

**Mr. Ellis' tender for the economic & profitable utilisation of the metropolitan sewage.**

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MR. ELLIS' TENDER

FOR THE

ECONOMIC & PROFITABLE UTILISATION

OF THE

Metropolitan Sewage.

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LONDON:  
PUBLISHED BY WARD, BROTHERS,  
56, BARTHOLOMEW CLOSE.

PRICE TWOPENCE.

[ 1863 ]



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MR. ELLIS' TENDER

FOR THE

ECONOMIC & PROFITABLE UTILISATION

OF THE

METROPOLITAN SEWAGE.

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76, Warwick Square, Belgravia,  
9th July, 1863.

To JOHN POLLARD, Esq.,  
*Clerk to the Metropolitan Board of Works.*

SIR,

In the Appendix to this communication, marked No. 1, you will find a copy of a letter from the eminent firm of Leed's solicitors, the Messrs. PAYNE, EDDISON, and FORD, from which the Board will learn that a sum of £60,000 is ready to be lodged in Bank, to the credit of my local trustees, so soon as a conditional concession of the Sewage shall be granted to me; as a fund to cover all preliminary expenses of establishing a Company to carry out my plan for the economic and profitable utilisation of the Metropolitan Sewage. This is, of course, enormously in excess of what will be required, but should the Board consider necessary. further proof of my ability to carry out successfully my own plans for the economic and profitable utilisation of the Sewage, I beg to suggest that an additional stipulation can be added to the conditional concession, to the effect that I shall not take any steps to advertise my Company until the Metropolitan Board of Works have first approved of my Board of Directors, and that half-a-million sterling of the capital of my Company has been subscribed for.

In the Appendix marked No. 2, you will find a copy of a letter lately received by me from BARON LIEBIG, from which the Board will see that my plan for the economic utilisation of the Sewage, receives the entire approval and support of the greatest authority in the world, upon agricultural chemistry.



In the Appendix marked No. 3, you will find suggestions for an agreement between the Metropolitan Board of Works and myself, with reference to a concession of the Sewage of the Metropolis, which the Board will be pleased to consider my renewed tender for the same.

I desire now (as they bear upon my tender) to draw the attention of the Board to the objections which have been raised against the economic and profitable utilisation of the London Sewage, but which, fortunately for the heavily taxed ratepayers of the Metropolis—the owners of the property,—will not bear one moment's examination.

It is alleged that "the Sewage is so extremely diluted that it is "useless as a manure unless enormous quantities are applied." Those, however, who urge this theory, seem to forget that the Sewage of the Metropolis has been analysed by a number of chemists of high standing and character, amongst whom I may mention the names of Hoffmann and Witt, Frankland, Versmann, Leithbey, and Rogers. These all agree in stating that in 1250 tons of average London Sewage, such as will necessarily be found at the outfall tanks of the Board, there is an amount of fertilizing matter, which if extracted and dried, would not be less than that found in 1 ton of the best Peruvian guano; but as manure, for a variety of reasons shown by the witnesses examined by the Select Committee of the House of Commons on Sewage of Towns,—was proved to have at least double the effect upon a crop, if applied in the liquid state; it follows that the effect on a crop of the fertilizing matter contained in 1250 tons of average London Sewage, if applied in the liquid state, as we find it in the Sewage, must be at least as great as that produced by 2 tons of the best Peruvian guano: provided that it be properly put on the land, so that none of it be lost off the surface, or sink down into the soil beyond the reach of the roots of the crop.

Now, 2 tons of guano would be sufficient, as every farmer knows, to manure richly over 14 acres of land: therefore 1250 tons of the London Sewage, if properly applied, would be sufficient for twice that quantity.

The correctness of this position is proved by the profitable and beneficial results obtained with small dressings of Sewage by several witnesses examined before the Select Committee of the House of Commons on Sewage of Towns; and in particular by Philip W. S. Miles, Esq., of King's Weston, Bristol. That gentlemen, as will be seen by a reference to his evidence, obtained a most extraordinary improvement in the quantity and quality of all the crops to which he applied Sewage. And that Sewage was much poorer than that of London, as it contained nothing but the excreta of 30 persons; which must have been enormously diluted, or it could not



have been spread over the 14 acres to which it was applied, even once in the year; how much greater then will this dilution appear, when we learn from Mr. Miles' evidence, that all the 14 acres were dressed at least two or three times every year? And yet by the use of this extremely diluted Sewage, Mr. Miles raised the value of the land from £2 10s. to £5 10s. per acre per annum. Is it not clear, then, from this, that had Mr. Miles purchased this manure from a Company, he could have well afforded to pay a very considerable price for it, and yet have been a great gainer by its use?\*

Mr. Miles by a careful and economic application to his land, of this manure, was able to show a clear profit of £1 8s. per person per annum for the Sewage applied; whilst Mr. Lawes, who is at the head of those who urge upon the public the theory of "*extreme dilution*" of Sewage as a reason why it should still be treated as a nuisance, and not as a valuable article of commerce *competing with his artificial manures*—only showed a return from his experiments on Mr. Campbell's farm at Rugby (conducted by him for the Royal Sewage Commission) of from 1 to 2 shillings per person per annum. But the reason for this poor return—so different from that obtained by Mr. Miles—is easily understood. Mr. Lawes applied this liquid manure in enormous dressings to the land, and as a matter of course the land was, to a great depth, reduced to the condition of a morass upon which nothing but inferior produce would grow, after which

\* Since forwarding this communication to the Metropolitan Board of Works, I have received the following letter from the Rev. Dr. Booth, for many years Chairman of the Council of the Society of Arts, who had previously informed me that the sewage he uses is much more diluted than that of London. Mr. Booth, not having any interest in "*getting rid of*" sewage, treats it in a rational manner, and applies it in moderation to the soil, as required; not pouring it *continuously* over the land, as we are taught to do by Mr. Lawes, (the artificial manure manufacturer), who can scarcely be considered the safest guide, either as to the agricultural value, or the best mode of applying a manure, which if properly dealt with, would enter into serious competition with his own. From Mr. Booth's letter it will be seen that he has a regular rotation of crops after applying sewage, as he would after applying any other manure.—*T.E.*

"The Vicarage, Stone, Aylesbury,  
"13th July, 1863.

"My dear Sir,

"I have sent this day to Dr. Brady, for you, some ears of wheat, raised on a soil which has received no manure whatever for more than twenty years, except the *small* quantity of sewage I let on the land last summer. The straw, which is only an average specimen, is over six feet in length. Such practical proofs should speak better than any theoretical evidence as to the value of Sewage.

"I am, my dear Sir,

"Yours very truly,

"JAMES BOOTH."

"T. Ellis, Esq.,  
"Warwick Square."



the Sewage ran away to loss as fast as it was put on. Then by charging against the crop all the Sewage applied, 99-100s of which was in all probability lost, he was enabled to show a return of only from 1 to 2 shillings per person. But I submit that these "*burlesque experiments*" in no way show the real agricultural, and therefore, the commercial value of Sewage as a manure, although they do most conclusively prove that the system recommended by him, that of enormous dressings, over limited areas, is utterly erroneous.

The different results obtained by these two gentlemen are sufficient to solve the question of Sewage utilisation, and show conclusively how untenable is the opposition to an economic and profitable utilisation of Sewage, on the ground of its *alleged* "extreme dilution." These results prove, that if the Sewage be applied in moderation, the earth will have power to extract from it, within easy reach of the roots of the crop, all the manure which it contains; improving wonderfully the quantity and quality of the produce, and enabling those using the manure to pay largely for it, to the great benefit of the rate-payers; whereas, if applied in large quantities, the earth will be overburdened and overpowered, and the manure flow away to loss: thus rendering it impossible for those who would use it in this wasteful manner to make any return for it to the rate-payers.

Another objection raised to the economic and profitable utilisation of the London Sewage, is "that owing to the large area over which "it would have to be distributed, it would cause a nuisance." Those who make this objection would appear to be entirely ignorant of everything relating to the cultivation of land, or they would be aware of the fact that farm yard manure is very offensive; but as land must be manured if we are to have food, no one is found to object to manure being put on land, on the ground of its being a nuisance. But although solid farm yard manure, when spread on land, remains in an offensive state for many days, yet a liquid manure like Sewage, if applied in moderation, would cease to give out the slightest offensive odour the moment after it had been applied to the crop, as it would be at once absorbed by the earth and deodorised. This is abundantly proved by the evidence of Lord Essex and other witnesses examined before the Select Committee on Sewage of Towns. In addition to which I may add, that under the conditions of the concession, I shall not have power to distribute any of the Sewage within a line round London, to be drawn by the Metropolitan Board of Works, and that further, I shall not obtain my Act, empowering me even to commence my works, until I shall have first satisfied Parliament that the public will not be either injured or annoyed by any of the operations of my Company. And in the event of the Act being obtained, the Metropolitan Board of Works and the rate payers shall, by the provisions of that Act, be exonerated and held harmless from all liability.



Another objection urged against the economic and profitable utilisation of the London Sewage is "the vast amount of its daily flow, which must be disposed of day by day, as it will not admit of accumulation." In addition to which, it is alleged that you "cannot apply it at all times to the land." But on reference to my letter to the Chairman of the Board, bearing date the 31st December, 1861,\* it will be found that those objections are fully met; and I may here remark that the opinions then advanced by me, have all been supported by the evidence, since then taken by the Select Committee on Sewage of Towns. In that letter I showed that there was no time of the year when Sewage manure might not be applied with advantage to some portion of the land on almost every farm upon a given area. And this is proved to be the case by the evidence of several witnesses examined before the Select Committee, amongst whom I may mention Lord Essex. His Lordship had used, and still uses Sewage with great success, upon all descriptions of crops. In answer to Question 35, his Lordship says "It is stored up as it were in the soil, and put it on, when you like, it remains in the soil till it is wanted by the plants." And in answer to Question 11, his Lordship says, "I put it on my land daily, somewhere or other." His Lordship thus exhausts upon a portion of his demesne, all the Sewage of the town of Watford. He is not overpowered by it, for we gather from his evidence that his Lordship would gladly have more Sewage if he could get it, for the rest of his land. What, then, is done with Sewage at Watford, can evidently be done elsewhere; it is simply a question of area. But what is the correct extent of area required profitably to absorb the Sewage of the Metropolis, in addition to the farm yard manure manufactured upon that area?

In the detailed calculations which will be found in the Appendix to my letter to the Chairman of the Board, bearing date, the 31st December, 1861, I showed that *having regard to the interests of the ratepayers, and to insure for them a fair price for their property, the area for the distribution of the Sewage, assuming that the Board were able to deliver to me 266,052,441 tons per annum,—should not be less than 532,104 acres.* The correctness of this calculation has since been established by the evidence taken by the Select Committee.

Another objection which struck at the root of the economic and profitable utilisation of the Metropolitan Sewage, was the alleged "engineering impossibility to distribute by steam power, over a suitable area, so vast a quantity of Sewage."

This objection was first put forth in a Report of Mr. Thomas

\* This letter, for the convenience of the Members of the Metropolitan Board of Works, was printed by me, in the form of a pamphlet, entitled, "The Metropolitan Sewage."—T.E.



Wicksteed, C.E. to the Metropolitan Commissioners of Sewers, printed by order of the House of Commons; and strongly insisted on in a pamphlet by Mr. Lawes; and, I may add, generally accepted as correct by the public. But in my letter to the Chairman of the Board, bearing date the 31st December, 1861, I not only explained the errors of Mr. Wicksteed's Report, but gave the most full and minute details of the only plan by which it is possible, safely and profitably, to distribute by steam power, the entire Sewage of the Metropolis over a sufficient area.

The information furnished to your Board was not volunteered by me. The Board was placed in possession of it, in consequence of their advertisement, calling for tenders for the Sewage, and in consequence of the personal request of the Chairman of the Board, made to me upon the occasion of my waiting upon him with a gentleman in my employment, with reference to the utilisation of the London Sewage, as well as in consequence of the Board's letter to me, bearing date the 16th November, 1861.

Having deposited with the Metropolitan Board of Works, the full details of the only plan of distribution, by means of which, the entire Sewage can be safely and profitably delivered over a suitable area, I proceeded, at considerable expense, to make that plan public, with a view to benefit the ratepayers, by arousing public opinion to the great importance of the economical and profitable utilisation of the Metropolitan Sewage. I therefore respectfully submit to the Board that I have a legal title to the ownership of all the information which I have furnished to the Board; and that having been shown by me, that it was possible to utilise the Sewage of the Metropolis, with profit to the ratepayers, it is not legally open to the Board to grant a concession of the Sewage to any Company or to any individual proposing to distribute, or utilise the Sewage upon my plan, or any colourable alteration of it.\*

I, however, feel confident that it is unnecessary for me to press upon such a body as the Metropolitan Board of Works, my legal rights, but only that I should draw attention to them, especially as I am in a position to carry out successfully my own plans for the benefit of the Metropolitan ratepayers.

As my letter of the 31st December, 1861 *has not yet been taken into consideration by the Board*, and as it contains all the necessary information with reference to the utilisation of the Sewage, and the fullest and most minute details of my plan—much more, indeed, than would be required by Parliament,—I forward with this a copy of it for the information of the Board.

With reference to the expense of my works, I beg to state that the exact amount cannot be determined until a careful survey of the entire area has been made. Such a survey would require a

\* For plan of Distribution, see Appendix marked No. 4.



large staff of engineers for a considerable period, and would cost a very large sum. This great labor and expense I cannot prudently incur, until a definite arrangement has first been entered into between the Board and myself, with reference to a conditional concession; but from the rough estimates which have been made by myself, as well as by Mr. Samuel Hughes, C.E., who is now acting as the engineer for my projected Company, I feel justified in stating that the cost of the works for the economic and profitable utilisation of the entire Sewage of the Metropolis, will be considerably under £3,500,000.

I wish now respectfully to draw the attention of the Board to two or three clauses in the advertisement of the Board, calling for tenders for the Sewage, which, if strictly acted on, would throw great, and, indeed, insurmountable obstacles in the way of the only method of utilising the Sewage, from which the ratepayers ever can derive any advantage commensurate with its great value.

The first clause to which I would draw attention is that "all tenders *must* be accompanied by a plan and section, showing their several details." Those tendering for the Sewage—or say half of it—who proposed to put it on a limited area,—say 20,000 acres—from which of course no return could possibly be made to the ratepayers, commensurate with the value of the manure lost; would find no sort of difficulty, and be put to scarcely any expense in complying with this clause: whereas, I, whose works, to enable me to reach 532,104 acres, must extend over an area of double that extent, in order to allow for the roads, water, houses, &c., &c., upon the area, would have enormous difficulties and be put to a vast expense in furnishing this information, which, I may here remark, would be useless to the Board when furnished, and would not be required from me by Parliament, when applying for my Bill.

The second clause to which I would wish to direct attention, is that information is required as to "the quantity and locality of the land over which it is to be distributed, the points at which the Sewage is to be intercepted," &c., &c.

I have already in my letter of the 31st December, shown the quantity of land around London required for the profitable absorption of the Sewage, but it is quite impossible for me to give the locality of each particular field on that area, from which those who shall hereafter purchase the Sewage, may please to put it; neither can I state the points along my lines of distributing mains at which the Sewage may be intercepted, as that must depend upon the customers of the Company; but this information could, of course, be at once given by those proposing to put the Sewage upon a limited area, the land being in their own occupation.

The next clause to which I would wish to draw attention, is that "in any contract, provision must be made to secure to the Board



“ the return of the Sewage works, and the full power to relet and deal with the same ; and so that the Board may in case of the failure of the Contractors in their operations, be left to their full rights, and without any cost to the Board.”

With reference this clause, I would remark that the works will be laid down at the risk of the shareholders of a great Company, and not of any “ contractors.” My proposed works are simply for the purpose of utilising the Sewage in a liquid state, for agricultural purposes, and not of manufacturing solid manure and purifying the Sewage, as at Leicester. If, then, it did not pay for a Company to deliver the Sewage to the farmers, it would not pay for the Board to do so. And as the works would not be of any use for sanitary purposes, as are the works at Leicester, which were lost to the Company that erected them in consequence of a similar penal agreement with the Corporation of Leicester ; the Board could be no gainers by the insertion of so hostile a clause in the concession, but which, if insisted on, would probably prevent the raising of the requisite capital, and thus inflict a great injury upon the owners of the Sewage—the ratepayers,—by preventing the economic and profitable utilisation of their property.

The next clause to which I would wish to draw the attention of the Board, is that the “ tenders *must* contain the names of two or more securities to be approved of by the Board, who shall be jointly and severally bound in a competent sum for the efficient execution of the works, in accordance with the provisions and subject to the limitations of the Metropolis Local Management and Local Main Drainage Acts.”

With reference to this clause I have again to observe that all the works for the economic utilisation of the Metropolitan Sewage will be undertaken at the risk of a great Company, and not of individual contractors. This Company cannot commence any works until it shall have obtained its Act of Incorporation, in which, due provision shall, as a matter of course, be made to protect the Metropolitan Board of Works, the ratepayers, and the public from all loss or annoyance ; and it will be the Company, when formed, who will let the contracts for the works, and not the Metropolitan Board of Works. It will therefore be to the Company, and not to the Board, that the “ contractors ” shall have to give security “ for the efficient execution of the works.”

In conclusion, I wish to draw the attention of the Board to the fact, that under the provisions of the concession of the Sewage for which I have applied, the ratepayers will be entitled to one half of all the profits made by the Company, which share will not be less than £700,000 per annum ; and further, that by great exertions, and a free expenditure of money, I may yet be enabled to have my surveys and plans completed in time to go to Parliament next session for



my Act, provided the Board shall at once grant me the conditional concession for which I now apply ; but should any delay take place, it is certain to throw me back for another year, to the great loss of the heavily taxed ratepayers of the Metropolis, by delaying for another twelve months, the commencement of the works for the economic and profitable utilisation of their property.

I am, Sir,

Your obedient Servant,

THOMAS ELLIS.



APPENDIX No. 1.

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COPY OF LETTER FROM MESSRS. PAYNE, EDDISON,  
AND FORD, *SOLICITORS*.

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70, Albion Street, Leeds,

30th of June, 1863.

SIR,

We beg to inform you that our clients are prepared to place in Bank, to the credit of your local trustees, a sum of £60,000, as a fund for promoting and carrying out your plan for the economic and profitable utilisation of the Metropolitan Sewage; upon the Metropolitan Board of Works granting to you the concession of the Sewage upon satisfactory terms. We cannot however advise our clients to lodge so large a sum, and keep it idle, until known that you have obtained the conditional concession that you have applied for, and the terms upon which it will be granted; for although we apprehend there would not be any difficulty in disposing of the entire stock, provided a liberal concession be made, yet we think it would be impossible to establish the Company unless the Board were disposed to act towards you with satisfactory liberality.

Yours truly,

PAYNE, EDDISON & FORD.

To Thomas Ellis, Esq.,  
76, Warwick Square, Belgravia,  
London.



## APPENDIX No. 2.

## COPY OF LETTER FROM BARON LIEBIG.

Munich, 22nd June, 1863.

SIR,

The pamphlet which you have sent me, and your letters, have given me much pleasure, by showing me that there are many excellent men fighting to promote that great national question, the economic utilisation of sewage. I have sent to-day, to Mr. Mechi, an article written to be printed in *The Times*, which I hope will contribute to forward and realize your views.

The enemies most to be feared to the application of Sewage, are undoubtedly the manufacturers of artificial manures, particularly of superphosphate of lime. The manufacturers are a very stupid set of people, because the application of Sewage to agricultural purposes, must necessarily increase tenfold their trade. This I tried to show in my article, and to fix all the money value which the sewer water of the Metropolis may have.

In my new work, "The Natural Laws of Husbandry," you will find many arguments to convince people of the necessity of the employment of sewage.

The most important for men like you, is not to lose patience, and to persevere in that good cause. I can tell you that my doctrine has very often received, as people believed, its death-blow, but it was always fresh and growing; and yet in the present moment there is not a single farmer in Germany and France who is doubting the truth of it. And if your endeavours arrive at their end, and you are successful, people will in ten years not believe that there was a great struggle to establish the application of sewage.

Believe me,

Yours very truly.

J. LIEBIG.

To Thomas Ellis, Esq.,  
London.



## APPENDIX No. 3.

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SUGGESTIONS FOR AN AGREEMENT BETWEEN THE  
METROPOLITAN BOARD OF WORKS AND THOMAS  
ELLIS, OF 76, WARWICK SQUARE, BELGRAVIA,  
WITH REFERENCE TO A CONCESSION OF THE  
SEWAGE OF THE METROPOLIS.

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1st. That a Company be formed, and its Act of Incorporation be obtained from Parliament, within a time to be fixed by the Metropolitan Board of Works.

2nd. That the Sewage be applied in the liquid state to the land; and in order to prevent nuisance by the application of large quantities to the land, as well as to secure the greatest return for the benefit of ratepayers, that it be sold by the ton to the farmers. The sewage in all cases being made to pass through water meters before being delivered on each farm.

3rd. That previously to the Sewage being delivered on the land, it shall be completely freed from all offensive smell (should it have any) if so required by the Metropolitan Board of Works.

4th. That the duly appointed officers of the Metropolitan Board of Works shall, at all times, have free access to the Company's works, and that the Board shall, on their report, have the absolute power (upon giving a written order to that effect) to immediately suspend the further distribution of the Sewage, should it at any time be found in a state likely to cause a nuisance, but that such suspension of the works shall at once cease upon the Sewage being fully deodorised.

5th. That the Company receive the sewage of the Metropolitan Board of Works from the outfall tanks of the Board, and that the Company be permitted to have free access to such outfall tanks at all times.

6th. That the Company shall pump the Sewage from wells constructed in the immediate neighbourhood of the outfall tanks, up to a summit regulating reservoir, upon either side of the Thames,



from whence it shall be allowed to descend by gravitation through pipes laid along the roads of the area to be irrigated.

7th. That the regulating reservoirs shall not be constructed upon any spots that have not first been approved of by the Metropolitan Board of Works; nor shall the sewage be delivered on the land within a line round London to be drawn by the Metropolitan Board of Works.

8th. That to prevent all fear of nuisance the regulating reservoirs shall be covered.

9th. That for the purpose of distributing the Sewage, the Company (hereafter to be formed) shall erect all necessary machinery, and construct all necessary works, at their sole expense.

10th. That the Company be empowered to let flow any or all of the Sewage into the river, provided that from any accident to the works, or other cause, the entire amount of the Sewage, or any portion of it, cannot be applied to the land. The Company undertaking in such case, that previously the Sewage shall be deodorised and precipitated.

11th. That the Company by their Act of Parliament (which must be approved of by the Metropolitan Board of Works, before it is applied for) shall undertake all liabilities of every kind, which may arise from their operations, and shall hold the Metropolitan Board of Works, and the Ratepayers, entirely harmless.

12th. That all profit derived from the sale of the Sewage, after deducting working expenses, management, reserve fund, &c., &c., shall *be equally divided* between the Metropolitan Board of Works and the Company.

13th. That the Management of the Company be vested in a Court of Directors; three of whom shall be nominated by the Metropolitan Board of Works (if they so desire it) from their own body. Such Directors to remain on the Direction only so long as they shall continue members of the Metropolitan Board of Works.

14th. That the Concession of the Sewage by the Metropolitan Board of Works shall be in perpetuity, with the right to the Board to purchase out the interest of the Shareholders, after fifty years, giving three years' notice. The price to be paid, to be determined by valuers, mutually chosen by the Metropolitan Board and the Shareholders of the Company. And that the Concession shall be granted to THOMAS ELLIS, the promoter of the Company, *conditionally* upon his forming the Company upon the above terms (or such alterations of them as shall be mutually agreed on), within a time to be fixed by the Board; failing which, the conditional concession shall be forfeited.



## APPENDIX No. 4.

As the Metropolitan Board of Works will, no doubt, before granting a concession of the Sewage, print for the perfect satisfaction of the ratepayers of the Metropolis, whose property the Sewage is ; all the information of every description with reference to the utilisation of the Sewage, furnished to them by those who have sent in tenders : I confine myself on the present occasion to a mere description of my mode of distributing Sewage, extracted from my letter to the Chairman of the Metropolitan Board of Works, bearing date the 31st December, 1861, and which, for the convenience of the Board, I printed in the form of a pamphlet, entitled "The Metropolitan Sewage."

THOMAS ELLIS.

" My plan is as follows :—

" I propose to take the Sewage from the outfall tanks which are to be constructed in connexion with the main drainage scheme of the Metropolitan Board of Works.

" I allow the Sewage to flow from these tanks through covered aqueducts, in the bottom of which numerous pits will be constructed and fine gratings erected across them, to catch all heavy or floating matter likely to be injurious to the engines ; and I may here remark, that these aqueducts, as well as all other vital portions of my plan, are to be constructed in duplicate, for reasons which will readily be understood.

" Through these aqueducts the Sewage will flow to my pumping stations, and from thence will be pumped by Cornish steam-engines, through covered mains, up to covered and well ventilated reservoirs, which will be placed on heights of sufficient elevation to command the area to be irrigated, and which reservoirs will be so constructed as to prevent the escape of all noxious gasses. From these reservoirs it will flow by gravitation into the agricultural districts, through covered pipes laid under the roads.

" By this plan I place myself precisely in the same position as a gas or water Company proposing to supply a town with gas or water. Such a Company, by laying down their mains through the streets of a town, put it in the power of every householder



“ to become a customer of the Company, should he so desire. If  
 “ he determine to become a customer, the householder lays down  
 “ at his own expense, any piping he may require for his own pur-  
 “ poses within his house. So in my case, by laying down my  
 “ mains along the roads I put it into the power of every farmer  
 “ within the area to deal with me; and any farmer electing to  
 “ become my customer, will lay down at his own cost whatever  
 “ piping he may require for his own purposes, within the bounds  
 “ of his own farm. His pipes on his farm will be connected with  
 “ my mains, and placed at the junction between the two will be a  
 “ water meter, which will register the quantity of Sewage taken  
 “ upon each farm.

“ According to the size of the farm, one or more hydrants will  
 “ be erected on the land from which the Sewage will be distributed  
 “ by the farmer through flexible hoses. The Sewage in the Com-  
 “ pany's mains being always under pressure, it will be delivered  
 “ with a jet, and fall on the land like rain.

“ The piping on the farm, if permanently laid, will cost the  
 “ landlord or occupier—as may be arranged between them—about  
 “ £3 15s. per acre for iron pipes and hydrants complete; if of  
 “ bitumenised pipes, something less than half that amount; or if  
 “ moveable surface pipes are used, the cost will average about 10s.  
 “ per acre, as the same pipes can be moved from field to field as  
 “ required.

“ Perhaps I shall be told that the agriculturists will not go to  
 “ this expense; to which I reply—they certainly will not, unless  
 “ they see that it is for their interest so to do. But if, as can be  
 “ seen in every case where Sewage has been already utilised, the  
 “ value of the land has, to say the least, been more than doubled,  
 “ I think the Company will not have much to fear on this point.

“ Referring to Mr. Pollard's letter, I may here remark that I do  
 “ not propose to interfere in any way with the cultivation or the  
 “ management of the lands occupied by my customers. Holding  
 “ simply the position of a manure merchant, I require no special  
 “ powers; selling to them at my own price, as much manure as  
 “ they may require, which they will themselves apply to their lands  
 “ at all seasons of the year, and at any period of the day or night  
 “ that may suit their convenience or their necessities.

“ The extent of my area is so large that the greatest average  
 “ quantity of Sewage per acre that can be applied is 500 tons, or  
 “ 4·9 inches in depth, and as that amount is certain never to be  
 “ applied at one dressing, but rather in several, the amount used on  
 “ each occasion will be no more apparent on the land than would  
 “ a slight shower of rain.

“ My ‘outfall’ for the Sewage will be on the lands to be irriga-  
 “ ted. The escape of the Sewage, in case of accident to the



“ machinery, &c., &c., would be into the Thames, in the rear of my works, and perfectly independent of them.

“ I have mentioned that I propose to pump the Sewage into covered reservoirs, those reservoirs will be placed on Hampstead and Shooter's Hill,\* as from those two commanding points I can irrigate on either side of the river, a much greater area than would be required for the Metropolitan Sewage.

“ It will be evident to all, that for the successful working of my plan, provision must be made to hold the Sewage during those hours of the day or night in which it is not being put upon the land. That provision it will be found, is made for the Sewage by my tanks and wells, as well as by the system of pipes over the area; and the hours of the night will be to me an acceptable and valuable aid to enable me to keep the entire system charged and in full working order.

“ The reservoirs on Hampstead and Shooter's Hill will perform another and very essential service. By their aid I can regulate at all times, with the utmost nicety, the quantity of Sewage it will be safe to pump; as by the assistance of a guage, placed in the engine house, and connected with the reservoirs, we can tell the exact quantity of Sewage in the reservoirs. When the Sewage rises beyond a certain height in them, as shown by the guage in the engine house, I shall cease pumping until it falls again, allowing the Sewage in the meanwhile to remain in the tanks of the Board of Works; when should the quantity accumulate to a considerable amount, I shall deodorise it (should the Board of Works require me to do so) and then let it flow into the river at the proper period of the tide.

“ Thus it will be seen that this vast machinery, extending over an area of not not less than 1,860 square miles, can, from the point of supply, be kept under the most perfect control, almost by a child.”—*Pages 16, 17, and 18.*

\* There are many other points round London that will give me a sufficient elevation, should those be objected to.—*T.E.*







