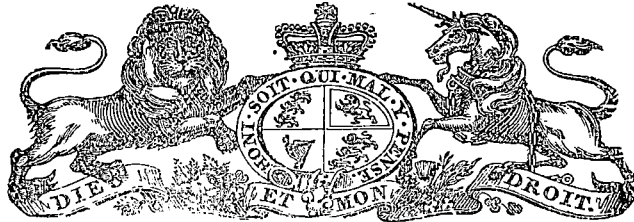


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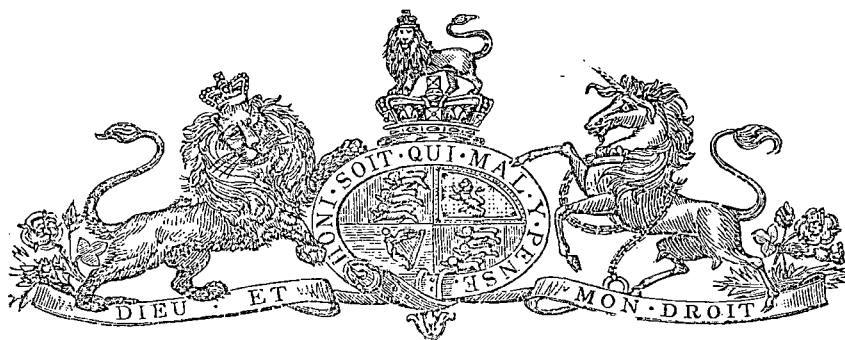
METROPOLITAN DRAINAGE BOARD:

REPORT.

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

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## METROPOLITAN DRAINAGE BOARD.

### METROPOLITAN DRAINAGE ACT, 1890.

1. THE 11th Section of the Metropolitan Drainage Act, 1890, imposed on the Board the duty of providing "a map or maps exhibiting a system of sewerage for effectually draining the Metropolitan Drainage Area," and empowered the Board to have all necessary surveys and levels taken for preparing such plans, and such enquiries to be made as were requisite "to ascertain the best means of disposing of the sewage, and the cost of carrying out the system of sewerage." The Board has now the honour to report upon the steps it has taken to fulfil the duty imposed upon it, and to submit the plans, specification, details, and estimates that have been prepared for the sewerage of the portion of the Metropolitan Drainage Area, the position of which makes it necessary that its drainage should be first undertaken—being the portion that is nearest to the proposed main-outfall.

2. The first work undertaken by the Board was the preparation of the necessary maps of the Area. As it was thought desirable to obtain as soon as possible the information necessary to formulate a general system of sewerage the undertaking of which might be begun before the entire detailed plan could be completed, it was decided in the first instance to prepare a skeleton plan only of the urban portion of the Area. The progress of the survey and mapping of this skeleton plan has been duly reported in the annual reports of the Board presented to Parliament, which show that it was completed in 1896. This plan comprises a much larger area than is now included in the Metropolitan Area, as during its preparation the Queenborough, Rural Queenborough, and Glenorchy districts were, at the request of their Local Authorities, excluded; and subsequently the greater part of New Town and considerable parts of Mount Stuart, and of the Road Districts of Wellesley and Leslie have also been withdrawn.

3. Immediately the surveys for the skeleton plan were sufficiently advanced for the purpose, the Board instructed the Consulting Engineer to prepare a General Report upon the sewerage of the Area. This Report was prepared, and with the plans illustrating it, was presented to Parliament in 1892. This Report set forth a sewerage system for the whole of the urban part of the Area at an estimated cost of £60,585. The withdrawal of the above-mentioned districts from the Area and the consequent curtailment of the sewers, reduce this estimated cost to £44,936. This Report also set forth three alternative methods of sewage disposal:—

- i. By land irrigation at a cost of £52,000, (allowance being made for restriction of area), making with the cost of sewers a total outlay of £97,000, and entailing a yearly expenditure for interest upon and repayment of cost, working expenses, and maintenance, of £9820:
- ii. By precipitation at a cost of £20,400, making, with the cost of sewers, a total outlay of £65,400, and entailing a yearly expenditure of £8520: and
- iii. By discharge into the sea, without treatment, at a total cost of £45,000 and a yearly expenditure of £3800.

4. With respect to the Engineer's estimates of the cost of making the sewers, the Board referred the matter to a Committee of its members practically acquainted with construction, who reported that the prices mentioned in the estimates were sufficient.

5. In view of the relative cost of the three methods of sewage disposal, the Board decided in favour of discharge into the sea without treatment, especially as the Engineer pointed out that without

waste of outlay either of the other methods, or any new method that might be discovered, could at any time be adopted if found desirable; but in order to neglect no precaution before committing itself to the carrying out of the work, the Board decided upon obtaining from Mr. Napier Bell, of New Zealand, a report on the Consulting Engineer's proposals. Mr. Napier Bell accordingly visited Hobart, and reported on the whole subject in November, 1895, and his report has been presented to Parliament. Mr. Napier Bell generally agreed with the scheme proposed by the Consulting Engineer and the estimates of cost, strongly expressing his opinion that no nuisance could be created by the discharge of sewage at Macquarie Point. But, in view of what he regarded as popular feeling against discharging the sewage at that point, he suggested a scheme for discharging it at One Tree Point, estimating the total outlay at £88,667, and the yearly expenditure at £7084. As the Board did not think that after Mr. Bell's emphatic approval of the Macquarie Point outfall, the reason given for suggesting another justified nearly doubling the original outlay and yearly charge upon the ratepayers, it decided to adhere to the Consulting Engineer's proposal, being again influenced by the fact that by so doing any one of the other plans can be adopted at any time it may be found desirable.

6. The attention of the Board was next directed to the question of house drainage, and the Consulting Engineer was instructed to prepare a report upon the subject. He accordingly prepared a general report illustrated with plans of three separate blocks of buildings in various parts of Hobart. He was subsequently instructed to prepare a detailed report on one of the blocks shewing the full particulars of the drainage of every house and of the ventilation of the sewers and drains and specified estimate of the cost. The plans and estimates thus furnished were submitted to a committee of expert members of the Board, and approved by them. As the block chosen did not contain any houses at present fitted with water-closets the Board instructed the Engineer to survey and report upon a block in Davey-street, in which there were many houses with water-closets, and the reports furnished have been presented to Parliament.

7. It will thus be seen that the Board at every separate stage of its work took every precaution to insure the reliability of the basis upon which it was founding a scheme for the drainage of the area. It then felt that it could safely proceed with the definite preparation for the actual work of sewerage and drainage of the area. It therefore made arrangements with the Engineer to complete in detail the survey and levels of the portion of the area shewn on the accompanying plans, to set forth thereon the whole of the sewerage and drainage works required, and to prepare the necessary specifications and detail drawings. The portion of the area included in this work may be described as bounded by the Domain from Macquarie Point to the University, by Bathurst-street from the University grounds to Murray-street, by Murray-street from Bathurst-street to the Harbour, and by the Harbour from Murray-street to Macquarie Point. This portion is estimated to contain about one-ninth part of the whole area in extent, one-seventh part of the houses in number, and between one-fifth and one-sixth of the work to be done in cost.

8. Attached to the plans and documents submitted herewith is the report of the Engineer, setting forth that provision is made therein for the construction of the main outfall works, the whole of the brick sewers that will be required in any part of the area, and a considerable part of the larger sized pipe sewers, and the other sewers and drains needed to drain every house in the above defined portion of the area, including provision of water-closet fittings, yard drainage, and sewer and drain ventilation and flushing apparatus, at a total cost, after making large allowances for contingencies, of £12,000.

9. Objection has been taken to the immediate undertaking of the drainage works on the ground of an alleged inadequate water supply, but the Board is satisfied by its inquiries that there is no valid reason for this allegation, as the available water supply is far in excess of that of by far the greater part of the towns in which water-closets are used.

10. The Board now finding itself in a position to ask Parliament to appoint and empower the Metropolitan Authority to carry out the actual work of the sewerage and drainage of the area, has prepared and submits herewith a Bill for that purpose. By this Bill it is intended that the entire cost of both sewers and house drains shall be paid for out of the general rates. This is found to be, both on financial and economical grounds on the one hand, and on sanitary grounds on the other, the only fair and equitable course. When the cost of house drainage is thrown on the proprietors it is often found that in the case of properties of equal value the cost of the drainage of one property, owing to the distance of the sewers and other circumstances over which the proprietor has no control, is three or four-fold more than that of another, but the respective advantages to each proprietor and to the whole community are equal in each case, and should be paid for equally. Besides, many of the poorer proprietors of house property would find it very difficult to provide the necessary funds. On the other hand, the failure that sometimes attends house drainage work is almost entirely caused by the improper construction of private drainage works, so that it is found to be essentially necessary to retain the control of the whole work in the hands of the Sanitary Authority. It is further evident that the Authority, having the work done altogether, can get it done more economically than separate proprietors having it done piecemeal.

11. By this means the Board believes that the whole of the work can be done without adding greatly, if at all, to the present burdens of the ratepayers, as a rate levied over the whole area (including the Crown property therein, which is to be rated for the purpose) equal to that required in the City of Hobart to defray the cost of the present Sanitary service, and of other work that will be no longer required when the drains are laid, will most probably be sufficient to pay interest on capital outlay, provide a sinking fund, and pay cost of maintenance and administration. It is proposed under the Bill to pay for the whole capital outlay out of loans, the Governor in Council being authorised to grant such under the Public Works Loans Act after the consent of the ratepayers is obtained. It is proposed to continue to obtain the necessary funds for the repayment of loans and for current expenses by issuing precepts to the various rate-collecting Authorities in the Area. These Authorities will be represented on the Board; the City of Hobart by the Mayor, the Officer of Health, and Five Aldermen; and the Local Boards of Health of Glebe Town, Mount Stuart, and New Town, and the Road Trusts of Wellesley and Leslie, by one Member of each respectively. It is also proposed to have Five Members appointed by the Crown.

12. The Bill provides for the granting to the Board of the usual powers exercised by similar drainage authorities in Great Britain and the Australasian colonies with regard to the making, repairing, cleansing, flushing, and ventilation of sewers and drains, vesting in it the sewers and drains used for sewage within the Area. The Board is further authorized to provide and fix water-closets and other such fittings. When the sewage at present flowing into the Hobart Rivulet is provided for by other sewers, the Rivulet is to cease to be a public sewer, and no sewage is to be allowed to flow into any freshwater stream in the Area.

13. The urgent necessity that exists for immediately beginning the drainage of the Area has been manifested more clearly than ever during the past season, when the fever that is most directly attributable to bad drainage, and most easily preventible by good, has unhappily been so prevalent. The Board therefore trusts that the Metropolitan Authority may, without delay, be empowered to begin its work.

P. O. FYSH, *Chairman of Board.*

*Hobart, 28th June, 1898.*

## APPENDIX A.

## REPORT ON DRAINAGE OF OUTFALL AREA.

*To the Honourable the Chairman and the Members of the  
Metropolitan Drainage Board.*

GENTLEMEN,

1. I HAVE the honour to submit to you herewith the drawings, specifications, and quantities of the works necessary to complete the sewerage and drainage of the portion of the Metropolitan Drainage Area bounded by the Queen's Domain from the Harbour to Edward-street, Edward-street, the portion of Park-street from Edward-street to Bathurst-street, Bathurst-street from Park-street to Murray-street, Murray-street from Bathurst-street to the Harbour, and the Harbour from Murray-street to the Domain. Area embraced in Report.
2. The drawings comprise seven sheets of lithographed plans, coloured so as to distinguish the various descriptions of property shown; and five sheets of sections and detail drawings. The lithographing of the plans not only entailed considerable delay, but gave me much additional work in preparing for the lithographer and in correcting the proofs before printing. Drawings.
3. As I think it very desirable, if not absolutely necessary, that the Board should have absolute control over the character, quality, and manufacture of the pipes to be used, I have prepared a specification dealing with them only. The whole of the rest of the work, both for sewerage and house drainage, is dealt with in a separate General Specification. Specifications.
4. Though not comprised in the offer I made you with regard to these works, I have prepared and attached to the specifications schedules giving full descriptions and quantities of all the work comprised in carrying out and completing the sewerage and drainage of the surveyed area as above defined. Quantities.
5. The outfall of the sewers is placed, as in my previous plans, at Macquarie Point, and is carried out into the water so as to discharge into the stream of the tide at a place where the rocky bottom, with its covering of sand, suddenly shelves down into deep water. The outfall is protected by a strongly-framed jetty, the piling and sheet-piling of which is completely filled with stone-packing, and further shielded by the deposit on its outer faces of the rock met with in the sewer trenches. The sewer is here made of strong sheet iron, asphalted within and without, and delivers the sewage into the water at two feet below low-water level. The iron sewer ends at manhole No. 1, in which is fixed a flap-valve to prevent the reflux of sea water into the sewers at exceptionally high tides. Outfall Sewer.
6. From this manhole the main sewer, 3' 6" × 2' 4", built either in brickwork or in concrete, is taken to manhole No. 2, near the eastern corner of the slaughter-yards. In this manhole will be fixed the necessary screens for preventing the discharge into the tideway of any solid matter. They are in duplicate, so that while one screen is being cleared the other may be fulfilling its office. The materials taken from the screens should be burnt, and as this should be done systematically destructors ought to be provided. I therefore recommend the securing of the land marked and defined on the plan as the site for such works. The site is large enough for any tanks, should such ever be needed, for the chemical or biological treatment of sewage before its discharge. These tanks could be as cheaply built at any future time as now, and their construction does not entail any change in the plans herein proposed. In the case that the flap at manhole No. 1 is closed by a high tide, there is provision made at manhole No. 2 for discharge overflows, which overflows it will be necessary to extend as the land beyond them is reclaimed. Main Sewer, 3' 6" × 2' 4".  
Screens in manhole No. 2.  
Land for Destructors and Tanks.  
Overflow.
7. Provision for the overflow of storm water is made at manhole No. 3, and at various other manholes along the lines of sewers near rivulet channels. Storm overflows.
8. The main sewer is continued of the size before mentioned to manhole No. 4 in Gas Works Lane, at which place it receives the drainage brought by the Davey-street sewer from the part of Hobart lying south-east of the Hobart Rivulet, and within the limits of the present survey. The bringing in of this sewage necessitates the laying of an iron sewer under the bed of the rivulet, with means of keeping it clear by flushing. Manhole No. 4.
9. At manhole No. 4 the main sewer, still of brick or concrete, is reduced in size to 3' 0" × 2' 0". At the crossing of Macquarie-street it receives a branch sewer from the Domain Road, and then runs along the left bank of the rivulet to Park-street, where, at manhole No. 5, it receives the sewer draining the Park Rivulet valley. Main Sewer, 3' 0" × 2' 0".

Park Rivulet  
Sewer, 15".

10. The Park Rivulet sewer is made with 15" pipes, laid along Lower Park-street, across Liverpool-street, where it receives a branch sewer, and thence across gardens, to where it ends for the present near Bathurst-street, at the limit of the survey.

Main Sewer,  
two 18" pipes.

11. The main sewer continues up the Hobart Rivulet valley. From manhole No. 5 above-mentioned to manhole No. 7 in Campbell-street it is laid along the footpath with two lines of 18" pipes, side by side—the levels of the ground not admitting the building of one larger sewer—and in their course they receive the Cross-street and Sackville-street sewer.

Main Sewer,  
2' 6" × 1' 8".

12. From manhole No. 7 the main sewer, reduced to 2' 6" × 1' 8", built in brickwork or concrete, runs parallel to the Rivulet to manhole No. 8 in Argyll-street, receiving in the way the branch sewer laid along the Hobart Rivulet to intercept the drainage now running from the south-east side of Liverpool-street, and from parts of Murray and Collins streets, into the Rivulet. The main sewer continues of the same size along Argyll and Liverpool streets to the crossing of Elizabeth-street, where sewers of brickwork or concrete end at manhole No. 10. At the crossing of Liverpool and Argyll streets it had received branch sewers from both those streets.

Main Sewer,  
18" pipes.

13. From manhole No. 10 the main sewer is reduced to an 18-inch pipe. After receiving branch sewers from Market-street and the Central School block, it ends for the present at the Murray-street limit of the survey.

Elizabeth-  
street Sewer,  
15" pipes.

14. The Elizabeth-street sewer also runs up that street from manhole No. 10. It is formed of 15-inch pipes, and for the present ends at the Bathurst-street limit of the survey.

Macquarie  
and Campbell  
Streets Sewer,  
12" pipes.

Collins-street  
Sewer, 9"  
pipes.

15. The iron sewer crossing the Hobart Rivulet from manhole No. 4 ends on the right bank of the Rivulet at manhole No. 17, which receives a 12-inch branch sewer that is laid along the bank to manhole No. 18 in Macquarie-street, and thence along Macquarie and Campbell streets to manhole No. 19 at the crossing of Campbell and Collins streets; thence as a 9-inch pipe-sewer it is laid up Collins-street, receiving branch sewers that bring in the drainage from blocks abutting upon Argyll, Kemp, Elizabeth, and Macquarie streets.

Davey-street  
Sewer, 18",  
15", and 12"  
pipes and  
branch sewers.

16. From manhole No. 17 the Davey-street sewer is made with 18-inch pipes to manhole No. 26 in Hunter-street, thence with 15-inch pipes to manhole No. 27 at the crossing of Davey and Argyll streets, and thence with 12-inch pipes to its present ending at the Murray-street limit of the survey. At the above-mentioned manhole No. 27 the Davey-street sewer receives a branch sewer bringing in the drainage of Morrison, Brooke, Despard, and part of Murray and Argyll streets, and Franklin Wharf.

Flushing.

17. The manhole at the head of every sewer, and several other manholes, are provided with sluices for flushing purposes.

Land  
drainage.

18. Along the course of the sewers provision is made for land drainage wherever it may be found necessary.

No pumping.

19. The above description embraces the sewerage system, as distinguished from the house-drainage system of the surveyed area. It has been laid out with the view of providing, without recourse to any pumping, for the sewerage of the entire Metropolitan Area, except Battery Point, St. George's Hill, and the Hobart side of the valley of the Wellington Rivulet, which excepted area will have to be drained to another outfall. This avoidance of the expense of pumping has not been unattended with some increase of capital outlay for building larger sewers to make up for the diminished carrying power of flatter gradients, and perhaps with some greater yearly expenditure for flushing. If, therefore, the immediate establishment of destructors were decided upon, and steam-power thus provided, I think the question of the construction of ejectors at about three points in the system would be worth consideration, especially as by their means the whole of the sewage of the above-mentioned excepted area could be also discharged from the Macquarie Point outlet. But this suggestion is not made on account of there being any doubt as to the sufficiency of the system herein proposed to deal, and properly deal, with the whole of the sewerage without pumping.

House  
drainage.  
Existing  
drains.

20. With respect to the house drainage of the surveyed area all information that, without opening the ground, is practically obtainable as to existing drains has been sought for, and the greatest care has been taken in deciding as to what portion of them may be utilised. Where there was any doubt either as regards construction, correspondence of level, or other condition of suitability, a new drain has been provided. In many places there were indications of existing drainage about which no certain information could be obtained, and in these cases also new drains have been shown. It is, therefore, very probable that when the ground is opened for work it will be found that too much rather than too little provision has been made. But the present existence of house-drains must not be always regarded as causing a saving. It has been so much the habit to make drains larger than necessary for the duty they have to perform that many of the new sewers and drains shown have had to be made larger than would otherwise have been necessary in order to

avoid the bringing of a larger drain into a smaller one. This fact will explain some details which might otherwise be regarded as due to oversight.

21. In the plans provision is made for the drainage of every tenement, except one, in the surveyed area, the one exception being in the neighbourhood of the Kangaroo Jetty. This can be drained by itself as at present, or can be brought into the general system if it be thought worth while for the sake of one house to lower and flatten the gradient of the sewer serving the district. The provision for house drainage includes the taking away of all water used for domestic purposes and water-closets, and of so much of the rain water as cannot be separately dealt with, and the ventilation of all drains that take this drainage away. This work involves the provision of special fittings, such as trapped grids or sinks, complete water-closet apparatus and ventilating pipes, valves, and cowls. With regard to these fittings, advantage will be taken of all existing ones that are suitable, and such will be connected with the new drains with as little interference as possible. In the case of new water-closets, the apparatus proper, such as traps, basins, cisterns, and piping for water, is included in the work done by the Board, the provision of new or repair of old buildings and seats being left to the charge of the proprietor. Four different classes of water-closets are proposed—trough-closets for public schools and factories, &c.; Class No. 1 for tenements rated at £20 and under; Class No. 2 for those rated from £20 to £40; and Class 3 for those rated above £40; but any one can have superior fittings on payment of difference of cost. Of course the above classification is an arbitrary one, and can be altered as the Board may determine. I may mention that with respect to the lines of house drains, they are laid down as far as practicable on those of existing rights of drainage.

22. As it is impracticable in a specification to clearly define all the special features of the fittings required, it is desirable and necessary that the Board should procure samples of the fittings it approves and adopts, and the provision of such samples is assumed in the specification and Schedule. It will also be necessary for the Board to have a yard for the reception and safe storage of the pipes delivered under the contract for their supply.

23. I estimate that the total cost of carrying out the works comprised in this part of the drainage scheme, including provision for way leave and contingencies, will be (£12,000), twelve thousand pounds.

24. As to the relation between this work and the whole work to be done by the Board, I estimate—(1st), with respect to the detailed survey, that one-ninth part in extent of the work is done; this reference to the survey work regards only the fully detailed survey, as you will remember that the whole skeleton survey is complete:—(2nd), with respect to sewerage and house drainage, that when the work embraced in this report shall have been completed, one-seventh in number of the houses will be drained, but that between one-fifth and one-sixth of the whole cost will have been defrayed. In explanation of this latter part of the estimate, it must be remembered that the whole of the heavier work will then have been done, such as all the outfall work, all the brick and concrete sewers, nearly all the 18-in. sewers, and a considerable part of the other large pipe sewers, leaving only pipe sewers and drains to be laid, of which by far the larger part are of small pipes.

25. Taking the surveyed area by itself, the following would be the financial position:—The £12,000 of capital expenditure, taken at 5 per cent. for interest and sinking fund, would require £600 a year; working expenses and repairs would be largely provided for by £300 a year, making the total yearly charge £900. The rateable value of the property drained as given in the Assessment Rolls is a little over £40,000, and there is Crown property drained that if assessed would raise the rateable value to £46,000, upon which a Rate of 5*d.* in the Pound would produce £970. After the repayment of the capital expenditure a penny rate would suffice.

26. As regards the disposal of the sewage, I am more than ever convinced that no danger whatever would be incurred and no nuisance whatever created by its discharge at Macquarie Point. In my former Report I gave details of what would be the cost of dealing with it chemically, so as to discharge clarified water only into the tideway; the figures I then gave still hold good. But within the last year or two experience has been gained in England going to show that the biological or bacteriological treatment of sewage is more effectual and economical than the chemical. The principle underlying the biological treatment of sewage, both as practised by Mr. Cameron, at Exeter, and by Dr. Dibdin, the medical adviser of the London County Council, at Sutton, being the rapid destruction of pathogenic microbes by non-pathogenic, is virtually that which renders the discharge of sewage into a tideway so rapidly innocuous. But should it ever become desirable to adopt the Exeter or Sutton system (which would never have been adopted at either place if they had been in the circumstances of Hobart), the provision made for tanks in my scheme of 1892 would be ample.

27. The most usual reason given for not at once beginning a proper drainage system is that there is not a sufficient water supply available at Hobart—a reason that is based upon a most complete misapprehension of facts. The adoption of water-closets would probably save water, and certainly would if under the present system, gutters were properly flushed, as gutter-flushing requires more

