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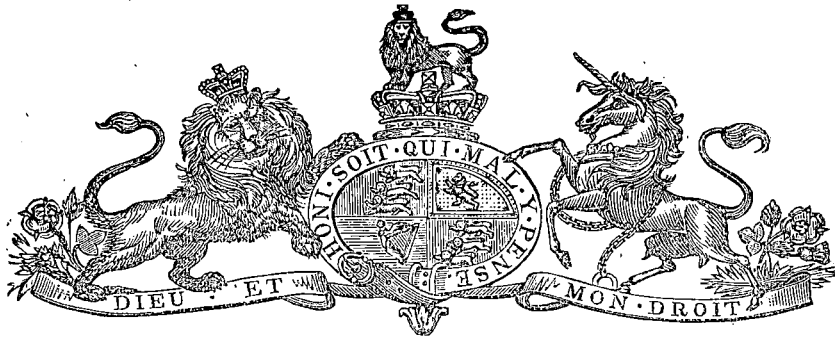
1889.

PARLIAMENT OF TASMANIA.

WATER SUPPLY OF LATROBE, FORMBY,
AND TORQUAY :

REPORT BY MR. A. MAULT.

Presented to both Houses of Parliament by His Excellency's Command.



THE WATER SUPPLY OF LATROBE, FORMBY, AND TORQUAY.

To the Honourable the President and Members of the Central Board of Health.

GENTLEMEN,

In accordance with your instructions, I have made an examination into the means of supplying with water the increasingly important towns at and near the mouth of the River Mersey, and have the honour to report to you as follows:—

1. The accompanying plan of the Lower Mersey District shows the relative positions of Latrobe, Formby, and Torquay, and will assist in the understanding of the observations and suggestions I have to make.

Latrobe.

2. With respect to Latrobe, the natural source of its water supply is the River Mersey, at some point above the influence of the tide. In regard to quantity, the river at all seasons of the year contains an abundant supply, as it is the natural outlet of the rainfall of some 630 square miles of country lying above the intake hereinafter proposed. The quality of the water is also very good, and the following analysis, made by Mr. Ward, shows that it merits its local reputation:—

- “Free ammonia, 0·01 parts in a million.
- “Albumenoid ditto, 0·08 ditto.
- “Nitrogen as nitrates, trace.
- “Chlorine as chlorides, 0·5 grains in a gallon.
- “Total solid matter, 5·5 ditto.

“This water appears to be free from contamination.” In looking at the quantity of albumenoid ammonia, which is less than Dr. Hassall's standard limit, it must be borne in mind that the small quantities shown of free ammonia and chlorine indicate that the organic matter is of vegetable origin, and consequently in such quantity does not affect the wholesomeness of the water. I have, therefore, no hesitation in recommending it.

3. The character of the land on the immediate banks of the river for by far the greater part of its course renders it improbable that it will be liable to much pollution. Most of the settlement and of the agricultural land at the Kentislibury and other plains is so situated that it will be comparatively easy to prevent such pollution of the river as will materially affect the quality of the water. But certainly special precautions will have to be taken if there be much lead-mining at Mount Claude, which is in the watershed. A great element of security in regard to the purity of the water is the character of the country through which the greater part of the river course runs, and that of its tributaries, as most of the basin is occupied by diabasic greenstone. And the large volume of water is another element of security in this respect. If the rainfall of the district be only 30 inches a year—a very low estimate—and if only half this finds its way to the river, the mean daily flow at the point of intake must be over 300 million gallons a day, and probably the least flow in the driest seasons 60 or 70 million gallons a day.

4. To supply Latrobe with water from the Mersey it will have to be pumped, as the fall in the river is not sufficient to supply it by gravitation without going many miles. The fall is, however, amply sufficient to provide the necessary water-power at little cost. After examination of the river I would recommend that the water should be taken at a place about three miles above the town. At this point there is a combination of circumstances that are favourable; there is a shelf of rock across the river and an island in its bed that would greatly facilitate the making of a sufficient weir and the other works of the intake; the river for some little distance has a rapid fall, so that the race

need not be very long; there is an old river bed that would lessen the work of making the race; and the whole of the works, and the whole pipe track to the town, would be on public property, either in the Dysodile Reserve, or on public roads. Another favourable feature is that this intake is above the confluence of the Caroline Rivulet, of which the water is said to be very liable to pollution. On all these grounds the site appears better than any nearer town—the cost of the additional length of main being more than compensated by the advantages above set forth, and others to be mentioned further on. This proposed intake is shown on the plan.

5. The township of Latrobe and the adjoining building land, called New Town, occupy a large area, the greater part of which is so sparsely occupied at present as not to be economically embraced in this scheme. What may be called the urban portion of Latrobe and New Town is that through which pipes, indicated by red lines, are shown to be laid on the plan. I estimate that there are at present 212 occupied houses therein, with a population of about 1100. There are in the township two blocks of land reserved, to be used in connection with the water supply, and these are situated on the top of Dooley's Hill, at a height of about 250 feet above the general level of the town, and about 270 feet above high water. One of these lots is well adapted as the site for a reservoir. As to the quantity of water to be supplied it should not be less than 30 gallons a day for each head of the population.

6. The above facts and considerations afford the data upon which this scheme of water supply is based, and they have been applied in the following manner:—On the one hand, in devising means for the water supply of an increasing population, it would be folly to provide merely for the existing population. On the other hand, the work would be rendered impracticable by reason of its costliness, if the existing small population had to burden itself with large works for the sake of its successors. This dilemma has been thus avoided: the pumping plant and the works above it, which could not readily be interfered with without cutting off the town supply, have been calculated for on a scale large enough for many times the present population—the distributing mains and the reservoir, which could at any time be duplicated without interfering with the supply, have been calculated for present requirements, but largely calculated. By these means the cost of the scheme will be well within the means of the community. Another reason for adopting this course will be found in the fact that the increase of the cost of the pumping plant for various quantities of water by no means follows the rate of increase of quantity, so that comparatively small increase of cost will supply comparatively large increase of power.

7. With regard to what may be considered the permanent work at the intake and pumping-station, the calculations have been based upon giving a daily supply of 30 gallons a head for a population of 5000. This is equal to 150,000 gallons a day, or 104 gallons a minute, and has to be raised 250 feet. The power necessary to perform this work partly depends upon the size of the pumping main—which will be three miles long—as much force will be taken to overcome the friction in such a length. From considerations not only of economy, but also of the fact that power exceeding present requirements may be usefully employed at the pumping-station in a manner hereinafter indicated, I think it advisable to have plenty of power and a comparatively small main. A sixteen horse-power machine will deliver more than the whole quantity through a four-inch main. As to the form of the machine for working the pumps, as the Mersey is subject to floods, a turbine is recommended as being the simplest in action and the least affected by rise of water in the tail-race. The pumps should be double or treble action, with solid plungers. All these details, and many that follow, are given as a basis of calculation, and may have to be modified when definitive measurements and levels are taken.

8. At the intake a rough stone weir should be made across the river to raise the water-level two or three feet. The narrow channel between the island before mentioned and the left bank of the river would afford easy means of fixing a large sluice, which would be useful in constructing and repairing the weir. The mill-race should have proper sluices, and advantage should be taken of one of the old river-beds met with in the course of the mill-race to construct a proper overflow and works to guard the race and buildings from damage by floods. A race, having an available cross sectional area of $7\frac{1}{2}$ square feet of water, falling at the rate of one foot to the mile, would supply over 600 cubic feet of water a minute, which, with 16 feet of fall, would furnish 16 horse-power with a 20-inch Leffel turbine. This fall of 16 feet would probably require a mile in length of race. If further examination show that a longer or shorter rate is desirable, the following calculations will not be greatly affected, as a shorter race would have to be larger and a longer one would give more fall.

9. The reserve along the river bank affords several good sites above the reach of floods for fixing the turbine and pumps; and the necessary work in this fixing will not be costly. If desirable, the turbine well may be wholly constructed of wood. The other building would be simply what is necessary to protect the turbine and the pumps. From this station the four-inch pumping main would be taken along the old Deloraine Road to the town reservoir hereafter described.

10. The works above described would be sufficient to supply a population of 5000 with 30 gallons a head daily, and their cost would be about £3450.

11. But, as before explained, it would not be necessary nor wise to immediately provide a storage and distributory service for such a population, as these works can at any time be added to as demand arose without interfering with the daily service. As regards the distributory service, mains would be laid wherever there were houses within reasonable distance to be served. Their length would be nearly three and a quarter miles—nearly a chain and a quarter for each house supplied. An ample number of fire-plugs is provided for, and stop-cocks to allow of repairs and works without shutting off a great part of the town; and arrangements are made for supplying directly from the pumping main when necessary. Provision is also made for the water authority to lay on such part of the house services as is on public property.

12. As the pumping machinery is liable to accident, and as the river is liable to discolouration by floods, it is necessary that certain storage-room should be provided. The following estimate is based on the assumption that a reservoir holding 42,000 cubic feet, equal to a week's supply at 30 gallons a head to a population of 1250, would be sufficient for the present. In connection with such a storage, it must be remembered that in case of necessity this quantity would be amply sufficient for the household requirements of such a population for more than a month. It is so desirable that it may be said to be necessary, that such a reservoir should be a covered one, and, therefore, its covering has been provided for.

13. The cost of these storage and distributory works I estimate at £3600. The cost of the whole of the works together will therefore be £7050, or, with 10 per cent. added for contingencies, say £7800.

14. The probable yearly charge upon these works would be—

	£	s.	d.
5 per cent. interest and sinking fund on £7800	390	0	0
Clerk and Receiver.....	25	0	0
Man and boy for pumping-station, and repairs.....	130	0	0
Stationery, oil, &c. and repairs	25	0	0
	<u>£570</u>	<u>0</u>	<u>0</u>

15. It is hardly possible to make a close estimate of the probable yearly income. It would not be fair to make a general rate on the whole township, as many owners and occupiers would not be immediately benefited; nor is it easy to foretell what quantity of water would be required for manufacturing, railway, and other purposes, apart from domestic use. But the estimate about to be given is based on the following considerations:—That properties upon which are carried on trades or businesses requiring much water should pay more than ordinary houses, and that some requiring very large quantities should be supplied by meter; that some charge should be made for fire extinction. The additional amount that may thus be received, and the rates for animals kept, are included in the heading "meter customers," &c.; that as building land in front of which mains are laid is increased in value thereby, it should be rated accordingly, and that water used for garden purposes and irrigation should be charged for; these are included under the heading "land and gardens." In regard to ordinary houses, the yearly rateable valuable of the above-mentioned 212 occupied houses is about £4200.

16. It is estimated that the above-mentioned sources of income would produce—

	£	s.	d.
Meter customers, &c.	120	0	0
Land and gardens	50	0	0
Leaving to be raised by a rate of 2s. on £4200...	420	0	0
	<u>£590</u>	<u>0</u>	<u>0</u>

It must be remembered that in all probability the narrow margin of profit thus left would be steadily increased every year by the building of new houses, which would not, for some time at least, entail any but a trifling outlay to supply them, and that thus a fund, small at first but continually increasing, would be formed for renewals and extensions.

17. I do not think Latrobe, taken alone, can be properly supplied with water in a more economical manner than above described. Before considering any combined scheme for the whole of the Lower Mersey District, it may be useful to consider each town therein separately.

Torquay.

18. Practically speaking, the only source from which Torquay can be supplied with water is that from which it is proposed to supply Latrobe. Even could the Sassafras Rivulet be depended upon, or a reservoir be formed in the valley of some winter water-course, the cost of pumping or of storing would be greater than that of a main from the other town, the length of which, as marked, would be about four miles.

19. The portion of the town of Torquay that it would be worth while to supply with water, having regard to probable returns on outlay, is that in which on the accompanying plan the distributory mains are shown by red lines. I estimate that there are 97 occupied houses in this portion of the town, with a population of about 500. Not only this part, but the whole of the township, could be served by gravitation from the proposed reservoir at Latrobe.

20. It is therefore proposed to bring the water on the township by a main from the Latrobe reservoir. A diameter of four inches would be ample for this main, and its cost, with the necessary stop-cocks and valves, would be about £2100. It would not be necessary to increase in the first instance the capacity of the reservoir at Latrobe, but, should increased storage be hereafter necessary, it can at any time be added without interfering with the supply.

21. As the houses in Torquay are more separated than at Latrobe, the above-mentioned 97 houses would require almost as great a length of service mains as Latrobe, though of smaller size, the length required being about $3\frac{1}{2}$ miles, or, for each house, about $2\frac{3}{4}$ chains, and the cost, including the necessary fire-plugs, &c., about £1100. Thus, without charging Torquay with any part of the cost of the pumping and storage works at Latrobe, the total cost of the work exclusively necessary for its supply from Latrobe, would be £3200, or with 10 per cent. added for contingencies, £3520. But, as the work can only be done in dependence upon the Latrobe works, it is useless to make a separate estimate for Torquay alone. In the following approximation of the yearly charge and income, the rateable value of the Torquay house property to be supplied is taken from the Assessment Roll to be £1620, and the yearly extra income from "meter customers, &c.," £25, and from land, &c., £25.

Latrobe and Torquay combined.

22. From the above calculations £11,320 may be taken as the cost of the works for supplying Latrobe and Torquay together. The annual account would then be as follows :—

<i>Charge.</i>		<i>Income.</i>	
5 per cent. on £11,320	£566	Latrobe income as above.....	£590
Clerk and Receiver (£10 more)	35	Torquay meter customers, and land, &c.....	50
Man, &c. (£24 more)	154	Leaving to be provided by a 2s. rate on	
Sundries	25	£1620	162
	£780		£802
	£780		£802

This shows that the financial position would be about the same as with respect to the Latrobe scheme when taken by itself.

Formby.

23. The Town Board of Formby has been taking action for some time with a view of getting a proper supply of water for the town. To enable it to do so it promoted a Bill in Parliament, which was introduced in the Session of 1888 by the Honourable the Attorney-General; but not passing through all its stages, it has been again introduced this Session. By this Bill powers are sought to take water from the River Don subject to existing rights; to exercise the usual powers of a Waterworks Company in regard to purchase of land, construction of works, breaking up of streets, control of service pipes, and other matters affecting waterworks, to make by-laws, and to levy a rate not exceeding two shillings in the pound on the annual rateable value of the property in the town or other district included in the operation of the Act, provided that properties, every part of which was situated more than 50 feet from a main, should pay only one-fourth of the above rate.

24. In connection with this scheme I have inspected, in company with various members of the Board, the River Don along various parts of its course; and the most suitable place found for an intake—regard being had to the desirability of having the water supplied by gravitation and without pumping—was at a little distance above Barrington Bridge, where the height of the river would admit of water being delivered to the highest part of the township.

25. The River Don for some considerable part of its course runs through land that is now to some considerable extent cultivated, and from the manner in which it has been taken up, in comparatively small holdings, is likely to be still more subject to pollution. The total catchment basin drained by it above the proposed intake is about 24 square miles. As on the various occasions during the months of December, April, and May on which I saw the river, I was not satisfied with the limpidity of the water, a sample was procured early in June, and the following is Mr. Ward's report upon its analysis :—

- “Free ammonia, 0·07 parts in a million.
- “Albumenoid ammonia, 0·19 ditto.
- “Nitrogen in nitrates, 0·34 ditto.
- “Chlorine in chlorides, 1·00 grains in a gallon.
- “Total solid matter, 8·50 ditto.

“This water appears to be more impure than is usually the case with a natural river water.” This analysis certainly shows that the water is quite unfit to be used for human consumption. The

relatively large quantity of albumenoid ammonia without a corresponding excess of chlorine is taken to show the vegetable origin of the organic matter. At the request of the Local Board of Formby, another sample taken from the same place in July, but after the recent floods had completely subsided, and when the river may be said to be in its normal winter condition, was analysed by Mr. Ward, who reports as follows:—

- “ Free ammonia, none.
- “ Albumenoid ammonia, 0·11 parts in a million.
- “ Nitrogen as nitrates, 0·36 ditto.
- “ Chlorine in chlorides, 1·10 grains in a gallon.
- “ Total solid matter, 5·50 ditto.”

This shows that after the recent rains the water is rather better than before, but it is still unfit to be used as drinking water, as it contains too much albumenoid ammonia and rather too much nitrogen in nitrates. I have therefore not thought it worth while to go into any close estimate of the cost of delivering it to Formby, but it would certainly be at least £1000 more than the amount set down for the supply from the Melrose Rivulet.

26. Another proposed source of supply to the Town of Formby was one of the affluents of the River Don—the above-mentioned Melrose Rivulet. The water of this rivulet appears to the eye to be much superior to that of the river. It is said to be perennial, and not much affected by the driest seasons, though the catchment basin above the proposed intake is so very small—not more than eight square miles, of which the greater part is capable of cultivation—that it is likely every year to be more and more liable to pollution. A sample of water was procured from it at the same time as the second sample was taken from the Don, and the analysis shows that the water of the rivulet is really no better than that of the river. The smaller quantity of albumenoid ammonia may indeed place it in regard to that organic impurity on the borderland between drinkable and undrinkable water, but the large quantity of nitrates is very indicative of pollution; and further, a water of this quality in winter is sure to be much worse in summer, when the small area and character of its catchment basin are sure to tell both on its quantity and quality. The following is the analysis:—

- “ Free ammonia, none.
- “ Albumenoid ammonia, 0·10 parts in a million.
- “ Nitrogen as nitrates, 0·58 ditto.
- “ Chlorine in chlorides, 1·60 grains in a gallon.
- “ Total solid matter, 8·00 ditto.”

27. The quality of the water from these sources is not the only consideration preventing my recommending their use. For if it be assumed that the Melrose Rivulet is a sufficiently good and permanent supply, the following works must be undertaken:—From levels kindly supplied to me by T. Townshend, Esq., C.E., of Formby, the rivulet at its confluence with the Don near the Limekilns is 99 feet above high-water, and at the Melrose Falls 480 feet. As the highest part of the Township of Formby is 200 feet above high-water, the water, if it be taken from the neighbourhood of the Limekilns, will have to be pumped. This would save something in cost of works, but would add more than proportionately to the yearly cost of maintenance, management, and working. In the following scheme the supply is, therefore, supposed to be taken from about the Falls, where the height is sufficient to supply the town by gravitation through a four-inch main, the length of which would be about $7\frac{1}{2}$ miles, and the cost of which, with some little work at the intake, would be about £4100. The course of this supply main would be chiefly parallel to the Don Company's Tramway to the bridge on the main road, and thence by the main road to Formby, and is shown by dotted red lines on the accompanying plan. In the above estimate of its cost nothing is allowed for compensation for existing rights to the water of the rivulet, nor for way-leave along the tramway sides.

28. The Town of Formby and the adjoining building lands of Wenvoe are occupied by a population so scattered as to take a great length of mains to supply the houses. I estimate that there are 150 houses that are so situated as to make it worth while to lay mains for their supply, and that the population thus supplied is about 800. As, however, the port has also to be supplied the population to be served by the distributory works hereafter described is taken at 1250, and the daily provision as before at 30 gallons a head. The above-mentioned supply main would give more than this quantity. The 150 houses are assessed upon a rateable value of £3400.

29. It would be necessary to have a storage reservoir, and if one were placed on the highest land in the township, at the site marked on the plan, a good pressure of water would be secured for all the houses. The cost of a reservoir similar to that described in paragraph 12 would be about £2230.

30. The distributory service mains are shown on the plan, and are about 5 miles in length, being about $2\frac{3}{4}$ chains to each house supplied, and would cost, including the necessary fire-plugs, valves, &c., about £2000. One quarter of this cost is caused by the length of main from the reservoir to the beginning of the real distributory service at William-street.

31. The total outlay upon works would thus be £8330, or, with 10 per cent. added for contingencies, £9160.

32. Estimating on the basis before laid down in sections 14, 15, and 16, the probable yearly charge and income would be as follows, the estimated income from the port being founded on information kindly given me by Mr. Cocker :—

<i>Charge.</i>		<i>Income.</i>	
5 per cent on £9160	£458	2s. in the pound on £3400	£340
Clerk and Receiver	25	Meter customers	80
Man	104	Land and gardens	50
Sundries	13	Shipping	150
	<u>£600</u>		<u>£620</u>

Recapitulation.

33. From the foregoing statements it appears that each of the towns of Latrobe and Formby can be supplied with water independently of each other, at a cost which will involve a yearly rate of two shillings in the pound on the rateable value of the houses supplied; and that Torquay can be supplied jointly with Latrobe at a cost involving a similar rate.

Latrobe and Formby combined.

34. I will now consider the cost of a scheme for supplying Latrobe and Formby together. For such a scheme the River Mersey is practically the only available source. The place of intake, the necessary works, turbine, pumps, and pumping main would require no change from those described in sections 7 to 10. In regard to storage space also, I do not think, and for the reasons I have given in section 12, that it would be necessary at once to build a larger reservoir than one containing 60,000 cubic feet, which, in case of necessity, would give a month's supply, for domestic purposes only, to 2500 people. The cost of this part of the works is estimated as follows :—

Works at intake, pumping station, &c.....	£3450
Reservoir.....	2650
	<u>£6100</u>

Or, with 10 per cent. for contingencies, £6710.

35. A 4-inch main, about 7 miles long, laid from the reservoir along the line of the railway fence would supply twice the quantity of water now required for Formby, and so would be amply sufficient for many years to come. It would be possible to lay a much shorter line along the track shown in connection with the Torquay supply, with a branch across the Mersey at a place where the shores and bed of the river are of mud; but the cost of the main across the river, and of a reservoir on the Appledore estate, which the liability to accident of the river main would necessitate, would more than counterbalance the cost of the additional length of main. These seven miles of main would cost £3600, or, with 10 per cent. for contingencies, £3960.

36. The Latrobe service would remain as before described, and its cost (now taken exclusive of the storage reservoir) would be £1375. The Formby service would also be as before detailed, with the exception of the main along Steele-street from the Don reservoir, and its cost would be £1475, making a total for the two towns of £2850, or, with 10 per cent. for contingencies, £3130.

37. The above calculations make the total outlay for works to be £13,800.

38. The yearly charge and income would probably be :—

<i>Charge.</i>		<i>Income.</i>	
5 per cent. on £13,800.....	£690	Latrobe meter and land, as before	£170
Clerk, &c.....	35	Formby ditto.....	130
Men, &c.	154	Ditto, shipping.....	150
Sundries, say.....	31	Balance.....	460
	<u>£910</u>		<u>£910</u>

As the united valuation of the houses supplied in Latrobe and Formby is £7600, a yearly rate of fifteen pence in the pound would produce £475, leaving a profit of £15 a year to begin with; or one of eighteen pence in the pound would produce £570, or £110 a year more than the outgoings..

Latrobe, Formby, and Torquay.

39. If Torquay be taken into the scheme the outlay would be—

Latrobe and Formby, as above	£13,800
Torquay, as in paragraph 21	3250
	<u>£17,320</u>

And the yearly charge and income would be—

<i>Charge.</i>	<i>£</i>	<i>Income.</i>	<i>£</i>
5 per cent. on £17,320	866	Latrobe and Formby, as above.....	450
Clerk, &c.	40	Ditto ditto, with 1s. 3d. rate...	475
Men, &c.....	180	Torquay, meters and land.....	50
Sundries, say	34	Ditto, with 2s. rate.....	162
	<u>£1120</u>		<u>£1137</u>

Or if the three towns be rated equally, the income would be—

	<i>£</i>
Latrobe—Meters and land.....	170
Formby—Ditto	130
Ditto—Shipping	150
Torquay—Meters and land	50
1s. 6d. rate on total valuation, £9220 ...	691
	<u>£1191</u>

40. From all the foregoing considerations and calculations I have no hesitation in recommending a joint scheme for the three towns as by far the most economical, and, as regards Formby, as giving a pure and abundant supply instead of one bad both in quality and quantity.

41. I do not think there would be much difficulty in arranging to have a joint authority constituted for supplying the district with water, as there seems to be a predisposition in its favour among many of those who have hitherto taken an interest in the matter. My object in this report is to show that if such an authority be duly constituted, it will easily be able to secure a good and economical supply of water. It is not part of my duty to suggest to the Authority what should be the amount of its rating power or the incidence of its rating, but, it will be observed, that the work is shown to be feasible, even if the rating lie only upon those to whom the water is actually brought for consumption. If, however, such rating power be taken as is proposed in the Formby Water Bill over the rest of the ratepayers, the rates will be still lighter than I have shown. Generally speaking, I have made my calculations as regards cost of work and of management at a high rate, so that the whole will be a safe guide as to financial requirements. As to the financial side of the matter, I beg to repeat the suggestion I have before made in regard to Longford, that the only economical way to find the funds necessary is for the provision to be made by Government, as is done for such matters in England. Government could get the money at $3\frac{1}{2}$ per cent., and by charging 5 per cent. for its use would establish a sinking fund to repay the principal in from 35 to 40 years—in 35 years if Government bear the charge of administering the loan fund, which would be only a very small one—or longer if some charge were made.

42. In the Act of Parliament necessary to constitute the Water Authority, I would suggest that not only the ordinary powers should be taken for administering waterworks, but special enablement to use for other public purposes the water-power derived from the river. It is before pointed out that the provision of water-power above described is much more than sufficient for present purposes, and might be well devoted to stone-crushing, production of electric force, &c. With respect to stone-crushing, an ample supply of good stone lies in the immediate neighbourhood of the works, and it would not be difficult to supply the surrounding Trusts with all the stone required for their roads.

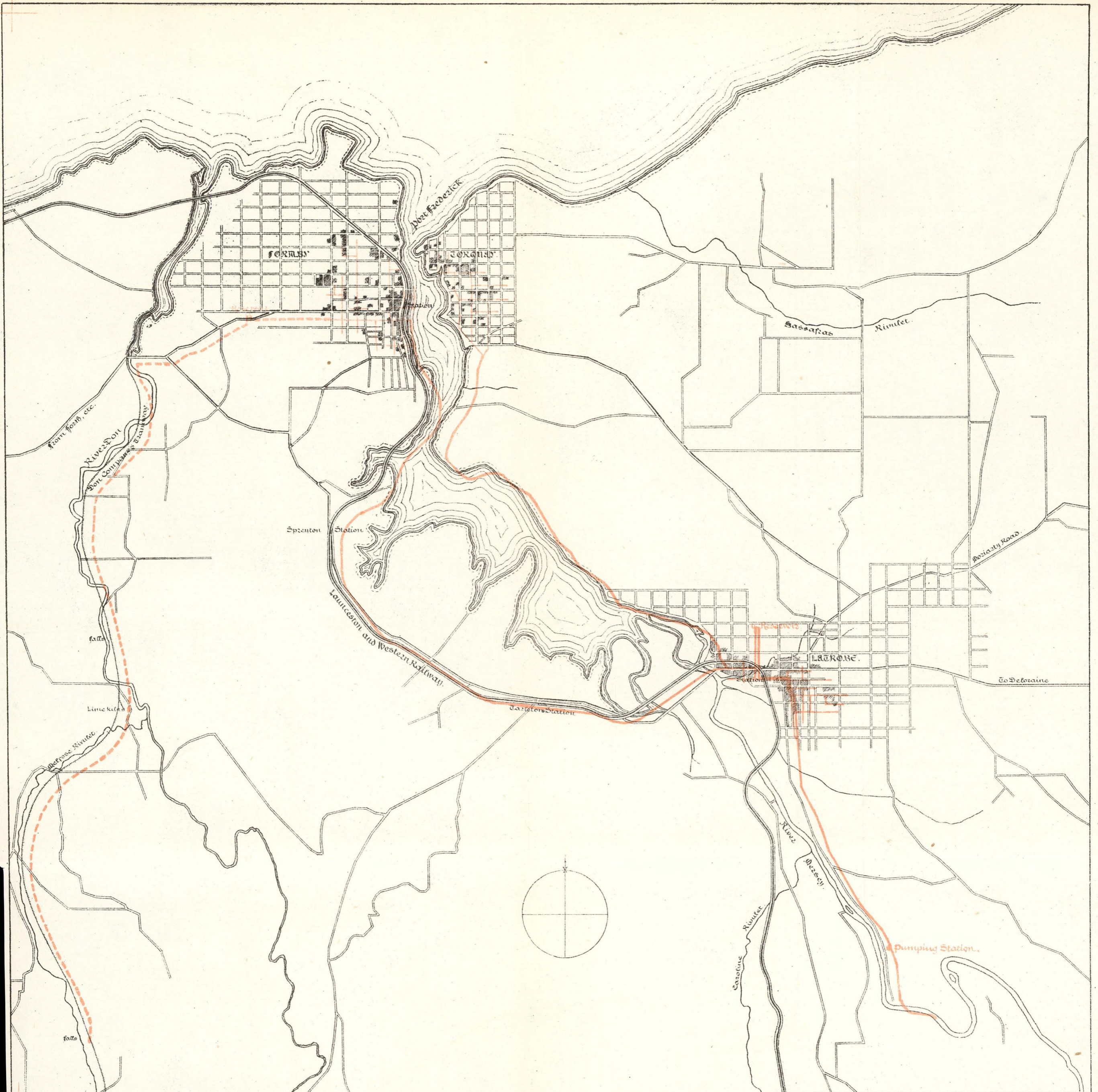
43. In conclusion, I must point out to the various Local Boards of Health of the towns of Latrobe, Formby, and Torquay that if the water supply herein described be obtained, it will be more than ever necessary to provide for the proper drainage of these places; otherwise, the good done by a provision of pure water may be more than counterbalanced by the evils caused by improper means of getting rid of it when fouled by use.

44. I beg to submit all these matters to your consideration and that of the Local Boards interested in the townships. In conclusion, I have to express my hearty thanks to Mr. Dooley, M.H.A., to Mr. Cocker and the Members of the Formby Board, and Mr. Townshend, their Engineer, and Mr. John Henry, for all the assistance I have received, and for the uniform courtesy with which I have been treated.

I have the honour to remain
Mr. President and Gentlemen,
Your faithful Servant,

A MAULT, *Engineering Inspector.*

Hobart, 30th July, 1889.



Sketch plan of proposed waterworks in the Jersey District.

Scale. Chains 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390 400 410 420 430 440 450 460 470 480 490 500 510 520 530 540 550 560 570 580 590 600 610 620 630 640 650 660 670 680 690 700 710 720 730 740 750 760 770 780 790 800 810 820 830 840 850 860 870 880 890 900 910 920 930 940 950 960 970 980 990 1000
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J. Mant June 1889