinary quantity of water fine gravel could be carried along, while in floods, as heretofore, or by the aid of periodical flushing, heavier gravel could be carried down to sufficient distances to prevent damage to the upper workings.

It would be necessary to commence this channel about 3 miles below the Dunedin road, and carry it up the main gully to above that crossing, and thence up Roach's Gully to above the present foot bridge, at which point the several tail races would require to be led into it as near the direction of the channel as possible, and at slopes within 100 feet of the outfall not greater than that of the channel, otherwise there would be *debris* discharged into it of a larger size, and at a quicker rate than it could carry off. It would require to be not less than 6 feet wide at the bottom, with sides sloped at about 1 horizontal to 8 vertical, and in the main gully it would be well to build these up to probably 2 feet above the level of the ground, while in Roach's Gully, where the deposit is so deep, the bottom of the channel would be sunk not less than 6 feet below the surface. If funds would permit, of course it would be well to build the sides of stone as being the most durable material, but, all circumstances considered, I believe it would be better to employ sods, which may last for five or six years with but little repair if properly selected and cut, and so built as to obtain the maximum stability, but the portion in Roach's Gully, where the bottom would be upon the artificial ground, would require to be pitched with stone along the bed. I have recommended the length above stated, as I can see no part of the gully higher up than that which has not already got so much deposit upon it as to render a

further discharge nearly impracticable, except in times of flood, and then even with the channel formed so far as I have stated it would be well to allow some discharge, so that the storage ground at the outlet may be economised, for it is not to be lost sight of that the channel in the course of two years probably would require further extension, and the same would require to be repeated so long as the workings continued. The advantages which would be gained by this scheme would be—first, the remedy of the existing danger to flood of the town of Naseby, and secondly, and of not less importance to the district, would enable present workings to be completely exhausted, and also new ones opened up upon the spurs lower down the main gully. I believe these objects could be obtained even with the present supply of water, but, with an addition thereto, of course the channel would be all the more productive of public benefit.

If these works described above were carried out, it would be expedient that their control should be placed in the hands of a local committee, with power to frame and enforce bye-laws, and within certain limits to levy rates, both for its maintenance and extension, when such became necessary.

It will be observed that the carrying out of these works would involve an interference with the rights presently exercised by the Dead Level Company in having a monopoly of the natural run of the creek down the main gully for the tail race; but this I can only refer to, as suggestions upon that point do not properly come within the scope of a report upon the engineering points involved.

For the guidance of the Government I have formed an approximate estimate of the cost of these works, which I may state at £6,000.

If it be not expedient to carry out the whole of the above scheme at once, I would suggest that the portion along Roach's Gully to the junction with the natural creek in the main gully be carried out by itself with as little delay as possible, otherwise the consequences to property in Naseby may be serious. I believe that even this instalment of the larger scheme would be productive of much present benefit, and if the junction at the main stream were properly formed and attended to by the local committee, there need be no immediate deposit of *debris* of such an extent as to damage either the property of the Dead Level Company or of the townspeople, but such an arrangement would render the channel in the main gully an unavoidable consequence within a year or two.

This portion of the work could be accomplished for probably £1,800 or £2,000.

I have, &c.,

G. M. BARR,  
Engineer of Roads and Works.

The Secretary for Land and Works.

Mr. PYKE's Report upon Accumulation of Tailings in the Hogburn, Mount Ida.

SIR,—

Warden's Office, Clyde, 23rd July, 1870.

In accordance with your instructions as conveyed in letter of 30th June, 1870, I do myself the honor to report that on the 15th instant I proceeded to Naseby to enquire into certain matters set forth in the petition (herewith returned) of miners and residents at Naseby.

2. For the better elucidation of the points at issue, I obtained from Mr. Surveyor Barron, and now forward, 1st. A rough sketch of part of the main gully, Hogburn. 2nd. A plan and section of proposed storm channel, Hogburn; and 3rd. A lithographed plan of the town of Naseby.

3. On Saturday, 16th, in company with representatives of all the parties interested, I made an inspection:—1st, of the main gully, and of Dead Levels Nos. 1 and 2 below the township; 2nd, of the same above the township; 3rd, of Roach's Gully; and 4th, of Wet and Enterprise Gullies. The following Monday, 17th instant, I heard the various parties at the Court-house, where evidence was publicly given touching the grievances complained of. On this occasion there were present—

Messrs. Farmer and Lewis, representing the Miners' Committee.

Mr. Roberts, representing the Race Owners.

Messrs. Glenn and Harper, representing the Townsfolk.

Mr. Brookes, representing No. 2 Dead Level.

Mr. Carling, Manager of the Extended Water Race and Sluicing Company, Registered, or No. 1 Dead Level.

There was also a large number of other persons, chiefly miners, in the Court-house.

4. Evidence and information were freely sought from all and sundry willing and able to render any. The only persons who gave any evidence, however, were Messrs. Lewis, Roberts, and Carling, copies of whose statements are appended hereto. I believe more evidence would have been tendered had not all parties been satisfied that the personal inspection made by me rendered more explanation unnecessary.

5. I may briefly mention here that during my investigations several attempts were made to induce me to review some of Mr. Warden Robinson's decisions, but that I steadily declined to do so, it not being any part of my instructions to entertain complaints of such a nature; moreover, as I pointed out, there is a Court of Appeal established by law.

6. The existing state of affairs I found to be as follows:—

In the main gully (see rough sketch) there are two large tail races, locally known as Nos. 1 and 2 Dead Levels. No 1 belongs to the Extended Company, and is held under a certificate, No. 9,449, dated July 9th, 1865, "for a tail race, 6 miles long, commencing in the main gully, opposite Noke's Bakery" (above Naseby). The certificate is signed B. R. Baird, pro. Warden.

By another certificate issued by Charles Broad, Warden, the same Company are entitled to a "flood race, 6 miles long, from Extended Company's claim in main gully." On the back of this latter the following condition is endorsed—"Water to run whole breadth of gully." I confess my inability to understand this condition.

No. 2 Company (known as the Rip and Tear) hold a certificate, No. 322, dated 21st December, 1866, signed by Charles Broad, Warden, "for a tail race, 1½ miles long, commencing at Extended claim in main gully, and terminating opposite Horswell's garden in main gully.

Endorsed upon this certificate are the following conditions:—"This tail race is granted by direction of His Honor the Superintendent, upon the condition that parties working along the line of such tail race are to use it free of charge." 22nd December, 1866. Charles Broad, Warden. And also, "The above condition is only to apply to parties sluicing on the spurs along the line of race who shall be permitted to run their *tail water* into the race free of charge, provided they are in occupancy of their claims at the time of the cutting of their ace." 26th December, 1866. (No signature, Warden. "This condition was placed on by the Secretary for Gold Fields, *vide* his letter 2,395, 1866. Charles Broad." (The letter referred to by Mr. Broad can be found in the books belonging to the late Secretary for Gold Fields Office in Dunedin.)

No. 2 Company also hold a certificate (No. 542, 11th February, 1868) "for an alteration of a tail race commencing about 50 yards above tunnel in Dunedin road, length about 750 yards." John Nugent Wood, Warden.

7. It will be observed that neither Company holds any grant of water by certificate, as provided for and required by the regulations. But it appears that in June, 1867, an action was brought in the Warden's Court by Carling and party (No. 1 Company) against Farmer and party (No. 2 Company) for £50 damages; and at the hearing of this case Mr. Warden Wood pronounced the very peculiar judgment by which No. 1 Company became declared entitled to eight sluice heads of water for the first time. This judgment was appealed against, and on hearing of the appeal His Honor Judge Grey defined the eight sluice heads to be "water derived from the natural supply of the creek, or water which reaches and mingles with the natural creek water." I append a copy of these judgments. No certificate has ever been issued for the eight heads.

8. The effect of these decisions has been to confer the water supply of the gully on No. 1. What is left after No. 1 is satisfied is claimed by No. 2. But as the latter has lately sold out to No. 1 this matter can be dealt with as a whole.

9. The tail race of No. 1 (see rough sketch) now extends from about half a mile above the township to three miles and seventeen chains below it. To protect their race from being silted up by tailings from other claims, they have gradually sodded up (*i.e.* built up a bank of sods) their channel thereby stopping the scour of the tailings and tail water combined from Roach's Gully, and the many tail races coming from the hill workings on the west side of the main gully below the township. The effect of this action is fully set forth in the statement of Mr. Lewis.

10. So far as Roach's Gully is concerned, I have no hesitation in saying that unless action is speedily taken the town will be swamped. The "lay" of the land is towards the main gully, and the town is placed between the two. Already sod banks have had to be built up in the main road (within the township) to keep the tailings off private property. I have seen several certificates granted at various times for tail races in Roach's Gully, and they all bear the same characteristics, having been issued merely as "from the claim of A.B. to Roach's Gully," no point of termination being defined." But it is not possible to roll back the chariot wheels of time, and since that which has been done remains, it is only necessary to propose a remedy for the future.

11. I am of opinion that, in the strict letter of the law, the claimholders in Roach's Gully should be compelled to carry their tail races past the township to the main gully. And I question very much whether No. 1 Company have acquired a legal title to eight sluice heads of water, since they have not complied with the Gold Fields Regulations relating to tail races.

12. But there would be great difficulty now in enforcing the strict letter of the law in these respects, I have therefore sought for an alternative.

13. Without the aid of the scouring power furnished by the water used by the Extended (No. 1) Company, it would not be possible to accomplish anything satisfactory. I therefore held a conference with the shareholders of that Company, and after much debate I obtained from them the following concessions:—

"That for the sum of £500, to be paid by the Government, they would permit the public use of their present tail race from a point immediately above the bridge on the Kyeburn (Dunedin) road, with the water flowing therein, Government to make any necessary repairs of the race from that point downwards. The company reserve to themselves their right to the use of such race without payment, and also their right to any gold therein."

14. In the event of the Government acceding to this proposition (which I regard as very favorable to the public), I propose that Trustees of the channel should be appointed to enforce the proper use and repair thereof under a regulation hereafter to be made, similar in principle to the proviso now attached to Sec. 2 of Regulation XIII, so that the tail race shall be kept in an efficient condition by persons using the same, and no further expense thrown upon the Government.

15. It will also be necessary to construct a branch channel from a point 300 yards above the Dunstan road to below the bridge on the Dunedin road, a total length of about 710 yards. The fall in this portion of the proposed work would be about 70 feet, or, say 1 in 30. The fall in the main gully is (as shown in the plan of proposed channel) very good. The quantity of water available for flushing varies with the seasons. But of course when there is little water there are few tailings. The following (approximate) statement was obtained by me:—

Supply of water at Hogburn.				Max.	Min.
Main Gully, above township	...	...	...	12 to 2	inches
"    below township	...	...	...	12 to 2	"
Roach's Gully	...	...	...	2 to ½	"
Total	...	...	...	26 to 4½	"

These figures refer to Government sluice heads of water. It will be seen therefrom that from 180 inches minimum to 1040 inches maximum are available for the purpose. As to the manner in which the channel should be repaired, the opinion of an engineer seems desirable. But as a practical

## WATER SUPPLY ON GOLD FIELDS†

man, I think that were the present channel lengthened and built up with sods so as to confine the discharge at the tail ends of the race, and thence worked upwards, repairing where necessary the existing banks, the scour would itself free the channel from all silt. Branch tail races should then be brought in at oblique angles so as to avoid the formation of "bars" at their mouths.

16. The cost of these works is estimated at from £1,000 to £1,200 in addition to the £500 required by No. 1 Company. Both sluicers and townfolk express a willingness to contribute to the expense in the proportion of £1 to £2. If this be carried out the cost to the Government will be slight indeed as compared with the great benefits anticipated to the District from the proposed channel.

17. I was specially desired by the Miners' Committee to report that the same evil as now exists in Roach's Gully is now in course of creation in Enterprise and Wet gullies, where sod wing dams are placed across the gully to check the free flow of tailings and strain off the tail water. I have no doubt but that these and other gullies will be soon choked up if this course is permitted. But this is a matter so entirely within the Warden's jurisdiction, that I refrain from further comment thereon.

I have, &c.,

VINCENT PYKE, R.M.,  
Commissioner.

The Secretary of Land and Works, Dunedin.

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