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1896.

SESSION II.

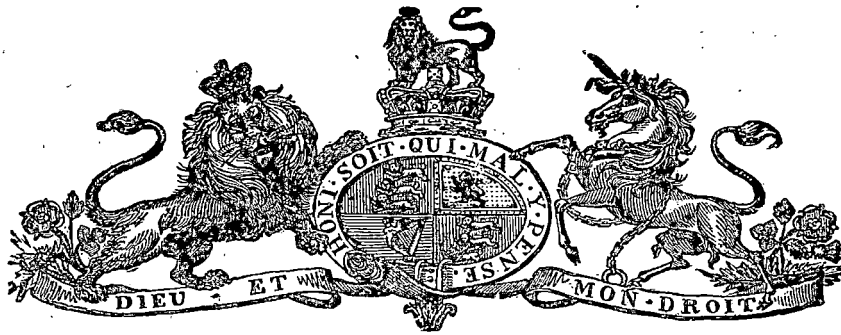
PARLIAMENT OF TASMANIA.

HOBART WATER SUPPLY AND RIVER
POLLUTION :

CORRESPONDENCE.

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

Cost of printing—£3.



Metropolitan Drainage Board, Hobart, 25th March, 1896.

SIR,

I HAVE received the enclosed memorandum on the subject of the Water Supply of the City in relation to the quantity required to properly flush water-closets, should such be generally adopted. It has been prepared by the Consulting Engineer to this Board.

I should be greatly obliged if you would give me the opinion of the Director of your Waterworks as to whether there is a sufficient supply here to flush closets should they be adopted with proper waste-preventing cisterns, and whether there is any valid reason for refusing to allow their adoption on account of the insufficiency of your water supply?

I have the honour to be,

Sir,

Your obedient Servant,

P. O. FYSH, *Chairman of the Metropolitan Drainage Board.*

The Right Worshipful the Mayor of Hobart.

MEMORANDUM on Hobart Water Supply in connexion with the provision of Water-Closets.

As the allegation is ignorantly made that the Hobart Water Supply is not sufficient to provide, in addition to present requirements, the quantity of water necessary to flush water-closets should such be introduced generally, I beg to submit the following information on the subject:—

As the result of careful inquiry into the subject at Croydon, it was found that the average daily quantity of water required for each head of the population in houses not supplied with baths, was two gallons a day for drinking, cooking, and washing: if in Hobart five gallons a day be allowed (2½ times as much), there will be required every day.....	140,000 gallons
If there be within the city 1000 houses with baths, and if every bath be used twice a day, the quantity of water required will be.....	70,000 "
In Launceston the railway stations, hospitals, breweries, and manufactories, shipping, &c. (meter customers), took 60,000 gallons a day: if in Hobart three times as much be taken (though the Cascade Brewery provides its own water), the quantity would be	180,000 "
If street-watering takes twice the average quantity used in towns of similar size in England, there would be used during summer every day.....	300,000 "
Apart from gutter-flushing, the scavengers do not certainly use more in a day than	30,000 "
And the public fountains do not take more than	30,000 "
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Giving a total for all these requirements of	750,000 gallons
A properly fitted water-closet requires two gallons to flush it every time it is used: if three gallons be allowed, and if each person used a closet twice daily (double the usual use), the quantity required would be	168,000 "
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Making a total, inclusive of closets, of	918,000 gallons

On the other hand, under the system of allowing house-drainage to run into the street-gutters, these gutters have to be frequently flushed; and in summer time, when the water is scarcest, this flushing would require to be most frequently done, and would probably take as much water as is required for street watering—say 300,000 gallons.

I am informed from the Waterworks Department that during this summer—an exceptionally dry one in Hobart—an average quantity of about 2,000,000 gallons a day was delivered from the reservoirs. If this be so, it shows how baseless is the allegation of the insufficiency of the supply, as, after allowing an enormous quantity for garden watering and waste, there must still be an ample margin for all eventualities. The absurdity of basing the opposition to the metropolitan drainage

scheme on this allegation is shewn by the fact that the scheme would require less than 170,000 gallons a day for the water-closets, while the existing arrangements require 300,000 gallons a day for gutter-flushing, which would be needless with underground sewers.

A. MAULT, *Consulting Engineer to the Metropolitan Drainage Board.*

Hobart, 25th March, 1896.

P.S.—I have elsewhere pointed out the fact that London, with a water supply of less than 30 gallons a day for each head of the population, and Liverpool, with one of 25 gallons a day, are each exclusively water-closet towns, and have sufficient water for the purpose. The above figures shew that Hobart this summer has had more than double this supply.

*Town Clerk's Office,
Town Hall, Hobart, 14th April, 1896.*

I HAVE the honour to forward the accompanying Report of the Director of Waterworks, as requested in your letter of the 25th March. Also a Memo. from the Chairman of the Waterworks Committee on the same subject.

I have the honour to be,

Sir,

Your obedient Servant,

J. G. DAVIES, *Acting Mayor.*

The Chairman Metropolitan Drainage Board.

*Office of Director of Waterworks,
Town Hall, 9th April, 1896.*

SIR,

IN reply to the question as to what water is available for the purposes of flushing water-closets in connection with the proposed underground drainage scheme, I have the honour to report as follows, and in doing so I find it necessary to go into the question somewhat fully.

The present population of Hobart and suburbs supplied with water from the Hobart Water Supply is estimated at	31,500 persons
The estimated daily consumption during this summer was.....	2,000,000 gallons
Making the consumption per head of population per day of	63 gallons

I have gone carefully into the consumption under the various headings, some of which are obtained by actual measure, and the result is as follows:—

1. Government buildings	120,000 gallons per day
2. Shipping	60,000 "
3. Street watering, &c.....	120,000 "
4. Public purposes	30,000 "
5. Trade and manufacture	210,000 "
6. Domestic	550,000 "
7. Hotels, stables, &c.	160,000 "
8. Irrigation	450,000 "
9. Miscellaneous	85,000 "
Total, say	<u>1,800,000</u> "

The balance of 200,000 gallons is accounted for by waste, leakage, and illegal use.

By deducting this last quantity, and also those under items Nos. 1, 2, 3, 4, and 8, the actual consumption per head of population comes to 32 gallons.

Of late years water authorities (especially in England) have been reducing the consumption *per capita* by means of special waste-water meters and other appliances, as will be seen by the following few examples, which are about the *extreme minimum quantity supplied*:—

	Population.	Date.	Water used.	Date.	Water reduced to	At annual cost of
Lambeth.....	341,856	1880	33 gallons	1890	18½ gallons	£2390
Liverpool.....	755,689	1873	30½ "	1890	16 "	£3668
Southwark and Vauxhall	842,000	1880	50 "	1890	18 "	£2000

On the other hand, the following table shows the consumption in 194 cities of America within the last few years:—

United States.—Average daily Consumption of Water in gallons.

Population.	200 and over.	100 to 199.	75 to 99.	50 to 74.	25 to 49.	Below 25.	Total Cities.
Above 100,000	1	10	9	8	2	—	28
50,000 to 100,000	—	8	2	7	7	—	24
25,000 to 50,000.....	1	9	7	8	5	—	30
15,000 to 25,000.....	—	17	10	8	9	4	48
10,000 to 15,000.....	2	10	13	11	21	7	64
TOTALS	4	54	39	42	44	11	194

Sydney, with a population of over 400,000 persons supplied with water, averages 32 gallons per head, and the consumption has been reduced to this quantity only by great care and at considerable cost. Therefore if Sydney, with 47 persons per acre, is taken as a fair example, as against 19 persons in Hobart, the latter, having more garden space, will consequently use more water for irrigation, and it can therefore be claimed that the quantity of 63 gallons, including trade, shipping, and all other purposes, is not so very large after all; although, no doubt, this quantity could be greatly reduced by a proper meter system, &c. The cost of this system is somewhat expensive, especially at the outset, therefore for a population of say some 40,000 persons, it is doubtful if it would not be better to expend the same amount of money in increasing the supply, and allow the consumption to continue as at present. In the above example about one-half the quantity of water consumed in Sydney has to be pumped, whereas in Hobart the whole supply is carried by gravitation, which makes it more necessary that the consumption in Sydney should be kept down. It must be remembered that in the Hobart water supply the pressure in the water mains is much greater on the average than in Sydney and most towns, and that a great number of the mains in Hobart have been laid down from 30 to 45 years, added to which the Hobart Waterworks Department has not the proper appliances to test all water fittings and pipes, as is done in most other towns, for which reason there is a higher percentage of bursts, and consequently more leakage. By adopting proper waste water meters and appliances, coupled with a more vigorous renewal of mains and services in the near future, I believe the consumption per head would be considerably reduced, perhaps to, say 50 gallons, per head, including domestic and all other purposes except water-closets.

On the other hand, a considerable increase in the population may reasonably be expected in the near future, and in making any calculation on this head it is well to provide for fully 25 per cent. increase, which would give a total number of, say, 40,000 persons.

The following tabulated information will, I believe, explain the position of the whole question:—

	Gallons.
Consumption for population of 40,000 persons at present rate of 63 gallons	2,520,000 per day.
Consumption for population of 40,000 persons at reduced rate of 50 gallons	2,000,000 "
Add for flushing W.C's. 40,000 at 6 gallons (allowed by Mr. Mault)	240,000 "
Total quantity required.....	2,240,000 "
This Summer the daily supply from Mountain was about	1,000,000 "
Therefore there would have to be drawn from storage	1,240,000 "
The capacity of the two Reservoirs as to what is available for consumption is about.....	100,000,000 gallons.
As these Reservoirs should not be drawn on (except in times of accident) more than <i>one third</i> of their capacity, they would only supply the required storage water of	27 days.
As a dry season may continue for 90 days (this year it has been more than that), then additional water supply must be obtained for the 63 days, of.....	78,000,000 gallons.

Owing to there being no suitable site near Hobart for Reservoir construction, except at very considerable cost, I believe it will be found more advantageous to increase the daily supply by bringing in more water either from the existing sources or from elsewhere, reports concerning which have been made from time to time within the last few years.

This subject has been under consideration for some time past, and I am now engaged in obtaining information to enable the Waterworks Committee to bring up a Report to the Council on the same.

I append the Report of May, 1893, previous to the Lower Reservoir being reconstructed; and, in conclusion, I beg to state that the figures in the reports are fully borne out by the position of affairs at the present time,—when the whole of the water in the Upper Reservoir is consumed. The

water in the Lower Reservoir is down about 13 feet, and is still being drawn upon, and the supply from the Mountain is very slack.

I have the honour to be,
Your obedient Servant,

His Worship the Mayor.

R. S. MILLES, *Assoc. M.I.C.E., Director of Water Works.*

*Office of the Director of Water Works,
Town Hall, 14th April, 1896.*

SIR,

BEFORE sending on the enclosed Report *re* water supply, I consider it my duty to forward you same for perusal and consideration.

R. S. MILLES, *Director of Water Works.*

The Chairman Water Works Committee.

IT will be seen by the above Report that there is insufficient water supply and storage for the present requirements during the dry season of the year, to a considerable quantity, but the Water-works Committee has under consideration at the present time a scheme for greatly improving the supply, which will, it is hoped, soon be laid before the Municipal Council, which scheme, if carried out, will not only supply the present deficiency, but also the amount of water required for flushing the water-closets under the proposed Metropolitan Drainage Scheme.

T. A. REYNOLDS, *Chairman Water Works Committee.*

*The Hon. SIR PHILIP Fysh, K.C.M.G.,
Chairman of the Metropolitan Drainage Board.*

SIR,

I HAVE the honour, at your request, to submit to you the following remarks on the Petition against the Drainage Scheme.

The Petition.—Estimates.

The first three paragraphs need no remark.

In paragraph 4, the estimates of £56,149 for the cost of works, and of £5368 for the yearly expenditure, are those of Mr. Napier Bell for his scheme. My estimates are £45,663 for works, and £3800 for yearly expenditure. Mr. Bell made no estimate of the cost of house drainage; my estimate is £30,000, not £20,000 as mentioned.

Paragraph 5 gives the opinion of the framers of the Petition as to what would be the effect of draining Hobart. If the carrying out of the drainage of Hobart would be detrimental to the health of the citizens, their experience would be unique in the history of the world. In every other town in the world, without exception, the drainage of the town has resulted in the improvement of the health of the town. Hundreds of these towns are in very similar positions to Hobart, and with but one or two exceptions, their sewage is discharged as it is proposed to discharge Hobart sewage, and without detriment to the health of the people. The petitioners have only their "opinion" to set against universal experience.

In paragraph 6, various objections to the scheme are stated under different letters:—

A. deals with the question of the facts upon which the estimates for the main sewers are based. All human estimates are, and must be, conjectural, and hence the differences that exist in contractors' estimates for any given work. But it is not true that "no adequate practical test has been really applied to the strata to be excavated," as foundations have been dug out, drains laid, and other excavations made all over the city, and to a sufficient extent to satisfy any resident contractor. For instance, the Department of Works from time to time calls for tenders for the work to be done at all Government properties. Contractors send in tenders without any more knowledge of the ground than that already possessed and made use of in framing my estimates. It is the very knowledge of how much must always be "conjectural" that induces a wise engineer to make very ample allowances for the unforeseen. That this has been done in the present case is easily proved. The Department of Works' contract, above alluded to, is for what are usually small quantities of work at each place, and so are consequently and naturally higher than if for large quantities. They are, in fact, retail prices, as distinguished from wholesale. Yet, notwithstanding this, if the Government wished to have the drainage scheme carried out under the existing contract, it would have to be done, so far as provided for in the schedule, at fully $6\frac{1}{2}$ per cent. under the prices given in my estimate. For instance, the schedule provides for the excavation of drain trenches, brick work in cement, and the laying and jointing 9 in. and 6 in. drains. My estimate of the cost of the brick sewers and the 9 in. and 6 in. ones is £38,560, with 15 per cent. added for contingencies. The contract price under the Works Department Schedule is £36,157.

To show the influence that the "retail" nature of this Schedule price has upon it, the experience of Launceston may be cited. The corporation of that city has long found out that its drainage work is not only better done, but far more cheaply, by employing its own officers and men to do it. Launceston is exclusively built upon a greenstone formation, with the valleys in it filled up with wet boggy soil. This latter in drainage work requires an amount of pumping and timbering that would hardly ever be needed in Hobart; and the greenstone, which occupies the far larger proportion of the site, is at least quite as hard a rock as in Hobart. The City Surveyor has kindly furnished me with the prices which 36 in. brick sewers, and 15 in., 12 in., 9 in., and 6 in. pipe sewers have cost him in various parts—and all at greater average depths than are necessary in Hobart. My estimate of the cost of these sized sewers in my general scheme is £43,028, with 15 per cent. to be added for contingencies; at the Launceston mean prices the estimate would have been £32,091. Only a very small percentage of this difference is due to the difference in the price of pipes between the two cities. Is any further proof needed of the sufficiency of the estimates?

- B. deals with the estimates for house drainage. The sufficiency of the prices in the estimates of house drainage work can be similarly proved. In the District of the Board there are 27 blocks of Government property, of which 13 are on the greenstone formation and 14 on sandstone; and this may be taken to represent the nature of the soil to be encountered by the contractor for Government work. If the Antill-street block were a Government property its drainage could all be done under schedule prices except the ventilation cowls and valves. Making allowance for these, the Government contractor would have to do for £137 16s. 6d. the work for which my price is £171 4s., with 10 per cent. added for contingencies. Taking the Launceston prices for work actually done, as far as applicable, the estimate for the above work would be £98. The estimates for the other blocks of which I have furnished the details of the house drainage, are based on the same prices as that for the Antill-street block, and would be subject to proportionate deductions if done at the Government contract or Launceston prices.

Water Supply.

- C. alleges an insufficient water supply. All experience shows that there is an ample supply of water at Hobart to carry out the drainage scheme. Nearly every town at home and in the Colonies that has a complete water-closet system has a far less water supply than Hobart. Sydney has less than 33 gallons of water a head, London less than 28 gallons, and Liverpool 25 gallons. Hobart is said to have over 60 gallons a head. There are no complaints of insufficiency of water for the system with the smaller supplies mentioned—why should there be with the greater?

Storm Waters.

- D. refers to the provision of sewers for storm waters. No scheme of drainage ever pretends to deal with storm waters, and this is no exception. This scheme, however, does deal with the rain water falling on houses and paved yards, and this is the usual and only practicable provision that can be made; and with regard to such water houseowners will be put to no further expense.

River Pollution.

- E. deals with effects observed during the recent visit of the fleet. As it is not proposed to discharge at Macquarie and Battery Points any faecal or other matter in the condition of that discharged from the ships of the fleet and found ashore, the fact that such matter in such condition was so found has no bearing on the proposed scheme of drainage. The whole paragraph is utterly absurd as suggesting that the "state of solution or suspension" of the discharged matter has nothing to do with its obnoxiousness when it arrives at a distant shore, and could only be penned by someone who knows nothing of the question. Ordinary water-closet-town sewage contains $\frac{1}{10}$ of its weight of solid matter. Let it be supposed that for one period of the ebb or flow of the tide the whole of the sewage of Hobart flowing in a direct line from Macquarie Point to a point as distant as the shore on which the matters from the fleet were found, without any other mixture with the surrounding water than that represented by a widening of the stream one inch on each side for every yard of flow, and that it took three hours to get there. (If it took a shorter time, of course the dilution would be greater.) All this is quite impossible, as may be seen by the wide fan-shaped discolouration of water when the rivulet is in flood. But if it were possible, the water arriving at the shore would have the solid matter in it reduced from $\frac{1}{10}$ to $\frac{1}{30000}$ —an absolutely inappreciable addition to sea-water. As Mr. Napier Bell says in his Report:—"A great deal of exaggeration and nonsense is talked about sewage polluting shores, and one hears more about it than is to be found in reality. A large number of the pleasantest towns in England discharge their sewage into the sea or the harbour in front of the town without any ill effect; and Edinburgh has just built two very large sewers to carry the sewage of 260,000 people, the mouths of which are at low water on the sea beach at Portobello, the most favourite watering-place in Scotland. Auckland and Wellington discharge their sewage directly into the harbour in front of the towns,

and I never perceived any ill effects from it. It is true that Auckland intercepts the deposits in a large tank, and where sewers bring down sand and mud from the streets the sand and mud gets black and filthy, and settles at the mouth of the sewers. When, however, the sewers carry nothing but sewage this becomes mixed with a million times its own bulk of sea water, and the effect of the sewage on the water is such as would be produced by pouring a thimble full of sewage into a 400-gallon tank of salt water . . . From observations of the effect of over 50 years' discharge of the Hobart sewage into the harbour, I cannot form any other conclusion but that the discharge of the sewage at Macquarie Point would have no effect in polluting the shores, or defiling the water of the harbour, especially if the storm water is kept separate from the sewage."

- F. refers to the Domain and Sandy Bay baths. The discharge of sewage at Macquarie and Battery Points cannot possibly affect the baths to the extent that the Wellington Rivulet affects one of them, and yet there has been no stir made as to the removal of the Sandy Bay baths on account of the loudly complained-of condition of the water in the rivulet.

Micro-organisms.

- G. totally misinterprets some recent experiments. These experiments, conducted in April, 1894, by Mr. J. Lunt and Dr. Roffer, of the British Institute of Preventive Medicine, in no way proved the danger of discharging "crude, undisinfected sewage" into the sea. They were undertaken to test the L'Hermite process of electrolysis, and were made, not upon ordinary sewage, but upon fæcal matter only. They had nothing to do with the action of sea water upon ordinary sewage, nor with the action of such sewage upon sea water when discharged thereto, and proved nothing with respect to one action or the other. But later on in the same year some investigations made by Mr. Parry Laws and Dr. Andrewes for the London County Council upon the subject of the micro-organisms of sewage, revealed facts which shew how baseless are the fears of the alarmists who talk about the danger of permitting living disease germs to run into the sea at Macquarie Point. The experts above named took samples of sewage from all parts of London, and found no germs of diphtheria, nor, in ordinary sewage, any germ of typhoid fever. Yet this sewage contained more than 3,000,000 non-pathogenic germs in a cubic centimetre. But, by arranging with the authorities of one of the hospitals that no disinfectants should be used for two days, the sewage from a fever ward, with 40 typhoid patients yielded the true typhoid germs. But later on, when this sewage was taken, mixed with other sewage, at a place a quarter of a mile from the hospital, no typhoid germs were found. Some germs may have been there, and if so any drinking water contaminated by the sewage would probably have caused typhoid. As it is not proposed to discharge Hobart sewage into any water that is used for drinking purpose, there is no fear of such dissemination of disease. But the alarmists aver that the germs in the sea will be left by the tide to dry on the shores, and will then be given into the air and cause disease. This is an absolutely unfounded statement, and contrary to all that is known on the subject. If sewage could give off germs into the air it would surely do so in the sewers. The sewage in them is at high-water between 9 and 10 o'clock every morning, and at that time usually covers all the invert of a large sewer. For the rest of the day, and until the same time next day, more or less of this invert is uncovered and left to dry. It has never been found to give off into the air a single germ either pathogenic or other. In fact the micro-organisms of sewer air are not those of sewage, but of the fresh air outside; for, though the temperature of sewer air is subject to very little change, the micro-organisms in it vary with precisely the same seasonal variation as those of the air outside, which is affected by summer heat and winter cold. If, therefore, the infinitely numerous micro-organisms of all sorts that swarm in sewage are not given off into the air from the dried inverts of sewers, what chance is there that the infinitely rare typhoid germs in the sea should be given off from the shore? For, if the typhoid germs are so rare in the sewage before discharge that they cannot be found, how much rarer must they be when the sewage is diluted by the sea?
- H. is a characteristic repetition of the plea for wasting money on temporary work of transient utility, instead of employing it to work a permanent remedy. The carrying out of the drainage scheme would put an end to this continual waste of the ratepayers' money upon temporary expedients that only very ineffectually deal with the nuisances caused by the present system,—a waste that the supporters of the Petition are constantly urging upon the Authorities.

I have the honour to be,

Sir,

Your faithful Servant,

A. MAULT,

Consulting Engineer to the Board.

Hobart, 8th April, 1896.