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GEOLOGICAL SOCIETY,

February 4th, 1880.

LIBRARY REGULATIONS.

THE Council, with a view to the convenience of the Fellows generally, and to the better care of Works that are easily injured, have deemed it expedient to make the following regulations, in conformity with Section XIX. Art. 1 of the Bye-Laws.

1. The Books shall only be delivered to a Fellow of the Society or to some one producing a written order from such Fellow; and a receipt shall be given by the person to whom the book is delivered (expressing the name of the Fellow for whom it is received), in a book kept for that purpose.
2. Any Fellow failing to return a book on the application of the Council, or returning books torn or defaced, shall be considered as liable for their value; and if they are separate volumes, for the value of the whole work rendered imperfect.
3. All books allowed to circulate may be retained A FORTNIGHT; after the expiration of that time every book shall be immediately returned, so soon as the Fellow shall receive an intimation from the Librarian that it is wanted; and after the expiration of ONE MONTH from the date of its having been delivered from the Library, every book shall be returned.
4. All books shall be returned on the first Monday in September for a fortnight, during which period the Library shall be closed for cleaning.
5. No Fellow shall have in his possession at one time more than SIX VOLUMES, without the permission of the Council.
6. Any Member failing to comply with the above regulations, after receiving notice from the Librarian, shall be fined half-a-crown for every week that a volume is detained beyond the time allowed; and the privilege of having books from the Library shall cease until the fines are paid and the books are returned.
7. All charges of carriage and delivery of books &c. to and from Fellows shall be defrayed by the Fellow borrowing the same.

EXCEPTIONS.

- I. There are certain Books which cannot be allowed to circulate. A list of these shall be prefixed to the printed Catalogue of the Library; and a notice of such additions to that list as the Council may from time to time feel it necessary to make shall be fixed up in the Library.
- II. No Map, Section, or Drawing can be allowed to circulate without permission in writing granted by the Council, or by the President or one of the Secretaries.
- III. No book or illustration in loose sheets shall be allowed to circulate.
- IV. No Periodical Publication, and no Volume or Part of the Transactions of any Society, shall be allowed to circulate until after the expiration of four months from the date of its having been received at the Society.
- V. All new works shall circulate amongst the Fellows after the expiration of a fortnight from the time of their being received, unless the Council (or, during the recess, the President or one of the Secretaries) shall determine otherwise.

*No Book lent to the Society is allowed to circulate without a written order from the Proprietor.*

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THE  
LOCAL GOVERNMENT BOARD  
AND THE  
PROTECTION OF WATER FROM POLLUTION,

BY  
PERCY GRIFFITH,  
Assoc.M.Inst.C.E., F.G.S., M.Inst.M.E.

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A Series of Articles reprinted from the "Journal of Gas Lighting, Water Supply, &c."

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ALL those who are interested in water-works will be aware that the Local Government Board recently endeavoured to introduce a series of clauses bearing upon this matter into several Private Bills which were before the Houses of Parliament this session. These clauses are given in full in the Appendix; and I propose to deal with them seriatim, afterwards summing up the actual position of affairs at the present time, and suggesting the lines upon which any further investigation of this important question should in my opinion be carried on. I would, however, suggest here that as the difficulties attending the alteration of the law of water supply are very serious, a Royal Commission should be appointed to investigate the matter in all its bearings, and report upon the most satisfactory basis upon which amendments to the existing law might be carried out. The following suggestions are advanced with the view of pointing out several of the principal considerations which must be borne in mind in dealing with the subject, and also with the object of opening a discussion which cannot fail to assist in the solution of the difficulties.

*Penalty for Failure to Supply Pure and Wholesome Water.*

The question of the position of a company or local authority convicted of supplying impure water to their consumers is one of vital interest at the present moment, seeing that during the past twelve months serious outbreaks of typhoid fever have broken out in two provincial towns (Maidstone and King's Lynn) with the most lamentable results, traceable in both cases directly to the contamination of the public water supply. The question which at once suggests itself is: What penalty can be inflicted on the purveyors of a necessity of life, such as water, when they are convicted of causing, not only an outbreak of disease, but a serious loss of life? In the case of any other comestible offered to the public for sale, the law provides very definite means of punishing any person or persons found guilty of causing injury to the health of the consumers thereof; but with regard to water, which is an element of public consumption far more essential than any other, it appears that no definite means exist of inflicting any penalty on the offenders whether they be corporations, companies, or private individuals.

It must be granted at the outset that, in the interest of the public health, this state of affairs should not be allowed to continue; but the most practical method of effecting the end in view is not by any means so clear. In my opinion, the clauses which the Local Government Board have attempted to impose upon several private water-works companies during the present

session of Parliament are very far from meeting the case, and for several reasons; the following being the most obvious.

Firstly, it is grossly unfair that the imposition of any serious restrictions should take effect only on such companies as may happen from time to time to be before Parliament. As the House of Commons has intimated very clearly, any amendment of the law should be made by means of a Public Bill applying equally to all water companies at one and the same time, and not piecemeal (as was proposed), which would mean the lapse of many years before the restrictions were applied universally.

In the next place, it cannot be fair that penalties for supplying impure water should be inflicted on one class of undertakings, and not on another. Seeing that the works at King's Lynn are in the hands of the Corporation, it is obvious that municipal water-works are quite as liable to pollution as companies' undertakings; and it must be obvious to everyone that no effective protection can be secured to the public at large unless municipal water-works are subject to the same safeguards as those in the hands of companies.

Another important oversight which is apparent in the clauses proposed by the Local Government Board, is that no definition is given of what "pure and wholesome" water really is. Experts are even now totally at variance as to what is the proper standard of purity in water used for domestic purposes. One contends that the presence of nitrates in any appreciable quantity (being an indication of "previous contamination") must be considered as sufficient to condemn any water, however satisfactory in other respects; others pin their faith wholly to bacteriological examination; while others again refuse to judge without having all possible information as to source and method of collection and delivery, and then combining both chemical and bacteriological examinations to give them a basis for their report. But even if the examination and analysis be of the fullest possible nature, it is probable that hardly any of the experts would agree as to the actual purity of any given sample examined. It is therefore obvious that, whatever penalties Parliament may make water companies liable to, there is not the slightest chance of their ever being inflicted unless, and until, some standard definition is adopted as to what constitutes a "pure and wholesome" water, and what characteristics are required to exclude any given sample from this category.

Following upon this difficulty, comes another hardly less serious, and that is detection of pollution when (as is most often the case) it exists at the source for a very short period, perhaps

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only for a few hours, and may therefore reach the consumers entirely undetected in spite of the most regular and frequent analysis. And, again, there is the probability that examination, even at short intervals, would not reveal the existence of pollution in time to prevent the delivery of the impure water into the mains or reservoir supplying the district. Judging from the history of the outbreak of typhoid fever at Maidstone (as given in a paper read before the Society of Public Analysts by Mr. Adam, the Medical Officer of Health), it appears that even had the Corporation not discontinued the regular analyses of the water—as they unfortunately had done just previous to the outbreak—it is extremely probable that the mischief would have been done before anything unusual had been observed in the character of the water.

It is also to be remembered that the question whether pollution has arisen through accident or neglect must always be settled before a penalty could be enforced, as it would be contrary to all ideas of justice to punish a water-works company for allowing pollution which had been caused through unavoidable accident, or some means utterly beyond their knowledge or control. The settlement of a difficult question of this nature is sufficient alone to make such clauses as have been proposed entirely inoperative, or at any rate provocative of almost endless litigation.

With all these points before us, it will, I believe, be generally accepted as a very doubtful means of accomplishing the end in view to resort to any system of penalizing water-works companies convicted of supplying polluted water. Before dealing with the question of punishment for default, some effort should be made to secure in a practical manner the protection of water supplies from any pollution at their source, which, if satisfactorily accomplished, would altogether dispense with the necessity of punitive measures of any kind.

#### Power to Take Samples.

The further powers proposed to be conferred on local authorities and their officers under this head—and not only on them, but on consumers generally—are, of course, on the lines laid down for preventing adulteration of ordinary products, such as butter, milk, &c., and appear to me to be in some respects far too stringent, and in others not by any means strong enough. In the first place, as they now stand they suggest the possibility of some zealous consumer with nothing else to do busying himself in collecting samples from every available source both on the works and at the consumers' services, analyzing them himself, and forwarding duplicate samples to the water company at all times and seasons—a risk which is utterly ridiculous, besides being useless in the extreme; and, on the other hand, there is the probability that after the present agitation has subsided local authorities will, as they have done in the past, allow the matter to fall in abeyance (professedly in the interests of economy), an issue which is equally unsatisfactory. It is, I think, sufficiently obvious that for the proper protection of water consumers, periodical analyses and examinations of the water on some practical basis (which ought to be clearly defined) should be made compulsory on all local authorities alike, whether the water-works are in their own hands or in those of a company; and, further, that for the reasonable protection of companies

and water-works officials generally, the power to invade the works and inflict duplicate samples and reports upon the company's officials should be strictly confined to some recognized sanitary officer—preferably one appointed for the purpose—and should be also limited as regards frequency and time of day. As I have already said, it is very doubtful if any system of analyses, however religiously followed, would secure absolute immunity from occasional and accidental pollution of water supplies; but there is no doubt that the Local Government Board would be well justified in prescribing some such rules as I have indicated for the guidance of local authorities, and if necessary for Parliament to deal with the matter by a General Act, amending the Water-Works Clauses Acts and the Public Health Acts as might be required.

#### Pollution of Source of Supply.

The two clauses under this heading are a great advance upon the preceding ones, and suggest a means of checking pollution which is likely to be far more effectual than anything previously specified. The examination by a properly qualified official of the works and land constituting the source of the water supply should, at any rate, give an indication both of risk and actual pollution in time for steps to be taken to prevent polluted water being supplied to the inhabitants. But here I must emphasize the fact shown by past experience, that it is utterly useless to confer optional powers on local authorities. To be effectual, these powers must be made compulsory, and must be very clearly defined; and, in my opinion, they might be considerably enlarged beyond what is indicated in the clauses in question.

#### Power to Enter Lands, &c.

The powers (or rather penalties for obstruction) of authorized entry on water-works, &c., detailed by these clauses are, of course, fair and reasonable enough. But it is worth while to examine the powers which local authorities possess in this respect under existing Acts of Parliament, before attempting to create new powers of this far-reaching character. This point will be enlarged upon in a subsequent paragraph.

Having thus briefly criticized the proposed clauses, and indicated the points to which further attention might profitably be devoted, I will now endeavour to further enlarge upon the latter in the hope of suggesting some practical *modus operandi*, by which such provisions may be made as will render the recurrence of serious epidemics such as have recently excited general alarm and severe local distress as near as may be impossible. In attempting this task, I am quite alive to the fact that while it is very easy to find fault with any proposals advanced with a view to solving a knotty problem such as this undoubtedly is, it is by no means so easy to suggest a practical and practicable method of getting over the difficulties which must be inevitably met with. Having, however, recently made a careful study of the parliamentary powers and obligations of water-works authorities, both municipal and commercial, and also having had some experience in the design and construction of water-works, I am hopeful that my remarks may at any rate prove useful, even if they do no more than suggest the lines upon which further investigations should be conducted.

I propose first to summarize the powers and responsibilities of

local authorities and water companies with regard to the purity of the water supplied by them, as laid down in existing Acts.

#### COMPANIES.

As is indicated in the Local Government Board clauses now under review, the clause which most definitely states the responsibility of water companies as regards the purity of the water supplied is section 35 of the Water-Works Clauses Act, 1847 (*vide* Note A), which requires the undertakers to "keep in the pipes laid down by them a supply of pure and wholesome water." It must be observed, however, that the exception which is made in the ensuing section, "unless prevented by frost, unusual drought, or other unavoidable causes or accident," and which is adopted by the Local Government Board in relation to the purity of the water, does not in this Act have any reference whatever to this point, but refers merely to the compulsion to supply water to all the inhabitants of the company's district upon certain terms. It is not at all clear whether any direct relationship exists between frost or unusual drought and the purity of the water, although there is no doubt an indirect relationship, which may sometimes prove of great importance, and which, in fact, did so in the case of Maidstone.

#### WATER-WORKS CLAUSES ACT, 1847.

[A] *Sec. 35.*—The undertakers shall provide and keep in the pipes to be laid down by them a supply of pure and wholesome water, sufficient for the domestic use of all the inhabitants of the town or district within the limits of the Special Act, who, as hereinafter provided, shall be entitled to demand a supply and shall be willing to pay water-rate for the same, and such supply shall be constantly laid on at such a pressure as will make the water reach the top storey of the highest houses within the said limits, unless it be provided by the Special Act that the water to be supplied by the undertakers need not be constantly laid on under pressure, and the undertakers shall cause pipes to be laid down and water to be brought to every part of the town or district within the limits of the Special Act, whereunto they shall be required by so many owners or occupiers of houses in that part of the town or district, as that the aggregate amount of water-rate payable by them annually at the rates specified in the Special Act shall be not less than one-tenth part of the expense of providing and laying down such pipes, provided that no such requisition shall be binding on the undertakers unless such owners or occupiers shall severally execute an agreement binding themselves to take such supply of water for three successive years at least.

[B] *Sec. 61.*—Every person who shall commit any of the offences next hereinafter enumerated shall for every such offence forfeit to the undertakers a sum not exceeding £5; that is to say—

Every person who shall bathe in any stream, reservoir, aqueduct, or other water-works belonging to the undertakers, or wash, throw, or cause to enter therein, any dog or other animal;

Every person who shall throw any rubbish, dirt, filth, or other noisome thing into any such stream, reservoir, aqueduct, or other water-works as aforesaid, or wash or cleanse therein any cloth, wool, leather, or skin of any animal, or any clothes or other thing;

Every person who shall cause the water of any sink, sewer, or drain, steam-engine boiler, or other filthy water belonging to him or under his control, to run or be brought into any stream, reservoir, aqueduct, or other water-works belonging to the undertakers, or shall do any other act whereby the water of the undertakers shall be fouled;

And every such person shall forfeit a further sum of twenty shillings for each day (if more than one) that such last-mentioned offence shall be continued.

*Sec. 62.*—Every person making or supplying gas within the limits of the Special Act who shall at any time cause or suffer to be brought or to flow into any stream, reservoir, aqueduct, or water-works belonging to the undertakers, or into any drain communicating therewith, any washing or other substance which shall be produced in making or supplying gas, or who shall wilfully do any act connected with the making or supplying of gas whereby the water in any such stream, reservoir, aqueduct, or water-works shall be fouled, shall forfeit to the undertakers for every such offence the sum of two hundred pounds; and such penalty shall be

Sections 61 to 67 of the same Act (*vide* Note B) provide water-works companies with very stringent powers in regard to the penalties incurred by persons causing or allowing the water to be fouled either before or after its collection and distribution, special mention being made of pollution caused by leakage of gas or by waste liquors, &c., from gas-works.

These clauses do not, however, suggest any penalty being incurred by water companies, who, whether by oversight or neglect, allow their water to become fouled; and it is a difficult matter to say whether any penalty could under this Act be enforced against a company for this, and, if so, what the penalty is. Upon this point, therefore, it is very desirable to have some more definite provision, if only to give practical effect to the stipulation in the 35th clause that the water shall be "pure and wholesome."

#### LOCAL AUTHORITIES.

It is evident from the tenour of the various Public Health and Local Government Acts dealing with this subject, that Parliament has always considered it to be specially within the province of local authorities to see that the water supplied in their district is pure and abundant; and I believe that if the

recovered with full costs of suit, in any of the Superior Courts; but such penalty shall not be recoverable unless it be sued for during the continuance of the offence, or within six months after it has ceased.

*Sec. 63.*—In addition to the said penalty of two hundred pounds, and whether such penalty have been recovered or not, the person making or supplying gas as aforesaid shall forfeit to the undertakers the sum of twenty pounds to be recovered in like manner for each day during which such washing or substance shall be brought or shall flow as aforesaid, or during which the act shall continue by which such water is fouled, after the expiration in either case of twenty-four hours from the time when notice of the offence has been served on such person by the undertakers.

*Sec. 64.*—Whenever the water supplied by the undertakers shall be fouled by the gas of any person making or supplying gas within the limits of the Special Act, such person shall forfeit to the undertakers for every such offence a sum not exceeding twenty pounds, and a further sum not exceeding ten pounds for each day during which the offence shall continue after the expiration of twenty-four hours from the service of notice of such offence.

*Sec. 65.*—For the purpose of ascertaining whether the water of the undertakers be fouled by the gas of any person making or supplying gas within the limits of the Special Act, the undertakers may dig up the ground and examine the pipes, conduits, and works of the persons making or supplying gas; provided that before proceeding so to dig and examine the undertakers shall give twenty-four hours' notice in writing to the person so making or supplying gas of the time at which such digging and examination is intended to take place, and they shall give the like notice to the persons having the control or management of the pavements or place where such digging shall take place, and they shall be subject to the like obligation of reinstating the road and pavement and to the same penalties for delay or any nonfeasance or misfeasance therein, as hereinbefore provided with respect to roads and pavements broken up by them for laying their pipes.

*Sec. 66.*—If upon such examination it appear that such water has been fouled by any gas belonging to such person, the expenses of the digging, examination, and repair of the street or place disturbed in any such examination shall be paid by the person making or supplying gas; but if upon such examination it appear that the water has not been fouled by the gas of such person, then the undertakers shall pay all the expenses of the examination and repair, and also make good to the said person any injury which may be occasioned to his works by such examination.

*Sec. 67.*—The amount of the expenses of every such examination and repair and any injury done to the undertakers shall in the case of any dispute about the same, together with the cost of ascertaining and recovering the same, be ascertained and recovered in the same manner as damages for the ascertaining and recovery whereof no special provision is made are directed to be ascertained and recovered.



duties of local authorities could be more clearly defined and made compulsory, instead of being left optional, very little further legislation would be required.

Clause 55 of the Public Health Act, 1875 (*vide Note C*) requires local authorities owning water-works to keep thereon "a supply of pure and wholesome water" equally with water companies, although it is curious fact that the proviso with respect to the sufficiency of the supply found in the Water-Works Clauses Act, 1847, is neither repeated nor incorporated in this Act.

Section 68 (*vide Note D*) prescribes the penalties incurred by gas undertakings which cause "any stream, reservoir, pond, or place for water" to be fouled, on the same lines as section 62 to 67 of the Water-Works Clauses Act, 1847, in regard to companies. Section 69 also empowers local authorities to take legal steps to prevent the fouling of streams by sewage. Section 70, which is usually taken to apply to the closing of private wells when reported to be "polluted so as to be injurious to health," is expressly worded so as to include "any well, tank, or cistern,

#### PUBLIC HEALTH ACT, 1875.

[C] *Sec. 55.*—A local authority shall provide and keep in any water-works constructed or purchased by them a supply of pure and wholesome water; and where a local authority lay any pipes for the supply of any of the inhabitants of their district, the water may be constantly laid on at such pressure as will carry the same to the top storey of the highest dwelling-house within the district or part of the district supplied.

[D] *Sec. 68.*—Any person engaged in manufacture of gas who (1) causes or suffers to be brought or to flow into any stream, reservoir, aqueduct, pond, or place for water, or into any drain or pipe communicating therewith, any washing or other substance produced in the making or supplying of gas; or (2) wilfully does any act connected with the making or supplying of gas whereby the water in any such stream, reservoir, aqueduct, pond, or place for water is fouled, shall forfeit for every such offence the sum of two hundred pounds and, after the expiration of twenty-four hours' notice from the local authority or the person to whom the water belongs in that behalf, a further sum of twenty pounds for every day during which the offence is continued or during the continuance of the act whereby the water is fouled.

Every such penalty may be recovered with full costs of suit in any of the Superior Courts, in the case of water belonging to, or under the control of, the local authority by the local authority; and in any other case by the person into whose water such washing or other substance is conveyed or flows or whose water is fouled by any such act as aforesaid, or in default of proceedings by such person after notice to him from the local authority of their intention to proceed for such penalty by the local authority. But such penalty shall not be recoverable unless it be sued for during the continuance of the offence, or within six months after it has ceased.

*Sec. 70.*—On the representation of any person to any local authority that within their district the water in any well, tank, or cistern, public or private, or supplied from any public pump, and used or likely to be used by man for drinking or domestic purposes or for manufacturing drinks for the use of man, is so polluted as to be injurious to health, such authority may apply to a Court of Summary Jurisdiction for an order to remedy the same, and thereupon such Court shall summon the owner or occupier of the premises to which the well, tank, or cistern belongs, if it be private, and in the case of a public well, tank, cistern, or pump, any person alleged in the application to be interested in the same, and may either dismiss the application or may make an order directing the well, tank, cistern, or pump to be permanently or temporarily closed, or the water to be used for certain purposes only, or such other order as may appear to them to be requisite to prevent injury to the health of persons drinking the water.

The Court may, if they see fit, cause the water complained of to be analyzed at the cost of the local authority applying to them under this section.

If the person on whom an order under this section is made fails to comply with the same, the Court may, on the application of the local authority, authorize them to do whatever may be necessary in the execution of the order; and any expenses incurred by them may be

public or private;" and it would appear to be in itself ample authority for the closing of any water-works or part of a water-works which might be shown to contain polluted water. It is evident that some such procedure as this would be a far more effectual protection from disease than the inflicting of a penalty only, as it would involve quite sufficient expense upon the water-works authorities to act as a deterrent against neglect, and would at the same time prevent the supply of polluted water to consumers—which, after all, is the vital point to be aimed at.

There is, however, one point in connection with this which is left somewhat vague in existing Acts of Parliament; and that is the power of entry upon the works when these are owned by a company. Clauses 102 and 103 of the 1875 Act (*vide Note E*), under the heading of "Nuisances," provide a model for such a definition, though they do not themselves cover the case in question.

Clauses 305 and 306 might almost be held to be (*vide Note F*) sufficient for the purpose as they stand; and at any rate a very

recovered in a summary manner from the person on whom the order is made. Expenses incurred by any rural authority in the execution of this section and not recovered by them as aforesaid, shall be special expenses.

[E] *Sec. 102.*—The local authority, or any of their officers, shall be admitted into any premises for the purpose of examining as to the existence of any nuisance thereon, or of enforcing the provisions of any Act in force within the district requiring fireplaces and furnaces to consume their own smoke, at any time between the hours of nine in the forenoon and six in the afternoon, or in the case of a nuisance arising in respect of any business, then at any hour when such business is in progress or is usually carried on.

Where under this Act a nuisance has been ascertained to exist, or an order of abatement or prohibition has been made, the local authority, or any of their officers, shall be admitted from time to time into the premises between the hours aforesaid, until the nuisance is abated, or the works ordered to be done are completed, as the case may be.

Where an order of abatement or prohibition has not been complied with, or has been infringed, the local authority, or any of their officers, shall be admitted from time to time at all reasonable hours, or at all hours during which business is in progress or is usually carried on, into the premises where the nuisance exists, in order to abate the same.

If admission to premises for any of the purposes of this section is refused, any Justice, on complaint thereof on oath by any officer of the local authority (made after reasonable notice in writing of the intention to make the same has been given to the person having custody of the premises), may, by order under his hand, require the person having custody of the premises to admit the local authority, or their officer, into the premises during the hours aforesaid, and if no person having custody of the premises can be found, the Justice shall, on oath made before him of that fact, by order under his hand authorize the local authority, or any of their officers, to enter such premises during the hours aforesaid. Any order made by a Justice for admission of the local authority, or any of their officers, on premises shall continue in force until the nuisance has been abated, or the work for which the entry was necessary has been done.

*Sec. 103.*—Any person who refuses to obey an order of a Justice for admission of the local authority, or any of their officers, on the premises shall be liable to a penalty not exceeding five pounds.

[F] *Sec. 305.*—Whenever it becomes necessary for a local authority, or any of their officers, to enter, examine, or lay open any lands or premises for the purpose of making plans, surveying, measuring, taking levels, making, keeping in repair, or examining works, ascertaining the course of sewers or drains or ascertaining or fixing boundaries, and the owner or occupier of such lands or premises refuses to permit the same to be entered upon, examined, or laid open, for the purposes as aforesaid or any of them, the local authority may, after written notice to such owner or occupier, apply to a Court of Summary Jurisdiction for an order authorizing the local authority to enter, examine, and lay open the said lands and premises for the purposes aforesaid or any of them.

If no sufficient cause is shown against the application, the Court may make an order accordingly, and on such order being made the local

slight modification would render them more suitable to the case in question than clause 102, inasmuch as an order of the Court would be required before forcible entry could be made—a very necessary protection to companies, if local authorities are to be given such large powers as have been proposed by the Local Government Board.

The Public Health (Water) Act, 1878, goes much nearer to the point than the Act of 1875, as the following section (7) will show:—

It shall be the duty of every rural sanitary authority from time to time to take such steps as may be necessary to ascertain the condition of the water supply within their district; and the authority may pay all reasonable costs and expenses incurred by them for the purpose of taking such steps. The authority, or any of their officers, or any person duly authorized in writing for that purpose by the authority, if they or he have or has reasonable ground for believing that any occupied dwelling-house in the district is without a proper supply of wholesome water, sufficient for the consumption and use for domestic purposes for the inmates of such house, shall be admitted into the premises for which such supply is required, or from which the water supply may be derived, for the purpose of ascertaining whether or not such house has such a supply within a reasonable distance; and for the purposes of any such admission, sections 102 and 103 of the Public Health Act, 1875, shall apply in the same manner as if such admission were necessary for the purpose of examining as to the existence of any nuisance on the premises, and the person so authorized as aforesaid were an officer of the rural sanitary authority.

It should be observed that this is a compulsory, and not an optional, clause; and the expression "or from which the water supply may be derived," might reasonably be held to include any existing water-works. A very slight amendment, such as "from which the supply may be or is derived," would meet the case, and would, in my opinion, cover all that is involved in the clauses recently proposed by the Local Government Board.

Referring again to the general responsibility of local authorities with regard to the purity of the supply, the Public Health (Water) Act, 1878, is very distinct upon this point, making the duty a compulsory one, and not optional.

Section 3 reads: "It shall be the duty of every rural sanitary authority, regard being had to the provisions in this Act contained, to see that every occupied dwelling-house within their district has within a reasonable distance an available supply of wholesome water sufficient for the consumption and use for domestic purposes of the inmates of the house;" and though this refers more directly to individual houses, still it clearly states the duty of the local authority to see that every house has a supply of wholesome water.

authority or any of their officers may, at all reasonable times between the hours of nine in the forenoon and six in the afternoon, enter, examine, or lay open the lands or premises mentioned in such order for such of the said purposes as are therein specified, without being subject to any action or molestation for so doing: Provided that, except in the case of emergency, no entry shall be made, or works commenced under this section, unless at least twenty-four hours' notice of the intended entry and of the object thereof be given to the occupier of the premises intended to be entered.

*Sec. 306.*—Any person who wilfully obstructs any member of the local authority or any person duly employed in the execution of this Act, or who destroys, pulls down, injures, or defaces any board on which any bye-law notice or other matter is inscribed, shall, if the same was put up by authority of the Local Government Board or of the local authority, be liable for every such offence to a penalty not exceeding five pounds.

Having now summed up the existing state of affairs in regard to this important matter, it will be easier to suggest such modifications in the existing Acts of Parliament as would appear to be necessary in order to affect the object in view, which is to provide some effectual safeguard against the supply of polluted water for public domestic use. Now no parliamentary enactment is the slightest use that does not allow fully for practical difficulties and lend itself to general application. It will therefore be desirable to consider the matter from a purely practical standpoint. The essential points to be secured in any amendment of the law may be summarized under five heads—

1.—It is above everything necessary that means should be adopted whereby any pollution may be detected as soon as possible after its occurrence, and in any case before the water is allowed to flow from the works into the service mains or reservoirs.

2.—It is next essential that in the event of pollution being discovered at any works or in any one source of supply, this works or source of supply should at once be closed, and not used again for supplying the public until the cause of the pollution has been discovered and removed.

3.—Before these conditions can be made compulsory, some more or less definite basis must be arrived at as a definition of pure and impure water. This must include a clearly defined method of collecting and examining or testing samples of water, and should preferably stipulate certain conditions both as regards physical, chemical, and bacteriological constituents, which could be taken universally as sufficient to render any water unfit for domestic use.

4.—Rules must be laid down and made applicable to all water-works undertakings, whether owned by municipalities or private companies, requiring the regular inspection of all sources of supply, and the regular analysis and examination of the water at the point where it enters the water-works, and also (at less frequent intervals) at the outlet of consumers' services, by properly qualified and duly authorized officials, who must be as far as possible altogether independent of the authority owning the water-works.

5.—Powers must be given to such officials to compel the immediate closing or disconnection of any source of supply, works, or mains that may be found to contain polluted water; and legal power must be given to the local authority to enforce his orders in this respect, whether the works be in the hands of the local authority or otherwise.

In order to give effect to the above conditions, I would suggest

Where the occupier of any premises prevents the owner thereof from obeying or carrying into effect any provisions of this Act, any Justice to whom application is made in this behalf shall, by order in writing, require such occupier to permit the execution of any works required to be executed, provided that the same appear to such Justice to be necessary for the purpose of obeying or carrying into effect the provisions of this Act; and if within twenty-four hours after the making of the order such occupier fails to comply therewith, he shall be liable to a penalty not exceeding five pounds for every day during the continuance of such non-compliance.

If the occupier of any premises when requested by, or on behalf of, the local authority to state the name of the owner of the premises occupied by him, refuses or wilfully omits to disclose or wilfully mis-states the same, he shall (unless he shows cause to the satisfaction of the Court for his refusal) be liable to a penalty not exceeding five pounds.

that amendments be made to the existing Acts of Parliament on the following lines:—

AMENDMENT OF THE PUBLIC HEALTH ACTS.

1.—Creating an official to be known as the "Water-Works Referee," who shall be appointed under sealed certificate by County Councils, subject to the approval of the Local Government Board, which approval should be endorsed on the certificate, and who shall be duly qualified to examine, test, and report upon sources of water supply and samples of water. These officers should in all cases be either qualified chemists or, better still, engineers of experience; and it would no doubt be necessary for most county councils to appoint more than one official, and allocate the county among them by dividing it into districts according to the number of referees appointed.

2.—Requiring such officials to inspect and examine *all water-works* within their district at intervals of not less than one month, and otherwise as circumstances might require; and to furnish reports to their respective county councils after each inspection, giving analyses and full particulars (physical, chemical, and bacteriological) of the water being supplied, also of the general condition of the source of supply and works. (The Local Government Board might issue forms and general instructions as to the manner of making these reports.)

3.—With respect to water-works in the hands of local authorities, the clauses amending the Water-Works Clauses Act (as suggested below) should be incorporated, with the exception of Nos. 3, 5, 6, and 7.

4.—Providing that, in the event of any local authority refusing to carry out the orders of the referee, it shall be the duty of that officer to report the fact to the county council, who shall issue an order requiring the local authority to obey such orders within a given time; and in the event of continued refusal of the local authority to comply with the terms of the order, the county council shall appoint some person or persons to close the works or part of same, and to carry out the alterations at the expense

of the local authority, as per clause 299 of the Public Health Act, 1875, or clause 16 of the Local Government Act, 1894 (*vide Note G*).

AMENDMENT OF THE WATER-WORKS CLAUSES ACTS.

1.—Defining "pure and wholesome water" (section 35 of the Water-Works Clauses Act, 1847) to be water which shall, in the opinion of the water-works referee of the district in which the works are situated, be suitable for domestic use. (The Local Government Board should issue directions as to what conditions may be generally taken to render any water unfit for domestic use.)

2.—Providing for the admission of the water referee to the works of the undertakers at any time between the hours of 10 and 4, on giving six hours' notice in writing, and producing his certificate from the county council and the Local Government Board; and that facilities be given him for examining the sources of supply and works, and taking samples of the water at any part thereof.

3.—Providing penalties for refusal or obstruction.

4.—Giving power to the referee to order the immediate closing or disconnection of any part or the whole of any works, or the alteration thereof for the purpose of protecting the water from pollution.

5.—Providing penalties for refusal to obey same, and limit of time fixed for carrying out any alterations required under the order of the referee.

6.—Providing that in the event of a works or part of a works being closed by order of the referee, the undertakers shall be at liberty to appeal to the Court against the order; and in the event of it being proved that the order was uncalled for or unjustified by the circumstances of the case, the Court may order the payment of damages by the county council to the undertakers for any loss they may have sustained owing to the carrying out of such order, also the cost of the appeal to follow the result.

7.—Providing similar right of appeal against an order to alter the works.

Government Board may from time to time by order change any person so appointed.

LOCAL GOVERNMENT ACT, 1894.

Sec. 16.—(1) Where a parish council resolve that a rural district council ought to have provided the parish with sufficient sewers, or to have maintained existing sewers, or to have provided the parish with a supply of water, in cases where danger arises to the health of the inhabitants from the insufficiency or unwholesomeness of the existing supply of water, and a proper supply can be got at a reasonable cost, or to have enforced with regard to the parish any provisions of the Public Health Acts which it is their duty to enforce, and have failed so to do, or that they have failed to maintain and repair any highway in a good and substantial manner, the parish council may complain to the county council; and the county council, if satisfied, after due inquiry, that the district council have so failed as respects the subject matter of the complaint, may resolve that the duties and powers of the district council for the purpose of the matter complained of shall be transferred to the county council, and they shall be transferred accordingly.

(2) Upon any complaint under this section, the county council may, instead of resolving that the duties and powers of the rural district council be transferred to them, make such an order as is mentioned in section 299 of the Public Health Act, 1875, and may appoint a person to perform the duty mentioned in the order; and upon such appointment, sections 299 to 302 of the Public Health Act, 1875, shall apply, with the substitution of the county council for the Local Government Board.

(3) Where a rural district council have determined to adopt plans for the sewerage or water supply of any contributory place within the district, they shall give notice thereof to the parish council of any parish for which the works are to be provided before any contract is entered into by them for the execution of the works.

APPENDIX.

For the convenience of readers, I append copies of the clauses that were proposed to be inserted in the Higham and Hundred of Hoo, Mid-Kent, and other Water Companies' Bills by the Local Government Board.

CLAUSES PROPOSED BY THE LOCAL GOVERNMENT BOARD, JUNE, 1898.

Penalty for Failure to Supply Pure and Wholesome Water (10 *Vic.*, cap. 17).

1.—If the company fail to provide and keep such a supply of pure and wholesome water as is required by section 35 of the Water-Works Clauses Act, 1847, they shall, unless prevented by frost, unusual drought, or other unavoidable cause or accident, be liable for the first offence to a penalty not exceeding £20, and to a penalty not exceeding £5 for every day on which the offence is continued after conviction; and such penalties may be recovered summarily before a Petty Sessional Court.

2.—Any offence under this section may be prosecuted by any local authority acting in the execution of the Public Health Acts in any part of whose district the company supply water for domestic purposes, or by any person supplied by the company with water for domestic purposes.

3.—All penalties recovered under this section shall be applied in such manner as the Court may direct.

Power to Take Samples of Water.

1.—For the better enforcement of the provisions of section 35 of the Water-Works Clauses Act, 1847, any Medical Officer of Health or other person authorized by any local authority acting in the execution of the Public Health Acts for any district in any part of which water is supplied by the company for domestic purposes (producing, if required, a certificate of his personal authority signed by the clerk to the local authority) shall be entitled at any time, on giving not less than six hours' notice to the company, to take and carry away samples of water from any land, reservoir, work, building, filter-bed, main, pipe, stand-pipe, or stopcock of the company, from, through, or by which a supply of water is given, and may for that purpose enter upon any lands or premises of the company. Any person who obstructs or molests such Medical Officer of Health or other person authorized as aforesaid shall be liable to a penalty not exceeding £20 for each such offence; and such penalty may be recovered summarily before a Petty Sessional Court.

2.—Any water consumer may at any time, on giving such notice as aforesaid, take and carry away samples of water from any land, reservoir, work, building, filter-bed, main, pipe, stand-pipe, or stopcock of the company, from, through, or by which a supply of water is given, and may for that purpose enter upon any lands or premises of the company.

3.—Any samples shall be taken in triplicate, and shall forthwith be respectively sealed up and marked by the person taking the same, who shall leave one of such samples with the company or an officer or other agent of the company, and may submit another for examination if he thinks fit, and shall retain the third for future comparison if required.

4.—The company shall be entitled to be represented by an officer or other agent when the samples are taken, sealed up, and marked.

5.—For the purposes of this section, "water consumer" means any person who is supplied by the company with water for domestic purposes, or who pays, or is liable to pay, any rate for such a supply.

Pollution of Sources of Supply.

1.—For the better discovery of any causes of pollution of the water obtained or supplied by the company, any officer of the company authorized in that behalf by the company and any Medical Officer of Health for any district whereof any part is supplied by the company with water for domestic purposes authorized in that behalf by the local authority for such district, may at any time between the hours of nine in the forenoon and four in the afternoon, on producing, if required to do so, a certificate of his personal authority signed by the secretary of the company in the case of an officer of the company or by the clerk to the local authority in the case of the Medical Officer of Health, enter on any land or premises from which water is obtained or supplied, whether immediately or otherwise, by the company, and may take and carry away samples of any water or of any matter, substance, or liquid which may appear likely to cause pollution to the water of the company, or to the sources of supply of the company, or whereby such water may be fouled.

2.—Any samples shall be taken in triplicate, and shall forthwith be respectively sealed up and marked by the person taking the same, who shall leave one of such samples with the person having the custody of the premises, and may submit another for examination if he thinks fit, and shall retain the third for future comparison if required.

Power to Enter Lands and Premises for the Purpose of Taking Samples and Discovering Causes of Pollution.

1.—If any water consumer authorized by section 2, or any person authorized by or under section 3, to take and carry away samples or to enter on any lands or premises is refused permission so to do, any Justice having jurisdiction in the place where the land or premises is or are situate, on complaint thereof on oath by such person (made after reasonable notice in writing of the intention to make the same has been given to the person having custody of the premises), may, on reasonable cause being shown, by order require such person to admit the person authorized as aforesaid upon the premises during the hours mentioned in the order, and to permit and to give all facilities to him to take and carry away such samples as aforesaid.

2.—Any order made under this section shall continue in force until the purposes for which such order was made are completed; and any person who refuses to obey an order so made shall be liable to a penalty not exceeding £10, and any person who obstructs or molests any person authorized to take samples shall be liable to a penalty not exceeding £5 for each such offence—such penalties to be recovered summarily before a Petty Sessional Court.



PURE SPRING WATER

SUPPLY FOR LONDON.

---

PROPOSED BY

GEORGE WEBSTER, Esq.

OF HAREFIELD GROVE, MIDDLESEX.

---

London:

LANE & SISON, Stationers and Printers, Westminster Chambers and Upper Thames Street, E.C.

1892.



PURE SPRING WATER

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---

London:

JAKK & SISON, Stationers and Printers, Westminster Chambers and Upper Thames Street, E.C.

# Pure Spring Water Supply for London.

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PROPOSED BY

GEORGE WEBSTER, ESQ., OF HAREFIELD GROVE,

MIDDLESEX.

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THE declaration that the Government is about to appoint a Royal Commission on the whole of the London Water Question shows that the public mind has at last become alive to the importance of having a pure and sufficient supply of water at all times available for the community. The deep connection between promoting health and propagating disease among the people makes it too serious a question to be lightly dealt with, and therefore it is a matter which the public should by no means lose sight of.

The possibility of a water famine in this vast metropolis at no very distant date should not leave a shadow of doubt in the mind of any inhabitant that the existing state of affairs ought to be remedied, and that immediately, without waiting for gigantic schemes that would cost many millions, and take a number of years to carry into execution.

Food of all kinds can be imported into the country and in any quantity, but for water, *the first necessity of life and health*, we must look at home. Nature has provided this for us in the pervious rocks beneath our feet,



and it is extremely satisfactory to note that the experiment made by the Commissioners of City Sewers in sinking a deep well in their Artisans' Dwellings at Aldgate has proved so great a success that they have water enough and to spare.

The question of obtaining further supplies of pure water from deep wells for the metropolis opens up a much wider subject than the above single experiment. There are eight companies supplying London with water, the greater part of which is drawn from the Rivers Thames and Lea, and a small, but the most pure portion, from deep wells sunk in the chalk.

It is an acknowledged fact that the Lea cannot be further drawn upon, while it is in the highest degree improbable that the authorities will permit the quantity now authorised to be taken from the Thames to be exceeded. But there appears to be no good reason why the chalk area by which London is surrounded should not be further tapped by deep borings, and a very large supplemental supply of water obtained, and it can be demonstrated that at least at one spot within 20 miles of the metropolis a very considerable volume of the purest spring water not only exists, but is now waiting to be made use of by any authority having power to deal with the same.

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#### VOLUME OF WATER.

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*Report of Mr. C. Monckton, C.E., on Mr. Webster's wells at Springwell and Rickmansworth, in the Colne Valley.*

In 1890 I reported as follows:—"From practical pumping tests, extending over  
 "several days and nights, I estimate the present amount of water available from  
 "your existing wells to be at least 10,000,000 gallons per twenty-four hours, and  
 "I am of opinion that by a further system of sinking and driving adits on your  
 "property this supply could be doubled, and can be taken from your reservoirs at  
 "Harefield Grove by gravitation to any desirable point in the metropolitan  
 "area."

On no occasion since then have I seen any reason to modify the above. I may add that your three wells at Springwell have been overflowing to waste at a uniform rate of about one million gallons per diem, both in wet and dry weather, ever since they were sunk some six years ago.

C. MONCKTON,  
 WESTMINSTER.

To G. WEBSTER, ESQ.,  
 29, CANNON STREET, E.C.  
 February, 1892.

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#### QUALITY OF WATER.

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*Dr. Percy F. Frankland, after subjecting the water from Mr. Webster's wells at Springwell and Rickmansworth to analysis, reports as follows:—*

"The water is, in fact, of most excellent quality for drinking and all  
 "other dietetic purposes. All three samples are hard water, but their hardness  
 "is neither excessive nor much greater than that of the river water supplied  
 "to London, whilst it is less than that of the Kent Company's Deep Well Chalk  
 "Water. The hardness being also of the kind known as 'temporary,' could be  
 "greatly reduced by treatment with Clark's process. After such treatment the  
 "water would be unsurpassed for all domestic purposes."

## PRESS OPINIONS.

“IRON”—August 21, 1891.

“There is no doubt that a supply of pure water for the metropolis would prove a great boon to its inhabitants, as the sources from which the greater part of its present supply is derived militate against its purity. Without going so far afield as Wales for water for potable purposes (a suggestion which has been mooted), it would appear that an efficient supplementary supply can be obtained.”

“JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.”—August 25, 1891.

“A somewhat singular feature in connection with the water supply of London is presented by the operations of Mr. George Webster, of Harefield Grove, Middlesex, in extracting water from the chalk formation in the Valley of the Colne. . . . Further prominence has recently been given to Mr. Webster's project by the circumstance that a party of gentlemen, including several members of the Hygienic Congress, paid a visit of inspection to the Colne Valley Works a few days ago—Mr. Webster having given an invitation for the purpose. There was sufficient proof that water abounded, and that Mr. Webster had got hold of it. . . . He has given practical demonstration to the existence of large stores of water in the chalk; and there is no reason why these should not be drawn upon for the benefit of the Metropolis, providing the district which yields the supply receives a proper share of it.”

“SUNDAY TIMES”—August 30, 1891.

“Of course we shall be accused of trying to make a sensation by those persons who are fattening on the present condition of the water supply. And that is just what is required. Until the inhabitants of the Metropolis are thoroughly aroused to a realisation of their danger, we shall get nothing done to remove it. For years past the subject has been nibbled at first by one and then another, commission has followed commission, report has followed report, and we are as far from realisation as ever. . . . We admit that the danger of a famine is a somewhat distant one at the present moment, but it is every year becoming nearer, and it is not difficult for us to foresee the circumstances which would make it an imminent one. We maintain emphatically that London cannot afford to run the risk any longer. Even a temporary breakdown in the water supply would be a calamity serious enough in all conscience, but anything approaching a famine would bring upon London untold misery and disaster. Disease, which is kept in check to a great extent by the free use of water, would gather strength, and stalk through the crowded city with death at his heels.”

“HYGIENE,”—September, 1891.

“VISIT OF MEMBERS OF THE CONGRESS OF HYGIENE TO RICKMANSWORTH AND HAREFIELD.

“Of all the numerous excursions arranged for the members during the Congress of Hygiene week, few could have been equal, and none superior, to that made on the 15th of August, to view the pumping stations on Mr. George Webster's estate, near Rickmansworth. . . . The first halt made was for the purpose of inspecting the two sources situated within a short distance of Rickmans-

worth railway station. . . . At each, directly the steam pumps were set in motion, thousands of gallons of splendid, sparkling spring water were brought up from the, comparatively speaking, inexhaustible reservoirs contained in the chalk. As we submitted it to the critical judgment of eye and palate, our memory wandered back instinctively to a similar inspection which we made at the commencement of the present year of a yellowish, repulsive fluid taken from the main of one of the London water companies. That which we drank at Rickmansworth was of the quality which Shakespeare had in his mind's eye when he spoke of 'honest water'. . . . At Springwell, situated, like the two wells previously visited, in the Colne Valley, two others were inspected. Here the supply of water pumped up as soon as the engines were set in action was much larger than that at Rickmansworth; and as the torrent, sparkling clear as crystal, passed along the large wooden trough by which it was discharged, forming a miniature cascade, into the adjacent river, there was a general expression of approbation at its appearance and quality, as well as of regret that such a valuable source should be at present absolutely wasted, and lost to London. It has been well said that history repeats itself; and an exemplification of the truth of this adage will be found in the fact that Mr. Webster's pumping stations at Springwell, whence such an enormous quantity of pure water can be obtained, are close to the site of the old Gulchwell Springs, which it was intended to utilise under the schemes we have alluded to, yielding 'six tons per minute'.”

“Why should London wait? is a question which has of late years been put, through the public press, when some important social or sanitary matter has demanded prompt attention. Why should London wait, indeed, when such an important problem as the supply to the metropolis of an adequate quantity of water of good quality is waiting for solution? Why should our governing bodies continue, day after day, and decade after decade, to place before us a series of dissolving views, in the shape of visionary projects for obtaining a better water supply from the Welsh mountains, from the lake district, and other far distant sources, merely to tantalise us, and then tell us that the scheme is impossible on account of the gigantic expense that would have to be incurred?”

“HEALTH,”—September 11, 1891.

“On the invitation of Mr. George Webster, a large number of gentlemen who attended the International Congress of Hygiene in London visited the village of Rickmansworth to view the pumping operations there and at Springwell, in connection with a scheme for supplying London with pure spring water. . . .

“The water from all the wells is very much the same in quality. Dr. Percy Frankland reported on it in 1888, and saw that it was of most excellent quality for drinking and other purposes. The water is a pretty hard one, containing from 16 to 17 degrees of temporary hardness, which could, of course, to a large extent be removed by Clark's process. Dr. Frankland states that it is not much greater than that of the river-water supplied to London, while it is less than that of the Kent Company's deep well chalk-water. . . .

“There can be no doubt that a large amount of the very best water exists in the district, and also that it can be supplied to London at a very moderate cost and in a short period of time. . . .

“At present the question of the London water supply is being discussed, and the visit of the Lord Mayor and others to the Glasgow Waterworks and Supply at Loch Katrine is evidence of their interest in the matter. London, has not, however, a Loch Katrine within thirty miles of it, and to bring water from the Welsh lakes would be a very expensive and tedious process. While there exists in



districts round London a large supply of pure water, and water that can be supplied by gravitation, we should think that it is the duty of the Corporation to use this as a supplemental supply until a more extensive scheme becomes an absolute necessity.

"Mr. Webster is to be complimented for his perseverance in carrying out these borings in the face of many difficulties and much expense, and the result has also amply justified the opinion of the able Engineer who devised the scheme."

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**"PALL MALL GAZETTE,"—October 12, 1891.**

"The London County Council will to-morrow consider important proposals with regard to the water supply of the metropolis, which neither on the score of quantity nor of quality is satisfactory. One of these proposals is to go so far afield as Wales for a service which will suffice not only for the wants of London of to-day, but for the vastly greater metropolis of future times. Before meeting the Council have had the opportunity of studying a much more modest scheme so far as cost is concerned, but which its author believes will meet the need while possessing desirable features of its own. Along with eminent representatives of the medical and engineering professions, members of the County Council and the City Corporation, were invited by Mr. George Webster to visit his estate at Harefield Grove on Saturday, in order that they might inspect the sources of supply which he has tapped in the Colne Valley. . . . Perhaps a tentative solution would be to permit the principle of free trade to be exercised in the matter of our water supply, and allow Mr. Webster, or any company which would undertake the risk, to offer to a district such as the City, or the public individually, an independent service of spring water."

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**"MORNING POST,"—October 12, 1891.**

"On Saturday a large party of gentlemen interested in the question of the London water supply paid a visit to Rickmansworth on the invitation of Mr. George Webster, of Harefield Grove, for the purpose of inspecting some experimental operations in connection with his scheme for supplying the metropolis with pure spring water.

" . . . . All the wells and pumps were inspected on Saturday, and the visitors appeared to be quite satisfied with the results.

" . . . . He claims now to have 10,000,000 gallons per 24 hours ready for immediate use, and has constructed a reservoir for half this quantity, which is said to be capable of being increased to meet the full water supply."

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**"THE LANCET,"—October 17, 1891.**

**VISIT OF EXPERTS TO RICKMANSWORTH AND SPRINGWELL.**

"The question of providing the metropolis with a purer and more reliable supply of water is one which has long occupied the attention of engineers, chemists, medical experts, and those in public authority. There is much difference of opinion existing as to where the source of a purer supply is to

be looked for. One great scheme, and one certainly which will involve an immense outlay, is to bring the pure water of the Welsh hills through large mains to reservoirs provided on the confines of the City. Another project is to sink wells to a very great depth into the huge basin of water which engineers surmise must underly London. More recently, however, comes a proposal which, to a certain extent, seems feasible enough, from Mr. Webster, of Harefield Grove, near Rickmansworth.

"The enormous amount of water pumped up at the rate of 5,000 gallons per minute was the subject of general admiration by those who witnessed this interesting operation. The water in the well was of course soon reduced to a lower level by the action of the powerful pump, but on stopping the pump at the request of many of the visitors, the water soon resumed its original level. On calculation this was found to approximate to a rise equal to more than 1,000 gallons per minute. Altogether there are five 'bore-holes,' two at Rickmansworth, and three at Springwell. The rapid pumping of any one well does not, it is stated, affect the water of any other, so that it may be concluded that each receives its supply of water through a different channel in the chalk.

" . . . . It is evident that a very valuable supply of water occurs in this Valley of the Colne (a river that has long been known for its eminently pure water.) . . . . The whole project is laid open with admirable fearlessness to the inspection and criticisms of those who are competent to express an opinion on this all-important question."

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**"St. JAMES'S GAZETTE,"—October 12, 1891.**

"Speeches were also delivered by Mr. Deputy Rose-Innes, Dr. Richardson, Sir Guyer Hunter, M.P., Mr. Morton, M.P., Mr. Haggis, and several others; all of whom expressed their conviction that the question of the London Water supply was one which urgently called for the attention of Parliament, and that the appointment of a Public Water Authority could not be longer delayed. Several engineering experts explained the ease with which Mr. Webster's proposals could be carried into effect; and we understand that his plans are so far matured that there is every prospect of a supply being furnished from the Colne Valley at an early date."

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**"THE TIMES,"—October 12, 1891.**

"Notwithstanding all that has been done towards raising the purity of the water supply of London to the desired standard, the fact remains that it still falls below it. This is due to the circumstance that a considerable portion of the supply is obtained from sources which, while in themselves objectionable, are at the same time unavoidable. In order to remedy this state of things, and at the same time to increase the supply to meet the requirements of an ever increasing population, it has from time to time been proposed to draw the supply, or a portion of it, from various other and far off sources, including amongst others, the Welsh hills. It, however, appears probable that an available supplementary supply of water will be found to lie at the very door of the metropolis awaiting utilization. It is well known that an enormous quantity of the purest water exists in the Colne Valley watershed, which comprises an area of about 230 square miles. By the light of some extensive boring and pumping operations which have been quietly going on for the past six years in the chalk in that district, it would seem that an adequate supply can be readily commanded. There are numerous isolated

instances of deep wells that have been sunk, in connection with local industries, within the area of this watershed, but it does not appear that any practical search for water on an extended scale has previously been instituted. The operations to which we have referred have been carried out by Mr. George Webster, of 29, Cannon Street, London.

. . . . . The various wells and pumping stations were inspected and the pumping operations at each were witnessed by a large party of gentlemen on Saturday last upon the invitation of Mr. Webster.

" . . . . . The engineering experts were of opinion that Mr. Webster had made out an exceedingly good case, and that he deserves every credit for his public spirit in having so far developed the resources of the Colne Valley watershed. There appears to be nothing to prevent other favourable sites in the Valley being acquired, from which a very large supply could doubtless be obtained. By this means the metropolitan supplies derived from the sources at present complained of might be efficiently supplemented, as proposed by Mr. Webster."

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**"DAILY NEWS,"—October 12, 1891.**

"On Saturday a large party of gentlemen paid a visit, on the invitation of Mr. G. Webster, of Harefield Grove, Middlesex, to the pumping works established by that gentleman at and near Rickmansworth. Mr. Webster has for some years taken a great interest in the question of the water supply of the metropolis, and has from time to time extended his operations, in demonstration that a valuable supply of pure water can be obtained from the chalk within a few miles of London, until he is now able to pump ten millions of gallons a day—a quantity which it is thought probable could be increased to twenty million gallons. . . . . The practical help contributed by Mr. Webster towards a solution of the question of sources of supply was suitably acknowledged."

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**"CITY PRESS,"—October 14, 1891.**

"Amongst the many matters of moment that are now engaging the earnest attention of our municipal authorities, the question of water supply occupies, without a doubt, a very prominent position. For years it has been conceded that the present water supply of the metropolis is at once unsatisfactory and insufficient. But while both Parliament and our municipal rulers have devoted much time and attention to the subject, so far no scheme of any practical value as regards the solution of the problem has yet been devised, much less adopted. And yet although no satisfactory solution has been made public, a private gentleman has at his own expense proved beyond all question that we have at our very doors, so to speak, a supply of pure water sufficient to meet both the present and future requirements of Londoners. That gentleman is Mr. George Webster, an Australian merchant, who resides at a charming mansion, a short distance from the newly-developed district of Rickmansworth. He has shown by a variety of experiments that in the Colne Valley may be obtained, at a very small cost, comparatively speaking, a supply of water, with which for purity and clearness the water we are at present condemned to drink cannot for a moment compare."

" . . . . . While, however, the value of the Colne Valley is only now beginning to be generally appreciated and recognised, the various reports that have been submitted on the subject in the past have not been without service as showing that in this district—which is only about sixteen miles from the metropolis—we have a supply which at any moment may be tapped and made available for the people of London.

" . . . . . Seeing, therefore, that we shall only require to have what may be termed an auxiliary supply, it is apparent that in the Colne Valley we have a source which is sufficient to relieve us of all further anxiety on the score of a possible water famine. For the purpose of affording our municipal authorities an opportunity of seeing for themselves the supply that is already available, Mr. Webster on Saturday last invited a numerous party to visit his wells and pumping stations at Rickmansworth and Springwell.

" . . . . . The experiments were eminently satisfactory, for no sooner were the pumps at work than the water came rushing forth in a perfect torrent, a veritable cascade being formed as it passed from the troughs and was discharged into the adjacent river. The water was pure as crystal, while its purity was practically proved by not a few of the party who took a taster and declared it to be excellent.

"The favourable opinion that the visitors had formed both of the quality and quantity of the water thus brought to the surface was expressed in very unqualified terms in the speeches that were subsequently delivered, engineers, experts, corporators, and County Councillors all being agreed that at Rickmansworth, and, indeed, on Mr. Webster's own estate, there is a supply that at a moment's notice, and with little or no expense worth speaking of, can be brought to town and placed at the disposal of Londoners. Under the circumstances, it will indeed be astonishing if in the near future advantage is not taken of it, and Mr. Webster rewarded in a handsome manner for the large outlay he has incurred with the object of solving a problem that for years has been engaging more and more the thoughts of those who have been practically interested in the question of water supply."

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**"COUNTY COUNCIL TIMES,"—October 16, 1891.**

"Mr. Webster is to be congratulated on having secured something like public and official acknowledgement of the value of his scheme for supplying London with that most necessary of all commodities—pure spring water. A more representative combination of experience and authority than that which on Saturday accepted his invitation to view the wells and pumping operations at Rickmansworth and Springwell it would be difficult to imagine.

" . . . . . Mr. Webster's scheme is an intelligible one, and seems to have been dictated by philanthropic impulses.

" . . . . . Easements have already been obtained from the several authorities, and we understand that Mr. Webster would be prepared to carry an effective supply for potable purposes into London within a very few months, probably nine or ten.

" . . . . . There were many eminent representatives of the medical and engineering professions among those who visited Mr. Webster's estate at Harefield Grove, on Saturday."



"IRON,"—October 16, 1891.

"Engineering experts were of opinion that Mr. Webster had made out an exceedingly good case, and that he deserves every credit for his public spirit in having so far developed the resources of the Colne Valley watershed. There appears to be nothing to prevent other favourable sites in the valley being acquired, from which a very large supply could doubtless be obtained. By this means the metropolitan supplies derived from the sources at present complained of might be efficiently supplemented, as proposed by Mr. Webster."

"THE PELICAN,"—October 17, 1891.

"I, for one, am heartily glad to see that Mr. George Webster's scheme for supplying London with pure water looks like being realised.

" . . . . . Many would certainly be glad to have on their table pure, sparkling spring water, and the health of the community would undoubtedly be improved by its use.

" . . . . . Perhaps a tentative solution would be to permit the principle of free trade to be exercised in the matter of our water supply, and allow Mr. Webster, or any company which would undertake the risk, to offer to a district such as the City, or the public individually, an independent service of spring water."

"THE TIMES,"—October 17, 1891.

"The question is becoming too urgent to be played with by doctrinaires, or tossed about by people who are politicians first and administrators afterwards, if at all. While London trifles with the problem other great towns are quietly tackling it.

" . . . . . The growth of population in several directions is also operating to complicate the question in more ways than one. Indeed, the time seems to be approaching when the water supply of the country will become an Imperial question of great magnitude and difficulty."

"INVESTORS GUARDIAN,"—October 17, 1891.

"A new scheme which, if it does not altogether supersede the present defective water supply of the metropolis, will at all events effect a very desirable improvement in it, by the creation of an alternative supply, has been formulated by Mr. George Webster, of 29, Cannon Street. He proposes to draw the new supply from the Colne Valley watershed, where he has been making experiments with encouraging results."

"THE HERALD,"—October 18, 1891.

"As London increases in size and population, the question of its water supply naturally becomes more important. Mr. George Webster thinks that the Colne Valley watershed will solve the difficulty. A number of engineers and members of the County Council accompanied him a few days ago on a tour of inspection of the pumping stations and wells at Rickmansworth. He showed that he had at his command a volume of spring water equal to ten million gallons daily. To those who are agitating for an auxiliary supply for London, this intelligence will not be unsatisfactory."

"INVENTION."

"It, however, appears probable that an available supplementary supply of water will be found to lie at the very door of the metropolis awaiting utilization. It is well known that an enormous quantity of the purest water exists in the Colne Valley watershed, which comprises an area of about 230 square miles. By the light of some extensive boring and pumping operations which have been quietly going on for the past six years in the chalk in that district, it would seem that an adequate supply can be readily commanded. There are numerous isolated instances of deep wells which have been sunk, in connection with local industries within the area of this watershed, but it does not appear that any practical search for water on an extensive scale has previously been instituted. The operations to which we have referred have been carried out by Mr. George Webster, of 29, Cannon Street, London.

" . . . . . The various wells and pumping stations were inspected and the pumping operations at each were witnessed by a large party of gentlemen on Saturday last, upon the invitation of Mr. Webster.

" . . . . . The visitors conducted by Mr. Webster and Mr. Monckton, were driven from station to station at each of which they found a large volume of water being pumped away to waste.

" . . . . . Engineering experts were of opinion that Mr. Webster had made out an exceedingly good case, and that he deserved every credit for his public spirit in having so far developed the resources of the Colne Valley watershed. There appears to be nothing to prevent other favourable sites in the valley being acquired, from which a very large supply could doubtless be obtained. By this means the metropolitan supplies derived from the sources at present complained of might be efficiently supplemented as proposed by Mr. Webster."

"FINANCIAL WORLD,"—October 19, 1891.

"The important discussion at the London County Council on the water question will doubtless bring the Colne Valley watershed into prominence. It is here six years ago Mr. G. Webster, a resident of Rickmansworth, first inaugurated a systematic search for water, and finding his efforts quickly rewarded, has persevered, with the aid of Mr. Monckton, C.E., until he is able to produce ten million gallons daily. From the nearest pumping station to London is only about twenty miles, so that if the County Council and the Corporation are prepared to secure an auxiliary supply for the

City they need not go far to do so. . . . Mr. Webster has for some years taken great interest in the question of the water supply of the metropolis, and has from time to time extended his operations in demonstration that a valuable supply of pure water can be obtained from the chalk within a few miles of London, until he is now able to pump ten million gallons a day.

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**"FINANCIAL STANDARD,"**—October 17, 1891.

"We appear to be a long way from finding a solution of London's great water problem. From a hygienic point of view the present supply is hardly satisfactory, yet no one has yet advanced any scheme which would ameliorate matters. No one, however, has done more to attain the desired end than Mr. George Webster, who has so far developed the resources of the Colne Valley as to have at his command a supply daily of some ten million gallons of pure spring water, while it is believed this quantity could be doubled with little difficulty.

"The question arises then will the authorities make any attempt to avail themselves of even such a comparatively small auxiliary supply.?"

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**"INDUSTRIES,"**—October 23, 1891.

"Mr. Webster's scheme for a supply of spring water from his wells at Rickmansworth is, however, one which at the present time may render important help in bringing this matter to a successful conclusion. He has already in operation private wells, which are available for the supply of at least ten million gallons of water per diem, and, by further system of sinking and driving adits, this supply could be doubled. We do not suggest that the County Council should at once make terms with Mr. Webster and buy up his undertaking, and thus show that they are in earnest in their present inquiry. Mr. Webster's scheme, however beneficial it may eventually prove to be, is in the same category of private enterprise as the undertakings of existing companies, and he may not be inclined to sell his rights any more than the water companies at the Council's valuation. The water companies have at least, at the present time, a competitor so far as the above quantity per day is concerned, and the County Council would do well to avail themselves of this favourable opportunity before these two interests become identical.

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**"HEALTH,"**—October 23, 1891.

"The four wells at present sunk on the estate will give a total quantity of 10,000,000 gallons in the twenty-four hours; but this supply could easily be doubled. The water is of excellent quality, with the freshness and pleasant sparkle common to aerated waters, and is agreeable to the palate. It is rather hard, but as this is of the kind technically known as 'temporary,' the hardness can be considerably reduced, if not obviated, by the inexpensive and effective process of Dr. Clark.

"Some may urge that the above quantity is not much in the face of the pressing wants of the metropolis, but this is hardly a fair plea. Water for London can never be obtained in sufficient quantity from one source, and certainly this admirable supply lying idle in the Valley of the Colne would go a long way towards settling the grievances of the western suburbs. The largest well is capable of discharging 5,000 gallons per minute, and it was an impressive sight to see the sparkling crystalline torrent gushing forth in an immense volume from the 40-inch borehole.

" . . . . Pure water is a matter which affects the well-being of every mortal, and whoever facilitates the acquisition of this for their fellow-creatures deserves the gratitude of all men. Mr. Webster is of the opinion that a first-class water can be conducted from the Colne Valley to satisfy the wants of at least a fair portion of London, and he has also possessed the courage to back his opinion by the expenditure of some thousands of pounds in experimental operations.

"Public spirit is a quality much too rare in these days, and such a man is worthy of our heartiest thanks. We hope to return to this important public question in some future issue.

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**"WHITEHALL REVIEW,"**—October 24, 1891.

"Some engineers of eminence support the proposal of going to the Welsh mountains, and others would draw upon the Devonshire watershed, making Dartmoor the base of operations. Either of these schemes would necessitate an expenditure of from ten to twenty million pounds, and the objection to them is on this account alone, from a ratepayer's standpoint very strong. Many competent to form a correct judgment on the question aver that it is not necessary to go so far afield or to incur such an enormous expense in making ample provision for future requirements in this regard. The experiments made by Mr. George Webster, of Harefield Grove, Middlesex, go a long way to demonstrate that the Colne Valley watershed may be regarded as the quarter from which can be drawn a supply of excellent water which, in combination with existing supplies, is more than ample to satisfy any demand which the future wants of London may render necessary.

" . . . . One of the most attractive features of Mr. Webster's project is that it could be made an accomplished fact within the space of nine months. Sir Guyer Hunter, M.P., Sir Spencer Wells, A. C. Morton, M.P., Sir W. Farmer, Sir W. Ogg, Surgeon-Major Cuffe, A. H. Haggis, Esq., Deputy Chairman of the London County Council, William Whiteley, Esq., Deputy Halse, Drs. Lenox, Browne, Cooney, Paul, and Hogg, as well as many noted members of the Hygienic and Demographic Congress, have inspected Mr. Webster's pumping stations and his method of conveying the water to the centre of consumption, and have expressed their approval of both. The adoption of his scheme by the Council would obviate the necessity of going either to Wales or anywhere else in the provinces for the supplemental supply required. It would, moreover, save London an expenditure of millions, an expense which many, in view of what Mr. Webster has proved, would regard as unnecessary, and would be the means of furnishing to the dwellers in modern Babylon a water so pure that at least one of the most deadly zymotic diseases—typhoid fever—would become comparatively unknown amongst us. At any rate his project, and what he has done to realise it, merit the attention of the Water Committee of the London County Council and the other public authorities in whose hands are placed the solution of this difficult problem and the safe-guarding of the public interest in connection herewith.

"HERTS MERCURY,"—October 24, 1891.

"Engineering experts are of opinion that Mr. Webster has made out an exceedingly good case, and that he deserves every credit for his public spirit in having so far developed the resources of the Colne Valley watershed, from which it is believed a very large supply could be obtained."

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"LIGHTHOUSE,"

"A more recent and certainly far more feasible proposal, and one that has the merit of having to an extent been practically tested, is that put forth by Mr. Webster, of Harefield Grove, near Rickmansworth.

" . . . . . The practicability of the proposal was recently demonstrated to a number of people invited down for the purpose, and who were afterwards loud in their praise of Mr. Webster's efforts in the direction indicated. The scheme is only in embryo at present, but enough has been said to show Londoners that there is hope at no distant date of having an abundant supply of pure, wholesome spring water flowing into their midst from the valley of the Colne—a river that has long enjoyed an enviable reputation for the purity of its water."

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"THE EVENING NEWS AND POST,"—November 12, 1891.

"At present our sources of supply are strained to something very near their limited capacity, and they could have no earthly chance of meeting the demand for one hundred and twenty million additional daily gallons anticipated by Mr. Haggis. So near and pressing does this shrewd observer think the necessity for action, that he estimates the present reserve supply of water as barely sufficient to meet the growing demand during the interval required for the preparation and carrying out of a scheme for a new supply.

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"THE DAILY NEWS,"—November 12, 1891,

In reviewing Mr. Haggis' speech before the London County Council, says—

"Discussing next how far the present supplies are adequate to provide for the future, he points out that if London had to get a fresh supply from Wales or any other distant ground, two or three years would probably be required to prepare the plans and to obtain Parliamentary powers, and at least ten or twelve years more to execute the legal preliminaries and to carry out the necessary works, so that at the most moderate computation, without allowance for delays or mishaps, fifteen years would elapse before the wants of consumers could be met.

" . . . . . The necessity, therefore, for the provision of a new or supplemental supply on the ground of insufficiency alone, altogether irrespective of the question of purity, would appear to be paramount and urgent. From the statistics I have given, it is evident we shall within a few years arrive at a crisis in connection with the water supply of London; already there is a barely sufficient reserve for the interval that is required for the preparation and carrying out of a scheme for a new supply.

"LIFE,"—November 25, 1891.

"That the present water supply of London is altogether unsatisfactory, has been proved by many authorities, and it is surprising that no steps have as yet been taken to obtain pure water for the metropolis. Yet the problem is not difficult of solution, a plentiful supply being available in close proximity to London. Mr. George Webster, of Harefield Grove, Uxbridge, has had wells sunk on his estate, which already supply pure water at the rate of ten million gallons per day, a figure which could easily be doubled. The water at the wells and pumping stations at Rickmansworth and Springwell is excellent, and ought to be made available for London. . . . . This water supply could, moreover, be brought to town with very moderate expense, and at almost a moment's notice, Mr. Webster having elaborated a complete scheme for the purpose.

"Pure water being one of the first necessities of life and health, it is to be hoped that Mr. Webster's well and plan will be utilized at an early date."

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"THE NORTH WESTERN GAZETTE,"—November 21, 1891,

After speaking of gigantic and costly schemes, continues—

"But the ratepayers will, no doubt, ask the question, 'Why all this expense?' Is the simple plan not only patent but the most easy and practicable. Can we not supplement the present supply with what can be found ready and at our very doors at a cost compared with which the ocean is to a tear-drop. Here in the County of Middlesex, within twelve miles of the metropolis, Mr. George Webster's springs are running to waste, and are already able to supply ten million gallons daily of the purest spring water. This is no fairy tale, for it has been certified to by many eminent authorities. . . . . We trust that the present agitation on this great question now that the Government, the Corporation, and the London County Council are about stirring themselves will result in at once testing Mr. Webster's water supply which could be brought to Hampstead or St. Pancras within a year. Mr. Webster has already got easements and powers to bring his water to the Finchley Road, by the Metropolitan Railway, and surely this is worth a trial."

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"ACTON AND CHISWICK GAZETTE,"—January, 16, 1891.

"The water supply to the great metropolis has during the past year or two passed into the category of 'burning questions' which it behoves all public men to studiously watch. Besides being unsatisfactory, so far as regularity and purity are concerned, the water supply, being in the control of independent monopolists, has been regarded with much jealousy and given rise to all sorts of grievances. But the authoritative warning as to the probable 'famine' if the Thames is to be almost sucked dry by various Companies is a much more unpleasant consideration. . . . . "The necessity," says one high authority, "for the provision of a new or supplemental supply on the ground of insufficiency alone, altogether irrespective of the question of purity, would appear to be paramount and urgent." Accepting it as absolutely certain—even for the sake of purity alone—that a supplemental supply must be tapped, we come to enquire from what source? Now, without vainly dreaming of some quixotic scheme for getting water to London all the way from the Cambrian Mountains, let us be practical, and deal with the possible and visible. Here at hand providence has revealed an ample



compensating resource out of Nature's bounty. By a curious discovery, Mr. George Webster, of Harefield, Middlesex, found that three wells at Rickmansworth can yield 10,000,000 gallons of pure, wholesome, and clear spring water daily. Let not the local authorities nor the parliamentary powers, stand in the way of such a boon. We look upon Mr. Webster's scheme as one of the redeeming agencies for the evils of modern London."

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"WEST MIDDLESEX STANDARD,"—*January 23, 1892.*

The question of the water supply of Southall has been for some time past agitating the Local Board at Southall.

. . . . . Is the plan not only patent but simple and practicable? Can we not substitute for the present supply that which can be found almost at our very doors, at a cost compared with which a tear drop is to the ocean? Here, in the county of Middlesex, within ten or eleven miles of Southall and Hanwell, these springs are running waste. This is no fairy tale. Anyone can see for themselves, and eminent authorities have certified to the absolute purity of the water and its suitability for domestic and culinary purposes. We trust that the present agitation on this great question will result, now that Southall and Hanwell Local Boards are bestirring themselves, in Mr. Webster's supply being tested.

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PURE SPRING WATER

SUPPLY FOR LONDON.

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PROPOSED BY

GEORGE WEBSTER, Esq.,

OF HAREFIELD GROVE, MIDDLESEX.

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REPORT BY CLAUD MONCKTON, C.E.

*21st August, 1890.*

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London:

LARK & SISON, STATIONERS AND PRINTERS, WESTMINSTER CHAMBERS AND UPPER THAMES STREET, E.C.

# PURE SPRING WATER SUPPLY FOR LONDON.

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GEORGE WEBSTER, ESQ., OF HAREFIELD GROVE,  
MIDDLESEX.

---

REPORT BY

CLAUD MONCKTON, C.E., 28, VICTORIA STREET, WESTMINSTER.  
*21st August, 1890.*

To G. WEBSTER, Esq.,

29, CANNON STREET, LONDON.

DEAR SIR,

In compliance with your request, I have the pleasure to place before you my report, in as brief a space as possible, regarding your search for pure Spring Water in the Colne Valley, from the time I was first connected with the enterprise down to the present date, together with a few remarks upon the subject, and a plan for general reference.

In the year 1884 you were engaged in sinking a well in the chalk on your property at Harefield Grove with a view to supplying your extensive gardens and farms with water. You then consulted Mr. Edward Easton, C.E., who gave it as his opinion that you would obtain a plentiful supply of water in your well if you went deep enough; after which you consulted me upon the same subject, and, having examined the work in progress, and possessing considerable knowledge of the locality, I expressed a similar view, but, inasmuch as your well started at a height of some 100 feet above the bed of the adjacent valley of the Colne, where I considered the chief water-bearing strata lay, I suggested that you would obtain a greater and more certain supply by sinking there and pumping up the water to any desired level, and I indicated a spot at Springwell, between the Grand Junction



Canal and the River Colne, where I was of opinion you would obtain water not only for all your own requirements, but sufficient to supply the surrounding neighbourhood, where the want of it was much felt during dry seasons. This land you eventually purchased, and I sunk a well there of 12 feet diameter with the result that at a depth of 20 feet the pump I was using was overcome by the inflow of water which rose to the ground surface and has ever since been running to waste in the River. Subsequently, a more powerful pump was employed, and the brickwork of this well (No. 3). was carried down to a depth of 30 feet. (See note 3.)

I then had the pleasure of preparing estimates for erecting pumping plant at Springwell, laying a main between Springwell and the highest portion of your property at Harefield Grove, and building a Reservoir there; also of obtaining the easements necessary for laying such main. (See note 6.)

About this time, seeing the large volume of water from your first 30 feet well at Springwell, you determined to embark upon the enterprise of searching for water on a large scale with the object of ultimately supplying at least a portion of the Metropolis with pure spring water, and with this view you purchased further property at Rickmansworth extending nearly across the Colne valley; a deep boring was made in your No. 3 Well at Springwell. (See note 3.) Two further wells and bore-holes, Nos. 4 and 5—(see notes 4 and 5)—were sunk there, and two wells with deep bore-holes, Nos. 1 and 2—(see notes 1 and 2)—were sunk on your Rickmansworth property, while nine trial bores of 9 inches diameter and from 90 to 100 feet deep were made in the same locality, and easements were obtained—(see note 6)—for connecting your Springwell and Rickmansworth supplies by a main, besides constructing a reservoir on your property at Harefield Grove at a level of about 340 feet above ordinance datum, which is capable of containing five million gallons, and could at any time be very considerably increased. At the same time easements were obtained from the Vestries of the Parishes of Harefield—(see note 6)—Ruislip, Northolt and Greenford for laying mains from your Reservoirs under the roads of these Parishes, a distance of over ten miles towards London, up to the boundary of Hanwell, which Parish is comprised in the Parliamentary area of the Grand Junction Waterworks Company, and you offered your water to that Company. They were, however, obliged to decline taking it, as they had not the

necessary statutory powers. With the object also of conveying your water to London, you opened successful negotiations for easements with the Metropolitan Railway from Rickmansworth to Finchley Road, and with the Grand Junction Canal Company from Rickmansworth to Paddington.

From practical pumping tests, extending over several consecutive days and nights, I estimate the present amount of water available from your existing wells, to be at least ten million gallons per twenty-four hours, and I am of opinion that by a further system of sinking and driving adits on your property this supply could be doubled, and can be taken from your reservoirs at Harefield Grove by gravitation to any desirable point in the Metropolitan area.

The purity of this water is guaranteed by the fact that in 1888 Dr. Percy F. Frankland, after subjecting it to analyses, certifies as follows:—

“The water is in fact of most excellent quality for drinking and all other dietetic purposes. All three samples are hard water, but their hardness is neither excessive nor much greater than that of the River Water supplied to London, whilst it is less than that of the Kent Company’s Deep Well Chalk Water. The hardness also being of the kind known as ‘temporary,’ could be greatly reduced by treatment with Clark’s process. After such treatment the water would be unsurpassed for all domestic purposes.”

The softening process could be applied at the site of your present Reservoir where there is ample area for constructing both softening and service Reservoirs up to the extent of 150 million gallons.

11 million gallons consumed per day  
 23 hours  
 Frankland

Tested by Mr. Snowball (1 & 3 affect each other)

Nos 1, 2, 4. Rickmansworth to 16-18' yield from was  
 2,515,715

Rickmansworth 2 Wells Rickmansworth to 16-18'  
 2,853,462

45' diam 1 1,750,200  
 2 762,500

4 2,091,950  
 5 762,500

take difference  
 min 1000  
 (24 hours)  
 best of ground  
 quality  
 notes

RECAPITULATION.

1. You have at the present ten million gallons per twenty-four hours of pure spring water available for immediate use, and the prospect of probably increasing this to twenty millions.
2. You possess a reservoir for five million gallons at a height of 340 feet above ordinance datum, with capabilities of increasing this to meet your full water supply, and also making softening tanks.
3. You have obtained easements into London, and up to the Grand Junction Water Company's area.
4. You are in a position to sell or lease your water and rights to any one who may desire to acquire the same.

The Committee of Investigation as to the present water supply of London, appointed by the Corporation of the City, before which both you and I have given evidence, is a proof of the desire for a pure supply, rendered necessary by an apparently evident want, and I cannot close this without expressing a hope that the enterprise and energy you have shown may result eventually in realising what I know to have been from the first your earnest desire, namely, to supply at least a portion of your fellow-citizens with the *first necessity of life and health* in as pure a state as it is possible to be obtained.

I am, yours very truly,

C. MONCKTON, C.E., ASSIST.M.I.C.E.

28, VICTORIA STREET,  
WESTMINSTER.

NOTE 1.

No. 4 BOREHOLE.

STATION FIELD, RICKMANSWORTH  
COLNE VALLEY.

Well 12 ft. diameter, brick and cement, depth 30 ft., sunk through gravel to solid chalk.

Borehole 40 ins. diameter to 115 feet, and 24 ins. below that depth. Borehole lined with steel tubes from water surface well into the solid chalk.

Total depth of bore and well, 184 ft.

No. 1	Sample, very hard chalk and flint at	- - - - -	30 ft.	0 ins.	from surface.
" 2	" " grey chalk, no flint at	- - - - -	86 ft.	0 ins.	"
" 3	" 5 ins. of blue clay at	- - - - -	108 ft.	0 ins.	"
" 4	" Hard grey chalk at	- - - - -	108 ft.	5 ins.	"
" 5	" 8 inches of soft clay at	- - - - -	137 ft.	0 ins.	"
" 6	" Grey chalk at	- - - - -	137 ft.	8 ins.	"

*? 40' from surface*

Water rises to surface.

NOTE 2.

No. 5 BOREHOLE.

WHARFLANE FIELD, RICKMANSWORTH,  
COLNE VALLEY.

Well 4 ft. diameter, brick and cement, depth 25 ft., sunk through gravel and resting on soft grey chalk and flints.

Borehole 23 3/4 ins. all the way.

Borehole lined with steel tubes from water surface well into the solid chalk.

Total depth of bore and well, 184 feet.

No. 1	Sample, soft grey chalk and flints at	- - - - -	25 ft.	from surface.
" 2	" Hard " " at	- - - - -	54 ft.	"
" 3	" Chalk, very hard, and hard brown stone at	- - - - -	84 ft.	"
" 4	" Grey chalk with flints at	- - - - -	115 ft.	"
" 5	" Hard chalk with no flints at	- - - - -	160 ft.	"
" 6	" Soft grey chalk, no flints, at	- - - - -	172 ft.	"

Water rises to 2 ft. 6 ins. from surface.

Real Mouse 2.5'  
 Borehole 20'  
 at 30' 8' 1/2' from surface

**NOTE 3.**

**No. 1 BOREHOLE.**

SPRINGWELL, COLNE VALLEY.

Well 12 ft. diameter, brick and cement, depth 30 ft., sunk through gravel to solid chalk.

Borehole 40 ins. diameter to 105 feet, and 24 ins. below that.

Total depth of bore and well, 282 ft.

No. 1	Sample, chalk and flints at	- - - - -	30 ft. from surface.
" 2	" Very hard grey chalk at	- - - - -	84 ft. "
" 3	" Hard grey chalk and flints at	- - - - -	137 ft. "
" 4	" " no flints at	- - - - -	154 ft. "

(This sample continues to the bottom of borehole, 282 ft. from surface).

Water overflowing and running to waste in the River Colne.

**NOTE 4.**

**No. 2 BOREHOLE.**

SPRINGWELL, COLNE VALLEY,

Well 8 ft., diameter, brick and cement, depth 20 ft. sunk through gravel to solid chalk.

Borehole 24 ins. diameter, all through.

Total depth of bore and well, 192 feet.

No. 1	Sample, chalk with flint at	- - - - -	20 ft. from surface.
" 2	" Grey chalk with hard stone at	- - - - -	84 ft. "
" 3	" " with a little flint at	- - - - -	95 ft. "
" 4	" " without flint at	- - - - -	112 ft. "
" 5	" " with a little flint at	- - - - -	136 ft. "
" 6	" " without flint at	- - - - -	170 ft. "
" 7	" Very stiff grey chalk at	- - - - -	174 ft. "
" 8	" Very soft " at	- - - - -	182 ft. "

Water overflowing and running to waste in the River Colne.

**NOTE 5.**

**No. 3 BOREHOLE.**

SPRINGWELL, COLNE VALLEY.

Well 8 ft. 4 in. diameter, depth 30 ft., sunk through gravel to solid chalk.

Borehole 40 ins. diameter, all through.

Total depth of borehole and well, 115 ft.

No. 1	Sample, very hard chalk and flint at	- - - - -	30 ft. 0 ins. from surface
" 2	" " " no flint at	- - - - -	86 ft. 0 ins. "
" 3	" Blue clay at	- - - - -	108 ft. 0 ins. "
" 4	" Very hard grey chalk, no flint at	- - - - -	108 ft. 7 ins. "

Water overflowing and running to waste in the River Colne.

N.B.—The particulars in the above notes were supplied by Messrs. Mather & Platt, of Manchester, the eminent Water Engineers, by whom the borings were made. The nine *trial bores* are lined with *steel tubes* into the solid chalk.

**NOTE 6.**

**EASEMENTS.**

Easements have been granted by:—

1. Lord Ebury for construction of mains through his property between Rickmansworth and Springwell.
2. By the Grand Junction Canal Company for crossing their canal at Springwell.
3. By the late Mr. W. F. Vernon for laying mains through his property in the Parish of Harefield to the reservoirs at Harefield Grove.
4. By the Vestry of Harefield for crossing their Parish road leading to the reservoir at Harefield Grove.



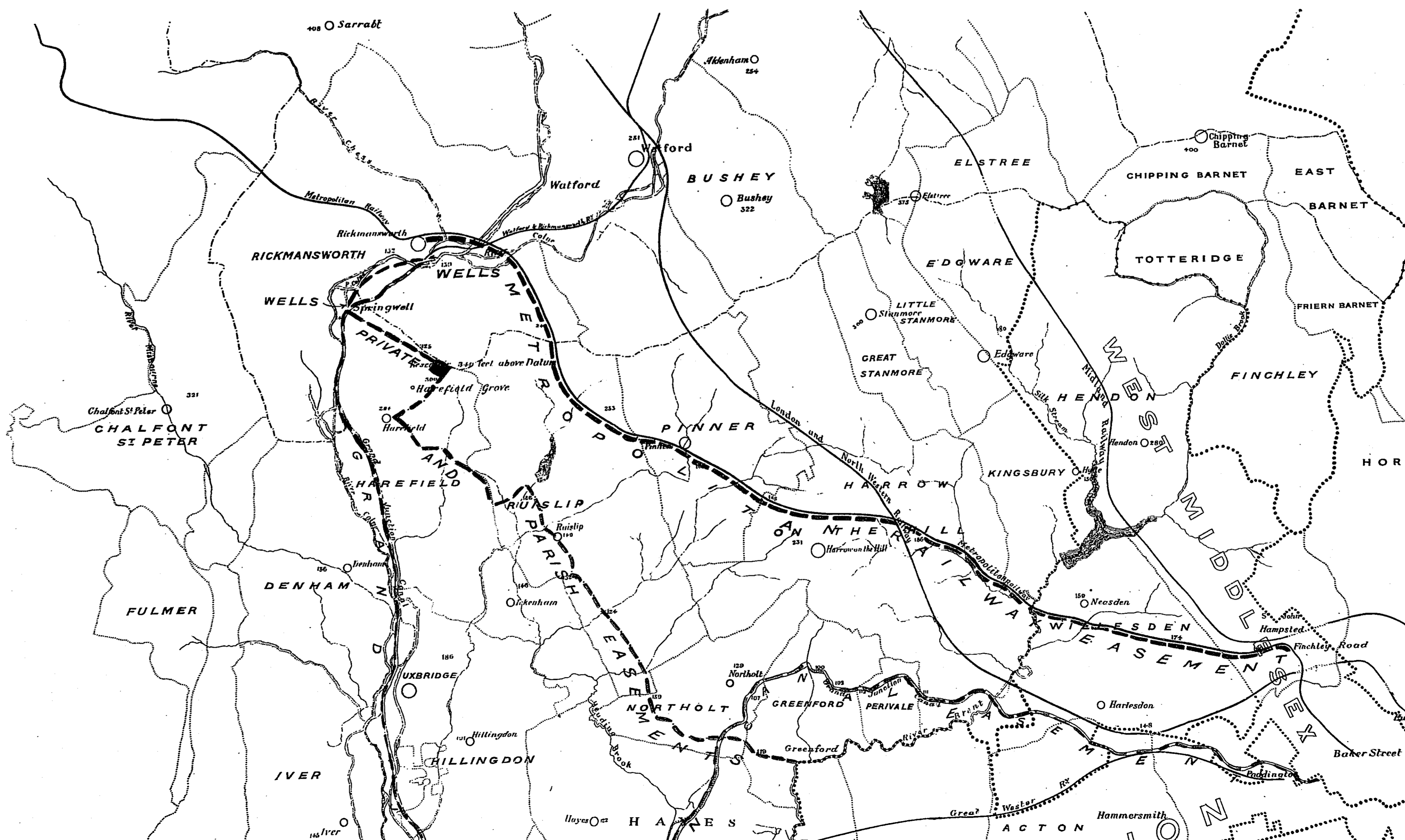
5. By the Vestry of the Parish of Harefield for laying mains under all their Parish roads.
6. By the Vestry of the Parish of Ruislip for laying mains under their roads.
7. By the Vestry of the Parish of Northolt for laying mains under their roads.
8. By the Vestry of the Parish of Greenford for laying mains under their roads up to the boundary of the Parish of Hanwell.
9. By the Metropolitan Railway for laying mains along their line from Rickmansworth to Finchley Road.
10. Negotiations have been for some time carried on with the Grand Junction Canal Company for laying a main along their tow-path from Rickmansworth or Springwell to Paddington, and these, under certain conditions, could at any time be concluded.

# —PURE SPRING WATER SUPPLY FOR LONDON—

—PROPOSED BY—

GEORGE WEBSTER, ESQ OF MAREFIELD GROVE MIDDLESEX.

SCALE OF  $\frac{3}{4}$  OF AN INCH TO A STATUTE MILE.



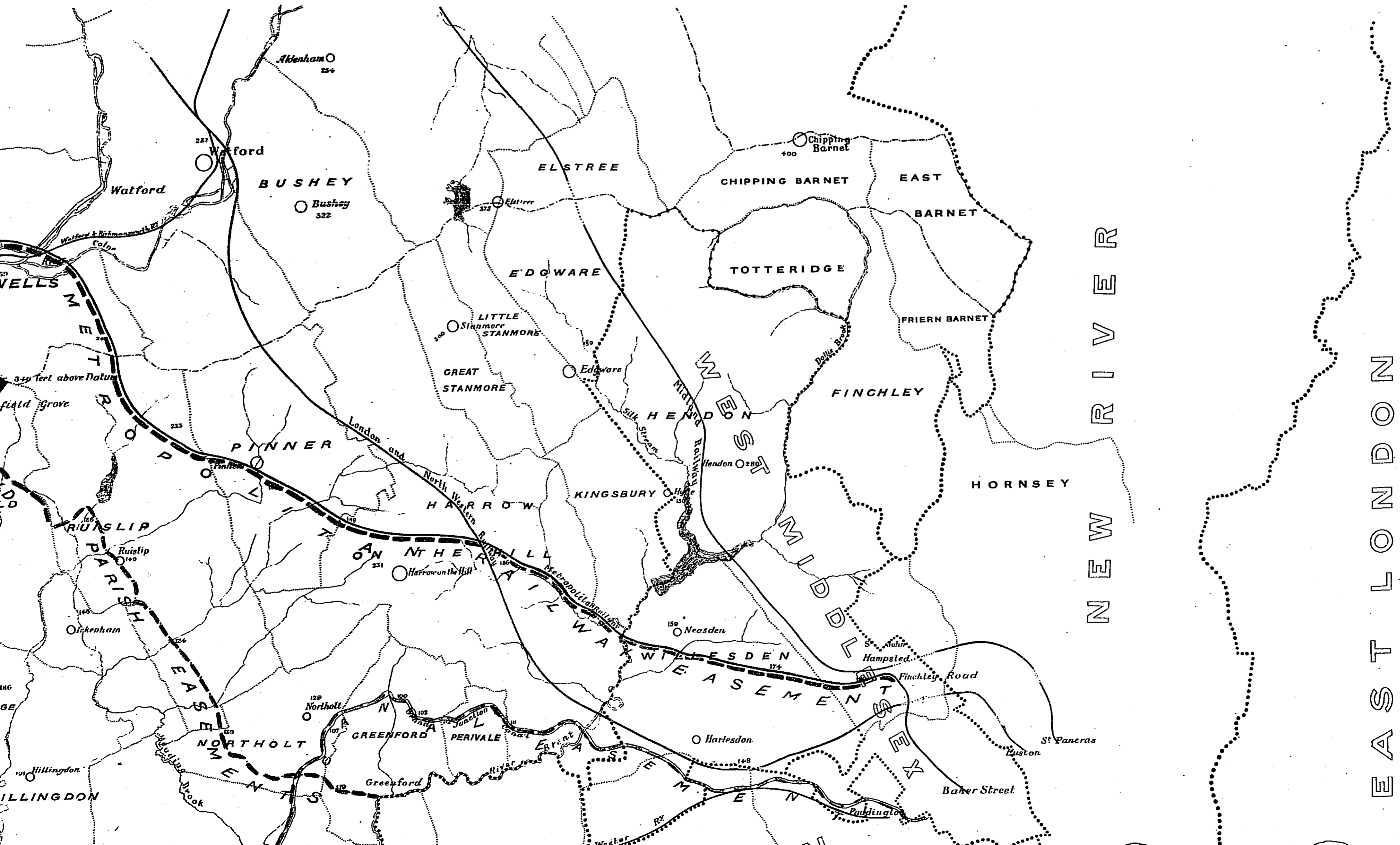
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# —PURE SPRING WATER SUPPLY FOR LONDON—

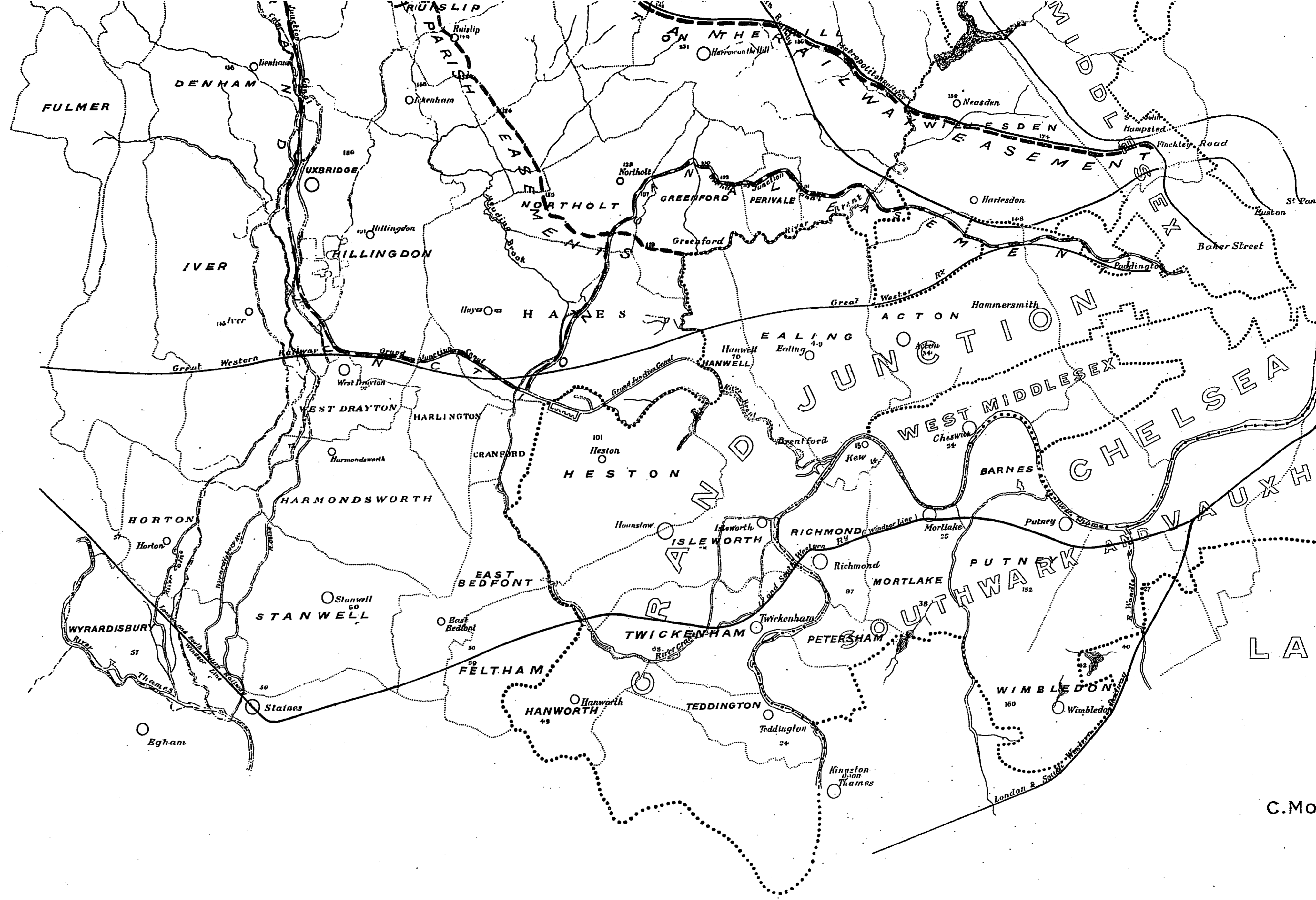
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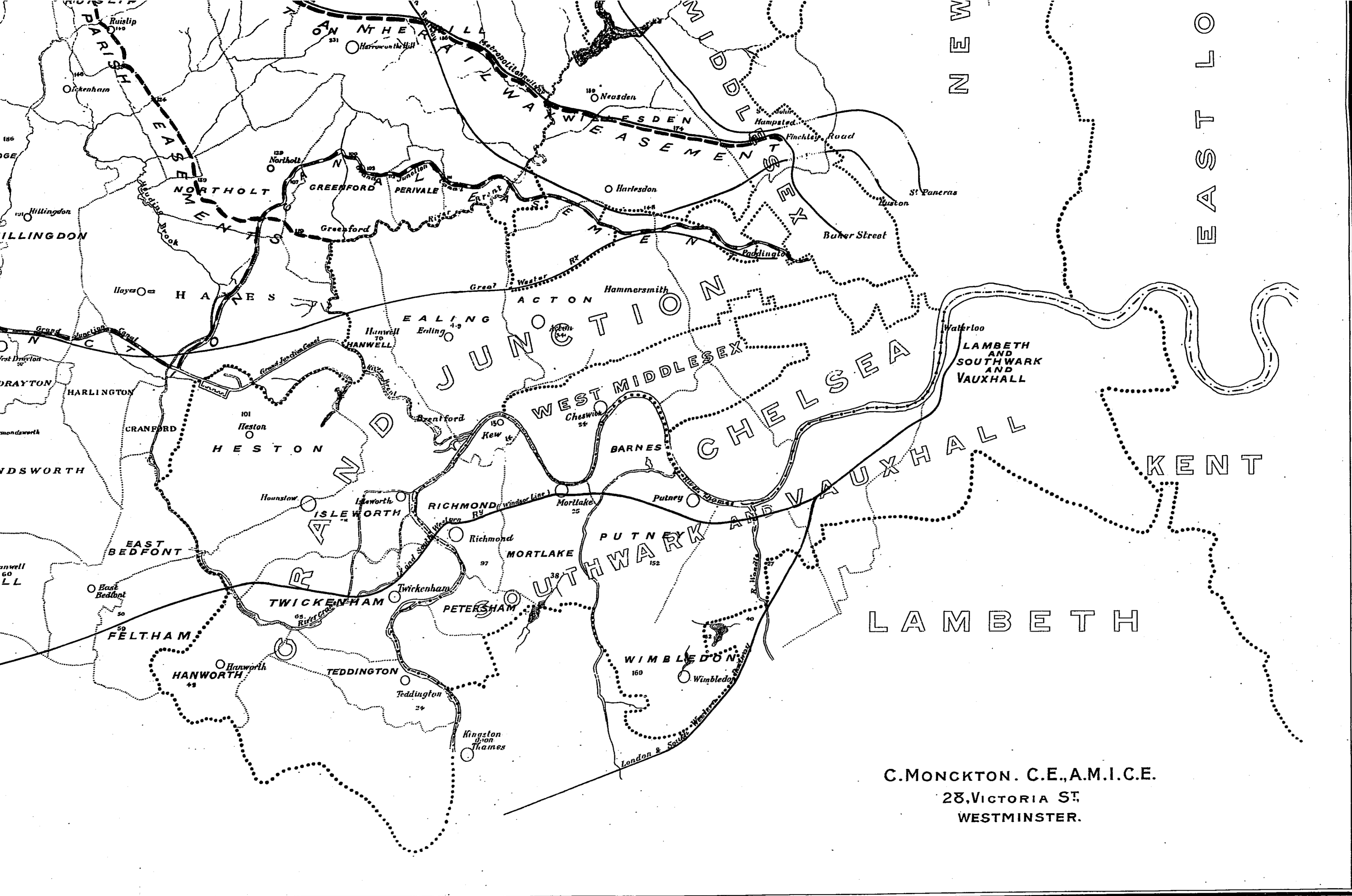






LAKE & SISON, WESTMINSTER & CITY.

C.Mo



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