

# S E C O N D   R E P O R T

OF

## THE COMMISSIONERS

APPOINTED TO INQUIRE INTO

### THE BEST MEANS OF PREVENTING THE POLLUTION OF RIVERS COMMISSION. (RIVER LEE INQUIRY.)

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### REPORT AND MAP.

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Presented to both Houses of Parliament by Command of Her Majesty.

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PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.

FOR HER MAJESTY'S STATIONERY OFFICE.  
1867.

### REPORT.

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

WE, Your Majesty's Commissioners appointed by Your Majesty's Commission, dated the 18th day of May 1865, to inquire and report as to the pollution of rivers and running waters, and also as to any remedial measures which may be practicable, having on the 29th March 1866 presented our Report on the main stream of the river Thames, proceeded to examine certain rivers and streams in the manufacturing districts of Yorkshire; but, in consequence of representations made to us upon the subject of an outbreak of cholera in the months of July and August 1866 in Poplar and other parts of the district supplied principally by the East London Waterworks Company, which Company derives its water from the river Lee, we thought it advisable to make earlier inquiry into the pollutions of the river Lee than we otherwise should have done. We commenced to make public inquiry on the 10th December 1866, at the Rivers Commission Offices, No. 2, Victoria Street, Westminster, and we continued such inquiry on the 11th and 15th of the same month, and also on the 4th of February 1867. We also, after due notice in the districts, made public inquiry in the towns of

Luton on December 12th 1866.  
 Bishop Stortford ,, 14th ,,  
 Tottenham ,, 18th ,,

Hertford ,, 19th ,,

Ware January 16th 1867

Information has been given to us by the officials and others connected with the River Lee Trust, the New-River Company and the East London Waterworks Company, and by the several local authorities in the towns and places visited, as also by millers, traders, and others. Tabulated returns are appended to the evidence of several witnesses.

In our Instructions, dated 30th May 1865, we are directed to inspect and report, first, on "the Thames valley, both as an example of an agricultural river basin, with many "navigation works, such as locks and weirs, and mills affecting the flow of water, and "many towns and some manufactories discharging their sewage and refuse into the stream "from which is mainly derived the water supply of the metropolis."

The river Lee is one of the northern tributaries of the lower Thames, rising out of springs in Leegrave Marsh, situated in the county of Bedford, and about three miles above the town of Luton. The upper part of the river and its tributaries drain a considerable area of Hertfordshire. From Waltham Abbey to Blackwall the Lee forms the boundary between the counties of Middlesex and Essex. It is tidal from the Thames to Lee Bridge, a distance of about five miles, and is navigable for barges to Hertford, a total distance of 28 miles. **The Stort joins the Lee at Feilde's weir, and is navigable for a distance of 13¾ miles.**

The area of the entire watershed of the Lee is about 500 square miles; or 320,000 statute acres, the dividing ridges to the west, north, and east, ranging from 450 to 300 feet above medium tide level..

The following is a list of the Tributaries from the north, east, and west into the main River, with the Population (as given in the last census) and number of Mills in the basin of the Lee.

	Boroughs, Towns, Parishes, Hamlets.		No. of Mills.
	No.	Population.	
The Lee proper	54	621,102	31
Tributaries north of Lee :			
Mimram	14	10,269	8
Beane	20	13,265	6
Rib and Quin	16	12,374	6
Ash	9	4,638	3
Tributaries east of Lee :			
Stort and Pineey Brook	27	25,064	12
Cobbins Brook	1	2,105	—
Tributaries west of Lee :			
Turkey Street Brook	4	3,106	—
Salmon Brook	9	21,174	—
Moselle	4	19,975	—
	158	733,072	66

Population in the basin of the Lee above point of abstraction (between Hertford and Ware) of the water by the New River Company, exclusive of Hertford, 73,526.

Population in the basin of the Lee above point of intake (at Ponders End) of the water by the East London Waterworks Company 153,030.

The canals which form junctions with the navigable part of the river are :—

Name of Canal. Point of Junction with Lee.

**Lee Union Canal.  
Limehouse Cut.**

**Old Ford.  
Bromley.**

Towns and Places on the Banks of the River Lee and the Population as given in the last Census.

Borough, Town, Hamlet.	Population.
Leegrave, Beds	426
Luton, Beds	15,329
Whenthamstead, Herts	1,960
Hertford, Herts	6,769
Ware, Herts	5,002
Great Amwell, Herts	1,660
Stanstead Abbots, Herts	980
Stanstead St. Margaret's, Herts	93
Hoddesdon, Herts	1,898
Broxbourne, Herts	765
Wormley, Herts	372
Cheshunt, Herts	6,592
Waltham, Essex	5,044
Waltham Cross, Herts	2,029
Enfield, Middlesex	12,424
Edmonton, Middlesex	10,930
Chingford, Essex	1,174
Chapel, Essex	370
Tottenham, Middlesex	13,240
Stamford Hill, Middlesex	5,483
Homerton, Middlesex	8,663
Stratford, Essex	15,994
West Ham, Essex	22,337
Old Ford, Middlesex	7,158
Bow, Middlesex	11,590
Bromley, Essex	24,077
Poplar, Middlesex	43,529
	<b>226,088</b>

The geological character of the river Lee basin is shown on a map appended to this Report. From the watershed on the north down to Hoddesdon the area is mostly chalk; from this point southwards towards the Thames the chalk passes beneath the plastic and London clays; in the several valleys the strata are covered by alluvial sand, gravel, and silt. Although the greater portion of the area is described as a natural filter, it is stated in the evidence that out of an average rainfall of 25 inches four-fifths or 20 inches are evaporated. The dry weather flow of the river Lee and its tributaries is described as, for the most part, spring water. The upper portions of the area are seldom flooded; there are, however, heavy floodings in the lower portion. There are also considerable areas of marshy land which arterial and land draining would improve.

The average annual fall of rain is about 25 inches, so that as compared with parts of England on the south and west coasts of Devonshire and Cornwall, or with the northern districts in the neighbourhood of the Solway, where the average fall of rain ranges from 36 up to 60 inches, the climate of the valley of the Lee is comparatively dry.

Mr. Beardmore, Mr. Greaves, and Mr. Muir furnish tabulated returns of local rainfall, which will be found appended to their evidence. It will be seen in these tables that there is considerable variation as to the total volume of rain falling in any one year. An average serves to contrast one district with another district, but

taken alone is not a trustworthy guide either for navigation purposes or for water-supply. The test in both cases is the rainfall of the driest years. The wide variation of rainfall is shown in the following extracts from the several tabulated returns.

EAST LONDON WATERWORKS.—Mr. Greaves.

Rainfall.

1860. Total depth from January to December -----	32.558
1864. Ditto ditto –	15.891

RIVER LEE NAVIGATION.—Mr. Beardmore.

Feilde's Weir, Herts, 90 feet above sea.

Rainfall.

1852. Total depth of rain, January to December -	39.500
1854. Ditto ditto -	17.900
1860. Ditto ditto -	33.750
1864. Ditto ditto - - - - -	17.880

NEW RIVER WATERWORKS.—Mr. Muir.

Hoddesdon.

Rainfall.

1860. Total depth of rain, January to December -	32.358
1864. Ditto ditto ....	16.405

ENFIELD.

Rainfall.

1860. Total depth of rain, January to December ... -	37.125
1864. Ditto ditto .....	18.490

These returns show as regards the valley of the Lee that in a dry year not quite one-half the depth of rain falls as in a wet year; during dry years much less water flows off the surface of the ground, and spring water is very much reduced in volume. The permanent water capacity of the Lee valley must therefore be measured by the *minimum* volume of rain falling on its surface rather than by the average.

Like the river Thames, the river Lee has been navigable from time immemorial; but whilst on the Thames the navigation works had fallen into ruin, through the abstraction of trade by railways and through neglect, on the Lee the weirs, locks and other works are at this time in better order, the navigation is more efficient, and the trade is greater, than at any former period. The drainage area of the river Lee, as stated previously, is in round numbers about 500 square miles, the area of the Thames, including the Lee, is about 5,000 square miles, so that the relative areas of the two rivers are as nine to one; but the areas from which water is drawn from the Thames and the Lee respectively for the supply of London are as about eight to one. Five great water companies draw water from the Thames for the west and south of the metropolis, and two great water companies abstract water from the Lee for the supply of the eastern and northern parts of the metropolis. The minimum dry weather flow of the Thames at Teddington lock is about 350,000,000 gallons of water in each 24 hours, the extreme dry weather flow of water down the Lee at Lee Bridge is little above 40,000,000 gallons in each day of 24 hours.

About one-half of the population of the metropolis receive their water supply (some 48,000,000 gallons per day) from the Thames, whilst the other half of the population is supplied with about 38,000,000 gallons from the Lee (as distinct from springs in the valley of the Lee), the New River Company supplying a population of 840,000 persons, and the East London Waterworks Company a population of 675,000 persons; the two companies together supplying 1,515,000 persons out of 3,037,991 the entire population

within the metropolitan area. In each case the Water Companies possess statutory powers to draw larger volumes of water than those named, but want of pumping power on the Thames and deficiency of water in the Lee during dry periods have limited the daily volume given in each case up to the present time.

In our first report on the Thames we show that pollution is general from the estuary to the highest point of the main stream. The great intercepting sewers of the metropolis intercept sewage from Hammersmith to Barking Creek on the north side, and from Putney to Crossness Point in Erith Marsh on the southern side, where it is passed into the ebbing tide; the Metropolitan Board of Works has entered into arrangements for the utilization of the sewage on the northern side, and are about to make arrangements for utilizing the sewage on the southern side. By an Act (29 & 30 Vict. c. 89) passed in the last session of Parliament, the Conservators of the Thames received powers to prevent pollution on the main stream of the Thames and of its tributaries for three miles on both sides above Staines, and this session the Conservators have before Parliament a supplemental Thames Navigation Bill, to prevent pollution by sewage from the towns of Richmond, Kingston, Surbiton, East and West Moulsey, New Malden, and Hampton Wick. As in the case of the Thames, so in the case of the Lee, we have found, on inquiry, that pollution of the waters by sewage is general. Details as to this pollution are given in a subsequent part of this Report.

The tidal portion of the Lee and the marshes on both sides of the River Thames were embanked at some early period, beyond any known written or reliable history. The oldest works on the river were the lower embankments, and the earliest works above the tidal flow were no doubt connected with the navigation. Milldams would be constructed at an early date to obtain water-power for grinding corn, and rights of fishing may probably be as old as any other interest on the river. The earliest population would use and pollute the water to some extent; and as no Conservancy Board has ever had jurisdiction over the entire river-basin, all those portions of the river and of its tributaries not required for navigation or for mill purposes remain, for the most part, in a state of nature; that is, neither embanked nor controlled in any useful way; hence the large areas of neglected marsh-land to be found on both sides of the river down to Lee Bridge. The rapid growth of the metropolis during the last half-century has caused a large increase in the population of the lower part of the valley of the Lee; and as no effective means have been taken to prevent pollution, this has also increased with the growth of population and extension of trade and manufactures. Formerly comparatively little of the water was used for domestic purposes; at present, the entire dry weather volume of the river over and above that required for navigation is taken for domestic and trade purposes.

The lower portion of the Lee valley, where the river forms the eastern boundary of the metropolis, is partially occupied by commerce and trade, but by far the largest area of the watershed above Lee Bridge is agricultural. Luton and the district around have the largest straw-plait trade in the world, and malting is extensively carried on in the towns of Ware and Bishop-Stortford, but in each case the manufacture and trade are principally connected with and contingent upon agriculture. There are water mills on the several streams in the area, but principally **on the Stort** and on the Lee. These mills are chiefly used for grinding flour; some for crushing out oil. Water-power is used at the Government gunpowder mills near Enfield, and also at the Small Arms Manufactory. There is one small paper mill near Luton. All the water mills on the river Lee, between Ware and Lee Bridge (except the Government mills at and near Enfield, and one at Broxbourne), belong either to the river Lee trustees or to the New River and East London Waterworks Companies. The mills situated **on the Stort** are private property.

*Pollution.*—In following the course of the river Lee, in order to estimate its pollution, it may be convenient to consider separately:—

1st. The upper district above the intake of the New River Company at Hertford.

2dly. The middle district included between that point and the intake of the East London Waterworks Company at Ponders End.

3rdly. The lower district to the junction with the Thames at Blackwall.

The upper district contains a population of about 73,000.

The Lee begins to be polluted close to its rise and while yet a slender stream. The first great source of pollution is the sewage and manufacturing refuse of Luton, the largest town in the upper valley, numbering now upwards of 20,000 inhabitants. The town is sewered, and most of the houses in it are drained; and

there are at present from 1,000 to 1,500 waterclosets in use. As the result of a compromised litigation with a large landed proprietor in the neighbourhood, the sewage and other refuse, before being cast into the river, are clarified by a liming process. The fresh sewage is mixed with a proper proportion of lime, and the semi-fluid after being so treated is passed into tanks of three or four feet in depth, where a separation of the solids and flocculent matters mechanically suspended takes place; the effluent water more or less clarified flows direct into the stream of the Lee, and downwards to the waterworks and navigation. This process of clarifying sewage improves it in so far as the solids are removed, but the fluid remains sewage, and if allowed to stagnate will become putrid and offensive; mixed with a much larger volume of water and continued in motion it seems to become purer as well as more clarified by the effects of the subsoil, air, and light, and after flowing a few miles the water loses a further portion of the sewage ingredients.

The bleaching and dyeing of straw-plait, the manufacture of which is the staple trade of the town, is undoubtedly a source of very considerable pollution of the water of the river Lee. Large quantities of various metallic salts, dye-stuffs, brimstone, and other objectionable and, in some cases, poisonous materials are, after use in the processes of cleansing, bleaching, and dyeing of the goods, discharged into the stream from which water for the domestic use of a large portion of London is drawn. It is true that the substances so finding their way into the river Lee, though large in quantity in the aggregate, are diluted in the much larger volume of water, and that there are natural influences at work which serve greatly to modify their noxious properties. We learn, indeed, with something approaching to dismay in the first instance, that one manufacturer alone employs from one to two tons of oxalic acid in bleaching straw-plaits, but are somewhat re-assured upon consideration that the poisonous character of this substance is entirely destroyed by admixture with the carbonate and sulphate of lime contained in the water of the river. But the answer to this as to other like pleas for pollution of rivers founded upon the counteracting influences of natural causes is, that we ought not to be dependent upon any such fortuitous protection. No justification of the discharge of these refuse matters into the river can be offered. There is no reason to believe that they would in any way be injurious to vegetation when mixed with sewage, and although it is shown in evidence that the bleaching, and more especially the dyeing, of straw-plait is to a great extent carried out in detail, and on so small a scale as to preclude separate purification of the refuse, there can be no reason why it should not pass into the sewage, and with the sewage on to land.

The town next in importance to Luton is Hatfield, which contains a population of about 4,300. The plan for disposal of the sewage was adopted with a view to its complete exclusion from the river. But it is essentially a "dumb-well" system, and the effect must be more or less to pollute the subsoil water, which after passing through the chalk or gravel subsequently finds its way to the river.

Except at Luton and Hatfield, the sewage of the upper district is not dealt with remedially in any manner. Villages and houses situated immediately on the banks of the stream, no doubt pollute the river; thus we were informed that "Whitwell is a place where privies hang over the water, and in Welwyn the whole of the sewage runs in." To a certain extent also the river is polluted by sheep-washing, which is carried on upon a large scale. The preparation used for dipping sheep contains arsenic; and when sheep come to be washed months after they have been dipped, the poisonous ingredients, it would appear, remain in the wool sufficient to make the water for the time unwholesome for fish to live in. But from the general district (exclusive of towns on the river and tributaries) the pollution is insignificant, the population being chiefly agricultural. Almost all the water falling upon this part of the Lee basin is absorbed or evaporated. The Lee and its tributaries above Hertford are consequently rarely flooded, and but slight abrasion of the surface takes place, so that scarcely any refuse is washed into the streams.

The middle district, lying between the commencement of the New River at Hertford and the intake of the East London Waterworks at Ponders End, comprises a population of 79,000 persons.

Hertford might seem to be more properly placed in the upper district, because it is a short distance above the point of the commencement of the New River, and formerly its sewers delivered into the Lee above the same point. But by an Act passed in 1854 the New River Company obtained powers to lay down intercepting main sewers through the town; to construct works for treating the sewage by the liming process; and to convey the effluent water past the New River head into the Lee above the town of Ware. The New River Company have completed these sewerage and outlet works at an outlay of about £22,000 and maintain them; they also subject the sewage to a liming process at a further cost of about £700 per annum, sparing neither trouble nor money. The effluent water usually passes away clear, but being, as it is,

the sewage of nearly 7000 persons, it cannot be otherwise than a nuisance, and it is, according to the evidence, a constant cause of complaint to the people of Ware.

Ware, in its turn, in the disposal of its sewage, shows no consideration for towns below. It is a town numbering some 6,000 inhabitants, and its sewers receive the discharge from upwards of 220 waterclosets, as well as household drainage. This sewage, without any liming or other sort of treatment, is passed direct into the river by several outlets, an arrangement which tends to diminish the local nuisance, but does not diminish the total amount of pollution caused to the river. In addition, the authorities of the town of Ware cause putrid refuse from cesspools to be conveyed beyond the town and there thrown into gravel-pits. The soakage from these masses of refuse must in some degree pollute water in adjoining wells, and also the subsoil water which eventually reaches the river.

Below the town of Ware the Lee is joined by the river Stort. In time of flood the Stort brings down large accumulations of sewage and mud from the towns on the banks above. The chief of these is Bishop-Stortford, a town of upwards of 5,000 inhabitants. Drains are general throughout this town, though main sewers have not been laid down on any proper system; these drains receive and discharge into the river the sewage refuse of the streets, houses, and other places, as also the contents of upwards of 300 waterclosets. The effects of this pollution are very sensible at the lower part of the Stort. Mr. Garratt, of Hunsdon-Mill, which is about eight miles below Bishop-Stortford, describes the river as becoming yearly fouler and fouler; every house on the river drains into it; farmyards also; carcasses float on the surface, and the bed becomes silted up with refuse.

At Ware, Bishop-Stortford, and other places on the river Lee and its tributaries, the process of malting barley is largely carried on, and gives rise to a pollution of the streams which is objectionable rather in a local than a general sense. The liquid which results from the steeping of barley to cause it to germinate, is a solution of various vegetable substances, not in themselves injurious, but liable to become offensive by fermentation. The evidence tends to show that this result does frequently occur, and the discharge of the liquid into the rivers is, under any circumstances, to be deprecated. On the other hand this refuse, which is objectionable in the river, would be beneficial to land; and as in most instances the maltsters' operations are carried on in the towns or in close proximity to them, the obvious method of disposal of the steep-liquid is through the sewers on to the land.

Below the junction of the Stort, the towns of Hoddesdon, Broxbourne, Cheshunt, Waltham-Abbey, Waltham-Cross, and Enfield-Highway, discharge sewage into the Lee.

The Lower District commences from the intake of the East London Waterworks Company at Ponders End. From this point the river ceases to be a source of water supply, and becomes, in a great degree, like an open common sewer. At the foot of Tottenham Lock is the outfall of Catchwater-Dyke, an open ditch which the East London Waterworks Company under their Act of 1853 have constructed to intercept the sewage of the towns on the west of the Lee for some miles above the reservoirs of the company, and to discharge it below. From this single outlet the Lee receives the sewage of Enfield, Edmonton, Hornsey, ChippingBarnet, East-Barnet, and Hadley, in its original condition, unmitigated by any process, except so far as it has undergone oxidation in its course along the open ditch. The outlet itself is very offensive in summer. Immediately below are situated the Tottenham sewage works with an outlet into the river Lee. Tottenham is at present a town of some 16,000 inhabitants, having upwards of 2,000 waterclosets, and a water supply of 400,000 gallons per day. The subsoil and open ditches bring the volume of water discharged from the district up to 700,000 gallons each day. The sewage at Tottenham is limed and the solids precipitated, but the effluent water retains so much sewage matter that the Lee Trustees, as protectors of the navigation, and of the health of those employed upon it, have recently obtained from the Court of Chancery an injunction to prevent the Local Board of Tottenham from casting their sewage into the river, so as to create a nuisance.

Leyton, Leytonstone, and Walthamstow, from the Essex side add, as stated in the evidence, considerable pollution to the Lee.

West Ham, a large and now populous parish, with four-fifths of its houses provided with waterclosets, throws the whole of its sewage into the receding tidal water of the Lee near to its junction with the Thames. The pumping of this sewage costs the locality at present £1,000 per annum. A large volume of sewage at each low water is also discharged by gravitation ; but so foul is the river Lee here that we were told by the

engineer to the Local Board that this enormous volume of sewage makes absolutely no visible alteration in the river. It should be stated that the discharge at this point into the Lee of the West Ham sewage, is only a temporary arrangement, and an alteration is now under consideration.

Pollution from sewage and refuse of manufactories, notwithstanding the efforts of the Lee Trustees to prevent it, is much on the increase. Large sums of money are spent in dredging out sewage-mud which has accumulated in the bed of the river. The river at Old Ford is rendered very pestiferous during hot weather from the discharge of impurities from large chemical and other works on the banks. The Limehouse cut in summer is also very foul. The district immediately bordering the tidal portion of the Lee has become a nuisance district, the seat of trades expelled beyond the limits of the better parts of the metropolis.

The evils of this pollution are greatly aggravated by two causes, shortness of fresh water in the river Lee and the action (rising and falling) of the tide. The Water Companies now draw direct from the Lee about 38,000,000 gallons of water daily and in consequence, during the extreme droughts of summer, the volume of the river below the intake of the East London Waterworks Company probably would not much exceed the 5,500,000 gallons to which the Lee Trustees are entitled above Old Ford Lock. Thus whilst the pollutions tend to multiply, the water wherewith they might be diluted tends to fail. At neap tides the river is reduced to a small foul stream, oscillating at the bottom of a muddy creek, and there exposes an area of eight acres of oozy mud and sewage deposit, verging into a state of putridity. During the last two summers the engineer to the Lee Trust has thought it advisable not to open the gates at Bow Locks for the receding tide. The flood tide flows through, bringing up vast quantities of refuse from the Thames and the Lee, and being locked in at Limehouse and Bow, deposits the sewage. Thus the evil is ever accumulating.

*Sewage of Towns on the Lee.*—The variety of systems now in operation and which have been attempted by towns situated within the Lee basin to get rid of their sewage, shows the difficulty that is experienced in dealing with it.

Luton, Hertford, Enfield, and Tottenham have sewage works. At Enfield the solid part of the sewage is separated and the fluid goes to the river; at the other towns the lime process is adopted. Ware, **Bishop-Stortford**, Edmonton, and other towns pass sewage into the Lee and its tributaries without any attempt at clarification. The visiting justices at Colney-Hatch tried irrigation by hydrants, but it was considered unsatisfactory, though the crops were reported to be good. The British Land Company tried filtration through burnt gravel at East-Barnet; at present the sewage is passed into dumb-wells, but the attempt to get rid of it in this manner is said to be a failure at both these places. At Hatfield the solid matter is first separated and the liquid is allowed to soak into the chalk. The sewage of Hornsey and Wood-Green passes into the Tottenham ditches, there stagnates and creates a great nuisance; that of Chipping-Barnet produces a similar nuisance at East-Barnet.

Cesspools exist to some extent in every town situated within the area; the contents are usually carted on to the land, but the Board of Health of Ware cart much refuse into gravel-pits beyond the town, where it wastes away in the subsoil on the dumb-well system.

Every plan hitherto adopted is unsatisfactory. The lime process does not purify the sewage even when carried out most carefully by the New River Water Company as at Hertford. The discharge of effluent water from these works and *d fortiori* sewage direct from towns into the Lee and its tributaries should be strictly prohibited. The practice of passing sewage into dumb-wells cannot be justified, it must contaminate water to some extent, though it would be difficult to prove it in many cases. The water percolating to the subsoil of the Lee basin liable to this pollution may be used subsequently for domestic purposes. The nuisances occasioned by passing sewage into open ditches shows that any general prohibition against sewage being carried into rivers or running streams should extend to its discharge into ditches and watercourses of all descriptions, although they may be occasionally dry. Open cesspools too frequently partake of the character of dumb-wells, with this important aggravation that they poison the shallow wells near them instead of the water of deep-seated springs. The mischievous effects of these cesspools on the health of the inhabitants were clearly proved at Luton, Ware, and Mile End Old Town, and such cesspools should be compulsorily closed.

Closets or privies supplied with dry earth or ashes may be adopted where the watercloset system is not introduced; they should be built at least 10 feet from any house, be properly managed, and frequently

cleaned out, under vigilant inspection from the local authorities. When these conditions are complied with, they do not injuriously affect the health of the people.

All nightsoil and sewage should be conveyed rapidly and regularly to the land in some way or other; it is a manure too valuable to be wasted as at present; if allowed to remain and ferment among the persons producing it, it is sure to cause disease; on the other hand, nothing can justify the common practice of merely getting rid of it irrespective of the injury and annoyance it may cause to others.

All main sewers and house-drains should be fully ventilated; at Luton, and other towns where a system of sewerage has been carried out without proper ventilation, sickness has invariably resulted from gases entering the houses.

We have received very conclusive evidence as to the success of waterclosets for the poor where they are properly looked after, as at West-Ham and Mile-End Old-Town.

*Litigation.*—The Lee exemplifies the evils inevitably entailed by absence of river government. Left without control, towns naturally take advantage of running water to get rid of their sewage, regardless of the fact that the process is simply a transfer of the nuisance from themselves to their neighbours lower down the stream; litigation follows; but litigation besides being expensive and breeding ill-will is unsatisfactory. Courts of law are in fact incompetent to deal with the difficulty, and too frequently the party proceeded against may not possess either the legal power or the pecuniary means to provide by permanent works a good and sufficient remedy. The town authorities of Luton are under a perpetual injunction obtained against them by a wealthy landed proprietor in the neighbourhood, which prohibits them from casting their sewage into the river unless it has been first treated by lime. The people of Luton have carried out the injunction strictly, and have remained safe. The New River Company which, as already stated, subjects the Hertford sewage to the same process, and in a still more careful manner, is nevertheless complained of and threatened with litigation by the authorities of Ware. But in both cases the result is the same; the large sums are annually spent in vain, the effluent water remains to all purposes sewage, and, except to the eye, the Lee receives both from Luton and Hertford almost as much sewage pollution as if that process had never been performed. In point of fact, if a river is really foul, it is safer that it should look so.

The authorities of Bishop Stortford resort to singular operations to deliver themselves from their sewage, which the clerk to the Board of Guardians thus describes:

"The nuisance of which the inhabitants have complained from the smell of the river was during last summer and the summer before, but it was very much abated in consequence of our having wet seasons, and a plan was adopted that succeeded remarkably well, and that was this: during the summer, when the water is very short, the filth will sometimes almost crop up to the mouth of the drains, and when there has been a flood in the winter this accumulation has been stirred up by a barge and a heavy rake behind, so that we have passed it on to our neighbours to some extent. We thought we had kept it long enough, and by use of the flood water relieved ourselves from a considerable quantity of stink by that means."

Bishop Stortford has hitherto escaped litigation, but the same witness informed us,—

"We have been threatened by several parties. Our neighbours at Sawbridgeworth have told us that we have been poisoning them. We have said that we are sorry for it, but we think that they contribute to the nuisance to some extent themselves, and we have therefore not heeded what they had to say."

Millers on the same stream are almost obliged to resort to similar practices by way of self-defence. Mr. Garratt, of Hunsdon Mill, who has been much troubled with accumulation of mud, says,—

"I find that other people send the mud to me; and I had a large hoe constructed, and I put four horses to it, and I sent the mud down again into the navigation. It is cheaper than throwing it out."

The condition of the lower end of the valley, where the population is much denser, and adoption of the watercloset system is more general, is of course much worse. Various towns on the Lee, and local authorities on the outskirts of London, have been or are at litigation one with another. To preserve the purity of Edmonton Brook, Edmonton has obtained an injunction against Enfield, and is applying for an injunction against the Trustees of Colney Hatch Lunatic Asylum. Tottenham last year instituted proceedings against Hornsey for fouling Moselle Stream, but although both the fact of the nuisance and the

right of Tottenham to relief were equally undoubted, no relief could be given by the law, because there was no public body at Hornsey to be made amenable. The Lee Trustees a few years ago obtained an injunction against the Metropolitan Board of Works, and £820 damages in respect of injury done to the navigation by discharge of sewage from storm-water outlets belonging to the Board. The Lee Trustees also recently filed a bill against the authorities of Tottenham, to put an end to the nuisance from their sewage works, and especially to prevent the sewage of Wood Green and West-Green, which are districts within Tottenham parish, being added to the sewage of the rest of the parish, which is now discharged into the Lee. An injunction with costs has been granted, and the consequence will be that the sewerage works of Wood Green and West Green, which the Tottenham Board of Health have just completed at a cost of £9,000, will be rendered useless; that the population of the two districts will be condemned to fall back on the noxious system of cesspools, already temporarily made; and lastly, that the overflow from these cesspools will be a nuisance not only to the parish, but also to its neighbours; and so perhaps Tottenham may escape from its litigation with the Lee Trustees only to find itself involved in litigation with Edmonton. The only means of putting an end to this litigation is for the Legislature to prohibit throughout the valley the casting of sewage into flowing water, and to create a Conservancy Board whose duty it shall be to see the prohibition carried into effect.

Sewage can very generally throughout the Lee basin be applied to land without difficulty, by gravitation. When pumping is required, towns may fairly be required to adopt it. The purification of the watershed of the river Lee from sewage may involve separate sewerage systems, and also the application of sewage to land for agricultural uses at several points, as at Dunstable, Luton, Stevenage, Buntingford, Bishop-Stortford, Harlow, and several towns and villages in the lower valley, from Hertford and Ware downwards. Schemes to drain all the towns and villages below Hertford would probably be very costly in the first outlay, because the subsoil is so full of water that large volumes of spring and subsoil water would enter sewers and drains in process of formation. On the other hand, under proper control, this abundance of water would eventually be an advantage, as sewage largely diluted is moved to the outlet more quickly and steadily and in a fresher state than when sewers and subsoil are dryer. Combination of the sewerage of towns situated in the higher or middle districts of the valley would involve large and long expensive culverts, whereas small sewage farms would find a readier market for the produce than large farms removed from the population. In the lower valley it may be difficult or impossible to obtain land for sewage irrigation, and it may be expedient, and it is certainly possible, for such towns as Enfield, Edmonton, Tottenham, and other districts, to combine and carry their sewage by continuous sewers either to the Metropolitan outlet or to land in the lower valley of the Thames.

#### *Application of Sewage for Purposes of Irrigation*

In our Report on the Thames, (pages 12 to 15,) we have described at some length the modes of sewage irrigation as practised at Croydon, Norwood, Worthing, Carlisle, and Edinburgh; we have little to add to this account other than that experience confirms the practice of this mode of disposing of sewage. In the course of our inquiry we have received evidence as to its advantage. At this time, April 18th, there are crops of Italian rye-grass at Worthing grown under sewage irrigation, which are being cut at the rate of from five to eight tons to the acre, whilst adjoining pasture-lands are almost bare. A small dairy has been established, the cows being stall-fed on the cut grass; the milk produced, from its richness and superior quality, commanding a preference in the town. A sewage farm requires special and peculiar management; the operations should be specially adapted to this mode of culture, and then it will be found that any land may be improved. The operations do not turn clay lands into swamps, although 60 inches in depth of sewage are added by irrigation to the rainfall. The dressings with sewage must be even and at regulated intervals. In all cases sewage should be used fresh, that is before putrescence has set in, so as to prevent any effluvia arising from the irrigated land. Where this is the case there cannot be any just grounds for complaint. Where clay lands are irrigated, and the contour of the land will admit of the operation, a second and even a third use of the water may be made with advantage.

Sewage irrigation works cannot be too simple in their character; the application should be by surface carriers, not by underground piping and hose and jet. Land which has been worked in ridge and furrow will require levelling, that is the soil should be stripped or the ground be broken up so as to bring the surface even. Main carriers should be laid in nearly level lines so as to command the area below, and secondary carriers at from half a chain to one chain apart should contour the entire surface. The main carriers may be covered in, having valves or sluice-boards of an inexpensive and simple kind to retain and let out sewage as

required. The main carriers will be of brick or of earthenware pipes in size proportioned to the volume of sewage to be distributed. Conduits below 18 inches in diameter may be made most cheaply of earthenware pipes: brickwork may be cheaper for conduits of larger cross-sections. Small carriers may be formed with common agricultural tiles, but jointed and laid only three parts in the soil, so that one tile or more than one tile can be removed temporarily at any point to allow of surface overflowing at such points when the tiles are removed for this purpose. All ordinary conduits may be open trenches, readily formed by hand labour or by the plough. These subsidiary contour gutters must not necessarily be looked upon as permanent. After one sowing of Italian grass has run its course (this should not exceed two years) these minor conduits may be ploughed up with the rest of the land. Some farmers will probably clean the land by taking a root crop off it, and then lay it down again for a second course of Italian rye-grass, and so on. Proper irrigation and cultivation neither fouls the land nor exhausts it. Where sewage irrigation is the cause of a nuisance it will be found to proceed either from use of old and putrid sewage in large and foul open ditch-like carriers, or from open tanks and large carriers being allowed to become foul.

A sewage farm not only requires a peculiar mode of cultivation, but also special management in dealing with the produce. Tolerably good land under sewage will produce from five to seven crops of Italian grass per annum, weighing in the aggregate when green from 50 to 60 tons per acre. A first cutting at Worthing, in May 1865, was from 20 to 25 tons per acre. The grass is used to the best advantage on the day it is cut and is most profitably applied to stall-feeding dairy cows. With such rapid growth and weight of grass a special market for the produce of the land must be provided to prevent waste, failure, and disappointment; but as milk and butter are a necessity, and as good milk and butter will command a preference in the market, there need not be any difficulty with a sewage farm because of its great productiveness. This has been, however, a complaint made against sewage irrigation in some places—a market did not offer means for immediate sale, the grass spoiled in keeping, and therefore the experiment was pronounced a failure. In course of time sewage farming will become a special business, and when it is found that there is more profit in a sewage farm than in an ordinary farm, the system of sewage irrigation will have been solved. Where there is sewage there must be population. Milk, butter, and beef will therefore necessarily be in proportionate demand; so that, when the true use of sewage is understood, that which is the cause of nuisance by being wasted will be turned to profit on the land.

*Floods.*—The valleys above Hertford are seldom injuriously flooded, as the chalk subsoil is absorbent, and the gradients are tolerably steep. When floods do occur, the water, though turbid for the time, subsides rapidly and soon becomes clear again. Below Hertford, floods are liable to act injuriously, the water remaining longer on the adjoining marsh lands. Mr. Beardmore stated that heavy floodings had taken place in May 1824, in November 1852, and in October 1857, and that at such times large areas of land were, laid under water for several days.

The marsh-lands on both sides of the lower Thames are not subject to such flooding, as the embankments are found to be sufficient to shut out the tides, and the primitive sewers, marsh-ditches, and tidal outlet-sluiques regulate the delivery of flood waters so as to prevent injury to land. The marsh districts on both sides of the lower Lee are now subject to the double evil of flooding and droughts; during long continued dry weather the surface cracks until there are fissures several feet in depth. Flood water is passed much more rapidly down the valley of the Lee in consequence of the improvements made of late years in the navigation by dredging the channels. Much, however, remains to be done which would improve the conditions of the marsh-land and the health of the people.

The evidence as to the water-mills proves that in many instances the dams and ponds act injuriously by preventing land drainage and impeding floods. However useful water-power may have been in former times, when these mills were first established, that use has now been greatly reduced in relative value, and, wherever there is sufficient trade to make grinding corn a profitable occupation, steam-power has to be brought in as an auxiliary, the improved navigation and railway accommodation facilitating the delivery of coals so as to give an advantage to steam over the constantly alternating and uncertain flow of water. Water-power having diminished in commercial value, and land for agricultural purposes having greatly increased in value, injury to the adjoining lands may be shown to cause an annual money loss to the district. To this money loss must be added injury to health by the retention of large areas of undrained land. Water-mills and mill-dams are proved to be injurious to local properties, but we have no evidence as to any serious pollutions being caused by these mills, other than so far as they cause a partial stagnation in the water and accumulations of mud by ponding. The rivers are not abused as in the manufacturing districts, by

being made the receptacle of solids. Furnace-ashes are too valuable to be so injuriously wasted, and the River Lee trust is active in preventing abuse and pollution within the extent of its jurisdiction.

*Rights of Lee Trust and Water Companies.*—The right of appropriation of the water in the Lee is determined by Statute 18 & J 9 Vict, c 196. The general result of these provisions is that the Lee Trust has a paramount right to water required for the purposes of the navigation, and that the remainder of the water is divided between the two Water Companies, practically in equal shares. The priorities are fixed in the following order: —

1. Right of the Lee Trust to pass through their locks,
  - a. For the Upper Reach, extending from the highest point where water is drawn by either of the Companies down to and including the first lock above Feilde's weir, a volume of water not exceeding in any 24 hours 5/6,000 cubic feet.
  - b. For the Middle Reach, extending from the first lock above Feilde's weir down to and including Waltham Town Lock, a volume not exceeding in any 24 hours 720,000 cubic feet.
  - c. For the Lower Reach, extending from Waltham Town lock down to and including Old Ford lock, a volume not exceeding in any 24 hours 864,000 cubic feet.
2. Right of the Lee Trust to draw such further quantity as shall be necessary, in each pond of the navigation, to maintain the water on a level with the customary head level of that pond.
3. Right of the New River Company to take 2,500 cubic feet a minute.
4. Right of the East London Waterworks Company to take 2,500 cubic feet a minute.
5. Right of each Waterworks Company to take *pari passu* 500 cubic feet a minute.
6. Right of each Company after notice to take *pari passu* any additional quantity.
7. Right of Lee Trust to whole of water below Tottenham mill.

The Lee Trust receives annual payments from each of the two Companies, viz., £1,500 from the New River Company and £2,000 from the East London Waterworks Company.

The New River Company has also contributed £42,000 to the Lee Trust for construction of navigation works.

*River Lee Trust.*—The navigation of the river Lee, as we have previously stated, is the oldest interest connected with the river. King Alfred is known to have visited Ware by water. Parliament legislated for the Lee in the reign of Queen Elizabeth. The incorporation of the River Lee Trust took place, however, in the session of 1850. On the lower tidal portion from the Thames to Bow Locks, there is a mixed jurisdiction of the Conservators of the Thames, the Essex Sewer Commissioners, and the River Lee Trustees. The total length of the navigable portion, from Blackwall to Hertford, is about 28 miles; the total rise in this distance is 110 feet; there are 20 locks, besides extra locks for flood overflows and minor purposes; up to Enfield the river is deeper and the locks are wider than above—96 feet in length, and 18 feet 6 inches wide—on this part of the navigation barges drawing 6 feet of water and bearing 110 tons can travel. From Enfield to Hertford the locks are also 96 feet in length, some are 16, others only 13 feet wide, and the depth of water is reduced to 4 feet: barges bearing more than 85 tons cannot navigate this upper portion. The oldest locks and weirs were, like those described on the Thames, of a primitive and rude character. Betwixt the years 1770 and 1780, Smeaton improved the navigation, under powers contained in an Act 7 George 3. cap. 57. It was at this period that locks partially constructed of masonry were first introduced. Nearly all these early and comparatively rude works have now been superseded; the existing improved and efficient works having for the most part been designed and executed by Nathaniel Beardmore, Esq., C.E, the present Engineer-in-Chief of the River Lee Navigation.

The navigation is of the utmost importance to the district, as is abundantly shown by its active condition, railway rivalry having failed to injure the river trade as in the case of the upper Thames. We have no hesitation in coming to the conclusion that the navigation of the river Lee must be maintained, as it confers a local value on land, on trade, and on all other property, far greater than the cost of maintaining the existing works. The two great Water Companies, which are now rival claimants for the water, have both

come in upon the navigation long subsequent to its establishment. The navigation requires a steady, regulated depth and volume of water, sufficient to supply the locks. The river betwixt lock and lock has in some parts more the character of a canal than the wide open reaches on the upper Thames.

The Lee Trust is an unpaid body, the constitution of which is herein-after described. Particulars as to the state of traffic will be found in the evidence of the Marquis of Salisbury, Mr. Marchant, and Mr. Glass, who are respectively the Chairman, Clerk, and Traffic Manager of the Trust. The Trustees are empowered to raise £230,000 upon the credit of the Trust, of which they have already raised £174,287. The Trust derives its income from tolls, from the annual payments of the water companies, and from the rentals of mills and other property. The whole revenue of the Trust is vested in the Trustees and is applicable to payment of charges and to maintenance of the navigation.

The river Lee Trustees dredge the river, cut weeds, cleanse the channel, and cause floating carcasses to be removed from the water—these are seldom, however, seen above Tottenham. There are no rigid rules to prevent or to regulate bathing: the trustees, in fact, act as conservators for the navigable portion of the river as regards its trade only, but not as special conservators for any other purposes. The soil of the bed of the Lee is vested in the Trust, but their legal powers are limited to the navigable portions of the river and to navigation purposes.

*Stort Navigation.*—The navigation upon the Stort was established in 1769, and is regulated by the provisions of 6 Geo. III. c. 78. The Act empowered the Undertakers to construct the works, and to take certain tolls for the use of the navigation. It also appointed a large number of noblemen and gentlemen as Commissioners, to protect the various interests of land owners, millowners, and others that might be affected. Vacancies amongst the Commissioners were to be filled up by the election of the survivors; the qualification required being the possession of a life interest in land to the amount of £40 per annum, or of personal property to the extent of £800.

The navigation extends from Feilde's Weir near Rye House on the Lee to Stortford, a length of 13¾ miles, and is constructed for vessels capable of carrying from 40 to 50 tons each. The annual traffic amounts to about 60,000 tons weight of goods. The navigation has passed into the hands of a private firm, which became entitled to it by foreclosure under a mortgage for £40,000. The body of Commissioners, from the omission to supply the places of defunct members, has become extinct. Great inconvenience ensues. Millers complain of the navigation and the owners of the navigation complain of the millers, and there are no means of redress from the absence of Commissioners authorized to settle such disputes.

The present owners of the navigation have power to dredge, and the expenses of dredging have been greatly increased by sewage thrown into the river at Bishop-Stortford, and at other places. This pollution the owners of the navigation, with their limited statutory rights and in the present condition of the law, are powerless to prevent.

*New River Company.*—The New River conduit was commenced by Sir Hugh Myddelton in the reign of James I. The source of the New River is in Chadwell springs, but water is now also derived from the River Lee direct, at a point between Hertford and Ware. The drainage area above this point is almost entirely chalk, and in dry seasons the entire volume of water is due to springs. The Chadwell springs vary in volume from 290 to 700 cubic feet per minute. By the River Lee Act of 1855 the volume of water which the company is empowered to take from the Lee is defined, as already explained; this volume has not, however, been taken. The average volume drawn appears to have been about 18,000,000 gallons per diem. The minimum flow at the point of abstraction is stated to be about 27,000,000 gallons. The extent of pollution of the River above the intake of the Company has been already considered under the head of Pollution. Besides the water from Chadwell springs and the river Lee, the New River Company obtain water from wells and borings; one well sunk and bored near the town of Ware has not been used for some time. There are also wells at Amwell Hill, at Cheshunt, and at Hoddesden. There are subsiding reservoirs, 40 acres in extent, at Stoke Newington, and about 8 acres at Hornsey, or 48 acres in the whole. The engineer, Mr. Muir, stated that the amount of sediment in the water was small, as also that the filtering was simply through sand-filter beds, which have been in use since 1856, situated as under:—

Hornsey - - - - 2 acres in extent.

Stoke Newington - - - - 5 „

New filter-beds of about two acres in extent are in course of construction. Charcoal filtration has been tried experimentally but, supposing it to be practically successful, the Engineer estimated that it would cost the company not less than £94,000 if permanently adopted, and that this would be too great an outlay. The Engineer also stated that the New River Company have, from all sources, a volume of 35,000,000 gallons per day to rely upon, though they have never delivered any such volume. There are at this date upwards of 112,000 houses supplied by the New River Company, having about 7.5 inhabitants to each house, or a total population, in round numbers, of upwards of 840,000, and the demand for water in the locality is increasing. The greater proportion of these houses have waterclosets. The company supply water by meter; at present there are 720 meters in use which register about 2,300,000 gallons per day. The total volume of water delivered per day in December last for all purposes was 22,500,000, which, deducting 2,300,000 used for trade purposes, leaves 20,200,000 as the domestic supply, or about 24 gallons per head of the entire population, or, including water for trade purposes, about 27 gallons each per day. Out of the total number of 112,000 houses supplied, not more than 1,200 or 1,300 are on the constant system; all the rest are supplied intermittently for about 35 minutes, six days in the week; but a large number of the inferior houses have a supply on Sundays. The time the water is turned on seems, however, in some respects to be left to the discretion of the turncock, who is expected to fill the cisterns of ordinary capacity. Some blocks of houses have cisterns, but in many of the poorer parts there are only tubs, pots, and pans, and if from any cause the tenant is not in the way when the water is on, the supply for that day must be begged or stolen. The Company does not hold itself liable for anything but delivering the water; the means of storing the water from day to day, from Saturday to Monday, must be provided and maintained in efficient order by the landlord or tenant; Mr. Muir, the Engineer to the Company, stated that the present arrangements are of a very wretched character. The Company have laid pipes to the doors of the houses, and yet some landlords will not go to any expense in making provision for laying in and storing water. Although, as is shown, the Company pump and pass into the district a daily volume for domestic uses equal to some 24 gallons per head, man, woman, and child, yet by experiments with model lodging-houses, where a constant supply was given for all requirements, the inhabitants, it was found, did not consume more than about 7 gallons per head. At present the eastern part of the metropolis has a daily volume of water poured in, far more than careful experiments prove to be necessary for all purposes, and yet to wretchedly defective are the landlord's arrangements for storing water, that there is a water famine, and the complaints are constant, very loud, and very angry.

The New River, like some other of our oldest waterworks, at first supplied water' through pipes of wood. Stone and earthenware were also used for water distribution in these early days: the first cast-iron pipes had flange-joints; now socket-joints are alone used. Some of the cast-iron pipes first laid have been, found after 60 years' use perfectly sound. The mains of the New River Company vary in diameter from 36 inches down to 3 inches.

The length of the New River conduit as originally laid out by Sir Hugh Myddelton was about 38 miles, but by cutting off bends, straightening and improving, it is now not more than 28 miles in length. The cross-sectional area is about 75 square feet, and the velocity about four-tenths of a mile per hour; the fall is not more than 1 in 10,000, and the flow is checked by gates and sluices; the bed of the river-conduit is not pitched with masonry or protected by concrete, but is the natural subsoil, with clay-puddle where required.

The New-River conduit is preserved free from pollution. There are fish in it, and all rights to fish are vested in the Company. The soil of the bed of the conduit is vested in the Company, and in some instances the banks also for some distance on both sides.

The present capital of the Company is £3,000,000 sterling, and a dividend a little over six per cent, is paid.

*East London Waterworks Company.*—The East London Waterworks Company commenced operations by purchasing two old works, one situated at Shadwell, the other situated at West Ham. In 1807 the first Act was obtained, and in 1809 the works were opened, but on a very small scale; the capital, at the outset, being £120,000; at present the capital is £1,300,000, consisting of stock, £975,000 receiving 6 per cent., and shares £325,000 receiving 4½ per cent. The dividends in the first instance did not exceed 2 per cent., and from 1820 to 1822 a suspension of dividends took place. The works, when first established, took water

from the open river and within tidal influences at Old Ford. In 1825-1826 application was made to Parliament to remove the intake up to Lee Bridge, from which place the water was brought down in an open conduit, and was stored in open reservoirs at Old Ford, from whence it was then pumped for use. The intake is now at a point not far from Ponders End in the parallel of Stonebridge Lock.

The Company have, in station and reservoir area with other land about 400 statute acres. On a portion of this land a storage reservoir exists capable of containing about 170,000,000 gallons of water or 8½ days supply, which can be drawn upon during the time the river water is muddy by reason of floods.

In addition to this reservoir the works at present consist of an open conduit from Enfield to Lee Bridge 1¼ mile long, having a cross-sectional area of 100 feet in which the water flows 20 feet per minute; filter beds 12 acres in extent; pure water basin and pumping establishment at Lee Bridge; a cast-iron conduit of 48 inches diameter, capable of conveying 20,000,000 gallons of filtered water per day from Lee Bridge to Old Ford, where there is a covered reservoir, and additional pumping power. There is also water-power for pumping but not on any large scale. There is steam pumping power equal to 1,100 or 1,200 horse-power requiring about 6000 tons of Newcastle small coal at 12s 6d. per ton per annum. The lift is about 112 feet vertical. There are about 500 miles of cast-iron mains, varying from the conduit of 48 inches down to 3 inches in diameter. By the last returns about 90,000 houses are supplied, which at 7.5 per house gives a population of 673,000. The volume of water is about 20,000,000 gallons per day for all purposes, or upwards of 29 gallons per head, or (exclusive of what is taken for trade purposes) about 18½ gallons per head of the population.

The supply is partly constant, but chiefly intermittent. The Company supply water largely for trade purposes, mostly by meters from mains constantly full. Some houses of the better class and some cottage-houses are also supplied on the constant system direct from the mains. Over the greater portion of the district in dwellings above the class of court-houses the inhabitants have tanks or tubs which are filled each day. The supply becomes in part constant in all cases where the Company can treat with landlords willing to make proper storage arrangements in tanks and cisterns, which may be filled each day. The supply of water to house-property of an inferior class is for the most part intermittent, and only on six days in the week, Sunday not being a day of supply. The water is turned on for about half an hour each day; in many of the courts the apparatus is an open wrought-iron stand pipe of about one inch in diameter having no valve upon it, so that the water flows to waste under whatever local pressure there may be when not actually being caught by some one or other of the inhabitants. This defective and unsatisfactory mode of supply leads to great waste of water even during the short period of half an hour. Also the receptacles, where they exist, are often unfit to store the water. Some tanks are placed over the water closet and dust-bin, and the open tubs stand in small crowded yards, exposed to any dirt, dust, or atmospheric contamination there may be.

Water closets are largely used throughout the entire district. At Christmas, 1860, out of 78,710 houses there were 36,214 having water closets supplied with water.

With regard to the quality of the water, the water drawn at Ponders End is not of course so pure as that taken by the New River Company higher up the stream, because the river in its course over the intervening space has received additional impurities from towns and places, as already detailed under the head of pollution, but this difference is greatly diminished by the fact that between Hertford and Ponders End the Lee has been reinforced by a large accession of fresh water from the land springs which break out from the chalk into the bed of the river. The result is, as the analyses show, that the East London Waterworks Company are able to obtain a fair wholesome water. The Company have gone to great expense to improve the water before it passes to their filterbeds, by the construction (under statutory powers) of Catchwater Dyke to intercept sewage of certain towns above the intake, and to deliver it at a point below. In a bill now before Parliament the East London Waterworks Company propose an extension of this system of intercepting sewers.

The process of sand-filtration is conducted successfully, though at some seasons under difficulties. A rapid growth of weeds takes place on the sand of the filter-beds, especially during hot weather in summer. The water, as it is delivered from the mains, is proved by the analyses published by the Registrar-General to be equal in quality to the average of the London waters.

Serious charges, however, have been made that the outbreak of the cholera, which in the months of July and August last year took place in the east end of London, is to be attributed to the water furnished by the Company from its reservoirs at Old Ford, whence the suffering districts drew their supply. We did not consider it incumbent upon this Commission to institute a medical inquiry into all the particulars of this special case, though the evidence we received incidentally bore upon the subject. Suffice it to say that on the one hand the water supplied by the Company at this period from its Old Ford reservoirs had received an admixture of some unfiltered water drawn from an open and partially abandoned reservoir, and that on the other hand there were several local conditions—the low level of the district, the use of polluted wells, the saturation with sewage of the subsoil, and the excessive accumulation of stagnant sewage in ditches and cuts arising in great measure from the storm overflows of the metropolitan sewerage works—the concurrence of which at that season were calculated to produce cholera. Under these circumstances we do not feel justified in attributing the cholera to any one cause exclusively. But the act of the Company in drawing water from the open reservoir for domestic consumption was unquestionably reprehensible. The Company have now entirely cut off all direct means of communication with this source of supply, and we assume that on no future occasion will this water again be resorted to.

*Improvement in Water Supply.*—With regard to the capability of the river Lee to meet the increasing demand for water supply in the eastern districts of London, the entire volume of water daily drawn direct from the river Lee amounts to 38,000,000 gallons, the NewRiver Company drawing upon an average 18,000,000 gallons, and the East London Waterworks Company 20,000,000 gallons. In very dry seasons some difficulty is experienced by the latter Company in obtaining their customary volume. It may therefore be taken that no dependence can be placed upon an increase of the supply from the river without the construction of impounding reservoirs on a much larger scale than those now in existence. The construction of such reservoirs has been a matter considered by the Lee Trust and by the Water Companies. The Marquis of Salisbury explained to the Commission a system of impounding reservoirs designed by the late Mr. Rendel for the Lee basin—two to be constructed on the Lee itself, and others on the Ash, Rib, and the Amwell Marsh—capable of holding some 6,212,500,000 gallons of water, a volume sufficient for 140 days' supply at the present rate of delivery from the Lee. It is questionable whether these chalk valleys can afford sites for reservoirs to hold such large volumes of water, unless great expense were incurred in puddling. In Mr. Muir's opinion it would be very difficult to make large reservoirs above Hertford. Extensive reservoirs might with ease be made below the point where the Lee passes from the chalk on to the London clay. The reservoirs of the East London Company, in which there is storage for 170,000,000 gallons of water, cover 120 acres. But reservoirs to hold the volume of water contemplated by the late Mr. Rendel would probably require an area of 2,000 or 3,000 acres; and though large storage reservoirs may be made available to reserve flood waters, yet if, in dependence upon such a store, a corresponding enlargement were made in the area of supply, then, in the event of several dry years following each other, the continued drought would most probably end in the exhaustion of such store, and consequently in temporary failure.

Another question which naturally presents itself is, whether the water of the Lee valley, when its collection and transmission to the metropolis have been surrounded by all practicable safeguards from pollution, will be of such a quality as to satisfy the reasonable wants of the population.

The various streams which contribute water to the river Lee have their sources at considerable distances from each other and flow through very varying soils. Their general characteristic, however, is that given by the chalk, from which the great bulk of the water is derived. That this is so will be seen by the following analyses taken from the different streams during the present month :—

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	1	2	3	4	5	6	7	8	9	10	11	12
	Lee, above Luton.	Lee, at Hyde Bridge, above Wheatthampstead.	Minram, above Welwyn.	Beane, at Watton.	Beane, at Stapleford.	Minram, below Hertingfordbury.	Lee, below Hertford.	Lee, above Hertford.	New River, near Ware.	Lee, above Ware.	Lee, below Ware.	Rib and Quin, near Wades Mill.
<b>SOLID RESIDUE in grains per gallon :</b>												
Mineral - -	24.28	19.17	21.11	22.15	21.78	20.92	19.94	19.57	21.60	20.24	21.28	23.13
Organic - -	1.04	1.32	0.88	0.88	0.45	0.85	1.09	0.74	0.48	1.18	0.57	0.81
Total - -	25.32	20.49	21.99	23.03	22.23	21.77	21.03	20.31	22.08	21.42	21.85	23.94
<b>HARDNESS, degrees of Clarke :</b>												
Permanent - -	5.7	3.4	2.9	3.6	4.1	4.4	3.7	4.2	3.8	4.7	4.3	4.3
Temporary - -	11.9	13.2	12.7	12.0	12.8	12.4	12.3	10.8	12.0	11.1	12.5	13.1
Total - -	17.6	16.5	15.6	15.5	16.9	16.8	16.0	15.0	15.8	15.8	16.9	17.4

(continued.)

	13	14	15	16	17	18	19	20	21	22	23
	Rib at Hunsell Park.	Quin, near Braughling.	Stort, above Bishop Stortford.	Stort, near Spelbrook.	Stort, at Harlow Mill.	Lee below Wheatthampstead.	Ash, above Waterplace.	Lee, navigation above Hoddeston.	Cobbin Brook, near Waltham.	Turkey Street Brook at Knifield Wash.	Lee, at point of diversion from E. L. W. C.
<b>SOLID RESIDUE in grains per gallon :</b>											
Mineral - -	24.43	24.05	24.68	26.40	24.68	20.01	22.96	22.05	29.23	18.09	21.82
Organic - -	1.20	0.91	0.72	1.32	1.37	0.95	2.10	1.25	3.54	2.70	0.97
Total - -	25.63	24.96	25.40	27.72	26.05	20.96	25.06	23.30	32.77	20.79	22.79
<b>HARDNESS, degrees of Clarke :</b>											
Permanent - -	3.5	5.5	4.8	4.9	5.4	5.1	4.3	3.8	7.6	7.5	4.4
Temporary - -	14.6	12.3	12.2	12.5	10.8	9.9	11.5	12.0	5.7	0.6	10.6
Total - -	18.1	17.8	17.0	17.4	16.2	15.0	15.7	15.8	13.0	8.1	15.0

The samples were collected during the week ending the 17th of April, in this year, and analyzed in the Laboratory of the Commission.

In the third line which shows the solid residue in each gallon of the water, if we omit No. 21, which is altogether abnormal and derived from a stream of small importance, we find the figures to range from 20½ grains to 27½. The same is true of the hardness which, omitting numbers 21 and 22, varies from 15 degrees (No. 23.) to 18.1 degrees (No. 13).

The water (No. 22) from Turkey Street brook is only about half the hardness of the rest of the samples. This stream is evidently supplied in great part by surface water, and it is liable to great variations in volume

from flood and drought. The samples are (in common with all chalk or limestone waters) reduced in hardness by boiling. The line of figures set down as "temporary hardness " shows to what extent this softening result is obtainable.

The general similarity of composition in all these samples is very striking, the only deviations of any importance being in respect of the quantity of organic matter. The effect of the contamination of the tributaries of the Lee, by impurity from external sources, is exhibited by contrast with the water of the New River, which contains less than half the organic impurity found in some of the other samples. The New River owes this superiority partly to its being to a great extent derived from springs flowing direct from the chalk, and partly to the fact that the aqueduct by which it is brought to the metropolis is devoted to no other purpose than that of a water carrier, and is most jealously guarded from pollution in its course. It may not be possible to raise to the standard of the New River the quality of the water of the lower Lee, which has received the **Ash, Stort, and other tributaries**, draining large areas of clay and liable to frequent floodings; but it cannot be doubted that, if proper measures be adopted to protect the river from avoidable pollution, a great improvement in its purity will be secured.

Such a system of protection of the water of the river Thames has already been inaugurated by the Act of last Session. We recommend that similar protection be secured to the water of the river Lee by the early action of Parliament. The question whether a navigation should be allowed to continue a proper conduit for water destined for the Metropolitan supply is one which deserves serious consideration.

*Water Supply of Towns in Lee Basin.*—Water is abundant throughout the valley of the Lee. Notwithstanding this, however, some of the towns are badly supplied, and sickness is distinctly attributed to the use of well-water polluted by cesspools. At Tottenham, Edmonton, and other towns the mains of the New River and East London Waterworks Companies are accessible, and are to a limited degree used; but some dissatisfaction is felt at the rates charged by the Companies, and at the exclusive right of the Companies to use the water of the Lee.

*Conservancy.*—Hitherto, the management of the Lee, so far as there has been a management, has been vested in the Lee Trustees; but as before mentioned, the jurisdiction of this corporation is confined to the navigable channel, and it is only as incidental to their duty to protect the navigation that they possess any authority to prevent pollution or to regulate the height of water and other matters. In their hands the undertaking has been a commercial success; the navigation is well maintained and it is a valuable convenience to towns on the banks and to districts inaccessible to railways; also the river improvements have been found beneficial to the health and comfort of the inhabitants of the valley. Abuses by mills, which in the Thames valley cause such disastrous floodings, have in a great measure been controlled in the Lee. Nor have the Trustees, in the exercise of such powers as they possess for the protection of navigation, been remiss in restraining the pollution of the lower part of the river. Altogether they seem to have administered their Trust well. The Trustees, we are assured by their chairman (the Marquis of Salisbury), consider that without any other change beyond an extension of power, they (the Trustees) are as a body competent to undertake the Conservancy of the river basin for all purposes, and would regard with disfavour any proposition to vest the duties in other hands. To this view we are unable to assent. In our opinion the present constitution of the Lee Trust is not fitted for that of a Board of Conservators.

The present constitution of the Lee Trust is fixed by the conjoint operation of several statutes. By the 16th section of 12 Geo. II., c. 32, the Lord Mayor, Aldermen, and Recorder of the city of London, the Parliamentary representatives of the counties of Middlesex, Essex, and Hertford, and of the city of Westminster, and the boroughs of Colchester and Rochester, were declared to be *ex officio* Trustees, and with them numerous other gentlemen were personally associated as trustees. To these the Act 7 Geo. III., c. 51, sec. 1, added more than 100 others, and further increased the list of *ex officio* Trustees by the Comptroller of the works and revenues of London Bridge, the Mayor and Recorder of Hertford, and the Governor, Deputy-Governor, and Treasurer of the New River Company; and by the 72nd and 75th sections it was prescribed that future vacancies should be filled up by election—the electors to be the Trustees themselves, or any seven of them, and the qualification to be that the person elected should be residing in the same county as that wherein the person whose vacancy was being filled up had resided, and further should, in his own right or the right of his wife, be in receipt of rents of landed property to the value of £100 per annum. By 13 & 14 Vict. c. 109, the Trustees were incorporated. The vacancies as they have

occurred have not been regularly filled up, and there are now, we are informed, 67 Trustees, including the *ex officio* members.

The interests which demand representation in any body having the government of the River Lee are, the navigation; the riparian owners; the towns on the banks of the different streams; the traders and wharfingers using the river: both the great Water Companies; the water consumers; **the proprietors of the Stort Navigation**; and lastly, the Central Government, whose presence at a Conservancy Board is essential to a due regard being paid to the various interests, and especially to the public health. Some of these interests are no doubt sufficiently provided for by the present Trust; but there are others which have no direct means of making their wishes known.

To add to the Lee Trust, numbering as it already does 67 persons, new members to represent the above-mentioned interests, would in our opinion be to add to a body already far too large, and to render it incapable of efficient working. Still more impracticable would it be to have two bodies; to retain the Lee Trust (whether in an independent or subordinate position) for the exercise of their present function of regulating the navigation, and to create a Conservancy to watch over all the interests of the river except navigation. Unity of management, so desirable in all undertakings, is, in river administration, an absolute condition of success.

We recommend that the Lee Trust cease to exist except for the purpose of providing electors as hereinafter mentioned; that their powers, rights, and property be transferred to a Conservancy Board which shall have charge of all the interests connected with the rivers, and that on that Board the Lee Trust be largely represented. The present staff of the Lee Trust should be retained, and thus the Conservancy would be enabled to start on its career with a complement of officers of local knowledge, long experience, and tried ability. The present Chairman of the Lee Trust would preside over the Conservancy Board, and the leading members of the Trust would continue to be associated with him. But the multitude of those who are now but nominal members of the Trust and who have no real concern in the undertaking would be superseded for all purposes except that of being electors, and be replaced by a limited number of active governors. In this way there might be established a good working body, compact in its constitution and adequately representing all the interests of the river basin.

We would propose a body not exceeding 15 in number, composed as under:—

5 Members to represent the navigation (the first five to be the present Chairman of the Lee Trust, with four of the existing Trustees to be elected by the existing body; future vacancies to be filled up by election by Members of Lee Trust.)

1 Member to be nominated by proprietors of **Stort navigation**.

2 Members to represent the New River Company, viz, the Chairman, Deputy Chairman, or Treasurer, for the time being.

2 Members to represent the East London Waterworks Company.

2 Members to be appointed by the Corporation of the City of London.

1 Member to represent and be chosen by Traders on the Lee and **the Stort**.

1 Member to be nominated by the Home Office.

1 Member to be nominated by the Board of Trade.

Provision should be made for members to go out by rotation, at fixed intervals.

The exact proportion which in the establishment of the Conservancy Board should be assigned to the various interests represented is not a matter upon which we lay much stress, it is a matter of detail; other arrangements than the one suggested might answer equally well. We contemplate that the need for a representative of the **Stort navigation** would shortly cease to exist. The Conservancy should have power to purchase the interest of the firm who now own that navigation. In the meantime that interest should nominate a representative to the Conservancy Board, which, in its turn, would not only succeed to the place of the defunct **Commissioners of the Stort**, but, for the purpose of protecting the river from pollution and the valley from floodings, would receive powers enabling them to control that navigation.

A Conservancy Board, such as we have indicated, would be equal to its duties, and would command the confidence of the public. The interests of the navigation could not suffer in the hands of such a Board, nor would the position of the bondholders of the Lee Trust be injuriously affected; on the contrary it might be improved if, as in our opinion would be just and politic, they received a first charge upon the funds of the Conservancy from whatever source.

In some respects the suggested change of the constitution of the Lee Trust is analogous to the recent change in the management of the Thames. In the case of both rivers the result will be the same, the substitution of a small governing body for a multitudinous collection of nominal governors, and the consolidation into the hands of a single administration of all the powers requisite to be exercised for any purpose throughout the watershed. But the reason for the change is very different in the two cases; in the case of the Lee the motive for change is not past failure of the existing government, but the necessity of wider action for the future; and therefore it is that the modification which we recommend in the Lee Trust is in the nature not so much of an absorption into a new body, as of an establishment on a stronger basis.

The Conservators should be furnished with complete powers. In addition to maintaining the navigable channel and managing the traffic of the navigation, they should be responsible for the due observance throughout the water-shed of statutory prohibitions against the pollution of water which can reach the river, and for keeping the bed and banks both of the river and the navigation in such a condition as to render the channel a fit carrier of pure water to the metropolis. The Conservators should also superintend the execution of works of arterial drainage in the watershed, and would be a guarantee that such works were carried out properly, and not for the benefit of some districts to the injury of others.

With regard to the funds required to meet the cost of the proposed measures, the Lee Trustees have, strictly speaking, no income, the surplus profits of the navigation which remain after defraying the cost of dredging the bed and maintaining the banks of the navigation being applicable to the reduction of the bonded debt of the Trust. However, it is unnecessary to expect that the expenses entailed upon the Conservators would be considerable. The cost of all works of arterial drainage and of works of improvement of the bed or banks of the river in places where it is not navigable would fall not upon the Conservators but exclusively upon the property benefited, the Conservancy being in fact merely a machinery to assist the co-operation of riparian proprietors, and to prevent the opposition of a few being a bar to the execution of works required for the common good of the district. Each town and village would justly be required to bear the cost of all works for the interception of its own sewage from the river, and for the disposal of it by irrigation or otherwise. The chief additional expense created by the institution of the Conservancy would be the maintenance of a staff to see that throughout the watershed the laws and regulations prohibiting the pollution of running water were strictly observed. This expense would rightly fall upon those most interested in the purity of the river, viz., the metropolitan consumers of water derived from the Lee, and these consumers would be most conveniently reached by the charge being in the first instance thrown upon the Water Companies who supply them. The right which the Companies possess to obtain water from the Lee, in such volume and purity as are now attainable, has been purchased by them at large cost. The New River Company has constructed sewers for Hertford at an outlay of £22,000 and maintains the outlet works at a further cost of £700 per annum: and to the Lee Trust it has contributed £42,000 for navigation works, and makes an annual payment of £1,500. In like manner the East London Waterworks Company has constructed the intercepting sewer, called Catchwater Dyke, to protect its intake, and pays to the Lee Trust £2,000 per annum. But this expenditure of the Companies is no objection to a further charge being laid upon them to secure a new gain. To the consumers of water from the Lee—one half of the population of the metropolis—the purer quality of water which the Lee would yield in consequence of the institution of measures to protect it throughout its course, would far more than compensate for the slight addition made to the water rate, which would be required to meet the expense of such measures. Both the Companies, we were informed by their officers, would be not unwilling to make an equitable contribution for this purpose. In fact the East London Waterworks Company are, as appears by their Bill now before Parliament, proposing to protect their intake by constructing additional intercepting sewers—works the expense of which properly belongs to the towns that require them. We therefore recommend that, to meet the expenses of the conservancy, the profits of the Navigation should be supplemented by a charge upon the Water Companies. In adjusting the proportion in which this charge should be borne between the two Companies, regard should be had to the fact that, as compared with the East London Waterworks Company, the New River Company, although they draw a larger volume of water from the Lee valley, draw a smaller volume from the river

itself, and that from a higher point in its course, where it is not liable to the greater part of the pollution which it will be the duty of the Conservancy to prevent.

#### CONCLUSIONS.

We now beg most humbly, in this our Second Report, to lay before Your Majesty the main conclusions to which we have been led by our inquiry:—

That the waters of the river Lee and of its tributaries are polluted by town sewage and also by refuse from manufactures.

That there has been much private litigation in consequence of local nuisances, and that the law in respect of pollution of running water is in an unsatisfactory condition.

That portions of the river may be improved by embankments, and that considerable areas of land require arterial drainage.

That there are milldams which injuriously impede the free flow of water, and cause injury to adjoining lands.

That it is expedient that more stringent measures be adopted to protect from pollution that portion of the Metropolitan water supply which is derived from the Lee.

That a Board of Conservancy is required for the river Lee, the Lee trustees having powers confined to the navigable portion of the river, and only for the protection of the navigation.

That the limit of supply of water from the river Lee, available without the construction of extensive storage reservoirs, has been fully reached.

That much of the water now supplied to the metropolis is wasted owing to the absence of proper means of distribution.

#### RECOMMENDATIONS.

We humbly submit the following recommendations to Your Majesty:—

That the charge of the entire watershed of the river Lee be vested in a Conservancy Board consisting of 15 members, to be appointed as herein-before mentioned.

That the powers and property of the Lee Trust be transferred to the said Conservancy

That the Conservators receive powers to purchase the **Stort Navigation**, with a view to consolidate it with the navigation of the Lee.

That after the lapse of a period to be allowed for alteration of existing arrangements, it may be made unlawful for any sewage, unless the same has been passed over an Ian so as to become purified, or for any injurious refuse from manufactures or agriculture, to be cast into the river Lee or into any of its tributaries, and that persons offending in this respect be made liable to penalties to be recovered summarily.

That it be incumbent upon the Conservators to see to the enforcement of the prohibitions that may be established against pollution of the river, and that for this purpose power be given to them to visit and inspect works, and, after due notice, to close the outlets of sewers, drains, and discharge-pipes into the river or its tributaries.

That, in the event of the funds derived from the navigation, together with the annual payments now made by the New River and East London Waterworks Companies, proving insufficient to meet the expenses of measures taken by the Conservators for the protection of the river from pollution, the said Companies be called upon to contribute in equitable proportion such further sum as may be necessary, not exceeding a *maximum* to be fixed by Parliament.

That powers be given to the Conservators to make embankments and to drain and improve marsh lands, and carry out arterial drainage operations, the cost of such improvements to be met by a rate upon the properties so improved.

That the Public Works Loan Commissioners be authorized to make advances to the Conservators upon such security as shall seem sufficient.

That Legislative measures be passed to render it compulsory upon each Company to supply water upon the "constant system" throughout its district, and upon owners of houses to furnish their houses with proper arrangements to receive such supply.

All which we humbly certify to Your Majesty, under our hands and seals.

(Signed) ROBERT RAWLINSON. (L.S.)

JOHN THORNHILL HARRISON. (L.S.)

J. THOMAS WAY. (L.S.)

GODFREY LUSHTNGTON,

Secretary. *May* 6, 1867.

LONDON.

Victoria Steet, Tuesday, 11th December 1866.

PRESENT: ROBERT RAWLINSON, ESQ., C.B., IN THE CHAIR. JOHN THORNHILL HARRISON, Esq.  
Professor JOHN THOMAS WAY.

**NATHANIEL BEARDMORE, Esq., examined.**

659. (*Chairman.*) You are engineer to the river Lee navigation?—Yes, under the Trustees.

660. Will you state what their proper title is ?—The Trustees of the river Lee.

661. Are they constituted under an Act of Parliament?—They are constituted under several Acts of Parliament, they were finally incorporated in 1850.

662. I presume that the most recent Act of Parliament defines the constitution and qualification and other particulars ?—Yes; I have requested the secretary to prepare a short paper referring to those matters, which, when completed, he will put in.

663. How long have you acted as engineer for the Trustees of the river Lee?—For about 16 years.

664. For what distance is the river Lee navigable from the Thames ?—From the Thames it is navigable to Hertford, a distance of about 28 miles. Bow creek is also under the jurisdiction of the Trustees; that leads from Bow to Blackwall, and is a natural creek of the Thames. **The jurisdiction of the Trustees does not extend up the Stort branch, which is about 13 miles from near Hoddesdon to Stortford.**

665. Does the jurisdiction of the Trustees extend to the junction of Bow creek with the Thames ?—From Bow locks to the Thames there is a mixed jurisdiction, for the Thames Commissioners are as much masters there as the Trustees of the Lee.

666. Do the works belong jointly to the two bodies? —There are no works on that part ; it is a natural river with banks, subject to the control of the Level Commissioners.

667. What is the length of that part of the navigation ?—About 2½ miles.

668. Then there are three bodies concerned in the lower or tidal reach of the navigation, the river Lee Trustees, the Conservators of the Thames, and the Essex Sewer Commissioners ?—Yes, they have one side.

669. They have charge, I suppose, of all the lowlands, the marshes ditches, and embankments ?—Yes.

670. I believe that body nominate three members on the West Ham Local Board?—Yes, they do.

671. Have you acted as engineer for the commissioners of sewers ?—Yes ; for several years.

672. Was Mr. Walker their engineer before that? —Yes. I was consulted by them for several years before his death, and two years before his death I was appointed.

673. In constructing the Victoria Dock works, what body would have been consulted, the river Lee Trustees or the Essex Sewer Commissioners ?—The Essex Sewer Commissioners entirely; the Victoria Dock works enter from the Thames. The Conservators of the Thames no doubt had control over the entrance works. I may say that great improvement in the drainage of the marshes was effected when these docks were formed, arising out of the construction of the docks, but their formation has also brought about complications as to the drainage which are still unsolved; on the lower side there is a strip between those docks and the Thames, which is awkwardly situated.

674. Do you mean the part on which Silvertown is erected?—Yes, it is quite out of the Lee.

675. That strip, by the construction of the Victoria Docks, has been cut off from the general area of the marsh ?—Yes, but it does not suffer so much for that reason ; it is becoming a great town, and the West Ham local board has not yet constructed sewers there; it is a very difficult thing, unless some new scheme is introduced, for them to do it.

676. At what date was the river Lee first formed into a navigable river, was it navigable before there were locks upon it, or do you know the origin of the navigation ?—Our first navigation Act was passed in the reign of Queen Elizabeth, but it must have been a navigation of some kind long before that. I have little doubt of that, because the Danes went up the river Lee in the time of King Alfred as far as Ware, but no doubt in those days the marsh was more of a morass, and consequently the navigation would have been easier. I have no doubt that in those days there were rough kinds of weirs, that is the original kind of weir; whether there was anything like a scientifically formed weir I should have a doubt, but I think there were most likely weirs to fish with, with arrangements for boats to go through, and for the trouble taken in letting them pass through a toll was paid ; we know that a toll exists to this day. I have very little doubt about it, because I have seen the same on some of the rivers on the continent. Those who had fishing weirs, made arrangements to pass the barges, and they were paid a trifle for each; there is a vestige still left of the the old weirs, and the property in them has come down by inheritance; when we dredge in the present river we now and then come across one of these old weirs. After Queen Elizabeth's time they became regular weirs formed by the commissioners; they were made scientific constructions, and the old weirs exist in the bottom of the river to this day; there is one close below Ware, and that has not been used for 100 years.

677. (*Professor Way.*) I suppose as there is nothing above the water there are no tolls levied now ?—No. When Smeaton formed his design for canalizing the river, the weir owners evidently appeared in Parliament and made the Trustees pay them compensation for abandoning their tolls, and fixed payments were maintained in the Act that was passed. As to some of them we do not know where they existed. I do not know at least where one or two of them did exist, and yet a sum of £20 or more a year was paid for them in compensation. A man would have said, you will destroy my property by making the new cuts, and therefore you must pay me. These places are spoken of in our Acts of Parliament as turnpikes, I believe legal ones; since Elizabeth's time they were, I think, treated as turnpikes; they may have varied in construction, but no doubt the system still exists, and you can see it upon other rivers. In the first place two piles were driven down into the river at a distance apart which would admit the largest barge, then there were sills, and those piles were connected with the shores by wings; on one side of the piles there was an iron pin, and a beam swung upon that iron pin; this was the turnpike, that beam was confined at the other end, and then upright boards were put in one after the other to pen the water up.

678. (*Mr. Harrison.*) There are such weirs existing now above Oxford on the River Thames ?—Yes ; and also on the river Nene and on another river near Bury St. Edmunds. We have, as I before stated, from time to time grubbed up these materials, and I rather guess that they were of the form I have described, and that the turnpike was that swinging beam ; from which we get the name of turnpikes on the roads. Tolls are mentioned as payable at such places as Waltham turnpike, which is a water passage on the old river.

679. I suppose that the name " Ware" comes from a weir on the river ?—I have not the slightest doubt of it.

680. What is the geology of the Lee ?—Down to the parallel of Cheshunt it is chalk covered by beds of sand, gravel, drift, and clay; some small extent boulder clay exists still in part of the valley, and the district varies greatly in the amount of the drift. Some of the upper valleys have vast beds of gravel, sand, and tertiary drift ; there being in some other valleys surface clay, and patches of boulder clay.

681. If you could strip the alluvium from the chalk you would probably find a distinct set of contours and pot-holes in the chalk ?—Certainly.

682. The valleys between the ridges and pot-holes are filled in by drift ?—Yes.

683. Therefore, I assume that a bore-hole in any one part of the valley would not be a sure indication of what it would be in another part of the same valley?— When you come to the higher parts of the valley, there you would always find chalk nearer and more certain; but the valleys themselves vary greatly in the amount and character of the drift. The charm and beauty of the Lee, as a water bearing country, are in fact that it is a great natural filter; there are some of those streams above Hertford that never flood nor overflow except with very unusual rain. When the Great Northern line was cut, you could see the beds of fine sand running from 10 to 15 feet thick, and those beds prevail largely ; indeed over at least 150 out of the 444 square miles above Fielde's weir, they are of that fine character.

684. Would you say that the Lee is essentially a spring fed system of rivers?—Most essentially of the spring water character, surface water drains out within three days of a flood, sometimes within two days ; in the earlier part of the winter and in the spring the flood water passes off, and the gauging shows that the river is mainly composed of spring water almost immediately.

685. (*Mr. Harrison.*) With almost a steady supply? —Yes. During the last month we had a flood, and within a week the river had gone back to its normal spring volume.

686. (*Chairman.*) Are you able to name the principal springs upon the tributaries and upon the main river of the Lee, where they are situated, and their probable volume ?—The river Mimram is a large spring of water. The rivers Beane, Rib, and Ash to a great extent are composed of spring water, but with no very large springs on either of them showing anywhere.

687. (*Mr. Harrison.*) Do you find that there is an accession of spring water into the beds of those rivers throughout their course ?—Yes; they are so highly porous that the springs must come from the hills into the marsh, and then down into the bed of the river; they are not very perceptible.

688. There is a constant accession of volume as the river proceeds ?—Yes. On the river Mimram I do not think it is possible to build so as to foul the stream unless you have pipe drains. It is absolutely a rural district, and there is nothing to foul it. It is so porous that it would be difficult to do it, except by pipe drainage going down to the Lee Proper. The upper part rises with springs direct out of the chalk above Luton. The river has a gradual accession of water, but not by means of any large prominent springs that I know of until you get below Hatfield, and even there I know that the bed of the river is a vast deposit of sand. It flows in a porous sand bed with chalk not very far off; the water passes through the sand, and in a very dry time portions of the valley will drain by natural filtration. Two miles below Hatfield the springs present themselves in a very large form; they are to be seen boiling out on the hill sides. There is one very considerable spring at Woolmer Park, but that spring being one of the higher springs fails in a dry year, for at least three months. In the last 15 years that spring has twice fallen off from August to October.

689. (*Chairman.*) Is that a spring which is known in some districts as a levant, or in others as a bura, or are there intermittent springs which appear and disappear?—We have no such name; it is a fine boiling pool, under a chalk cliff. You can see the gravel and sand on the chalk when not grown over with shrubs and creepers.

690. You say that it is intermittent ?—Yes, so far so that in a dry year it has fallen off and come to nothing.

691. The flow ceases ?—Yes.

692. Do you know the Bourn at Croydon ?—Yes.

693. Which only breaks out after there has been a certain rainfall ?—I know nothing of that kind in the Lee valley ; it is all too highly porous and consequently the flow is more regular. These springs doubtless prevail, but not visibly, all the way down to Hertford, because the Lee Proper increases in volume and becomes there a very considerable stream. Below Hertford the first large spring that you meet with is the one that was taken originally by the New River Company, the Chad well spring, which is between Hertford and Ware; below Ware, the western side of the valley becomes a succession of boiling springs all the way down to Hoddesdon ; the last great spring is at the Hoddesdon Mill. The volume of that spring is not less at any time than 300 feet a minute. There appears to be a fault in the valley at Broxbourne; I think the London clay exists below the parallel. Comparatively speaking there are not many springs below that point, but if you bore through the clays and drift you will find boiling springs again, showing that the whole valley is

full of springs which cannot come out on account of the weight of the clays, the mottled clay, and the London clay lower down than that. These springs will boil up as far down as Edmonton. There is one which has been bored within seven years, which is now running over in ample volume at the roadside near Angel Road Station.

694. The word "boiling," I presume, is not used as having any application to heat, but simply to coming up and flowing over?—Merely this, that they come upward and flow entirely over.

695. Did you ever test the temperature of any of those springs?—I have often tested them.

696. What is their mean temperature?—According to the season; they vary from 51° to 53°.

697. Or from 48° to 50°?—I do not think that the mean temperature goes as low as 48°. They vary with the latitude.

698. (*Mr. Harrison.*) Will they not vary to some extent with the depth at which the spring is seated?—I think you would get in the winter a more uniform temperature, nearer the mean temperature of the latitude; less according to the mean temperature, and more according to the latitude. A deep spring will vary less, and that is the difference.

699. (*Professor Way.*) If the springs are in large volume, I suppose the surface does not affect the temperature?—No, they follow a fixed law. I tried some springs the other day in the centre of the coldest part of Russia, and they followed the same law.

700. (*Chairman.*) Have any records of the rainfall been kept upon the river Lee?—Yes, I have kept one at Fielde's weir for 16 years.

701. Shewing the least and the greatest rainfall, and about the average?—Yes, and I will put that in. (*The witness subsequently furnished the same. It will be found printed at the end of his evidence, Appendix No. 1.*) About four or five years ago I published a statement, and that I will refer you to; it gives almost as good a statement for 10 years as you can have. You will find it at page 346 in the tables contained in "Beardmore's Manual of Hydrology, 1862." (*See end of this witness's evidence, Appendix No. 6.*)

702. Have you any gaugings of the flow of the water, its minimum and maximum, at any fixed points upon the river?—I have kept for 16 years gaugings at Fielde's weir, where I consider the maximum of the spring water obtains, or nearly so.

703. What variations have you found in the flow of the water;—The variations between a wet year and a dry one is very considerable, and perhaps I might almost say that that would be rather better given in the form of a table, for it is so very difficult to give all the figures in any other way.

704. Will you be good enough to give us the highest and the lowest and the mean?—I will refer you to the best gaugings on the Lee; that I can supply, at page 151 of the same book (*see end of this witness's evidence, Appendix No. 2*); but I will also furnish you with the details of the year 1858. (*The witness subsequently furnished the same, and it will be found printed at the end of his evidence, Appendix No. 2.*)

705. (*Mr. Harrison.*) Referring to that former table, can you give the rainfall down to the present time?—Yes, I will give you a further table. Referring to the minimum flow of the river Lee, at Fielde's weir, I think the years of 1857-58 will afford a good specimen; in that year the minimum of the month of August, after the New River Company had taken its supply, was 2,073 feet per minute, but for supply purposes you should take the mean of that month; in August 1857 it was 3,654 feet after the New River Company had taken their supply.

706. Was that the driest season?—Yes, that I consider to have been a very dry year. We had also a very low discharge in October 1854. The mean of that month was only 3,041 cubic feet per minute at Fielde's weir after the New River Company had taken their supply. Under such circumstances you may take it, according to my experience, that it was entirely and absolutely spring water.

707. Can you give us the volume in September 1865?—The mean flow of the river at Fielde's weir was 4,550 cubic feet per minute, inclusive of the water flowing towards London through the New River.

708. Have you a return which has been kept continuously of the volume of water passing down the river?— I have kept records continuously, but they are not yet calculated up. I do it entirely as an amateur matter, but I have not got them yet quite complete. I will have some of them prepared.

709. (*Chairman.*) With the knowledge you possess of the river and supposing that the navigation question could be superseded and the water supply could be made permanent, would it be difficult to secure for the metropolis a supply of spring water at all times, putting aside also the amount of money that might be required to accomplish that object?—Not in that sense I think, because the spring water flow is collected from such a large area, and you must have the surface flow mixed with it when there is rain.

710. You think that you could not insure, by any system of collection or by conduits, a supply of the largest volume of spring water the river and streams are capable of yielding?—I think it would be a very difficult operation and an expensive one, for you would have to drive into the very neighbourhood where your collecting places would be liable, from being lower than others, to collect the foul drainage, in that would be the difficulty, because the whole valley is so porous, that driving for springs in that way must lead to your getting sewage and drainage water.

711. (*Mr. Harrison.*) You mean that at present the water comes from below, and if there was sewage or any matter of that kind above it, and you were to tap from below, the sewage would follow and be mixed with it?—That I think would be the difficulty. Take the valley below Ware as an example; at the bottom of the valley drift there are large boulder stones, and even in some cases rubble chalk, that have fallen down from the hills, this substratum is teeming with springs, and when they boil out they flow over the ground and come into the river. The difficulty of the sewage question is that by touching anything like the valley itself you would run the danger of getting the sewage into the water; at the present time from a large majority of the buildings along the valley the sewage never gets to the river at all, they have cesspools of their own and drains and ditches and so on and it filters through and evaporates.

712. (*Professor Way.*) To carry out the supposition of the chairman, if any scheme could be devised with any hope of success for securing a supply of spring water, the interception of the sewage would in all probability form a part of that scheme, so that the fear of pollution would not exist?—You must keep them very clear of each other, and I fear if you did that to any beneficial extent your volume of water would fall off and you would not have supply enough; you would have to be so careful to shut out foul drainage, that you would have to shut out clean water. This difficulty has arisen at Hertford; the town was sewered by the New River Company, with the object of carrying the filth past and below the point where they took in their water, it being manifest that the town standing so close to the source of supply did not give nature any time to act to get rid of the bad effects of the sewage; the town was sewered through open gravel and the consequence has been that the New River Company have drawn a great quantity of fine spring water into their deodorising beds, which is a waste of the water, and oftentimes there is a very great difficulty in deodorising; they could not help it, for when the sewer was laid down in came the clean water.

713. If the bed had been dry the sewer water would probably have mixed with the spring water at another place?—Yes, it might.

714. (*Chairman.*) At the present time works are being carried out on a gigantic scale on the south side of the river; they have also been in progress on the north side for the low level metropolitan drainage. Do they, or do they not, shut out the foul water from those sewers?—They do not, I should say, shut out any; they have sucked out the water from everywhere. I was concerned in a case at Hackney where it was found that the sewer had taken away everything from some very valuable springs which used to supply some ancient watercress beds which were originally established there in Sir Joseph Banks's time.

715. Do you think that that is an absolute taking away of water by the internal conduit, or a draining away along the external line of the sewer in the gravel from the ground having been broken?—Originally, no doubt, it was a draining away on the outside, but I believe it got into the sewer eventually somewhere.

716. That is to say by filtration or bad joints?—By bad joints I should think.

717. I think you will find that Mr. Bazalgette, who is the engineer for the works, professes to keep the drainage out?—They say that not a drop came in in the first instance. The impossibility of doing this, however, was shown in the Lewisham road case. The Kent Waterworks Company contributed towards the construction of a sewer for the sake of carrying the sewage from the Crystal Palace away from their source

of supply ; the sewer was laid in drift of precisely the same character as the drift in this case; the springs poured into the sewer and they never succeeded in keeping them out. The springs disappeared from the ornamental gardens and from the brook altogether, and the Kent Waterworks Company have in consequence entirely altered their system of supply. The sewer took the brook water as well as the sewage, every effort was made to keep the water out and enormous expense was gone to line the sewer, but in spite of everything the springs blew in the work. I do not mean to say there are many such springs within the metropolitan area as would act in a similar way and you may be correct in thinking that the drainage of the water is by the side of the sewer and that it gets away, but if you were to apply the same law to collecting sewers up the valley of the Lee you would find the same thing happen. I myself built a lock near the Amwell springs, and it was blown up by the springs just as if a barrel of gunpowder had been placed under my works.

718. The springs lifting the work bodily ?—Yes, and blew it up; the difficulty there was enormous. I got down into boulders, chalk and large boulderstones which prevail there, and the water boiled up in a manner that I had never seen before. In the Lewisham sewer, a year after it was made, you could see the springs boil up in the middle of the sewage from the bottom.

719. (*Mr. Harrison.*) Before the passing of the sewage into the metropolitan sewer, did not a large party of gentlemen pass through on the occasion of the sewer being opened, and go and inspect the reservoirs? — Yes.

720. At that time was there any water coming in to any great extent before the sewage entered ?—That I cannot speak to.

721. Do you not think it would have shown itself then ?—I cannot tell you, but where the metropolitan middle level sewer goes there are large beds of gravel which are full of springs, and they have had to lay little pipes into the sewer by scores, so that anybody might now go into the middle level sewer in Finsbury and Bethnal Green and collect sweet drinking water fit to supply the population if it were not for the locality.

722. Do you think the springs are under considerable pressure there ?—No. That sewer is constructed as it were on a hill. It is not the condition of things that I spoke of before where the springs boil out on the river Lee, but the springs generally flow in through pipes. You may see them in the sides of the middle level sewer.

723. (*Professor Way.*) The engineer of the metropolitan board, I think, does not say that the subsidiary or secondary sewers are water-tight by any means; he only claims exemption from leakage in the main sewer. The water that you speak of may come in at some short distance from, but yet not in the main sewer? — Yes, that is what I mean. The water may pass along, and by and by it will come to some place where they have put a pipe in and so it is let in.

724. (*Chairman.*) Is any part of the river Lee embanked above the tidal influence ?—Small portions of the navigation are embanked, which has the effect of keeping the floods off the neighbouring lands, but not to any extent, or beyond what is necessary for the due management of the river itself.

725. Up to what point in the Lower Reach does the tide flow?—A very high tide would tail up to Lee Bridge mills.

726. How many miles up would that be from the Thames ?—Five miles.

727. Is there any record to show the period when the river Lee and the Thames along the marshes there were embanked ?—No, but it must have been at a very early date. We know from the annals of the city of London that the corn required for the use of the citizens was ground at the City mills at Stratford, and those mills could not have existed without embankments ; they were essential to them. When I say that no part of the river Lee is embanked, I exclude the part which lies below Old Ford where it is all embanked.

728. What is the rise from the Thames up to the highest point to which the river can be navigated The highest point is 119 feet above Trinity high-water mark ; that is the level of Hertford Pond.

729. What is the whole distance ?—It is nearly 28 miles from Limehouse, taking the whole length.

730. What number of locks are there upon that length of the river ?—There are 20 locks, besides six extra flood and tidal locks or stop gates.

731. At what date was the earliest masonry or timber lock of an ordinary character constructed on the river Lee ?—They were built by Smeaton. I have always considered them to have been built by Smeaton between the year 1770 and 1780.

732. They were perhaps the first that were constructed in England ?—I do not know.

733. It has been stated that Brindley constructed the first locks on the Bridgwater canal, but that is not correct ?—I should think so. I believe that ours were not the first that were constructed in the country.

734. Is it your opinion that Smeaton was the first person who improved the river Lee navigation ?— We know that he laid out the works, and that they were executed under his general advice. No doubt other engineers were called in occasionally, but Smeaton laid out the line of the navigation as it is defined by the Act 7th Geo. III. cap. 51. His works have since been improved on the same general course.

735. Are all the locks now in existence that were designed and constructed under Smeaton ?—Many have been removed and others altered in situation; the fall of two or three locks has been concentrated into one in several places.

736. Were they made of timber, or brick, or stone? —The waist, platforms and foundations were of timber, but the upper and lower recesses for the gates were of brick.

737. I suppose with piling between ?—Yes, there were piles placed about 16 feet apart with horizontal campsheeting.

738. What is the greatest and the smallest lift ?— Smeaton laid them out for about a maximum of three feet draught of water, and a rise of about four feet, but now they have been very much increased. The width of his lock was 13 feet, but the width of the present locks up to Enfield is now 18 feet 6, and above Enfield the locks are made 16 feet wide.

739. What is the length of the locks ?—96 feet from centre to centre of the gates.

740. What is the greatest lift that you have on the river Lee ?—About 9 feet 6, except at the tidal lock at Limehouse; that will lock down to 13 feet fall, according to the tide. There is no doubt that a line should be drawn in forming locks so that there should not be less than 6 feet, nor more than 9 feet of fall The loss of water is enormous in a 9-feet fall, and the loss of time as well, with a greater fall.

741. Have you what are termed side ponds on any of your locks for the purpose of economising water ?—**There is a lock at Tottenham which has a side pond.**

742. Does that enable you to save half the water ?— Yes. We have also double locks at Old Ford, and they can be worked one against the other as side ponds. Those works were carried out in the year 1856.

743. (*Mr. Harrison.*) And since you have been engineer ?—Yes.

744. (*Chairman.*) What is the present draught of your boats and the tonnage ?—The present draught is four feet in order to get to Hertford, and six feet to get to Enfield. With regard to the tonnage, the maximum tonnage that can be carried to Hertford now is about 85 tons, and that with difficulty. The maximum tonnage that could be conveyed to Enfield would be from 100 to 110 tons.

745. Is there any steam navigation on the river Lee now ?—Not practically to any extent. The Trustees do employ a steam barge, which answers well and has done a great deal of work.

746. Is there any steam towing or are the barges themselves worked by steam ?—No, not besides the Trustees' own steam barge, excepting this, that the Grand Junction Canal Company send a pair of boats to Enfield lock now and then, but that is not done to any very great extent; they have steamers on their canal and they send a pair of boats sometimes which carry iron to the Royal small-arms factory at Enfield.

747. Is the towing done by horses ?—Our towing is done by horses entirely.

748. I assume that the towing-path belongs to the navigation, but do the powers of the trustees extend to any defined line beyond the towing-path on one side and the water on the other, or do the water and the towing-path limit them on both sides ?—Except on the old river, the bank on one side and the towing-path

on the other are the boundaries on the cuts which form the major part of the navigation as defined on the section I have put in. The foot of the bank on each side is the boundary, or where there is no bank there is generally a defined boundary, but upon the newer portions of the river the Trustees have acquired land with fixed boundaries; they have a good deal of wharfage ground.

749. When the navigation was first formed and before much improvement had been carried out, do you know what the practice was, if the channel altered its course in any way, or the towing-path was washed away. Had the Trustees power to form another, irrespectively of any riparian rights to keep up and maintain their navigation?—I believe that the Trustees were kept to their line as a general rule; whether in olden times they did not evade it and whether they did not gradually encroach on the land is perhaps doubtful; but in my time, when I have had anything carried away during a flood I have attempted to restore it.

750. Is the ownership of the soil vested in the Trustees, or is it claimed in any way by neighbouring riparian owners?—It is vested in the river Lee Trustees. The opinion of counsel has been taken on the subject, and the different Acts of Parliament distinctly vest it in the Trustees. In that respect the river Lee Trustees are different from any others in England, the soil is vested in them and they are a body corporate; they were made a body corporate in 1850.

751. Do you find that much or any dredging is requisite in order to maintain the navigation?—A great deal of dredging is required in the lower parts of the valley where the sewage comes in, and that is gradually increasing and more dredging is required.

752. What is the material that is generally brought up, is it gravel, or sand, or filth?—There are certain points such as Limehouse cut and the Bow river, and to some extent near Tottenham where what is dredged up is sewage; but we have been gradually deepening the river, and so up to this time we rarely dredge without taking a good deal of clean gravel out; that is in the lower part. In the upper part of the river there is very little to dredge out except gravel and sand, but at certain points where the cut is entered from the old river, the floods form banks of silt which has to be taken out. These, however, are localised points that we know, so that we can go to any point after a very heavy flood and do what is necessary.

753. Have you any surface scavenging carried out under your directions or have your banksmen instructions to scavenge and cleanse the surface from weeds and floating carcasses?—Yes; we cut the weeds and we dredge on a regular system. The officers employed on the river Lee are required to get out and bury any carcasses, but these are very rarely seen above Tottenham. Latterly, in the Limehouse cut and all the way up the river towards Tottenham, there are in hot weather a considerable number of dead dogs and other things, but we have systematically had them collected and buried, and so got rid of.

754. Have you laid down any regulations with regard to bathing within your jurisdiction?—No very strict regulations; we warn parties against bathing so far as our jurisdiction extends; but there are parts of the old river in a few convenient places where bathing goes on without any control being exercised by the Trustees, but not to any great extent.

755. Do the Trustees claim the ownership of the fishing rights, or do they in any way regulate or license the fishing?—No; the fishing generally is held by private owners; the Trustees by the right of purchase are the owners of some fishing; at all the weirs, they catch eels; but those fisheries are let where they are worth letting.

756. What mill power is there upon the Lee that belongs to or is in any way controlled by the Trustees?—I may say, generally, that nearly all the mills from Ware to Lee Bridge belong to the two water companies or the Trustees, with the exception of one at Broxbourne and the Government mills, from King's weir down to Enfield.

757. What kind of mills are they principally?—They are flour mills almost entirely with one or two exceptions; there is a chain of powder mills from King's weir down to the small-arms factory at Enfield.

758. Which are the Government mills?—Yes, these all belong to the War Department who allow their surplus water to grind corn at Waltham, and the water power at the small-arms factory turns grindstones for sabres.

759. Do you know anything of the river tributaries beyond your jurisdiction above you and up towards the sources?—I know them generally.

760. Are there any mills on the tributaries ?—Yes, a great many, but they are entirely corn mills ; I think there is scarcely an exception; there may have been one small paper mill near Luton some years ago, but I doubt whether it is there now.

761. Do any of those mills that you know of use steam as an auxiliary?—Yes ; steam has been very much introduced.

762. As an auxiliary to water?—Yes, as an auxiliary to their trade, the demand increasing. A man cannot work a mill to any advantage unless he can draw plenty of wheat through it, and so he puts on steam; it is not altogether an auxiliary to water.

763. I need not perhaps ask you whether you would restrict the putting of ashes into the river within your jurisdiction or not, but suppose a man burns coal to any large extent and he puts the ashes into the stream, of course, you would complain of that?— Yes ; but I hardly think there is a ton of ashes thrown into the Lee in a month ; they are too valuable.

764. Because they are so well checked within your jurisdiction ?—Nowhere on the Lee is it done ; there are no steam mills of any importance above us at all; within our jurisdiction I should say that there is not a ton of ashes thrown in in a month.

765. As to the condition of the streams above you, do you think that any solid refuse is put in by riparian owners or by persons having access to the river at any point ?—A little perhaps at Stortford ; it is not as sweet as it should be there, and I think there must be some come in from Ware.

766. You think that as a rule the river is not subject very much to abuse from being polluted by solids or obstructed ?—As a rule, I think not much above Waltham.

767. Have the river Lee Trustees any jurisdiction above the point to which they navigate to prevent such a state of things if it exists ?—The Trustees have no jurisdiction beyond being the body who can make a legal complaint to the Court of Chancery and obtain an injunction ; they can do nothing more than that, and that is a most expensive and troublesome process.

768. You can put in force the common law of the land which is applicable to nuisances?—Yes, but not any special law; that is what the Trustees very much want.

769. There is I believe no such body as a conservancy having charge of the entire valley of the Lee and its tributaries ?—No ; that is what is wanted, and that is what did occur to me when I was called in in 1850 as being a most desirable thing to have, that the Trustees should be a drainage board as well as a river board.

770. You say that the river or the navigation is now managed by the Lee Trustees, but supposing that persons above your jurisdiction thought fit to abuse the river by casting in solids, there is no recognized body whose duty it would be to step in and immediately prevent it ?—No.

771. The offenders would have to be indicted by any parties who chose to take the matter up ?—Yes, they must either proceed by indictment at common law, or move for an injunction in the Court of Chancery.

772. Would you be surprised to learn that in Yorkshire and other parts of the kingdom ashes are thrown into rivers and streams by thousands of tons annually, that foundation materials and road scrapings are thrown in in the same large quantities, and in fact every form of solid refuse, and otherwise, is thrown in because a river happens to be near, and it is cheaper to throw it in than carry it anywhere else ?—Yes, I am aware of it; but I can say absolutely that such a practice as that does not prevail at any point in the valley of the Lee. The river is owned by millers and landowners to such an extent that they would immediately stop such a state of things, because if permitted it would immediately affect the next mill below. I can give you an instance; in Luton there was a board of health and some years ago they began to foul the river, but a large landowner close below commenced a Chancery proceeding against them, and he holds them under terror to keep all the solid matter back, and practically, I believe that Luton does not hurt the river in consequence. By clause 109 in the 7th of George the Third, it is enacted that "if any person shall wilfully throw ballast or gravel into the said river, cuts, or canals, he shall be committed and put to hard labour for a period not exceeding three months," but that only applies to the river as a navigation.

773. (*Mr. Harrison.*) For a considerable distance the navigation and the river run parallel ?—Yes.

774. Have the Trustees of the navigation any control over that part of the river ?—No, very little indeed; nothing more than if there was any overt act by which the river was damaged, coming in afterwards into the navigation, then the Trustees would, by common law, have a right to complain.

775. They do not take any steps to keep it at a proper depth, or pass over the water in any way?— They have no interest at all in any way in that.

776. There are some parts of the river which have been canalised?—Yes.

777. In those parts of it, are you obliged in the summer time to give any considerable fall to the water ?—No, there are very fine deep reaches in the river very much like the Thames, and we keep them perfectly clear, we keep them regularly dredged.

777a. I see that you have deepened some of them considerably ?—Yes ; we also dredge after gravel for profit in some of these rivers, and some of them are very fine deep rivers.

778. In those parts where the river has been formed into a navigation, have your improvements had the effect of passing off the floods more rapidly than before?—Very much so; in the last 10 years the valley has been sensibly improved in its drainage by the works which have been carried out by the Trustees.

779. Does that remark extend to those parts of the river which do not form part of the navigation ?— Not entirely, but partially it does. There are certain portions of the river, say between King's weir and Chingford on the Essex side of the valley, that are comparatively in their natural state still, because they are only relieved by the improved navigable river in one or two parts in the whole of that distance.

780. Is the effect of passing off the floods more rapidly from that part of the river which forms the navigation to expedite the passing down of flood waters from those parts which do not form part of the navigation?—Yes; all that has been improved, but there are portions of the valley which are left in their original state.

781. Has the effect of the improvements that you have made in the parts of the river that form the navigation been to pass off the floods more rapidly, but to pass them on to parts of the river not under your jurisdiction, and which remain in their primitive condition ?—Yes, to some extent that is so; but as the river has to pass at many points through the new navigation, the general effect has been to get the water off the valley more quickly, at the same time, as I have said before, there are some portions between King's weir and Waltham and between Waltham and Chingford which are not much affected by these circumstances.

782. Would it be beneficial to the whole of the valley of the Lee if the other parts of the river were placed under the jurisdiction of the Trustees of the navigation ?—Certainly a great deal of improvement might be effected if there were means for it; some of the rivers are in a disgraceful state, the banks are allowed to grow up, and the place is left like a morass.

783. Is there much land flooded in consequence of that ?—Yes; there is a good deal of land overflowed by the floods, but that is in the winter months, and the lands are not very valuable; they are left in a half soddened state, and water logged, both from a wet winter and a wet summer; the people do not seem to value the lands much, and many of them are lammass lands.

784. That is to say, lands upon which the occupiers of adjoining land can put their cattle for a certain period during the year ?—Yes, but those lands are getting gradually enclosed.

785. Do you know whether the effect upon the health of the people is marked or not ?—The truth is that there are so few people who live in those waterlogged parts that I cannot tell you, no one indeed lives there, they are neglected places.

786. Are the lands so injured by that condition of things that an improvement to the land would pay for an improvement to the river if it were placed under the jurisdiction of the Trustees of the Lee ?—If the commons were enclosed it would; not otherwise, as long as they are commons and open lands there is not sufficient ownership in them to make it worthwhile. When they get enclosed you soon see an improvement take place; they make partial embankments and deep ditches, and so on. We have had a marsh in Nazeing opposite to Broxbourne very much improved in the last few years; besides being enclosed it was drained. The surveyor laid out a drain at my suggestion through that marsh, which has very much improved the land altogether.

787. (*Chairman.*) I assume that all those marsh districts are considerably above the level of West Ham marshes?—Yes; they have got plenty of fall, all of them.

788. It would be simply a question of embanking and keeping the floods from them, and getting an outfall by a cut down to the lower district?—Yes.

789. You could drain any one of them?—Yes, and there is one very strong instance of that where I hope this will be carried out some day, and that is the large marsh which lies below Lee Bridge. That marsh ought to be enclosed and the river-course improved, and part might be laid out as a park for the people. I may mention that the marsh is very much frequented by the poorer orders of London during the summer time, and it would make as pretty a park as can be imagined, if properly laid out, with the river Lee like a lake in it.

790. Is that marsh now common land?—Yes, and it is in a most disgraceful state.

791. Who is the lord of the manor?—I do not know exactly; Mr. Tyssen is lord for part.

792. Is the valley of the Lee in any shape or way a manufacturing valley in any part of its area?—Not in that sense above Enfield. The powder mills can be scarcely called manufactories, at all events it is one of the cleanest and quietest manufactures that can be earned on, they occupy about three miles of the river; But below Enfield we are gradually getting manufactories. One has been lately established as large jute works at Ponders End, and a large floorcloth manufactory has been erected in Edmonton parish. There are also some manufactories at Tottenham that drain into the Lee below Tottenham lock.

793. Is jute Chinese grass?—It is a vegetable fibre that comes from the neighbourhood of Calcutta, an Indian fibre, and it is now forming the basis of everything; they say that they even adulterate silk with it. Nearly all the coal sacks and flour sacks are made of jute now; it looks like hemp, and it is a charming article, but it has one drawback, that it will not stand wet; wet causes it to rot immediately.

794. Are there any fords in the river in the valley of the Lee?—There are a few fords in the old part of the river, but all the main lines of communication are bridged over entirely, and the old fords have disappeared.

795. Has there been any extensive system of land drainage in any part of the valley, or does the subsoil not require it?—The subsoil does not require it, the river Lee valley is healthy for that reason; there is a wonderfully free percolation of the water through.

796. (*Mr. Harrison.*) In the upper parts of the basin which are chalk would agricultural drainage be at all affected if it were carried out?—There is no occasion for it, it drains so excessively freely in the valley of the Lee. The malt trade of the Lee arises from the fine free quality of the land, growing as it does such excellent barley, it was carted down to Hertford and Ware and made into malt, and then sent by water to London; that was the origin of the Ware trade in malt.

797. No agricultural drainage would diminish the volume of water coming into the river from that area?—No, nothing could be done to affect that.

798. (*Chairman.*) In the course of our inquiries we have had very strong opinions expressed by many persons that from some cause or other, our climate is altering, that drainage or clearing of the land is gradually reducing the rainfall, and diminishing the floods. Do you believe that that is based upon any reasonable foundation; for example, taking the valley of the Lee, is that as subject to floods now as it was in a former period?—I should think so. I believe that there is to some extent a popular error on the subject; floods will come occasionally in such a valley as the Lee, but a bad flood comes but rarely; there was a terrible one in the month of May 1824, and there was a very bad one in November 1852. Again there was flood that topped the one of May 1824 in October 1857, but since then we have had no flood at all that has been equal either to the one of November 1852, or the one in October 1857, so that I might say that now great floods seem to be disappearing, as we have had none for so long. I think people forget these things, and we might run on till such a period as has elapsed, as that between May 1824 and October 1857, before we get another. While the present elements of nature exist, I apprehend that we shall in this climate be subject to these irregular periods of drought, gradually merging into wet periods, which prevail according to something like a law. We got into a dry period in 1865, and no doubt we have run into a wet period again, we had a wet period in 1860 or 1861; the summer of 1861 was marked by floods through the summer.

799. In our first inquiries in Yorkshire, for the first 3 or 4 weeks every witness, without any exception, was quite satisfied that there would be no more floods, but before we had completed our inquiry there was destruction caused by a flood, such as the oldest inhabitant could not recollect?— Yes, and so it will be everywhere, people are apt to forget what has already passed. There is one point touching this inquiry to which I may refer, namely, that in a valley like the Lee which is so full of porous grounds it is a long time before dry weather loses its influence. I attribute the low state of the river in 1865 to be the excessively hot weather of 1864. The wet marshes were cracked open, so that it was dangerous to walk across them between July and September, 1864; you might have dropped an umbrella out of sight in some of the cracks, many of which did not close up all the next winter of 1864-65.

800. And very probably they never would be watertight?—The water certainly during all the next year did not appear as usual in the river; so that the cause of the river being so low in 1865 was the drought of 1864.

801. (*Mr. Harrison.*) What is about the level of the water shed of the river Lee within range of the chalk hills, how much does it rise above the sea?— The top of the range is about 450 feet, and the general average of the county round Hatfield may be said to be a great plain, with deep river channels cut into it; this table-land is from about 300 to 350 feet above Trinity high-water mark.

802. At what depth below that do the springs appear?—About 150 feet, they begin to boil out at about 150 feet below that level, and they cease to boil out when you get to about 80 feet above Trinity highwater mark.

803. Is that cessation in the boiling in consequence of the London clay overlaying?—I think so; underlying the drift and London clay, you get too far from the sources of the water to give fall enough for the water to come up with the same force, and you get an additional depth of drift and mottled clays, and then the London clays, which keeps down any tendency the water might have to rise. The Lee is a filling valley down as far perhaps as the parallel of Cheshunt; below that there is not much feed into it, except land springs and flood water. The lower part of the valley has a great thickness of pure green sand reposing on the chalk; near Ponder's End there is 70 feet of this material; the whole depth to the chalk being about 100 feet. At Tottenham lock the London clay is close to the surface, and is many feet thick.

804. You gave us the minimum volume of the water you had recorded as passing after the abstraction of water for the New River Company at Hertford?— Yes, as passing over Feilde's weir.

805. Where is that?—At the junction of the Stort and the Lee.

806. That is after taking in all the springs intervening between Hoddesdon and Hertford?—Yes, with one exception; that gauging does not take in a large spring at Hoddesdon. Hoddesdon mill and other springs are not included in that gauging.

807. Do you know what they are?—Hoddesdon mill spring discharges about 300 cubic feet a minute; 2,700,000 gallons a day.

808. There is a large drainage south of Hatfield where you may see plenty of swallow holes; Have you examined that district?—Not much.

809. It is of very considerable extent, is it not?— Yes.

810. All the water passes away?—Yes. I think they are not so much swallow holes as vast beds of sand. There may be swallow holes underneath and the water gets away. The bed of the river below Hatfield park has swallow holes. The Marquis of Salisbury took me last year over the bed of a pond on the river course from which he had diverted the river. He made a dam across the pond and laid one part of it dry and the water was going through the bottom of the pond, which was of fine sand.

811. That water no doubt passes into the chalk and finds its way out below?—Yes, not far below.

812. It was suggested to us in a former inquiry by Mr. Bailey Denton, that advantage must be taken of the drainage of the clays in certain places by passing it into the chalk in that way so as to increase the perennial supplies to the springs in the river adjoining; do you think that it is at all impossible?—I think there may be places where it would be very possible, but I could not apply such a scheme to any part of the valley of the Lee.

813. Go to the valley of the Stort; do you know the geological character of that valley?—It has a very great deal more of clay. The river Stort quickly floods.

814. Is it from the Stort that the floods chiefly arise in the lower parts of the valley?—Not chiefly, but in a great deal larger proportion than from the other parts. The river Stort is very foul when it floods.

815. Does it fall down to a great extent in a dry summer season?—Certainly it falls off comparatively to nothing, and in that respect it shows its clayey character.

816. Is that the case with the Ash also?—Yes, the Ash is a steep river also. I do not think that the Ash has so much clay in it, but it is a steep river, and it falls off very much. It floods rapidly after a certain amount of rain. None of those other rivers flood after the first rains. We have a regular monsoon in this country as in India. For example, we have our first warning rains, and then in October we have a heavy rainfall; it is very rare that we do not have a flood in October, when whatever collection may have taken place in the ditches of the upper country gets washed out and the water comes down very foul for the first 24 hours, when a flood has got to its maximum it comes down foul, but after that the water soon becomes clear. I can mention an instance which has occurred in the last week. The river was in a high flood on the 7th of this month and the water was then foul, but on the 9th it got nearly back to a fine and clear condition. I was surprised on Sunday to see it a fine magnificent volume of water, nearly clear, although so shortly after a high flood.

817. In the river Thames from observations that have been made by Mr. Simpson, it would appear to take nearly 30 days after a heavy general flood before the river assumes the appearance you described just now, indicating the springs at its source?—Yes, but it is very different in the river Lee, because we are so much nearer the spring head and get so much larger a proportion of water from the springs.

818. And more rapidly passed into the river?—Yes, I can assure you that it is a matter of fact that on the 7th of this month the river was in a state of high flood, and on the afternoon of the 9th one half of the whole volume of water was spring water. I know it by former gaugings, we had only got volume enough in the river, but so small a volume was it reduced to that one half of it was spring water; the river was falling off to a wonderful extent.

819. Have you made any observations at Hertford so as to determine approximately the quantity of water that is evaporated from the surface above Hertford?—No, but I know a great deal about it from the gaugings made at Feilde's weir, and from comparing the quantity that flowed off with the quantity of rain that fell.

820. Will you be kind enough to state the result of your observations there?—I will, if you please, answer that question by referring you to the table, where taking the depth of rain actually run off at unity, the rain gauge showed 4.26 in 1851; 4.35 in 1852; 4.29 in 1856; and 4.74 in 1858. In other words for every inch available as water supply in 1851 there was 4.26 inches of loss and so forth. (*See end of the witness's evidence, Appendix No.2.*)

821. I believe the New River Company take water not only from the river Lee at Hertford and from the Chadwell spring, but pump also from wells?—Yes, they have pumps near the springs but they pump very little.

822. You stated, I think, that there would be a difficulty in drawing a larger quantity of water from the wells for fear of having the sewage flow back through the chalk or gravel; do you anticipate that that would be an obstacle to your drawing a larger quantity from the wells than you do now?—If the water had to be taken in that way upon a large scale, that is if it were collected by culverts upon a large scale, I apprehend that at the same time you would take care to have a proper system of sewerage upon a large scale, and I think that the two things together would be liable to clash. I have always looked at that as one of the difficulties in foul draining the valley of the Lee, that you must lay main sewers where the fine water is most plentiful. Wherever you attempt to lay a sewer in the valley of the Lee you find yourself taking in beautiful spring water. Carrying on works as I have done, I have found that when I have attempted to pump the river out in order to construct locks, it has been the most difficult engineering operation to get rid of the water that comes from everywhere, it is in fact to pump the whole district round.

823. Do the East London Waterworks Company take the water from your navigation, or from the old river?—From the old river. Under their Act of 1852 they were empowered to cut the navigation off from the old

river in several places so that the old river became the carrier of pure water for miles above their point of abstraction; consequently their supplies are not affected by the navigation at all until above Ponder's End.

824. Then the navigation above a certain point acts partly as a subsiding pond for their water supply ?—Yes; if it does take in the sewage and the stuff carried down by the floods, it settles in other parts of the navigation.

825. At the lower part of the river you stated that there were two miles and a half which were jointly under the jurisdiction of the river Lee Trustees and the Thames Conservators ?—Yes, we call it technically the Bow creek.

826. To what height do the ordinary spring tides rise there ?—The rise of the bed of the river between Blackwall and Bow Lock is about 7 feet at low water, and the tide at Bow Lock rises 13 feet.

827. What is the difference in the level between ordinary spring tides and ordinary neap tides?— About 3 feet 6 at high water.

828. Is there any large extent of surface of the bank and bed of the river that is exposed between those two points during neap tides ?—Yes, there is a good deal of bank, and all the Lee waters ebb out, so that the river is a mere stream at the bottom of a large muddy creek.

829. Therefore for some days there would be a considerable area left without being covered at all with water during the 24 hours ?—Yes.

830. Of what area do you suppose that must be? —In acreage perhaps 10 or 12 acres.

831. What is the condition of that surface ?—It is ooze and mud with a few reeds growing in it; there is a good deal of reed shore above the influence of the neap tides, but below the spring tides.

832. Is there much sewage matter carried up from the metropolitan outfall and from the West Ham works into that portion of the river Lee ?—Since the middle of August last we have been very much relieved of anything from the metropolis, for they have set a temporary pump to work at the West Ham station, and they pump it now under the Lee, but there are many outlets still which are not connected so that we still have sewage coming in. There is a very annoying place at Bow brewery; there is also a newspaper factory and a soapworks near Old Ford that cause a great deal of nuisance; on the whole, however, we are very much better than we were. West Ham drains into the tidal creek below Barking iron bridge, and that does not help to mend the creek by any means; when the Metropolitan Board's pumping engines set to work at the Abbey mills, the West Ham drainage ought to be dropped in there; their culvert goes close to it, and some arrangement, I think, must be made to send it down there, unless the West Ham local board make their own pumping station near Barking. There is this disadvantage, that when the tide returns up Bow creek, it brings up anything through our flood gates ; it flows to Old Ford lock on one side, and towards Limehouse on the other; but bringing in the sewage from the Thames, and being locked in as it is at Limehouse and at the Bow gates, of course what sewage there is drops to the bottom of the river, which renders it unwholesome in hot weather.

833. Is it worse than it was before the completion of the sewerage works ?—Yes, it has very much increased in the last year or two. Then the Tottenham drainage also coming in deteriorates the quality of the water, and we suffered very much from it, both in 1864 and 1865, and last summer but in a less degree.

834. Was there a considerable nuisance caused by it then ?—Very great, and that is a thing that will grow, although they have taken it away from the metropolis. If something is not done with the Tottenham sewage above, we shall be liable to have the same nuisance where, until the last few years, it was a very beautiful river; that is, above Lee Bridge. In my opinion, some large scheme ought to be devised to carry away the drainage of the valley then.

835. It would appear that London has removed its drainage to your neighbourhood, and that you feel the disadvantage of it ?—Yes ; now that London has got rid of its difficulties the suburbs are increasing and the evils are repeating themselves. I have prepared this map (*handing in the same*) for the purpose of explaining the new state of things; this map is a general sketch showing the state of the valley below Edmonton at the present time.

836. Are you sufficiently acquainted with these parts (*pointing to the map*), Poplar, Blackwall, and Limehouse, to say whether they are above or below the level of high water?—The greater portion of that district is below the level of high water. In addition to that there was no efficient system of sewerage carried out; the inhabitants were of a very low class, and very badly built houses existed all over that district.

837. I believe the low level sewer has been partly carried out?—It was, in fact, at the time of the breaking out of the cholera, complete throughout the district but they had no outlet at the end. They are making from the low level, or they have made, a deep sewer into the Poplar district, running under the Limehouse cut at Bromley lock, which is just completed; one was also contemplated under the Victoria park approach to drain the Isle of Dogs.

838. The condition of this district (*pointing to the map*) at the breaking out of the cholera would be very similar, would it not, to the condition of that district on the south side of London where it broke out on a former occasion?—No doubt of it; and there was quite enough to account, I think, for the breaking out of the cholera, in the filth of some of the places here (*pointing to the map*), without looking to abstract theories. The first cases of cholera that we heard of at Bow were those of a man and his wife who worked in a small factory by the side of St. Thomas's millstream. A great many people work there, and in a very small building; they had an abominably foul ditch by the side of the factory, and this ditch was cut off from the general West Ham sewerage district, and was in fact illegally fouled by this factory and by some other nuisances above. The street in which the cholera raged so badly in Bow was close behind Lloyd's paper works, and the smell from a brewery and the stuff from Lloyd's paper works occasionally was of the foulest description. About six weeks ago I had occasion to visit an enclosure close by the newspaper works at the end of this street (*pointing to the map*), and I was convinced that there was quite enough to account for the cholera appearing there.

839. Where does the discharge from the paper works find an outlet?—Into the river Lee, close below Bow bridge. There was a smell from Esparto grass in the tanks. There was a sort of faint smell from it that was dreadful, and the closeness of the place was something worse than I ever experienced in my life, that was where the cholera broke out.

840. Is the part you have referred to below the level of high water?—No; it is on the side of a hill facing the east.

841. Are you aware whether there was any obstruction to the free passage of the sewage from Poplar about that time consequent upon the flaps being out of order?—I do not know. I had a great many men at work at Limehouse at the time, and knowing that cholera was raging so badly I of course made my inquiries, and it appeared that at the time of the outbreak there was scarcely anybody who was not seized with diarrhoea. I do not believe we had a man among the 60 who were there employed who was not ill in that way.

842. Was the effluvium from the river, and in the district bad at that time?—The effluvium was very bad.

843. (*Chairman.*) Do you know what the ordinary condition of Limehouse cut is?—The ordinary condition of Limehouse cut has been very fair during eight or nine months of the year; but it has been very bad in dry, hot, summer weather in the last four or five years, within which period factories have been increasing, and sewage has been increasing from the metropolitan area.

844. It has been literally, has it not, an open cesspit?—It has been a good deal like it.

845. Was it not so in the last spring?—I think from about June.

846. When the cholera broke out?—Yes.

847. An open continuous cesspit?—Yes, as foul as it could be.

848. Are you aware that a barge load of blue vitriol was sunk in the middle of it, which throughout its whole length entirely disinfected it?—Yes. It must be remembered that we labour under other difficulties which must be explained. All the fresh water that we have flowing down the river is divided into five parts, so that several of these streams (*pointing to the map*) also are water-logged, and get foul. Then there is a reservoir there (*pointing to the map*) that it would be very desirable to close up; it collects mud, and I think it ought to be closed up. An improvement might be made also in the drainage of this district and the cleanliness of it if there were means at hand. We can help ourselves in foul times by opening the gates at

Bow locks into Bow creek. We do that, and we almost always do it on Sundays to clear it out and to draw the water off the land generally, but the collection of mud increasing in these other rivers (*pointing to the map*), there are dead ends to them that we cannot draw. Much good, however, might be done. We do all that we can to draw off the water from the surface, but the difficulty is this, when you get a very short water time and hot weather, the drawing off is no longer of any good, for the smell from the river that has been drawn is worse than when the river is kept up. The foul water that passes down Bow creek never gets away; it is pounded up, and comes back to us the next tide. During the past two summers I was obliged to keep the water up instead of drawing it off. When the autumn water comes, or we have had a wet summer, we can draw these places off, and they can be kept comparatively sweet.

849. (*Mr Harrison.*) Have the trustees any control over these branches (*pointing to the map*)?—No; they have no control over any but their own branch down to the Four mills. The others are private branches. One belongs to the East London Company, two to the city of London, and one to Christ's hospital. There are the means of getting a very great improvement made here (*pointing to the map*); this part might be very much improved if we could cut the river off there (*pointing to the map*) and turn part of this ground into a park. It is all open common now.

850. (*Chairman.*) Have you had any communication recently with the West Ham authorities relative to their sewerage?—The trustees of the river Lee have not had any communication with them, but the Essex Sewer Commissioners have had a communication with them. The Commissioners have offered to give them every facility they could, but nothing tangible has been done yet.

851. Had not the local board some understanding, or did they not obtain some sanction from you as engineer relative to their outlet?—Not the Trustees, but the Essex Sewer Commissioners Sanctioned a new wall for passing the outfall through their embankment; beyond that they have had nothing to do with it. At Barking iron bridge the Commissioners also sanctioned the making of another outfall.

852. (*Mr. Harrison.*) Is that portion of the land (*pointing to the map*) water-logged or liable to be flooded?—It is not flooded at all, or very rarely; the West Ham sewers now underdrain it completely. There are still some islands above the Stratford road which are not connected with the West Ham sewerage, and they are more liable to be water-logged.

853. What is the substratum of this district (*pointing to the map*) which is marked "Poplar" and "Bow"?—It is a fine bed of gravel and sand.

854. How far does it extend from the river inland?—In all directions; to Hackney, Homerton, Victoria park, and Bow common. They are all on a great bed of gravel and sand.

855. (*Chairman.*) All this district (*pointing to the map*) is more or less peaty and compressible?—Yes. The district I have just spoken of is bounded by the Limehouse cut and the river Lee. When you get into Poplar you get to the marsh in the same part of the river, there the London clay does not exist, and you have drift, and peat, and gravel.

856. Have you ever had occasion to use the ordnance bench marks in this part of the district (*pointing to the map*)?—I have used them.

857. I wish distinctly to say that any person wishing to refer to ordnance bench marks, ought never to refer to them anywhere near where the metropolitan drainage works have been carried out, or anywhere within the area of West Ham, or the flat district where the sewers have been carried out; houses, streets, and bench marks have been lowered from 6 to 7 inches, and in some instances 12 inches by gradual subsidence from the draining of that site?—Your remark applies, I think, to the east of Bow creek. The West Ham sewerage drains that district very completely, and the only fault that it has is that it does not go far enough, it requires now to be carried farther; a new outfall is wanted now at Barking creek or somewhere else.

858. (*Mr. Harrison.*) Were you consulted at all when the outfall was made for the West Ham sewerage?—Yes, so far I was consulted that I advised both the Trustees of the river Lee and the Essex Sewer Commissioners that the outlets must be only looked upon as temporary only, inasmuch as the metropolitan drainage works were then being commenced, and it was only a question of a few years when proper relief would be obtained for the district, without throwing the sewage into Bow creek.

859. The outlet was made under those conditions?—Yes.

860. So that the West Ham board of health are now under an obligation to remove the present outlet, and discharge the sewage at some other place?—Yes, and they must do it; it cannot be deferred much longer.

861. I dare say you remember that Mr. Simpson mentioned at the Institution of Civil Engineers, some gauging which he had made on the river Churn above Cirencester, showing that the volume increased from the Seven springs down to a certain point, and diminished after that; so that at a certain distance below the source it was reduced to nearly the volume obtained at the Seven springs. Have you observed any such phenomenon on the river Lee as a loss in the volume of water below a certain point?—I have not in that sense, but I have no doubt that it does occur at Hatfield. I have no doubt that the river is lost to a certain extent and then comes out again above Hertford in the form of springs.

862. Can you say that from actual observation?—No.

863. Is there any stipulated volume of water for the use of the navigation?—Yes, that is all set out in the Act of 1855, the whole agreement in fact is embodied in that Act. The companies have their shares as between themselves, and with regard to the river Lee Trustees, a certain volume is set apart for the river Lee Trustees when they want it.

864. The volume which you have power to take is 3,500,000 gallons a day is it not?—The Trustees can take for the use of the navigation, from the upper reach above Feilde's weir 3,600,000 gallons per diem; between Feilde's weir and Waltham 4,500,000 gallons per diem; between Waltham and Old Ford 5,400,000 gallons per diem; below Old Ford lock, all the surplus water belongs to the navigation. By the River Lee Water Act 1855 the Trustees are bound to undertake new works for improving the water supply at the expense of the companies if they require such; if consumption of water in the navigation is to be reduced the Trustees may be called upon to execute the necessary works under similar conditions; but practically there is not much water wanted for navigation, compared with the resources of the river. If the companies wish to exercise their powers we can reduce the quantity of water consumed in the navigation to a very small quantity. The quantity of water which the New River Company could draw before 1855 was limited by the marble gauge, but the Act of 1855 removed all restrictions and divided the water in certain proportions to the New River Company and the East London Waterworks Company, and then after these certain proportions had been received they took half, foot for foot, each of them. Under the powers of that Act, the New River Company laid down pipes past the marble gauge, and they also put in a new balance engine; their supply was very much increased indeed, no restriction was put upon it, and a new balance engine was put in, the old legal quantity was removed, that is to say, the quantity mentioned in the reports and so often spoken of as going through the marble gauge was altered by the Act of 1800.

865. (*Chairman.*) What is the working establishment employed by the Trustees?—It varies.

866. There is a paid secretary, is there not?—Yes, and a paid engineer, also bankmen and dredgers.

867. Are they paid out of the funds which the Trustees have at their disposal?—Yes.

868. I think you have stated that the Trustees are not paid?—Yes.

869. Do you know whether they have any capital account?—Yes; we have always been carrying out large works on borrowed money.

870. They mortgage their income to raise the money?—Yes.

871. And they pay interest upon their debt?—Yes.

872. What is the present amount of the debt?—The clerk will be better able to state that.

873. Since you have been engineer to the trust have they expended much money on new works?—Yes, a very large sum.

874. Can you state the amount in round figures?—I should think they have expended at least £160,000.

875. In what number of years has it been laid out?—In 15 years.

876. Was the whole of that money borrowed?—Not entirely. Under the Act of 1855 the New River Company contributed £30,000 towards the works; the money was laid out specifically in new locks and works. The New River Company paid it in aid of a better water supply for the metropolis.

877. Has the East London waterworks contributed anything for similar purposes?—Yes, they contribute in the form of income.

878. Do you mean for works which have been executed?—I mean generally towards the funds of the trustees.

879. What do they pay you now?—£2,000 a year.

880. Is that £ 2,000 a year to be a perpetual mortgage upon the trustees for works accomplished, or will it cease at any time?—No, it is a perpetual income contributed towards the resources and for the purposes of the trust.

881. In consideration of certain sums of money laid out at some former period by the trustees?—It was generally in consideration of sums to be laid out.

882. In the event of any conservancy being set up, do you think it would be compatible with the constitution of the trustees that they should become conservators if the necessary powers were tendered to them for acceptance?—Do you mean that they should become conservators and drainage commissioners?

883. Yes. Conservators and drainage commissioners for the entire valley of the Lee?—My opinion is that it would not be convenient for them to become drainage commissioners anywhere above Hertford. I think that above that town it should be left to the different local parts, but I think there should be power given to prevent nuisances being committed, and that some such powers should be conferred upon them, as have been recently granted to the river Thames Conservators, that is to say, if the authorities in any town chose not to drain properly, the trustees should have the power to go in and execute the necessary works, and charge the town with the costs, and levy a tax upon them. I am strongly of opinion that something of that kind ought to be done. The great difficulty is to force people to do what is right; unquestionably something ought to be done with the drainage of Bishop's Stortford, but unless the whole navigation of the Stort was vested in the Trustees, which might be inconvenient at the present time, because it is private property, it might be difficult to deal with it. I think that parties who are at such a distance as Bishop's Stortford should be left to carry out their own drainage, but that the Trustees should have power to go in and do it compulsorily, if after a certain number of years notice they did not do it.

884. The river Lee Trustees holding in trust the main navigation in the lower part of the river do in a measure hold the key to the whole valley, do they not?—Certainly.

885. Would it in your opinion be a convenient arrangement to establish a new form of conservancy to have jurisdiction over that part of the valley where they would be liable to come into collision with the Trustees?—I certainly think there would be no objection to that on broad principles, the subject is of course quite new to me, and in what form it should be I am not prepared to say.

886. You think there would be no objection to a new conservancy?—No, I think not as to the lower part of the valley; to deal with, say, the valley drainage below Enfield or below Broxbourne, something of that kind is called for because the Trustees now only hold the position of objectors general to everything, and it would be more convenient for everybody if they could say "Very well, if you will not put this place to rights we will do it for you and tax you for doing it." It certainly is a case, I think, in which it is possible to form such a body.

887. The Trustees you have said are unpaid?— Yes.

888. Then by what interest are they moved or what is supposed to be their interest in the navigation?—To keep it sweet and pure, that is all.

889. Are they large riparian owners?—Some of them are; not all by any means. The members for Hertford, Essex, and Middlesex are *ex officio* members of the board, so that in fact the whole of the contributing area is represented on the board.

890. When you have board meetings, does anything like the whole number of the members attend?—No; the *ex officio* members do not attend the meetings much. We emanated originally almost from the city of London, the mayor, the corporation, and aldermen are members of the board, and sometimes they take a good deal of interest in the meetings.

891. Is it true that the great mass of the business is transacted by a very few members ?—Yes, there is a working board; I think that that works better.

892. Is the work done by a committee selected from the entire board and appointed by them ?—No, it is not done by a committee but by the board.

893. Do you mean that a certain number are nominated by the rest of the members ?—No, there is no nomination. Notices are given to the whole body; we have no committee for the monthly meetings.

894. But I suppose there are some members whom you never see, and others whom you see frequently? — Yes.

895. In the event of the Government desiring to interfere with the valley of the Lee and with the present arrangements for sanitary purposes, do you think that a large or a small board would be most eligible ?—I really have not formed any opinion upon the subject, but practically our board may be called a small board.

896. Should a board having such duties to perform as those which are entrusted to it be, in your judgment, an unpaid or a paid board ?—I think it would be rather better if there were a small payment.

897. Do you think it would come within the range of your duties to act as engineer for a conservancy board and at the same time to act as engineer to the river Lee trust ?—Certainly; the engineer of the river Lee could act much better and more effectually if he had the drainage under his control, and if there were funds to carry out improvements; the great thing is to have the sinews of war: you cannot deal otherwise with such a matter. The river Lee Trustees have no funds at present with which to deal with these things, and it is a great grievance, I think, to have perpetually to go to law for the purpose of restraining or punishing wrong doers.

898. Do you think that if the river was to be managed by a conservancy board for the benefit of the riparian owners and the towns on its banks ; for the benefit also of the navigation and the different water companies, it would be an equitable and unobjectionable way of raising an income to levy a rate upon all persons who should be directly or indirectly benefited ?—I cannot answer that question quite in the form in which it is put: my opinion is, however, that to a small extent taxation ought to be laid upon those towns that are drained into the river and who thereby compel the Trustees to incur expense in various ways. On the other hand the people might say, referring to the way in which you have put your question as to their being benefited, "We are not benefited; it is true that our drainage is passed into your river and you say that it may damage it, but if you put us to any expense we shall not be "benefited." In the sense in which I have explained it I should be inclined to tax those persons whose drainage formed the very subject matter with which you had to deal.

899. Then you would take an area supposed to be directly or indirectly affected by the river and also benefited by the works which had been executed in it ?—Yes, because the land to be benefited by mere drainage is practically *nil*. You could get no taxation out of any absolute benefit done to the land; you must take the broad principles as laid down in the Public Health Act and tax them broadly; not upon the old system, viz., that you could only tax parties whom a jury of 12 men would say were benefited ; that is the essential difference between old sewer law and the new board of health law. The board of health takes a district; they do not look very minutely into the question of who is benefited, but they take a whole district, and they tax the people in that district.

900. From your knowledge of the valley of the Lee, do you think you could define a limit beyond which you should not go, but within which taxation should be imposed ?—Not at the moment, but I think there would be no difficulty in doing so.

901. That will be a matter for consideration ?— Yes.

902. The taxation you have suggested would be imposed under parliamentary authority?—Certainly, there should be taxation, but people should not be taxed by the Trustees direct, but a law should be passed as in the case of the county rate, to levy a certain amount of taxation on each district in a lump. The Trustees should not collect the money.

903. But do you mean it to be handed over to the fund in charge of the Trustees ?—Yes.

904. To be expended by them, and that they should publish annually audited accounts ?—Yes, I may say that the Trustees do that now, but no doubt there should be accounts published drawn out with great minuteness, and there should also be an annual report presented to Parliament.

905. For this purpose, of what do you think the establishment should consist in addition to a secretary an engineer and the staff which he might choose to appoint under him ?—I should think not much more, there would of course be in of a very extensive staff, but if such a plan were carried out there must be some very extensive works carried on in the neighbourhood between Tottenham and Stratford in order to get rid of some portion of the foul state of things which exists down there; that must be their work, and there must be a large outlay of capital if the works are to be completed, and a general system adopted ; the mere working of the thing need not be an expensive matter.

906. In the event of any large works being devised and sanctioned by Parliament, or by some properly constituted authority, the engineer, I presume, would either let them by contract, or he would have power to call to his aid persons who were required to superintend and carry out the works ?—Yes, the works would be planned and carried out and the capital expended. I thought that your first question applied to the annual expenditure.

907. Have you seen the scheme as drawn up by Mr. Bailey Denton called the Lee Valley and Ham Marshes Sewage Bill ?—No.

908. How many lock-keepers have you at present? Have you a resident lock-keeper at each lock ?—Yes, on the average we have quite one per mile.

909. I assume that the whole of their time is not occupied in the duty of lock-keeping ?—Pretty much so; the work is too much for them to get away much from the lock.

910. Do you know how your income and expenditure balance at the present time ?—I think that perhaps the clerk will answer that question better than I can, but they balance very fairly. On the whole we do very well. The trade very much increases.

911. Do you regulate your rates in proportion to your income, or are they fixed ?—We should regulate them according to the income. We have practically a fixed amount, and if we find ourselves short of money, we try to economise in our work for a year, and not to do so much. Ever since I have had to do with the river we have always been improving, putting substantial works instead of old ones.

912. Is there anything which you think you can add to the evidence which you have so kindly given to us?—I may mention that the East London Company have deposited plans in the last month for diverting the future drainage from Waltham, Cheshunt, &c. I have not had an opportunity of seeing those plans, or knowing anything about them, but they would touch the question of the general conservancy of the river, and so on, and perhaps rather increase the desirability of having something done.

913. That question will come before Parliamentary Committees in the next session ?—Yes.

914. Is there anything further which you would wish to add ?—Nothing occurs to me now. I shall be most happy to state anything afterwards, if it should occur to me.

915. Are you also engineer for the New River ?— No. I may say that the New River Company last year called upon the Trustees to execute a new work near Hertfprd in order to get the water better to London, and that was paid for by them in addition to the £30,000, and that is one of the works which either they or the East London Company could call upon the Trustees to execute under the powers in the Act of 1855.

APPENDIX No. 1 to the Evidence of N. BEARDMORE, Esq., C.E.

RAINFALL at FEILDE'S WEIR, HERTS (Height above Sea, 90 feet).

Extract from Manual of Hydrology, by Nathaniel Beardmore, Esq., Civil Engineer, (referred to supra, Question 701).

Years.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	Mean of 10 years.	
	in.											
January -	3.2	3.5	4.6	3.4	1.7	0.5	2.3	3.5	1.0	1.3	2.5	
February -	0.8	1.0	1.5	1.4	0.9	1.0	1.3	0.2	1.8	1.4	1.1	
March -	0.2	4.1	0.3	1.7	0.5	1.8	1.0	1.6	0.7	2.0	1.4	
April -	3.0	1.8	1.6	2.8	0.7	0.2	2.0	2.3	2.8	2.4	1.9	
May -	2.3	0.6	1.8	2.5	3.4	2.4	3.6	1.3	2.6	1.1	2.2	
June -	0.8	1.4	3.2	3.0	0.8	1.2	0.7	1.6	0.9	3.2	1.7	
July -	3.2	3.3	2.7	4.0	1.5	5.3	2.2	1.5	3.3	3.2	3.0	
August -	1.3	2.1	3.7	2.4	1.9	2.0	2.6	2.2	2.9	2.2	2.3	
September -	2.0	0.6	4.0	1.5	0.6	1.8	2.8	3.8	1.1	3.7	2.2	
October -	1.8	1.8	6.0	3.8	2.4	5.2	1.9	5.1	1.4	2.7	3.2	
November -	1.8	1.1	7.8	1.8	1.6	1.9	1.4	1.6	0.6	3.1	2.3	
December -	1.9	0.6	2.3	0.4	1.9	1.7	2.5	0.7	1.7	2.9	1.7	
Total -	22.3	21.9	39.5	28.7	17.9	25.0	24.3	25.4	20.8	29.2	25.5	
Mean of 5 years -	26.1				24.9							
Winter -	7.8	8.2	7.8	14.9	4.1	5.0	7.2	7.6	5.1	5.0	7.4	
Mean of 5 years -	8.7				6.0							
Spring -	6.3	7.9	6.9	10.0	5.4	5.6	7.3	6.8	7.0	8.7	7.2	
Mean of 5 years -	7.3				7.1							
Summer -	8.3	7.8	16.4	11.7	6.4	14.3	9.5	12.6	8.7	11.8	10.8	
Mean of 5 years -	10.1				11.4							

  

Years.	1860.	1861.	1862.	1863.	1864.	1865.	1866.	Mean of 7 Years.
	in.							
January -	3.40	0.85	2.15	3.50	0.95	4.00	3.90	2.68
February -	1.50	2.35	0.38	0.70	1.20	1.95	4.05	1.73
March -	2.60	3.10	3.42	0.85	2.72	1.40	1.90	2.28
April -	1.30	1.28	2.60	0.80	0.73	0.28	1.95	1.28
May -	4.30	1.40	2.80	1.00	2.40	2.40	1.70	2.29
June -	5.60	1.95	2.30	3.94	1.55	1.90	3.20	2.92
July -	2.00	2.00	1.32	0.78	1.00	3.05	1.95	1.73
August -	4.05	0.55	2.65	1.85	0.95	3.56	2.20	2.26
September -	2.70	0.80	1.50	3.05	2.25	0.60	4.40	2.08
October -	1.70	0.90	3.45	2.10	1.05	5.40	2.55	2.45
November -	2.60	4.60	1.40	2.05	2.50	2.35	1.95	2.49
December -	2.00	1.20	1.78	1.35	0.60	1.90	2.50	1.62
Total -	33.75	20.98	25.75	21.97	17.88	28.79	32.25	25.81
Mean of 7 years -	25.81							
Winter -	10.90	7.80	8.33	7.38	5.55	9.05	12.20	
Mean of 7 years -	8.74							
Spring -	13.80	7.33	11.12	6.59	7.40	5.98	8.75	
Mean of 7 years -	8.75							
Summer -	10.45	4.25	8.92	7.78	5.23	12.61	11.10	
Mean of 7 years -	8.62							

RIVER LEE, HERTFORDSHIRE. DISCHARGE OP THE VALLEY AT FEILDE'S WEIR (including all water taken into the New River above that place).

Drainage area 444 square miles; height of district from 80 feet to 500 above the sea; mean 240 feet. Length n 1)<c-1866 of main river 31 miles, of tributaries 92 miles above the weir; which is above 20 miles from the Thames ' ~ at Blackwall.

Extract from " Manual of Hydrology," by "Nathaniel Beardmore, Esq., Civil Engineer (referred to supra, Question 704).

Year 1851.

Month.	Mean temperature at Greenwich.	Rainfall.			Discharge over Feilde's Weir.			Discharge per square Mile.	Depth run off district.	Proportion of depth run off to depth fallen.
		No. of days.	Maximum day's rain.	Total.	Maximum.	Minimum.	Mean.			
	Deg. Fah.		In.	In.	Cubic feet. per min.	Cubic feet. per min.	Cubic feet. per min.	Cubic feet. per min.	In.	1 to
January -	42·9	18	1·10	3·65	83,080	7,227	23,198	52·2	1·04	3·51
February -	40·1	12	0·40	0·90	29,641	10,567	14,868	33·5	0·58	1·55
March -	42·6	20	1·22	4·35	95,677	9,448	28,582	64·5	1·24	3·51
April -	44·7	14	0·56	1·80	38,565	11,384	15,682	35·3	0·66	2·73
May -	50·9	10	0·30	0·76	21,216	8,887	11,207	25·2	0·48	1·58
June -	58·9	11	0·80	1·45	11,217	6,455	8,678	19·5	0·36	4·03
July -	60·1	16	1·55	2·92	10,930	6,235	8,000	18·0	0·30	9·73
August -	62·3	8	1·05	2·33	8,562	5,569	6,894	15·5	0·30	7·77
September -	56·9	9	0·36	0·63	6,669	4,508	5,814	13·0	0·24	2·63
October -	52·6	12	0·45	2·15	8,108	4,473	6,260	14·1	0·27	7·96
November -	37·9	10	0·40	1·10	7,342	4,753	6,290	14·2	0·26	4·23
December -	40·4	6	0·50	0·58	8,126	4,660	6,127	13·8	0·27	2·15
	49·2	146	1·55	22·62	95,677	4,473	11,800	26·6	6·00	4·26

Year 1852.

January -	42·0	16	2·20	4·67	79,469	5,260	19,912	44·8	0·86	5·43
February -	40·8	10	0·60	1·48	40,957	9,305	14,575	32·8	0·59	2·51
March -	41·3	3	0·30	0·35	9,890	6,158	8,065	18·2	0·35	1·00
April -	45·9	2	0·56	0·94	8,226	5,102	6,722	15·1	0·28	3·36
May -	51·5	12	0·48	1·78	7,571	4,865	6,429	14·5	0·28	6·28
June -	56·1	21	1·02	4·35	44,695	4,929	9,804	22·1	0·41	10·60
July -	66·6	4	1·03	3·15	14,436	4,760	6,432	14·5	0·28	11·25
August -	62·1	15	0·63	4·08	29,098	4,890	9,717	21·9	0·42	9·71
September -	56·8	13	1·20	4·02	63,214	5,405	13,823	31·1	0·58	6·93
October -	47·9	15	1·60	5·22	91,744	9,011	27,614	62·2	1·19	4·39
November -	48·9	22	1·80	7·30	106,795	18,699	55,341	124·6	2·32	3·15
December -	47·6	19	0·55	2·39	66,707	23,323	36,273	81·7	1·57	1·53
	50·6	152	1·80	39·71	106,795	4,760	17,892	40·3	9·13	4·35

Year 1856.

January -	39·4	18	0·55	2·35	69,428	9,225	24,345	54·8	1·05	2·24
February -	42·0	10	0·45	1·30	60,420	10,060	16,829	37·9	0·68	1·91
March -	38·7	6	0·70	1·00	15,167	8,669	10,246	23·1	0·44	2·27
April -	46·8	13	0·60	2·00	22,935	7,555	9,944	22·4	0·42	4·76
May -	49·5	18	0·77	3·60	47,031	7,533	12,235	27·5	0·53	6·80
June -	55·2	7	0·30	0·65	13,963	7,399	9,264	20·9	0·39	1·66
July -	61·1	13	0·72	2·25	8,792	6,009	7,529	16·9	0·32	7·03
August -	63·6	10	0·80	2·60	6,047	5,266	5,799	13·0	0·25	10·40
September -	55·2	7	1·05	2·80	11,312	4,119	5,851	13·2	0·24	11·66
October -	51·7	10	0·25	1·90	12,030	4,958	6,634	14·9	0·29	6·55
November -	40·7	10	0·40	1·40	20,056	5,969	7,849	17·7	0·33	4·24
December -	40·2	12	0·40	2·05	64,902	6,242	14,500	32·6	0·63	3·25
	48·7	134	1·05	23·91	69,428	4,119	10,915	24·6	5·57	4·29

Furnished by Nathaniel Beardmore, Esq., Civil Engineer (referred to supra, Question 704).

Year 1858.

January -	—	8	·20	1·00	12,396	7,101	9,932	22·37	·43	2·32
February -	—	7	·50	1·80	92,383	9,470	18,718	42·16	·73	2·47
March -	—	9	·14	·75	14,466	6,748	10,046	22·63	·49	1·58
April -	—	8	·80	2·80	82,869	7,429	14,282	32·17	·60	4·67
May -	—	16	1·45	2·60	32,568	6,527	10,268	23·12	·44	5·91
June -	—	5	·50	·88	9,620	5,753	7,169	16·15	·30	2·93
July -	—	14	·70	3·30	9,628	5,199	7,100	16·00	·31	10·64
August -	—	10	·90	2·90	7,632	4,387	5,734	12·91	·25	11·20
September -	—	11	·20	1·05	7,250	3,107	5,116	11·52	·21	5·00
October -	—	12	·28	1·43	6,088	3,586	4,874	10·98	·21	6·81
November -	—	8	·18	·60	5,665	3,346	4,746	10·69	·20	3·00
December -	—	16	·42	1·75	9,058	4,121	5,392	12·14	·22	7·60
	—	124	1·45	20·85	92,383	3,107	8,614	19·40	4·39	4·74

\* This month had the heaviest floods known all over the Eastern Counties, and basin of the Thames; they happened during the week of the funeral of the Duke of Wellington, and the flood is generally called after his name in consequence.

**Bishop Stortford, Friday, 14th December 1866.**

**PRESENT:**

**ROBERT RAWLINSON, ESQ., C.B., IN THE CHAIR.**

**JOHN THORNHILL HARRISON, Esq.**

**Professor JOHN THOMAS WAY.**

**Mr. JOHN DOBEDE TAYLOR (Bishop Stortford), examined.**

2047. (*Mr. Harrison.*) You are clerk to the board of guardians?—Yes.

2048. How many parishes are included in the union?—Twenty, containing a population of 20,000.

2049. Is the town of Bishop Stortford included in that union?—Yes.

2050. What is the population of Bishop Stortford?—A little over 5,000.

2051. Is it an increasing population?—No, not of late years. During the last 10 years it may have increased to the extent of 500 or 1,000; it was 4,000 and odd for some years, but it is not increasing now.

2052. What is the area of the union?—Over 19,000 acres.

2053. Does it lie chiefly in the valley of the Stort?—No.

2054. How far does the union extend?—The valley of the Stort runs to Sawbridgeworth, which is included within our union; it is four or five miles away.

2055. Are there any other places besides Sawbridgeworth included in the union?—There are 20 parishes altogether; the largest are Bishop Stortford and Sawbridgeworth and Stanstead in Essex.

2056. Is Stanstead within the valley of the Stort?—No; the Stort is an artificial canal beginning here, but there are some small streams which, contribute to it and that run from Stanstead.

2057. What is the population of Sawbridgeworth?—Nearly 3,000; it is a very large parish and it is very much scattered.

2058. Besides the town of Bishop Stortford the population is chiefly agricultural, is it not?—Yes, the population of the union.

2059. Is there any other authority in the town of Bishop Stortford besides the board of guardians?—Yes, we have a highway board, and the inhabitants have recently resolved to adopt the Local Government Act, but that has not yet been put in force.

2060. Then any nuisance that may exist can only be remedied through the board of guardians at present?—Yes, through the board of guardians for the whole union, but as soon as the Local Government Act comes into operation the board will have authority to deal with nuisances in Bishop Stortford parish.

2061. The board of guardians cannot initiate anything in the way of improvements, they can only act in case there is a report made to them from some of the inhabitants that a nuisance exists?—Or through the inspector. They can only make structural works where a nuisance is not abated, not otherwise, and that is to a very small extent.

2062. Feeling the want of some authority to carry out improvements in the town, the inhabitants of Bishop Stortford have applied and are about to obtain power to adopt the Local Government Act?—Yes, I understand so.

2063. Do you know at all in what condition the public health is?—I think it has been pretty healthy as a whole—quite healthy.

2064. Is the town generally considered a healthy town?—I believe so.

2065. Do you know what the return of the registrar is as to the deaths per thousand?—I do not know that.

2066. Have there been any sewerage works carried out in the town?—No; except by the ordinary sewers draining into the river.

2067. Under whose direction were they constructed?—Lately they have been under the highway board; before their formation these matters were under the direction of the surveyor of the highways, under an old Act of Parliament.

2068. Do the sewers discharge into the river?—Yes. The plan has been for many years for the parish to provide sewers for the houses as they were built, and into which the occupants of the houses might turn their filth, those sewers meeting each other in the town and discharging themselves eventually into the river.

2069. Are they carried out upon anything like a system?—I should say not. From time to time the surveyor of highways, and subsequently the highway board, have had a sewer made, and they have improved the sewers from time to time, and they have made others as they found that a greater quantity of filth required to be sent away. Thirty-five years ago there were not above two or three waterclosets in the town, but now they are to be numbered by hundreds.

2070. What manufacture is carried on in the town?—It is malt principally.

2071. Can you give any information as to the number of quarters of barley that are manufactured into malt in this neighbourhood?—No, but there are gentlemen here who will tell you that.

2072. Do you know of any nuisance that arises from the making of malt?—No, I do not think there is any particular nuisance except this, that the water from the cisterns in which the barley is steeped is turned into the river, and that helps to contribute to the pollution of it at certain times of the year, but as malt is made in the winter time the flood water carries everything away, and I should say that no great nuisance can be caused.

2073. Have you at any time observed that the liquor which is passed away after the process of steeping is objectionable?—I cannot say that I know much about that.

2074. What other manufactures are carried on besides that of malt?—None, that I know of.

2075. The town is an important town having a market, and providing for an extensive neighbourhood?—Yes.

2076. Business is carried on, I suppose, chiefly on market days?—Yes; a very large trade in the manufacture of malt is carried on.

2077. There is a canal leading to the town?—Yes, it is navigable to the town.

2078. A railway also passes through the town?—Yes.

2079. Is the traffic on the canal large?—I think it is.

2080. Is the valley at all subject to floods ?—Very much so.

2081. What is the effect of those floods upon the health of the inhabitants ?—I do not know. I have never had any complaints, nor has it been suggested that the public health has been affected by them. We are not flooded so much now as we were years ago. The millers do not hold up the water as much as they did.

2082. Does any person control them ?—I think not.

2083. Do the waters sometimes lie for a considerable time upon the lands ? — Yes, but they get away quicker than they did. If the rain continues they will be there for some days, but when the rain ceases they get away more quickly.

2084. Are they considered beneficial or injurious to the land ?—They are not beneficial, I think, but it depends upon the time of year the flood comes upon the pastures. If the grass was to be mowed the flood would leave it all gritty and no animal would eat it; it would be useless to mow it; there is no doubt however that upon some pieces of land flooding would do good.

2085. Do you think it would be an advantage if there was some system of management throughout the valley of the Stort by which the water would be regulated, and better means provided for passing it off"? — I should say so decidedly.

2086. Do you think that would be an universal advantage ?—Yes.

2087. At the present time, as well as being a disadvantage to the meadows from the water hanging upon them, it backs against the water wheels and I presume actually injures the millers themselves ?— I should say so.

2088. Anybody who had power to improve the condition of the valley would not only improve it for agriculture but also for the benefit of the millers ?— I should think so.

2089. How is the town supplied with water ?— Principally by pumps.

2090. From what stratification does the water come ?—It varies ; we get the strongest springs on the hills; in some places they are 70 feet deep; all our hills are wet, and the valleys here are comparatively dry.

2091. What is the subsoil in the valley ?—We get down to brick earth and loam—stiff loam; after that we get into chalk, and then find water.

2092. You are rather upon the clay ?—Yes.

2093. And the chalk below is full of water ?—Yes; we get gravel on some of the hills.

2094. As clerk to the board of guardians, have you had many complaints made as to nuisances existing within the union ?—No; we have recently appointed inspectors for the union, and they have been at their work for three months past, since the Sanitary Act came into force, and they have removed an immense number of nuisances. Without requiring the board of guardians to interfere at all, the public are admitted the necessity of doing whatever they can, and they have met the thing uncommonly well. We found a very large number of cottage houses without any privy accommodation, and it is astonishing what a number in the last three months of new ones have been made, and others will be made. The board of guardians have not been obliged to put the provisions of the Act in force against anyone yet, the people have acceded most willingly; no doubt there are some cases which are now standing for consideration, but I believe that the efforts of the board of guardians and the local authorities will be effectually aided and willingly so by the inhabitants in carrying out the provisions of the Act.

2095. Before you appointed the inspectors of nuisances, did you find cases of sickness occur in certain parts of the town as distinguished from the health of the people in houses adjoining ?—It has been recently so in one of the parishes of the union, where fever has prevailed to a considerable extent; in that case information was given to the board of guardians that it was caused by nuisances and bad drainage, and to some extent I believe the board considered that it was so. A great deal has been done in that neighbourhood, and the epidemic has ceased.

2096. Did that case occur in Bishop Stortford ?— I think not. You may have some medical gentlemen here who will say that we have had fever arising to a great extent from defective drainage; it may be so, but generally speaking I believe that Bishop Stortford is a healthy town. We had some cases of low fever here

some months ago, but it prevailed not only here but generally throughout the district, and it passed off after a time.

2097. (*Professor Way.*) The state of the public health is hardly observable by a non-medical person? — No, and I am not competent to speak upon the matter.

2098. (*Mr. Harrison.*) You are by profession a solicitor?—Yes.

2099. Have you heard of any advantage being gained from the lower price of coal by a railway being brought here?—There are gentlemen here who will give you better information than I can upon that.

2100. (*Professor Way.*) As I understand, you have applied to be placed under the Local Government Act?—Yes.

2101. In what stage is that application?—The clerk to the highway board, through whom the application was made, is here, and he will explain.

2102. It was not made through the board of guardians?—No.

2103. Do you know whether any legal proceedings have been taken as to the discharge of the sewage into the river Stort?—I never heard of any, and I believe there have been none. We have been threatened by several parties. Our neighbours at Sawbridgeworth have told us that we have been poisoning them. We have said that we are sorry for it, but we think that they contribute to the nuisance to some extent themselves, and we have therefore not heeded what they had to say.

2104. No actual proceedings have been taken against you?—Certainly not.

2105. (*Mr. Harrison.*) Has it ever been in contemplation to place the river under a district drainage board?—No. The nuisance of which the inhabitants have complained from the smell of the river was during the summers of 1864 and 1865, but it was very much abated in consequence of our having wet seasons, and a plan was adopted that succeeded remarkably well, and that was this: During the summer, when the water is very short, the filth will sometimes almost crop up to the mouth of the drains, and when there has been a flood in the winter this accumulation has been stirred up by a barge and a heavy rake behind, so that we have passed it on to our neighbour to some extent. We thought we had kept it long enough, and by the use of the flood water relieved ourselves from a considerable quantity of stink by that means.

2106. Do you think that there is a considerable amount of pollution in the river?—There must be, because we drain everything into it that we can.

2107. (*Professor Way.*) You say that the privy accommodation is being very considerably increased, do you mean that this accommodation is in the shape of waterclosets? — No, I am talking about cesspit accommodation.

2108. And that might indirectly affect the water if it does not directly do it?—It might; it would depend a good deal upon the position of the privies.

2109. If the town were placed under the Local Government Act could you then be required to take steps for the purpose of draining the whole of the town?—I really do not know.

2110. You have not contemplated that?—Yes, I have always contemplated that if we were put under the Local Government Act considerable works would have to be carried out to get rid of the sewage in a different way. I have foreseen that there would be very considerable outlay required, and I do not know that the town would be indisposed to make the outlay if they could see a means of effectually doing the work. The difficulty that I have always seen in the matter has been this,—that we may probably spend a considerable sum of money in carrying out some well organized plan, and perhaps, very shortly afterwards, some general measure may be passed in the House of Commons affecting the whole country, and all we had done might be rendered useless. I believe that the inhabitants of the town and all the ratepayers have looked at it in that way.

2111. You have spoken of getting rid of the sewage; there are two stages in doing that, and the first is to get rid of it by passing it into the river?—We do that now.

2112. Not all of it, because the town is not fully sewered?—No.

2113. I suppose the more perfectly the town is sewered, if no arrangement is made to dispose of the sewage other than by passing it into the river, the greater will be the nuisance ?—Yes.

2114. At first, probably, the town is contemplating, by putting itself under the Local Government Act, steps that will tend very largely to increase the impurity of the river ?—I have no doubt that that has been passing in the minds of many gentlemen who have taken the subject up.

2115. (*Mr. Harrison.*) As a solicitor practising in the town, you probably know something of the ownership of the land in the neighbourhood ?—Yes.

2116. Do you think there would be any difficulty in obtaining land below the town to which to apply the sewage of the town ?—I have heard that there will not be any. An opinion, I know, was entertained that there would be no difficulty; probably there would be some difficulty which might be overcome. The difficulty we have always seen has been as to the meadows. They lie here very low, and they are all subject to floods frequently.

2117. Is there a considerable flow in the river ?—No.

2118. What is the value of the land in the neighbourhood ?—It is very valuable.

2119. Beyond a mile from the town?—It would fetch £100 an acre. I speak of purely agricultural land. There is accommodation land close against the town, but that is getting very high too. Common agricultural land within a mile of the town is worth £100 an acre.

2120. There are about 6,000 inhabitants ?—Yes.

2121. Then you would not require more than about 40 acres of land to which to apply the sewage ?—Perhaps that may be so.

2122. (*Professor Way.*) Bishop Stortford is about 32 miles from London, I think ?—Yes.

2123. Is milk ever sent to London from this neighbourhood ?—I think not.

2124. Is there any further information that you wish to give us ?—I think not.

The witness withdrew.

**Mr. HENRY GLASSCOCK (Bishop Stortford), examined.**

2125. (*Mr. Harrison.*) Are you surveyor to the highway board ?—Yes.

2126. How long has the highway board been formed ?—I have been surveyor about seven years.

2127. It is not a highway board formed under a recent Act ?—No, it is not under that Act.

2128. What is the extent of the district over which you act ?—There are about 11 miles of road.

2129. Does the district include any parish besides that of Bishop Stortford ?—No.

2130. Does it include the roads through the town? —The turnpike road is part of the road that is connected with the town. I have about 11 miles of road as surveyor of the highway board to look after.

2131. Has the Highway Act been carried out in Hertfordshire to any extent ?—No, but in Essex it has been—at Dunmow.

2132. What are your duties as surveyor of highways?—I am inspector of nuisances and I give attention to the state of the roads.

2133. Do the sewers of the town come under your management ?—Yes.

2134. How far has sewerage been carried out in Bishop Stortford?—Pretty well through the whole district where there is any house property; not exactly to the whole of it, because some of the houses are at some considerable distance from the town, and there we have not sewered, but nearly the whole of it is sewered.

2135. Is the town sewered upon any system ?—It has been going on for a number of years, but not upon any scientific principle.

2136. How many outlets are there ?—Seven.

2137. Where are they situated ?—We commence with two in Lee Street, then we come to the end of the town and the river, there is a main sewer that empties itself there, then we have four others in South Street.

2138. Where do they discharge themselves ?—Into the river.

2139. What is the size of the main sewer ?—The largest is 18 inches.

2140. Of what shape is it ?—It is a barrel drain.

2141. Are the houses connected generally with those sewers ?—No, I should think that about 300 of them are connected with the sewers from waterclosets and there are about 400 cesspools in the parish.

2142. How are the waterclosets supplied with water ?—By private individuals for their own use.

2143. Do they pump the water up ?—Yes, it is all done by pumps.

2144. Have you occasion to open up those sewers in different parts of the town from time to time ?—Yes.

2145. In what state do you find them ?—Some part of the town lies very flat.

2146. What do you find the state of the sewers is there?—Generally there is an accumulation of grit more than soil, which gets washed in from the washings of the roads.

2147. You find them so filled?—Yes, at times.

2148. What steps do you take to clean them out?— We thoroughly clean them out when we find them in that state.

2149. Have you to open a considerable length of drain in order to clean it out ?—Yes.

2150. What length of drain have you had to open out and clean upon any occasion ?—From 100 to 200 feet at different places.

2151. Are they constructed generally below the surface ?—Yes.

2152. At what depth are they below the surface ?— They are not very deep, on account of the fall to the river. A large portion of the town lies exceedingly flat, and of course we cannot get our sewerage down very deep on account of the river.

2153. Is there any ventilation to those sewers?— No; they are principally trapped.

2154. Have any complaints been made to you at any time of the gases being driven back into the houses and causing a nuisance ?—Yes; I have had complaints made.

2155. Do they continue to be made ?—I should say that the cause of that is on account of our sewers being so trapped, and that private parties when they leave a house often leave their drains not trapped, and there an escape of gas takes place.

2156. You trap it in the sewers under your control, and by that means you force it up the side drains into the houses, and where they are not trapped the gases find their way into the houses ?—Decidedly.

2157. Have you on any occasion known sickness to arise in a house in consequence of the gases flowing back into them ?—I cannot say that I ever did ; but parties have sent for me frequently, and I have found that that was the cause, and in such cases the thing has been remedied.

2158. If there was a proper system of sewerage in this town, there ought to be no occasion to open the drains in the way you have just mentioned, 100 or 200 feet at a time, and there should be no gases passing back into any house causing a nuisance ?— Such is the case, no doubt.

2159. How many cesspools are there in the town? —I think there are 400.

2160. And 300 water closets ?—Yes.

2161. What is the character of the cesspools?— They are made of brick dug out of the earth, and closed in.

2162. What is the soil generally in which they are made ?—It principally consists of brick earth here and strong clay.

2163. Impervious clay ?—Yes.

2164. Is there any percolation ?—No. We should not consider so at all.

2165. What steps are taken, or do you take any, to remove the refuse collected in those places ?—We have done a great deal in that way during the last few months. By order of the highway board we were directed to go from house to house and to clear out everything.

2166. At whose expense was that to be done?—Partly at the expense of the highway board, and from them at the expense of the board of guardians.

2167. Not at all at the expense of the individuals? —Not at all.

2168. What expense may you have incurred in the last eight or ten months in removing these nuisances? —I cannot state exactly, but I should think £25 or £30

2169. Were the directions which your board gave you to cleanse these places out systematically ?—Yes, and we have done so.

2170. Shall you continue to do so?—I have not received any further orders.

2171. Was it merely a temporary effort in consequence of the cholera being in the neighbourhood ?— Yes, that was the cause of it being done.

2172. Do you not think that some measure more efficient than that is required in order to prevent nuisances continually arising ?—There is no question about it, and if it is not done in that way accumulations will grow up again. ,

2173. (*Professor Way.*) Do you remember how many years ago it is since it was first done, or has it been done before in your recollection ?—It has only been done once during my term of office in seven years.

2174. What are the sizes of the cesspools generally? —They are between three and four feet square.

2175. Does one serve for one house, or more than one house ?—There is generally one for two houses and sometimes for three.

2176. I suppose the water from a house drains into the drain of the town ?—Yes, principally so.

2177. Nothing goes in there in the shape of water? —No.

2178. Do you believe that ashes are thrown in ?— Yes, at the side of it, bt not into the cesspool generally speaking.

2179. Are these cesspools made with clay bottoms and clay sides, and then lined with brick ?—Yes, they are principally so made.

2180 Will more than two families join in the use of these cesspools ?—No, not generally speaking.

2181. Two families consisting of from 10 to 12 individuals ?—Quite that.

2182. As I understand you, it would take seven years to fill one of them ?—They are obliged to be emptied about every second year. I was not speaking of the cesspools when I said it would take seven years. It was the ashpits that I meant. We were ordered to go and cleanse every yard. Not all the cesspools, but many, were cleansed out. I do not think that the parish had been so clean before for many years as it was at that time.

2183. Have the cesspools any overflows ?—No, only into the sewers; there are some connected with the sewers.

2184. With overflows at the top of them ?—Yes.

2185. You draw a distinction between cesspits and ashpits ?—Yes.

2186. Will you describe the cesspools as distinguished from the ashpits?—Generally speaking the ashpits are made purposely low down in some portion of a garden—at the bottom of it. The cesspools are about from three to four feet square, and of various sizes.

2187. Of what depth are they?—They are three or four feet deep.

2188. How many ashpits do you think there are?—There is one to every house; that is, not an ashpit, but there is an accumulation at every house.

2189. How do the inhabitants obtain their water?—I think as to water we are well supplied.

2190. What is the source of your supply?—We get the water from wells.

2191. Are those wells sunk through the clay that you mentioned just now?—Yes, and they get into the chalk.

2192. Throughout the township is there an abundant supply of water?—Yes, there is.

2193. Are there any gravel beds in the town overlying the clay?—Yes, just under the clay.

2194. Is water drawn from that bed in any case?—No, it is principally from the chalk.

2195. It is almost always carried through the gravel to the clays and the chalk, is it?—Yes.

2196. Is it very hard water?—I have heard it so spoken of, at least some part of it.

2197. Do the gravel beds run under the "George Hotel"?—Yes.

2198. Do you think that they get water from the gravel?—It is supposed to be one of the finest springs we have in the country. I have been speaking of the water with reference to the general health of the town.

2199. Would there be any difficulty in applying the sewage to the land below the town for irrigation?—That has been thought of, but I think there would be a difficulty in it.

2200. What would the difficulty be?—On account of everything lying so low. . .

2201. You could pump it?—Yes.

2202. If you were obliged to pump it, would there be any difficulty in obtaining land?—I believe some offers have been made of that description.

2203. What is the condition of the river as it passes through the town in consequence of the sewage being delivered into it?—We do hear complaints about it.

2204. From whom?—I have heard complaints from Sawbridgeworth, from people living there by the river.

2205. Have any complaints been made by residents in the town of Stortford?—Not particularly, that I am aware of; Mr. Davis has complained to me about it.

2206. Does he reside near the outfall of one of these sewers?—Not exactly; he is between two of them.

2207. How far are they apart?—I think they are from 200 to 300 yards apart.

2208. He is situated between the two, and not near either of them?—Yes.

2209. Which of them is he nearest to, the upper one or the lower one?—The upper one.

2210. When complaints of this kind are made to you, do you report them to the board?—They have been made to the board.

2211. Are they entered in a book when they are so made?—Minutes are always kept by the board.

2212. (*Mr. Harrison.*) They would appear in their books?—Yes.

2213. During the summer season is there much water coming down the Stort?—No.

2214. What becomes of the refuse from the sewers when there is so little water in the river?—It must of course accumulate.

2215. It would accumulate in the bed of the river, would it not ?—Decidedly.
2216. And become a nuisance, and as you say, it would be complained of by some people ?—Yes.
2217. As surveyor do you take any steps to remove the nuisance?—In the case of a flood we stir it up, if we have an overflow of water.
2218. And send it on by the flood to your neighbours below ?—Yes, we get rid of it.
2219. Are you aware that the water, after it goes from here goes to London, and is one of the sources of the water supply ?—Yes.
2220. Do think that that should be permitted to continue ?—I have no doubt that some steps will be taken to remedy that sort of thing.
2221. (*Professor Way.*) When you stir it up, I suppose it is about at its worst ?—That is the only means we have of disposing of it; when we get a flood we get rid of a large amount of it.
2222. Do you fancy that discharging the sewage occasionally in a flood, or discharging it regularly day by day so as to be able to distribute it equally, would cause the greater nuisance ?—We cannot get rid of it except at the time of a flood.
2223. But the form in which you get rid of it probably constitutes the greatest nuisance you could create ?—Yes.
2224. (*Mr. Harrison.*) Have you, as surveyor, to collect rates to meet the expenses of the highways ?— I had to collect rates until within the last six or eight months.
2225. What is the rateable value of the parish ?—I think that the last estimate was £23,700
2226. What is the annual rate in the pound collected for the maintenance of highways and for your superintendence ?—It has been 8d., this year it will be 1s.
2227. (*Professor Way.*) Do you know how many of these cesspools have overflows ?—About 300. I mean the refuse of the waterclosets that flow into our sewers.
2228. I think you stated that the cesspools have an overflow at the top ?—Yes; some of them have. I am speaking of those; I included those in the water closets.
2229. The waterclosets have cesspools, but with overflows ?—Yes.
2230. Then the refuse in them does not go direct from the waterclosets into the drains ?—Not all of them. I consider that there are 300 which are connected directly with the sewers.
2231. Have they any cesspools?—No; certainly not. I mean that there are 300 waterclosets that drain into our sewers, that go into the river.
2232. How many waterclosets are there, as we understand them generally, the contents of which go direct into the sewers ?—I cannot say offhand.
2233. Do you think that the majority of them have cesspools as well as drain into the sewers ?— Yes.
2234. It is only the liquid that drains into the sewers ?—Yes.
2235. In London the houses have direct connexion, by means of a pipe running into the main drain, without any cesspool at all ?—Yes.
2236. On the other hand, we know that there are such things as cesspools in the country districts with overflows into drains. What is the general character of the waterclosets here ?—Some 10 years ago, when there was an order given with reference to the sewerage of the town, many of the waterclosets were connected with the drainage direct, that I am now speaking of, still they had no water supply further than that which they drew for themselves. They had no pumps.
2237. Have those got cesspools ?—No; the cesspools were done away with at the time that these places were connected with the sewerage.

2238. How many do you suppose there are connected directly with the sewers but without cesspools? —I should say 300. We were ordered some years ago to take the sewage direct from the waterclosets into our sewers, and they were then connected with the sewerage.

2239. The figures I have taken down are the 400 cesspools and 300 waterclosets. Do you mean to say that those are all waterclosets, but that 400 are waterclosets with cesspools, and the 300 are waterclosets communicating directly with the sewers without cesspools?—Yes; as near as I can give it.

2240. (*Mr. Harrison.*) How many privies are there in the town?—I think there are 400.

2241. I believe the highway board consists of the whole of the ratepayers in the parish?—Yes; they are selected from the parish.

2242. For how long are they appointed?—They are appointed every year.

2243. Of how many do they consist?—Thirteen.

2244. Is there any other officer besides yourself?— Yes ; there is a clerk.

2245. Are there men employed under you?—Yes.

2246. How many are there employed?—The number varies from five to seven, according to the nature of the work.

2247. Are they employed in repairing the roads and opening and constructing drains?—Yes; when they are required. My own men do not construct drains.

2248. Not the main drains?—Not the men under my control. They do not do anything of that sort; the work is put out to tender, and it is done by the parish.

The witness withdrew

**Mr RICHARD HUNT (Bishop Stortford) examined**

2249. (*Mr. Harrison.*) Are you resident in Bishop Stortford?—No, but I come here occasionally.

2250. Are you a native of the town?—No, but I have known it from childhood.

2251. Do you own any property in the town?— Yes.

2252. What is it?—South Mill.

2253. How long have you owned it?—About nine or ten years.

2254. Have you resided there at any time?—No, but I go there two or three times a week sometimes.

2255. Is that mill near to any of the sewers that the surveyor has spoken of?—It is just below them all, I think, about a mile from here.

2256. Is there any nuisance arising from the sewage of the town being passed into the Stort? —Very great just now, and there has been in the last two or three years.

2257. How does it affect you at the mill?—The stench in the mill and dwelling-house and the neighbouring yard and garden is very bad in the autumn and summer of the year, so bad that in 1865 the miller who lived in the mill-house complained that he was obliged to send his wife and children away.

2258. Is there no one living there now?—Yes, but he sent them away in the dry time.

2259. Was their health affected by it?—Yes, very much.

2260. Had they to call any medical man in consequence?—Yes.

2261. Did he attribute their sickness to the condition of the river?—Yes; and he complained himself when he went into the house, so much so, that I consulted my solicitor about it, and I talked to Mr. Taylor and threatened proceedings against the town, but I hardly know whom to begin with.

2262. Is there much difference in the volume of water that comes down the Stort in the summer season and in the winter season?—Yes, very great.

2263. In the summer season is it reduced to a very small quantity?—Yes, very small.

2264. How many pairs of stones have you at your mill?—Two.

2265. Can you drive both of those pairs of stones in the summer time?—Not one, nor half a one. It would be I should think for about 10 hours out of the 21 with one pair of stones in the summer time.

2266. The sewage of Stortford being thrown into this small volume of water passing down to your mill increases the nuisance very greatly?—Yes, in the autumn part of the year; there is but little to complain of now on account of the large volume of water in the river.

2267. That has probably cleared away all the nuisance?—Yes.

2268. What regulations are there as to adjusting the quantity of water taken for your mill and for the canal?—The canal company have a right to take as much water as they require for passing and re-passing barges, and they pay to the millers sixpence each time they fill their lock.

2269. Do you know what the size of a lock is?—Not exactly; but I think it is about 100 feet by 14 and about five feet deep.

2270. What fall have you at your mill?—About five feet or rather more—five or six feet.

2271. During the winter, when you say there is a large quantity of water passing down, do you find that your mill wheel is obstructed by tail water?—In a heavy flood, but not all the winter, for there are overflows or tumbling bays above each mill, above which the miller may not keep his water, it runs away and it does not affect us more than two or three inches when the section of the river is not so large, then it does for two hours.

2272. Is that often the case in the winter?—Yes; sometimes we have gone through a winter without a flood, and sometimes we have six or ten down in the same time.

2273. For what length of time do they obstruct your work?—It is variable; perhaps two or three hours; I mean not more than that unless we have two heavy falls of rain continuously, and that is very seldom.

2274. Have you any land adjoining the mill?—Yes, I have two acres.

2275. Are they liable to be flooded?—No, not unless it is a very high flood. I believe they have been flooded once or twice.

2276. Is the land that is flooded benefited, or otherwise, by it?—The land which adjoins the mill will be benefited by the flood—the small piece that belongs to me.

2277. Would the remainder of the land nearer the river and lying at a lower level be benefited in a similar manner?—Not unless there was a good drainage to it to get it off quickly.

2278. Is there good and sufficient drainage to the land in the valley of the Stort?—I am not able to answer that question. I have a very good knowledge of my own land; but I think there is generally good drainage in the valley of the Stort.

2279. In coming up by the railway last night I observed a great deal of land which appeared to me to be in a very indifferent condition?—Yes; lower down there is a large piece of land called the Mead, of 160 acres, and that is very frequently under water; it will be now drained and inclosed.

2280. Is that to be done under a special Act of Parliament?—Not for the parish, only under the General Inclosure Act.

2281. Not under the powers of a new Act?—No; besides the inclosure they will carry the outfall below another lock in order to get more fall.

2282. Does that merely extend to a short length of the river ?—Yes, about a mile and a half or two miles.

2283. Do you not think it would be much better to have the river put under some general management, and carry out arterial drainage efficiently throughout the whole length of it ?— I have not sufficiently thought of that to be able to give an answer to the question.

2284. Is what you have mentioned being done with the consent of the millers below ?—There is no mill, as it happens, at this lock.

2285. Is there a weir without a mill ?—Yes, a waste weir, and that is near the junction of the Stort with the Lee.

2286. As an owner of mill property, if there was a good system of drainage carried out throughout the valley, and if the flood waters were carried off more uniformly than they are now, would you not be benefited rather than otherwise by such a measure ?—Yes, in some cases. I have a mill nearer to London, and we suffer very much from flood water there.

2287. Is that upon the river Lee ?—Yes, it is the last mill but one on the Lee, at Edmonton.

2288. Do you suffer at all from back water ?—Yes, we suffer from back water and from the water getting out on to the meadows and lying there for days together.

2289. Do you live near to that place ?—No, I live near to the junction of the Lee and the Stort.

2290. Are you near to the valley that is liable to be flooded ?—Yes.

2291. Do you know whether the flooding of that district affects the health of the people living there? —I have heard that it does not ; they say that a case of ague is rarely known in the valley of the Lee.

2292. Have you ever known of any cases of ague? —Very rarely; only one or two.

2293. Have you known fever to occur after the valley has been flooded for a considerable time ?— No, I have not, the valley is so thinly populated.

2294. Is there any arrangement as to the payment by the Canal Company generally throughout the valley of the Stort ?—The whole way down. I think it applies generally to every mill but one, and there are 11 or 12.

2295. What is the exception in that case ?—I do not know.

2296. For each lock of water a payment is made of 6*d.* ?—Yes.

2297. Is that so in the case of each lock ?—Yes, it is paid to the miller adjoining. The barge owner generally pays 1*s.* when he goes through, and he comes back for the same payment.

2298. Does that repay the miller for the use of the water ?—No, certainly not.

2299. If you had the water to use which they take, I suppose you would be able to turn over something more than 6*d.* by its use? — Yes, three times the money.

2300. (*Professor Way.*) Do the bargemen open the locks ?—In some cases the owners of the canal keep a lock man to work two or three locks.

2301. The miller does not do it?—No. As to the injurious effect to health by the drainage being passed into the river, I may say that it was not so a few years ago. When I was a boy there were plenty of gudgeon and small fish in the river, but now one cannot live in it. A friend of mine lives 10 miles lower down, and he will tell you that he can remember when there were fish in it there.

2302. What is the condition of the water that comes down to your lower mill at Edmonton ?— There it is apparently clear, but this water goes there and the water from Hertford too.

2303. Then they will have at Edmonton a larger volume ?—Yes. I have a mill also at Stanstead, and there the water is offensive at times from the drainage of Hertford.

2304. Notwithstanding the steps which are taken at Hertford to purify it ?—Yes ; I have passed along the towing paths and I have had to put my handkerchief to my nose on account of the stench; that has been in the autumn of the year.

2305. Is the sewage of Ware turned into the river? —Yes ; nothing is done with the sewage there, it comes in neat, but the sewage of Hertford is deodorized. The New River Company has a fixed volume of water from the river Lee above the point where the sewage of Hertford comes in, and they take in the autumn, when the water is short, nearly their full quantity, and we have scarcely any water in the Lee then.

2306. How are you paid, as a miller, for the water that is taken out there ?—The millers receive no payment; it was done first by agreement some 150 years ago with the river Lee trustees, but since then there has been another agreement made, in 1851, by which they were to take a further quantity of water, and the millers were deceived.

2307. How many pairs of stones do you drive at the mill below Ware ?—I had 10 when I first took it some 25 years ago, but the water has got considerably less, and we have but six now at work.

2308. Can you work them constantly in summer and winter ?—No; nor can we work two in some summers. As I have said before, in a dry summer the quantity of water that is taken by the New River Company is always the same, and it takes all the water almost away ; we have not water then for more than one or two pairs of stones.

2309. Is the water that is taken by the navigation larger than it was formerly ?—I do not think it is; I think it is rather less at Stanstead weir.

2310. The diminution which you experience arises from the New River Company taking a larger volume? —Yes; there is certainly less water in the valley than there was 20 or 30 years ago.

2311. How do you account for that?—In this way, a great deal of woodland has been destroyed and there is less rainfall.

2312. Have you observed the rainfall over a series of years ?—I have been informed that where the gauges have been kept they have found it so; they have been kept by the New River Company.

2313. Do you know how long they have been kept ?—I believe for some years. I should mention that they have been sinking a number of deep wells at the lower end of the valley.

2314. Does that affect the discharge of the water in the upper parts of the valley ?—Yes.

2315. The water which they abstract must come from somewhere ?— Yes, it comes down through subterranean channels, but we cannot get the water we used to have. Who has got our water? We know that we have lost it; and the old millers will tell you that there is not now nearly the quantity of water there was 30 years ago.

2316. After making allowance for the increased quantity of water the New River Company take, you find that there is less ?—Yes; and that applies to this stream particularly. We have no control or power at all, and there were two mills that I knew, which in the course of 20 years have been done away with, because there was not a sufficient quantity of water to make it worth anyone's while to occupy them. On another branch of the Lee, the Rib, the river is entirely dry, there is no water for a mill.

2317. Do you know of any other cases where mills have been abandoned from a similar cause ?—Not that I can speak to.

2318. How many years have you occupied the mill below Ware ?—25 years.

2319. In that period have you experienced a marked diminution in the volume of the water ?—Yes; I have a mill also, and my family have two, on the Ash, which is another feeder of the Lee, and there again the water has disappeared in my time. More than one half the upper portion of the Ash is dry now.

2120. That I suppose would not be affected by any abstraction of water by the New River Company ?—Not at all.

2321. You attribute the falling off of the water to two causes, the clearing of woodland in the neighbourhood and the consequent diminution in the rainfall und the abstraction of water by extensive pumping establishments ?—Yes, by brewers and manufacturers, and there are many other causes that might be mentioned; for instance, farmers have taken to deep drain their heavy spongy land which retained the water very much, mixed varieties of soil containing gravel which would hold the water and supply us in the summer; through these lands they have driven five feet drains and these cause a flood in the winter, but the

water is short in the summer; that is another cause. But I think the principal cause is the deep wells which have been sunk near London called artesian wells,

2322. (*Professor Way.*) Are there any deep wells in this district?—Yes, the New River Company have two or three wells.

2323. Do you think their level is interfered with by the pumping which takes place in London; we have heard that in London at the great breweries they do not pump on Sunday?—The wells I have referred to are comparatively new wells within the last 15 years, and I know they are affected. They sunk a well 15 or 16 years ago at Amwell and that is almost dry; they are spending money now to get lower down.

2324. Have you heard that the wells at Watford and some other places in the neighbourhood of London, in the chalk, are deepest on a Monday morning, and that they have several feet more water then?—No, I have not heard of that.

2325. Because the brewers have not been pumping on Sunday?—That may be so. In the autumn of the year the brewers do work very much, and the New River Company, in the largest wells about here, pump all Sunday.

2326. (*Mr. Harrison.*) Do you know whether at your mill below Bishop Stortford any of the nuisance you have mentioned -arises from refuse poured in by maltsters?—Some little of it may, but I do not think it will affect us. We did not complain before the sewage of the town was turned in.

2327. Was malting carried on to as great an extent then as it is now?—Not quite to so great an extent, but the water that comes down from the cisterns is not always bad and is not at all offensive if the barley is clean; sometimes it is worse.

2328. Generally speaking, I believe it is delivered in the autumn and winter when there is an abundance of water in the river?—Yes, in the winter and spring.

2329. Have the millers below you experienced a similar kind of falling off in the quantity of the water near Edmonton?—Yes, they find that it is very much less.

2330. How many pairs of stones do you drive there? —Fourteen.

2331. Are you enabled to work them all in the summer?—No.

2332. How many are you able to work?—The number varies; sometimes I work them all for two or three years together, sometimes I work six or seven pairs, and sometimes only five. I know a mill where I was engaged when I was a boy, and there were there but six pairs of stones with bad machinery, and I never knew a year that they did not have as much water run to waste as they used. We work about five or six pairs of stones now from shortness of water.

2333. Would that diminution in the volume of the water, do you think, be accounted for by the increased abstraction of water by the New River Company and the East London Water Works Company?—Not by the East London Water Company, because they take water below us.

2334. Would it then be accounted for by the increased quantity taken by the New River Company? —Yes, I think so, and by the other causes I have mentioned.

2335. Have you much nuisance to complain of at that mill near Edmonton?—No.

2336. Do they suffer from the flooding of the water below you?—No; my partner lives on the bank of the river, and he has a large family, and they are remarkably healthy.

2337. (*Professor Way.*) You have attributed to two principal causes the falling off of the waters of the Stort of late years, viz., the diminished rainfalls and the wells; I suppose that one of those may be a substantial and obvious cause—the wells?—Yes.

2338. Might they not account for the greater part of the diminution, if not the whole, without taking into account the smaller rainfall?—I have been speaking of rain gauges kept in London, not here.

2339. It may be a fact, and probably is, that the cutting down of trees generally has diminished the amount of the rainfall?—The underground and the wood was a great reservoir of water in the summer time. It held the water up much longer.

2340. Your statement that there is less rainfall might be controverted, but it does not follow that you are in error in saying there is less water in the valley? —I know that as a fact.

2341. (*Mr. Harrison.*) Has that diminution been marked within a short period?—No; it has been going on as long as I can remember.

2342. The water has been gradually diminishing since you can remember?—Yes. I can mention half a dozen places where feeders of the rivers Lee and Stort had mills upon them, but in which there is now no water at all.

2343. Will you just mention them? — Bendfield, Elsenham, Haddam, and Waltham Abbey are instances.

2344. The cases you have mentioned are cases of mills which you know were in existence some years ago, and which, in consequence of the diminution in the water, if not its total abstraction at certain points, have ceased to exist?—Yes; they have been given up.

2345. Is there anything more you wish to mention? —No.

The witness withdrew

**Mr JOHN D FAIRMAIN (Bishop Stortford), examined**

2346. (*Mr Harrison*) Are you a resident here? — Yes

2347. Do you carry on a business here? — Yes; I am a Maltster.

2348. Have you been engaged in that business for many years past? — I have been in business for 14 years. I have lived here for about 18 years, and my father before me.

2349. Can you give me any information as to the number of quarters of barley that are converted to malt at Bishop Stortford in a year? — I can tell you what I do at Bishop Stortford, and that is 40,000 quarters.

2350. Is that a large proportion of what is malted here? — It is a large proportion.

2351. What proportion does it bear to the whole? —I cannot tell you.

2352. How many maltsters are there in Bishop Stortford?—Seven or eight.

2353. What becomes of the water which you use for steeping the barley?—From my makings it nearly all goes into the river.

2354. Is it objectionable in its character?—I do not think I have ever had any complaint made about it. I have not found it any nuisance, and I have often been in the habit of going round the makings when the water has been let off. I may say that I have not had two complaints made since I have been in business.

2355. Have you noticed in other cases that the water so discharged has been a nuisance?—No.

2356. Some of the malthouses lie up the hill, do they not?—Yes; I have several that are up the hill.

2357. Where does the water pass to from them?— I suppose it goes into the main sewer, and thence into the river.

2358. Is the barley that you malt here chiefly grown in this neighbourhood?—No.

2359. Where does it come from?—From Norfolk, and Cambridge, and Essex.

2360. Has the malting trade of Bishop Stortford increased of late years?—I should say that it has increased very much.

2361. How would you account for that increase of trade?—I may observe that the railway has benefited me, because if the supply of barley here is bad I can get it from an equal distance with other people, and that puts me on equal terms with the rest of the world. My business is certainly two thirds, and more than that, larger than it was before the railway was brought here.

2362. You have derived a benefit from the railway passing through this district?—Certainly I have.

2363. Is the canal used for the carriage of barley and malt to any great extent now ?—I cannot tell you. I only do business with the railway company.
2364. You receive your barley by railway and you send it off, converted into malt, by railway ?—Yes, that is so.
2365. How do you get your coals ?—I get coals both by the railway and the navigation. The one is a very wholesome check upon the other.
2366. Do you live in the town ?—Yes; on the top of the hill.
2367. Have you observed the condition of the river from time to time ?—Yes.
2368. What is your opinion as to its condition in consequence of the sewage of Stortford being passed into it ?—I have known it to be in a very bad state.
2369. At what period of the year ? — In the summer.
2370. In dry seasons ?—Yes; and we have had several complaints made about it to the highway board. I am a member of it, and that is why I suggested to our surveyor that we had had several complaints from persons living close to the river; for instance, Mr. Taylor has represented that the stench has been so great that Mrs. Taylor could not sit in her drawing room in the evening, such was the state of the water; but we got rid of it entirely by means of a barge with a large rake behind stirring it up and passing it on.
2371. As a highway board, I believe you have applied to be placed under the Local Government Act? — Yes.
2372. Do you propose to carry out a system of sewerage in this town ?—I have voted for it and for this reason, I thought that something would be done which would benefit the town.
2373. Are you aware that the sewage of many towns is now very successfully, and with advantage to the towns, applied to the land in the "neighbourhood? —Yes; we thought of that. The highway board have all come to the determination that something will have to be done, and the question was, what was the best thing to be done.
2374. Do you propose to carry out a system of sewers ?—I do not think we have any plan.
2375. Do you propose to have any water supply further than you have at present ?—I cannot tell you, but we shall get the best opinion we can.
2376. Where do you obtain your water for malting? —From wells.
2377. Is that water very hard ?—I consider that the water is very hard. It is very hard in my own house.
2378. Is it suitable for malting purposes ? — We consider that we make pretty good malt here, and I suppose the water must be good.
2379. As a maltster, should you consider that hard water or soft water was better for brewing ?—I think I should prefer soft water if I was asked.
2380. What is the effect of the application of water, is it to encourage the growth of the bailey ?—Yes; and the quicker it grows the better.
2381. Do you think that soft water would produce that effect ?—Yes, I fancy so.
2382. (*Professor Way.*) There is no particular secret, I suppose, in the making of malt ?—Not any that I know of.
2383. The barley is first soaked in water ?—The barley is first steeped in water.
2384. In a large quantity of water or only enough to cover it ?—Just enough to cover it.
2385. How long does it remain so ?—Sometimes 48 hours and sometimes 64 hours, but it depends upon the barley.
2386. It remains until it is soaked ? — Yes; it depends upon the season.

2387. Do different kinds of barley produce different coloured waters ?—Yes; I should say that barley from heavy land gives water a much higher colour than barley from light land.

2388. Heavy land is not so good as light land for growing barley, is it ?—I prefer barley that is grown in light land.

2389. Not only because it malts better, but I suppose it is better for the brewer ?—I suppose that they get a greater amount of extract from it.

2390. You pay more money for barley grown in light land, do you not ?—No; that depends upon a man's opinion.

2391. Does not a farmer get more profit out of light land than out of heavy land ?—That I cannot tell you.

2392. (*Mr. Harrison.*) Have you ever known a case in which, after converting barley into malt, the barley has increased to such an extent in bulk that the exciseman was inclined to disbelieve the fact and to fine you ?—I do not believe that barley, if the trader is an honest man, will increase to such an extent as to give any exciseman good grounds for suspecting anything. I think, generally speaking, there is nothing in the ground in which the barley is grown.

2393. (*Professor Way.*) What is the colour of the water that you run off after the barley has been steeped in it for 48 hours ?—Of a deeper colour than the wood work there.

2394. Is it thick ?—No, I think it is not thick sometimes.

2395. Will it settle if put into a vessel ?—Yes.

2396. Something falls to the bottom ?—Yes.

2397. What is that ?—I cannot tell you.

2398. Is part of it dirt. ?—Yes.

2399. And the liquid will still remain of that colour ?—Yes.

2400. Do you know whether that water has ever been applied in any way to grass or any other culture? —I have not heard of it.

2401. Do you think it would be possible to use it and to pump it over grass land ?—Yes, it might empty itself into a tank if it was anywhere where it could be so used.

2402. Supposing it not to be so used, the water must pollute the river —I suppose you will compel us to take it away.

2403. Could you pump it over any ground ?—No, you must carry it away. The maltings are all in the town, and you could not pump it on to the land.

2404. I suppose when you speak of soft water you would get more colour out of the barley with that? — No, I do not fancy so; we very often change our water in 24 hours.

2405 (*Mr Harrison*) What volume of water do you use to a certain number of quarters of barley? — We first fill the cistern with barley, and we keep pumping in the water until the barley is covered.

2406. You do not use a very large volume of water? — No, certainly not.

2407. Of what size are your tanks? — The cisterns are of different sizes according to the malting.

2408. (*Professor Way*) Do you pump by hand? — Yes

2409. You cannot tell how much water you use? — Not in the least.

The witness withdrew

**Mr THOMAS N. MILLER (Bishop Stortford), examined**

2410. (*Mr. Harrison.*) Are you also a maltster?— Yes.

2411. What number of quarters of barley do you malt in a year?—From about 10,000 to 12,000.

2412. What is the size of the tanks in which you steep the barley?—They vary.

2413. How deeply do you put the bailey into the tanks; do you fill them full?—The cisterns are generally full.

2414. Can you give me the dimensions of one of those cisterns?—They are so very various, according to the quantity; some will steep only about 20 qrs.— I am not speaking of ours in particular—some will steep 20 qrs. and some 100 qrs.

2415. Take some of your own?—Some steep 70 qrs.

2416. What are the dimensions of a cistern that will steep 70 qrs., what length is it?—I really cannot tell you exactly. I believe 10 cubic feet will hold a quarter of bailey.

2417. Do you malt wheat here as well as barley?— We do not, and I do not think it is malted in the town.

2418. What becomes of the liquid after the steeping? —It passes through the sewers into the river.

2419. Does it cause an objectionable smell at any time?—I think if it was passing through any length of sewerage, for instance, if it was passing through the town sewerage, that at times it would be objectionable.

2420. Fermentation would be set up, and it would smell badly?—Yes.

2421. There is nothing in that liquid that would be mischievous to vegetation if it was turned on to the land?—Rather otherwise, I should think.

2422. It would improve the sewage for irrigation purposes?—I think so decidedly.

2423. You are chairman of the highway board?— Yes, at present. I have been a member of the highway board for nine years out of ten since it has been formed. I have been chairman only during the current year.

2424. Did you hear the evidence given by your surveyor?—Yes.

2425. Are the facts that he stated correct?—I think there were certain facts that he did not attach sufficient importance to ; I think he did not attach sufficient importance to the complaints that we, as a board, have received from individuals at different times.

2426. Have you received from individuals a greater number of complaints than he mentioned?—I think we have.

(*The Surveyor.*) I stated that some had been made to me; but that the principal complaints had been made to the board, which are entered on the minutes by the clerk of the board. I thought you were asking me about complaints that were made to me individually.

2427. Complaints might have been made without your cognizance?—Yes, of course I was aware of them, and I said that the minutes would show them.

2428. (*To the witness.*) Have these complaints been more frequent of late?—Yes, and they would have been very much more frequent had it not been in contemplation to effect some general system of drainage which would remedy the evil. I believe that the inhabitants have no wish to throw impediments in the way, and in consequence of this measure being in contemplation the complaints have been fewer. I believe that if it had not been we should have had a great many more serious complaints, and frequent applications to the board.

2429. Do you attribute the increase in these complaints to a larger quantity of sewage matter being passed into the river?—I think there can be no doubt about it; in the early part of the year there certainly was not so much, not nearly so much.

2430. Have the waterclosets been increased considerably of late years?—Yes, very much so.

2431. Within how many years?—They have been within the last five years very materially increased.

2432. Has the malting business carried on in Bishop Stortford increased of late years?—It has increased.

2433. Then the refuse from the malshouses and the sewage are both sent into the river, and both accumulate more or less matter in the river adjoining the town?—Yes. We have one very important street here called South Street, and the drainage lies upon a level with the river, and the consequence is that the accumulations in that sewer must be such as to be very detrimental to the health of the people. We had at the lower end of South Street last year several cases of fever, and several deaths from fever, and I have no doubt that medical gentlemen will be able to give you some evidence in reference to that. I believe, under our present system, that that street lies so low that it is impossible to get the accumulations out even into the river, so as to render that neighbourhood healthy, without adopting some improved system of drainage by carrying the sewage actually away. I may mention that this being a gigantic question it has very much for the present limited the action of the highway board.

2434. (*Professor Way.*) Do you know how soon you are likely to come under the Local Government Act?—I think in about a month.

2435. Have you sent in any plans or proposals in applying to be so placed under that Act?—No.

2436. Do you know that it would be useless to carry out any large sewerage works without a large supply of water?—Yes, that is my own idea, and I think it would be the greatest boon to our parish to obtain a large supply.

2437. (*Mr. Harrison.*) Have you not a mill in this town?—Yes.

2438. What is its fall?—About an average fall, I dare say, of five feet.

2439. What is the next mill to it?—The next mill belongs to Mr. Hunt, that is called South Mill.

2440. There the fall, I believe, is about five feet?—Yes.

2441. Is there not a mill at Twyford?—Yes.

2442. What is the fall there?—Something similar.

2443. That will make 15 feet of fall within a mile and a half of the town?—Yes.

2444. With such a fall there cannot be very much difficulty in getting the sewage of the town on to some land without any pumping?—The difficulty that has always presented itself to us has been the difficulty of getting quit of it after getting it on the land, or into the reservoirs.

2445. If you were to carry out a good system of sewerage, and carried your sewage away to the land, no reservoir would be required; you might have a trap to catch the heavy gravel and so forth, but the whole of the rest of the sewage might be passed on to the land day by day as it came from the sewer's mouth summer and winter?—But will the landowners receive it?

2446. You must make your own arrangements about that. You ought to secure, either by lease for a very long term or by purchase, land to put the sewage on, and have it completely under your own control, so that the sewage should be put on to the land and purified before it passed into the stream?—That is a matter for our consideration.

The witness withdrew.

**Mr. CHARLES BARNARD (Harlow)** examined.

2447. (*Mr. Harrison.*) Do you reside here?—No, at Harlow, but I own property in Stortford. Two sewers go through my property, one on one side of it and one on the other, in this street.

2448. You occupy some mills, I believe, in the town of Bishop Stortford?—Yes, and in the town of Harlow, but the property I own here is just below; there are two sewers running into the river from the town and they are most offensive.

2449. Do they run above or below it?—One below and one above the mill.

2450. Do you experience any annoyance from those sewers?—They are exceedingly offensive; in the summer time very much so. My men have been made ill by it at times.

2451. Are there many houses adjoining the river there, as well as the mill ?—Yes ; a great number all the way in the direction of South Street. The houses are very thick there.

2452. Those are inhabited houses ?—Yes.

2453. You believe that the annoyance you find at the mill must be experienced by those people ?—Yes; it is experienced by my men who work in the mill a good deal. The mill is right on the river, and the smell is most abominable at times.

2454. Have you known sickness to prevail among your men in consequence of that smell?—Yes; at summer especially.

2455. The water in the stream, we have been told, is lowered very considerably in the summer time, is that so ?—Very much so.

2456. Any sewage thrown into it must create a great nuisance?—A great nuisance. It not only does so here but it comes down to our place at Harlow where I have some land on the side of the river.

2457. You experience an annoyance, do you, from the sewage of Bishop Stortford at that distance ?— Yes. I have a memorial here that we sent to the highway board in 1865 complaining of it, and I have the correspondence.

2458. The highway board have applied to have the town placed under the Local Government Act ?— Yes; I know that they have.

2459. They are considering the question of carrying out a more thorough system of sewerage ?—Yes; I have always said that they must come to that. The question would be a question of time, but the answer that they gave us was that they had not sufficient powers.

2460. If they carry out a system of sewerage and bring down more sewage into the river they will only increase the nuisance?—Yes. Some gentlemen have told you truly that they have sent men to work here; they have barges in the river for the purpose of raking up the sewage and sending it down to us below. We say that we have received it, but we do not very much like it.

2461. At the same time that they carry out a system of sewerage for the improvement of the town, it is necessary that they should take steps to pass the sewage on to the land?—Yes; that has been my opinion for many years.

2462. What is the fall at this mill?—Mine is a steam mill.

2463. Where do you get water from ?—Out of the river, and we put it in again.

2464. What becomes of your ashes ?—The ashes are sold. We do nothing but take the water out of the river, but all the condensed water goes back again.

2465. Have you any water power ?—None at all.

2466. Is it generally the case where there are flour mills here, that they are applying steam power to them?—Yes, generally; there are several instances. I built two myself.

2467. So as to be able at all times to do a certain quantity of work?—Yes; at all times. I had a mill some years ago, a water mill, on the stream, and I put up a steam engine there, and when I gave the mill up I brought it away again.

2468. How do you obtain coals ?—Sometimes by river and sometimes by rail.

2469. Have you found the competition caused by the railway to alter the price of coal at all? Yes; it has cheapened it very much.

2470. How much per ton ?—Something like from 5s. to 7s. compared with what we used to pay. We used to pay 23s., now we get it by railway at 16s. or 17s.

2471. What quantity of coal do you use in a year? —About 10 tons a week.

2472. Five hundred tons a year, with a reduction of 7s. per ton?—Yes; which is a very considerable advantage.

2473. Has that reduction in the price of coal been enjoyed by the whole of the town?—Yes, by all.

2474. If they are obliged to use a little coal in pumping their sewage, the reduction in the price will be rather a benefit to them?—Yes, a very great benefit; the pumping is done so easily, machinery now is so good for pumping it that it is very easily done.

2475. Have you experienced any annoyance from the malt works as well as from the sewage?—No. I do not think that the waste water from the makings is of that deleterious nature as to cause any nuisance in the river. There is a little spirit in the water, but no great deal of sediment; now and then in the summer time there is sand. There is a little spirit in the water, but there is such a large amount of water that it does not pay to take the spirit out of the water. The barley is covered with the water; it lies under it for about 48 hours, and then the water is drawn off, and in that water there is a certain spirit or a certain gum, and that goes into the river, but it is not at all putrid or deleterious.

2476. (*Professor Way.*) It would become putrid if it was kept?—Yes, most likely; there is a sort of sugar that comes out from it.

2477. Does it get sour sometimes?—Yes; it smells rather sour in summer time, but there is not much malting carried on in summer time. There used to be, and the water was rather offensive, but now it is mostly carried on in the winter time.

2478. As a maltster you discharge your refuse into the sewers?—Yes. I let my malting business to Messrs. Taylor, but the water from my malting place goes directly into the river.

2479. You could discharge it into the sewers, could you not?—Yes

2480. Supposing the sewage is diverted from the river, and the malting water goes into the sewers and is taken on to the land, will it do any harm?—Not at all

2481. So that in fact that question will be dependent upon the question as to the application of the sewage?—Yes, I think there is land to be got just below the river. There is a great fall from the brewery; each side rises up very abruptly. On each side there are deep gravelly slopes that would take almost any amount of sewage.

2482. Have you had any experience yourself of the application of liquid manure?—Yes; for the last seven years.

2483. Of what nature?—Where I live at Harlow, at my homestead, I have a great number of cattle of my own in sheds. We get all the liquid manure and run it into a tank shaped like that (*describing*), and after that I put in a wire grating, and take it into another tank, and then pump it out on to the land. I pump this two or three times a week on to the pasture, and in five minutes you cannot smell anything, although it appears to be putrid before it soaks into the land, which is porous. I have done this for the last seven years, and I think it has not cost me 5s. in seven years. It has been very effective.

2484. Then that experience would lead you to think that although sewage and farmyard liquid are not the same things, you could do the same thing with sewage as with the other?—Yes; you are aware of one case where certain operations in law took place.

2485. What was the case?—A certain kennel of hounds used to drain into my horse pond. It was just by my house. The drains ran from this kennel right into my horsepond, and it killed my cattle. Thereupon an action ensued, and we beat the gentleman, and now that sewage is taken and put into a tank and pumped on to his land; that has been in operation for several years, and it is now very effective.

2486. What is drained from the kennels is now pumped on to the land?—Yes, and it is offensive to no one.

2487. Do you know anything of that character in your experience which is more offensive than the drainage of those kennels?—There is nothing that I know of so offensive as that is. If you opened a small bottle of it in this room gentlemen could not stay here with any comfort at all.

2488. And that is now pumped on to the land without offence to anybody?—Yes; I took one or two gentlemen down there to see it, and it made them so sick that they were obliged to have some brandy before they could recover themselves.

2489. That was at the kennels?—Yes.

2490. Has anybody seen it when it has been put on the land?—After it was put on the land it made the grass grow so tremendously that they could hardly keep it down. In the early spring of this year it was so high that there was no such grass anywhere as where the kennel sewage was put. The dogs live a good deal on animal food, and the manure is very strong indeed, but the stench is very bad.

2491. Have you any land in the neighbourhood?—Yes.

2492. Have you any land which would take this sewage?—Yes; but I have none near Stortford.

2493. How far is it from Stortford?—Seven miles.

2494. Is it below Sawbridgeworth?—Yes; I should only be too glad to get it. We applied to the highway board from Harlow, and I got up this memorial to the gentlemen of the board of highways at Bishops Stortford.

2495. (*Mr. Harrison.*) When was that?—This was in June 1865. The newspaper has a report of it, which I will read. This is what I drew up, and it is signed by Mr. Pryer Field, vicar of Sawbridgeworth, William Barnard, Sawbridgeworth, R. Barnard, Harlow, Charles Barnard, Harlow, John Brickwell, Sawbridgeworth, Thomas Unwin, Sawbridgeworth, Frederick J. Unwin, Sawbridgeworth, Francis D. Beck, Sawbridgeworth, William Poole, Sawbridgeworth, surveyor, William Franklin, Sawbridgeworth, churchwarden, John Barnard, Sawbridgeworth, Henry James Bonner, Hallingbury, and William Death, Burnt Mill, and this is what they say: "To the board of highways, Bishops Stortford, Herts. . Gentlemen, We the undersigned, being residents near to the river Stort, beg to call your attention to the increasing pollution of this river situated within your district. There is at the present time so much filth, ordure, and sewage entering the river from the cesspools and main drains which have of late years been constructed for the purpose of draining the town of Stortford, that from this cause the river has not only become very offensive to many of the inhabitants of Stortford, but also to those who reside some miles distant from the town (where this foul nuisance arises); and we further say that this nuisance is particularly offensive to some of the inhabitants of Sawbridgeworth (through which the aforesaid river flows). The foul effluvia arising from this river in this parish is now very offensive, and fears are entertained that it will soon be very much worse unless some very efficient method is adopted to prevent the Stortford sewage entering and daily polluting the river Stort. Some of the inhabitants of Sawbridgeworth and its vicinity are about to convene a meeting for the purpose of considering the propriety of sending a memorial to the General Board of Health for England, asking them to send a Government inspector to survey such parts of the river Stort as are or may be considered injurious to the health of the inhabitants residing near to the river. In the mean time we shall be glad to learn that very efficient means are speedily to be adopted to remedy so foul a nuisance." That was the state of the river in 1865.

2496. Since that time the highway board have taken steps for the town to be placed under the Local Government Act?—Yes; I have a letter here which was received in answer to that application. It was written to my cousin. This letter was written by Mr. William Gee, who is clerk to the board, and it is as follows: "Bishops Stortford, 19 June 1865. Dear sir, I have laid the communication received from you in reference to the pollution of the river Stort before the highway board in accordance with your request. The powers conferred by the Highway-Act are inadequate to enable the board effectually to grapple with the question. It is therefore, proposed to convene a public meeting of the ratepayers for Thursday the 29th June, at 10 o'clock, when the matter will be taken into consideration."

2497. The highway board did take the step which they mention in that letter?

(*Mr. Miller.*) The highway board called the meeting.

2498. (*Mr. Harrison.*) And in consequence of that did you take steps to place the town under the Local Government Act?

(Mr. Miller.) We did take steps to gain additional powers so that we may do that which may be required, and which may be considered necessary, and in conformity with the Act of Parliament. We are the greater sufferers, of course, and we are anxious to get rid of the nuisance.

2499. (Mr. Harrison.) Are you expecting now to have a local board formed under the authority of the Local Government Act?

(Mr. Miller.) We expect it almost directly.

2500. (Mr. Harrison.) And have you heard that it is the wish of the town to take steps to improve the condition of things?

(Mr. Miller.) At a large meeting of the ratepayers and the inhabitants, I believe that it was unanimous.

2501. (Mr. Harrison.) (To the Witness.) Are you the owner of property in Bishops Stortford?—Yes.

2502. Besides the mill which you occupy?—Yes; I have malting premises near it, and a sort of market garden let to tenants.

2503. Have you any house property?—Two cottages for the labourers, situated near the malting premises.

2504. And you will not object to what is provided by the local board?—No; I think that it is the best thing which can be done, namely, to tax the town for the making of a very great main sewer, which I think might be easily carried out. I do not think that there is any engineering difficulty in the way; it is only a question of money, and that as far as I am concerned, having a good deal of property in Stortford, I shall be very happy to pay.

(Mr. Miller.) The Commissioners called very particular attention to the water sent from the malting cisterns, and it appears to me that they looked upon that as one of the greatest nuisances.

2505. (Mr. Harrison.) We only asked for information.

(Mr. Miller.) I did not state it at the time when I was being examined, but there is a very large brewery here, which of course discharges an immense quantity of sewage into the river, and there are also upon the banks of the river the gasworks.

2506. (Mr. Harrison.) (To the Witness.) Besides the sewers and the refuse from the malthouses, is there any other source of nuisance in the town of Stortford which you know of?—There are the maltings so far as they are a nuisance, but they are of course a very small nuisance. There is a brewery at the other end of the town, and from that I have seen a vast amount of sewage go into the river, such as brewers usually produce.

2507. (Professor Way.) You do not mean sewage, but a discharge of liquid of some sort?—It is very dark stuff.

2508. (Mr. Harrison.) In what part of the town is that brewery situated?—In the upper part of the town.

2509. Does that refuse, whatever it might be, pass right through the town?—Yes.

2510. And have you known objectionable matter to be passed from that brewery?—It looks very thick, and very muddy.

2511. Do you know what it arises from; is it from the cleansing of the casks?—I daresay that the gentleman who owns the property will give you that information.

2512. Are there also gasworks in the town?—Yes, right beside my property, and I have no means of going into the town without passing them; but the gentleman is here who has the management of the gasworks.

2513. (Professor Way.) Do you ever see any tar or anything of that kind floating upon the waters?—I cannot say that I have not seen tar, but the barges are a good deal tarred, and I cannot say whether it is from the gasworks or from the barges.

2514. Is it in any large quantity?—I never saw it in any large quantity.

2515. I suppose you know that tar is now too valuable to be wasted?—A great deal too valuable.

2516. (*Mr. Harrison.*) Besides being an owner of property in the town of Bishops Stortford and a miller on the banks of the river, do you farm any land in the neighbourhood?—Yes, about 500 acres.

2517. Is any of it situated in the valley of the Stort? —Yes.

2518. Is it liable to be flooded?—Yes.

2519. Is it benefited or otherwise by the floods?—Some of our land is very much benefited, and some of it is very much the contrary. When we get a surface of land like this table, and the water simply flows over it, and it soon gets dry again, the land appears to be very much benefited, there is a good deal of detritus left and a good deal of silt, and so on, and it makes the grass grow immensely. I have one field on the banks of the river, and that is very much injured by it.

2520. From what cause does that injury arise?—The water cannot get away, being dammed by the mill, and the land is constantly flooded. A few years ago, I could not grow any grass there of any value, and I dug the land and applied it to osiers.

2521. Had you any difficulty in passing the drainage below you?—Yes, the expense was so great that I would not encounter it.

2522. Are the proposed improvements in the river Stort proposed to be made in the neighbourhood of your farm?—No.

2523. That is lower down the river?—Yes.

2524. Is there much of the land in the valley of the Stort which is injured by the floods in a similar manner to what you have mentioned?—Yes, very much.

2525. Would a general system of arterial drainage be beneficial to the land in a very decided manner?—Yes, very much.

2526. Have any steps at any time been taken to carry out such a system?—Not a general system; there have been some local endeavours to put the land under drainage, and now and then, as Mr. Hunt was telling you, to put the water under another fall, and if you put it under another fall next to the mill, you can get good drainage, otherwise there has been no general system.

2527. Do you think that it would be a benefit to the land lying in the northern parts of the valley of the Stort, if the whole of the Stort basin were put under the authority of a board whose duty it should be thoroughly to drain the land, and to erect weirs, and to make the necessary arrangements for passing off the flood waters?—Very much indeed. I had a scheme, some years ago, and drew the plans myself for draining about 60 or 70 acres of land, which is now a mere swamp, and we could not carry it out, because we could not get everybody to agree to it. The land was owned by various people (I am now speaking of a large piece of land lying in and near Harlow Marsh), and we could not carry it out, because the land belonged to so many persons, that they would not all agree to the same thing, and therefore the land belonging to me is now in a swamp.

2528. Do you know that some few years ago, a Drainage Act was passed enabling such a work to be carried out, if a certain proportion of the owners of the property agreed to it?—Yes; but taking into consideration the amount of trouble and expense which it would be to us, we do not consider it worth while to enter upon it. At the same time the land would be very much benefited. I should think as much as a pound an acre.

2529. You think that the rent would bear raising to some considerable amount for the purpose of carrying out the improvements which you recommend?—Yes, I shall be very happy to pay 5s. per acre a year for my land to have it drained.

2530. Your experience of the working of the Land Drainage Act is, that notwithstanding the facilities which it affords and although it is desirable you have not been able to carry out the drainage in this district?—I am only speaking of this particular case. We saw so much difficulty in dealing with certain persons, that we dropped the matter at once, we did not go to any expense.

2531. Have you any facts which you can mention to us with respect to the diminution of the water in the river?—Some years ago, my farm happened to belong to some gentlemen who were conversant with the Land Drainage Act. My farm had a good many little springs on it, and they drained all these springs. Those

little land springs used to remain till the summer, and used to go into the river, but now they all go away as soon as the rain falls, and that would diminish the amount of water in the river in the summer time.

2532. Is there no water passing in the summer time into the river from that source?—No, except we have a very heavy rain. In the winter time, of course, we have a great deal of water, and as much as we ever had.

2533. Do you agree with the former witness, Mr. Hunt, who stated that the quantity of water passing down is very much less now in the summer time than it was in former years?—Yes.

2534. Do you attribute that to the same causes as he did?—In some measure; but he did not mention the land draining which has been very extensively practised in our district.

2535. (*Professor Way.*) He mentioned that as one of the causes?—That I did not catch. That is one of the causes, and the other causes which he mentioned I have no doubt are very correct.

2536. (*Chairman.*) At what depth do you drain?—Many farmers drain about four feet deep.

2537. Is from four to six feet about the average depth?—Some people average 18 inches, and some two feet, and others three feet, and others four and five feet deep.

2538. At all events four feet would be deep draining?—Yes, and I think that it is a great deal too deep draining on heavy land, but it is light land where my drains were made.

2539. With regard to the question of diminishing the quantity of water by draining, do you imagine that springs are seated in any section of land which is touched by four feet in depth?—Those are what we call land springs, we get them in at four feet.

2540. Supposing that something could sweep away the four feet of surface altogether, do you not think that you would have the same amount of springs as you have now?—That I cannot say.

2541. Do you not think that that spring water has connexion with a much greater depth than four feet?—These are very small springs. I will describe the nature of the land. We will suppose that there is a cup of clay, as is the case in some of my fields of two acres in extent, and in that cup there is a bed of gravel, the water cannot get away when it rains,—there it is. If you take a four feet drain through it, it goes nearly to the bottom of the gravel, and the water goes right away. As an example, I could point out a land ditch which generally begins to run in the month of November, and continues to run till about the middle of May.

2542. You can take away that water which rises to within four feet in depth?—Yes. I have spoken as to the effect upon my land and not the effect upon the river. It is only consequential.

2543. It takes away on your land water to the extent of four feet, and it passes it on to the river more quickly than it did before?—Yes.

2544. (*Professor Way.*) The instance which you give is one of the worst which you could select, because it is not the case of a spring but the case of water logged land. But supposing that you had a hillside of gravel upon clay, the water would come out for mouths together, solely drawn from the superficial gravel, is that what you mean?—Yes. Sometimes the land crops out in gravel, and sometimes it crops out in clay, and what we call the four feet drains take a great quantity of water away.

2545. (*Chairman.*) Is there anything further which you wish to state?—No.

The witness withdrew

**Mr THOMAS GARRETT (Hunsdon) examined**

2546. (*Chairman.*) Are you the proprietor of Hunsdon Mill?—I am the tenant of Hunsdon Mill.

2547. Where is Hunsdon Mill situated?—On the river Stort, about eight miles below Bishop Stortford.

2548. Down the river?—Yes. Roydon Mill is the mill below, nearer the Lee, which empties itself into Lee, it being upon the Stort, about four miles below Harlow.

2549. How long have you occupied that mill ?—I occupied Roydon mill before I took Hunsdon mill; I have lived immediately on the Stort about 15 years.

2550. What number of stones can you ordinarily drive there ?—There are six in the Hunsdon Mill, but the water of late years has come so irregularly that we frequently have water sometimes more than the mill will take, and at other times we have not more than enough for about two or three pairs of stones. It averages about three pairs of stones in summer, but now there are considerably more.

2551. Do you mean three pairs of stones, with cleaning and dressing machines ?—No.

2552. Do you use steam power ?—Not on the Stort, but on the Chelmer I do, where I have a mill in partnership with my brother.

2553. What is your fall ?—Between 13 and 14 feet at Hunsdon. It is the highest fall on the whole river.

2554. What horse power do you use ?—From about 24 to 26 horse power.

2555. What is your horse power when you have the least volume of water ?—About 12 on the average. It is about half. I consider that I can do barely half as much in winter as I do in summer, because I am flooded in winter for days together. It is an overshot wheel.

2556. What diameter is your wheel ?—14 feet 8, and it is about 12 feet high.

2557. Have you only one wheel ?—Yes. I formerly worked two, but I had an overshot wheel put in lieu of a breast wheel some years ago.

2558. In what condition is the river ordinarily ?— In a very bad state.

2559. Do you mean bad as regards the quantity of the water, or the condition in which the river itself is ?— Both as regards the condition of the water, and the dirty state of the mud at the bottom, so much so, that about eight years ago it was a pure stream, and being in the habit of keeping trout where I come from in Hertfordshire, I introduced trout into the river, and I fed them till they were about 4 lbs or 5 lbs. weight; but about four years ago the water came down in a green filthy state, and the whole of my trout died. The mud has come down by the barges. My water after it leaves the wheel is a private water for about three fourths of a mile to a mile, where there is no navigation, and the mud settles there to a great extent. I find that other people send the mud to me, and I had a large hoe constructed, and I put four horses to it, and I sent the mud down again into the navigation. It is cheaper than throwing it out.

2560. Can the persons below find any fault with you for doing it ?—We occupy the mill below.

2561. What do you do at that mill below ?—We drive the mud away in the best way we can. We have had iron harrows, with two or three horses. In some places a barge comes down on Sunday when my mill is stopped. The River Lee Company do not allow the navigation to be opened on Sunday, and the barges run up on the Saturday night to get to the mouth of the Stort before the river closes, and the others come down to get to the mouth of the Lee by the time that it is opened on Sunday night, and the mill standing still, there being no fresh water, it is just like a ditch, and the fish frequently come to the top of the water on Sunday from sickness.

2562. Has the condition of the river been getting better or worse since you have known it ?—Decidedly worse.

2563. It is getting worse every year ?—Yes. There is not a house near the river but what drains its sewage into the river the whole of the way up. Farmyards and other houses do so.

2564. In what condition do you occasionally find the surface of the water ?—It is covered with green scum like a pond.

2565. Are there the carcasses of dead animals floating on the surface ?—Yes, frequently; and unfortunately, about three weeks or a month ago, I found the body of a dead child floating on the surface.

2566. When you find the carcasses of dead animals, what do you do with them ?—I push them through the gully hole.

2567. You do not bury them ?—No; they would stink too much for that.

2568. What became of the carcase of the poor child ?—I sent immediately for a policeman, and had an inquest held upon it.

2569. Was it found out where it came from ?—No. There was an open verdict, "Found drowned." The child was about 24 hours old.

2570. As the sewage of the towns and villages and of the individual houses comes in, do you ever see human ordure floating upon the water ?—I cannot detect it.

2571. It gets broken up ?—Yes, from the wheels disturbing it. It is at times more like churning up mud than anything else. I have frequently seen a barge come down and there has been a foot of mud. It shoves it down to the navigation, and there is a channel which drives it down to the head of the mill, and I am obliged to remove it in the best way that I can.

2572. Does it ever affect you or your men with sickness ?—I have a pretty good constitution, and I do not think that it affects me.

2573. Where do you get your drinking water from? —From a well, and if the well is out of repair I send nearly a mile off for water for the use of the house.

2574. You do not think of drinking the river water ?—Not in the least, and two years ago it was in such a state that my horses would not drink it, but that was only for a few days from the refuse of gasworks, or something of that sort.

2575. Do you think that it is a proper water to send on for the people of London to drink ?—Decidedly not.

2576. If any improvement can be made so as to restore it to a pure condition I suppose that you think that it ought to be made ?—Yes. The whole of the streams would be very pure water barring the pollution which comes in.

2577. If the springs were kept pure you think that the water coming to London would be pure water ?—Yes.

2578. If they did that they would take certain water past your mills ?—Yes.

2579. I suppose you would think that that should be compensated for ?—I do not see why one individual should monopolise the whole to the detriment of thousands.

2580. I suppose that most of your mills are water mills ?—Yes; those on the Stort.

2581. What is the rent of your mill ?—The rent of my mill is £310 a year with the land, and the tollage on the lock. I value the mill and the machinery with it, without the grounds, at £240 or £250. We have very good grounds. Nearly the whole of the machinery is mine, in addition to that.

2582. Any scheme which contemplated buying up the mills for the purpose of carrying out these improvements must face a very considerable outlay?—Yes.

2583. For instance the purchase money of a mill like yours would amount to a very good round sum? —It was purchased some few years ago.

2584. £5,000 or £ 6,000 ?—It would not be worth that without the house and the grounds.

2585. If any scheme contemplated sweeping away the mills for the sake of a good water supply for London, it would come to a good round sum ?—Yes; and I have always advocated that it would pay. The mills now are often flooded.

2586. An area of land is now back watered, and the annual value of water-logged land is much greater than the annual value of the power ?—With the exception of a few instances in Hertfordshire, I consider that the mills cause more detriment to the land than they are worth. My family work two mills on the Lee and two on the Stort. My family occupy one on the river Ash and one on the Mimram.

2587. Is steam used at all in this part of the country for supplementing mill power ?—On account of water falling off some four or five years ago we hired another mill with 13 pairs of stones on the Chelmer to make up for it; six being worked by steam, and seven by water.

2588. Have you ever used steam for grinding ?—I do so now on the Chelmer.

2589. Is there anything in water power which gives it an advantage in driving your machinery as compared with steam?—There is more wear and tear with steam power than there is with water power, because there is the friction, but in my opinion it makes very little difference if we had a full supply of water, cold water was the cheapest; but situated as we are, if we cannot do more than half our power, water power is very little cheaper than steam power. My family now occupy with water and steam upwards of 40 pairs of stones, and I think that 20 pairs of stones with steam would do more than 40 with water. When Monday morning comes and we make sales for 500 or 700 sacks of flour we know that we can do it in a certain time, but with water perhaps there may be a flood to-day and we are standing still, and to-morrow we have no water. At the mill at Hunsdon I have stood still for want of water at 9 o'clock in the morning, and before 9 o'clock next morning I have stood still from a flood, and that is within a fortnight of the present time.

2590. Then we have these facts; you find the river itself, you think, from some cause or another, to be more uncertain in its volume than it used to be?—Decidedly.

2591. You have the water getting much more impure than it used to be?—Certainly.

2592. You have greater deposits of mud than you had formerly?—Certainly.

2593. And you have large areas of land waterlogged most injuriously by reason of the mill dams which are existing?—I do not think that at the lower part where I occupy, after a flood, if you lowered the river one yard, you could stop it from, at times, overflowing the banks.

2594. But you could easily bank the river in; you could raise a parallel bank which would keep the land from being water-logged?—I think that you must first of all see to the river the whole way. The Stort is the floodiest stream running into London. My water wheel is frequently from six to seven feet in tail water when I am standing still for a flood.

2595. Of what length is the weir?—About 22 or 23 yards in the widest part.

2596. If your mill were to stand in dry weather, what depth would the water come over it?—I frequently have to stand seven or eight hours when the water will not rise an inch. The other mills shut down at nights, and the water is frequently running over the banks for the whole of the day, and then the mill stands still after the others have stopped.

2597. What with the water wanted for the canal, and the water ponded by the other mills, and let down by the other mills without any consultation with you, you cannot tell what you will be able to do?—Just so.

2598. And yet the Stort is liable to very rapid floods?—I think that there is scarcely a river in England which is so subject to floods.

2599. Can you give me any idea of the height to which the river would rise in the middle of one of your ponds when it is in flood?—Our lands are frequently three feet under water besides what the gates will take.

2600. (*Professor Way.*) How much is the river below the banks?—Not more than about eight inches, but the valley is so low below that it fills the valley, it takes a sweep right down the valley, so that four fifths of the water comes right down the meadows and over the roads.

2601. You know that very mischievous floods very frequently come down which you cannot control?—Just so. I do not think that you could construct banks high enough to carry them over, unless you went with the natural valley of the river. My mill is carried along a side hill, and when the banks overflow the valley is filled up. The original river Stort is now nothing but a dry ditch. I have no doubt that the old valley might be constructed to carry the whole of the water. If you swept away all the mills and opened the valley, you might carry all the water away without any difficulty.

2602. I suppose you need not sweep all the mills away if you replaced the water by steam?—You could not do that in the case of my mill at Hunsdon, it would be useless, for it is three miles distant from a railway station. You had better pull down the mill and build it elsewhere.

2603. (*Mr. Harrison*) You have two mills, one at Roydon and another at Hunsdon?—My brother-in-law lives at Roydon.

2604. Do you receive anything from the navigation?—Yes.

2605. How much do you receive for each lock of water passing the navigation?—Under the original Act it was 6d. a barge, and we had to let the barges through. After that, there was some arrangement with the proprietors of the river Stort and the mill owners, that they should give 10d., collecting a shilling, and should retain 2d. out of every shilling towards the labour of letting the barge through.

2606. At what mill is that?—At all the mills.

2607. A former witness stated that it was 6d?—I have the 6d., but I return one penny to the lockkeeper employed for the Stort proprietors; the 10d. and the shilling apply to the journey up and the journey down; there are two locks. I maintain that if there was a fair compensation for the loss of water I ought to have four times as much as the other mills do; it takes double the quantity of water to fill my lock that it does to fill the locks of my neighbours, and the water is of double the value to me.

2608. Is the 13 feet fall at your mill the same now as it was before the navigation was formed?—I believe that it is exactly the same.

2609. At what time of the year was it that the refuse which you have mentioned came down and killed your fish?—In the summer, in July and August. We always consider that there is the shortest water in the Stort as soon as the grass is cut, because there are so many ditches and water courses on the Stort which are affected after the grass has grown; there are a great many flags and, the sun having considerable power, they draw out the water into the atmosphere. When vegetation begins to cease we have more water.

2610. You have mentioned that the refuse collects; have you much of it in your tail race?—No, it is not so deep there; for the bed of the river is gravel and shallow.

2611. You mentioned that you obtained some water from a well, where is that well?—That is in my own house, and if the pump was out of order, rather than use the Stort water, I would send a mile for water to a spring.

2612. Do you think it desirable that the river should be put under some government, so that these evils which you speak of might be remedied throughout?—It wants some alteration.

2613. Do you think that it should be done at a system?—It would be for the benefit of the community at large. I think that it would be a detriment to occupiers of mills like myself, but for the community I maintain that it wants a different system altogether.

2614. Do you think with the last witness that the benefit to the land from the arterial drainage would be such as would bear the expenses necessary to carry out the improvements?—Higher up the stream it might be so, but with me as soon as the water is gone the land is so porous that I could plough it to-morrow, and it is so till you get to Stanstead marsh which Mr. Hunt has alluded to, and then it is bad. I consider that the floods are a benefit to me personally, but in places they are a great detriment.

2615. In parts of the river where rushes are growing, do you think with the last witness, that the benefit derived from arterial drainage would be equal to £1 an acre?—I know the land which Mr. Barnard alluded to well, and it would be a great improvement.

2616. Is there much land in the valley of the Stort which would be considerably improved?—In Hallingbury it is very bad, it is a good deal flooded; but where I alluded to was on the Mimram, and there I believe that the mills are a great detriment. I refer to the neighbourhood of Welwyn.

2617. {*Professor Way.*} On the line of the Great Northern railway?—Yes, the Mimram is the purest stream which runs into London. I never knew that water the whole of the time fall below its banks. Whitwell is a place where nearly all the privies hang over the water, and in Welwyn the whole of the sewage runs in.

2618. {*Mr. Harrison.*} One of the former witnesses mentioned a number of mills which had had water power some few years ago, and which, in consequence of the diminution of the water, had been abandoned as water mills, are you aware that that is the case?—The water power is abandoned in this way: there is a mill which has been in my family for upwards of 50 years that is dry for three or four months at a time, but steam power is added to it; there are several mills in my family to which steam power is added. I maintain that the whole of the mills from Whitwell to Hertingfordbury, on the Maran or Mimram, do more harm than they are worth; there are about eight mills there, and I should think that the average of them do not

make more than from 50 to 60 sacks of flour a week in the summer time. There are two mills on the river Lee which scarcely have any water; there are about 400 feet on the river Lee, from the source to the mouth.

2619. *{Chairman.}* That is from Houghton-Regis? —Yes.

2620. It is about two miles above Luton? —Yes; the mills have been dry for months together there in summer time. When I was a lad at home I took the height of all the mills from the source of the Lee, right down the Lee, and I calculated that there were about 400 feet.

2621. What is the number of mills? —There are about 12 or 13 mills on the river Lee above Hertford.

2622. In dry weather what amount of flour would those mills grind on the average? —Below Wheathamstead 100 sacks a week, and above Wheathamstead about 50 sacks.

2623. *{Professor Way.}* Do you know the river Stort and Lee sufficiently to give us an account in writing of the mills on them? —Yes, I know every mill from Luton to London, and every mill on the Mimram from the source to London.

2624. *{Mr. Harrison}* And the Bean and the Ash? —Yes, and I can give the fall to each mill. There is not a mill on the whole stream but what I have seen.

2625. *{Chairman.}* We shall be obliged to you if you will furnish us with that information? —I will do so.

2626. Is there anything which you wish to add to your evidence? —I think not.

The witness withdrew

#### **Mr WILLIAM GEE (Bishops Stortford) examined**

2627. *{Chairman}* What are you? — I am a solicitor and I am clerk in the highway board of the town of Bishop Stortford.

2628. Under what authority is the highway board acting? — Under the General Highway Act of the 3<sup>rd</sup> and 4<sup>th</sup> of William the Fourth.

2629. Then you have not adopted the new Highway Act for consolidating the previous enactments? — No, the parish of Bishop Stortford has just adopted the Local Government Act.

2630. What is the area of the parish? — I cannot state.

2631. Is the area of the parish and the township the same? — Yes.

2632. Does the parish include a considerable acreage of agricultural land? — I really do not know, but I should imagine 2,000 or 3,000 acres

2633. Do you know what length of highways you have to maintain? —Eleven miles. We shall shortly have some more highways on account of the expiration of the turnpike trusts.

2634. When did you adopt the Local Government Act? —On the 25th of October, I think, and it will come into force on the 25th of December. I think that the time for appealing has now expired.

2635. Have you had any inspector down here? —No.

2636. Do you know what number of members you are going to elect as your local board? —Fifteen.

2637. You have settled that? —Yes, we have settled that at a meeting.

2638. The qualification will be settled by the Act? —Yes.

2639. It will be, I suppose, £500 property, and £15 rateable value? —Yes.

2640. You are under 10,000 in population? —Yes.

2641. Your population is about 5,000? —Something over 5,000.

2642. What have been the difficulties which have prevented your carrying out any sanitary measures as a highway board ; have they been legal difficulties? —We object to any considerable outlay of money. I believe that at present we have no borrowing powers as a highway board.

2643. Are you pretty well acquainted with the Local Government Act ?—I have had no practical experience of that Act.

2644. As a lawyer have you looked over its provisions ?—Yes.

2645. Have you had any legal decisions as to what it can do and what it cannot do for you ?—No, we have not gone into it generally. We have had two public meetings.

2646. Has the question been, at all raised of the chance of excessive outlay ?—Yes. I think that there is a fear on the part of the ratepayers that it may lead to a large outlay.

2647. Do you think that the ratepayers would be at all assured if they knew that an outlay which would be burdensome and would not give any benefit for the expenditure need not be contemplated ?—I have endeavoured to impress that upon them.

2648. That if you manage your affairs as you ought to manage them, any rating or outlay will really add more than the money expended to the value of the property of the town ?—Yes.

2649. If you have better streets you have better means of getting over them. If you have sewers and drains which are properly devised, you ought of course to have more comfort and better health, and less poor's rates ?—Yes.

2650. And if you have a water supply you can give facilities which you cannot possibly possess where you have no water supply ?—There is no doubt of that, but the great bugbear is a great increase of rates.

2651. Have you had any discussions amongst you as to what the sewerage might cost if properly executed ?—We have had no definite estimate at all.

2652. Have you had any sum mentioned ?—There was a scheme of drainage proposed in, I think, the course of last year, of which the estimated outlay was about £5,000.

2653. That is about £1 per head of your population ?—Yes. It was rather an indefinite estimate; no particulars of measurements had been gone into.

2654. You have no debt, I suppose, now upon the township ?—No.

2655. You expend the rates which you levy annually ?—Yes.

2656. What amount of rate have you levied as a highway board ?—Varying from *6d.* to *10d.*, and I believe that this year it has been *1s.*, but I think that we shall have a little surplus from it.

2657. Are there any exemptions now from the rate ?—No; we rate the whole parish.

2658. Does the land pay equally with the town property ?—Yes; for all purposes of the Highway Acts. It is exempt from the lighting rate, with which, as a highway board, we have nothing to do.

2659. You have adopted the Lighting Act so far as enabling you to light the district ?—Yes; there is a separate board of inspectors.

2660. Will all that be incorporated under your new local board ?—Yes.

2661. At present where does the sewage of any drains or sewers which you have empty itself?—Into the river.

2662. Into the river which goes on to London ?— Yes.

2663. Have you had any complaints from parties below, from millers, or owners of property, of the fouling, of the river ?—Yes. I think that the only formal complaint is the one which was brought forward by Mr. Barnard this morning. He read the requisition which he sent to the highway board. That was in the course of last year. That complaint was principally by the inhabitants of Sawbridgeworth.

2664. Complaining of the nuisance which is sent down to them ?—Yes. At the same time they themselves drain into the river.

2665. And they send down the sewage to some one below ?—Yes.

2666. So that if that system was general you would have people making complaints, and threatening actions all the way down ?—No doubt there are great nuisances arising at times.

2667. Are there any privies situate in Bishop Stortford so as to overhang the edge of the river ?— Yes, I believe that there are.

2668. Where the soil passes right away into the stream ?—I believe that there are such; not a great number.

2669. But there are some few ?—Yes.

(*Mr. Taylor.*) There are many.

(*Mr. Miller.*) There are many.

2670. (*To Mr. Gee.*) What measures have you adopted with reference to the nuisance of privies, or pigsties, or nuisances of any kind ?—An inspector acting under the board has given notice to the parties in the ordinary way, and has taken such steps as might be necessary to remove those nuisances. A connecting drain may have been necessary; and in certain cases he has done that.

2671. How long have you had an inspector of nuisances?—All the time that I have been clerk to the board, and some years before.

(*Mr. Miller.*) From the formation of the board about 10 years ago.

2672. (*To Mr. Gee.*) What does he get per annum? —He is inspector and surveyor of the highways.

2673. What do you pay him for his services altogether ?—£60 a year.

2674. What has been the general health of this district since you have known it ?—I should say that it is a very healthy town as a rule.

2675. Have you had any outbreaks of fever ?—For several years past there have been cases of fever, but I do not think that we have been more subject to it than the neighbouring villages and places of that. sort.

2676. Have you ever had cholera ?—I never heard of a case here.

2677. Has there been cholera at all in the neighbourhood at any period, above you, or below you ?— Not within some miles that I know of.

(*Mr. Hawke.*) In the year 1834 I lost a relative by cholera.

2678. Were there any other cases at that period ?— There was only one other instance of cholera, and that case survived.

2679. (*Professor Way.*) Was that case in the same year ?—Yes.

2680. And there has been no case of cholera since that you know of?—Not that I know of.

(*Mr. Skipp.*) About ten or twelve years ago there was a bargeman who died of cholera in the town, and it was supposed that he brought it from London.'

2681. (*Chairman.*) (*To Mr. Gee.*) Have you as a board anything to do with the house drains—do the parties make application to you for leave to drain into your sewers ?—As a rule they are supposed to make application to the surveyor, but I believe that the sewers are sometimes made use of without any application.

2682. Have the highway board made any new sewers since you have been clerk to the board?— Small additions have been made to the sewers.

2683. I suppose that you would not be authorized to construct what we should call sewers ?—No.

2684. They would be drains to carry off the surface water from the roads ?—That is no doubt the origin of the drains here. They have since been applied to sewage purposes. On the hills I believe that they answer very well for that purpose.

(*Mr. Miller.*) They are no more than surface drains for the roads.

2685. Of what shape are they ?—They are circular. (*Mr. Glasscock.*) They are all barrel drains.

2686. (*To Mr. Gee.*) As regards the Local Government Act, we may take it that you have complied with all the requirements. Have you received the assent of the Home Office ?—We shall receive it when the time for notices of appeal has expired.

2687. And you have not received any notices of appeal ?—No.

2688. (*Mr. Harrison.*) The surveyor was asked this morning with regard to the complaints ; I think that you have brought the book in consequence ?— Yes.

2689. Will you refer to a few of the complaints, so as to give us an idea of their character ?—On the 1st of August 1863, "Mr. Marshall Taylor and Mr. John Miller attended to complain of the offensive state of the mill below the town mill. After inspecting the nuisance in question it was proposed by Mr. March, seconded by T. N. Miller, and resolved, that the assistant-surveyor endeavour "to make arrangements with Mr. Davis, the superintendent of the Stort navigation, for the use of his "boat and implements to clear the filth from the bed "of the river between the town mill and the navigation, and also in the rear of the steam mill, and at the outlets of the sewers." Then on the 28th of May 1864,—" Mr. John D. Taylor and Mr. Marshal Taylor attended to draw the attention of the board to the state of an open ditch in the rear of the houses on the north side of Hockerill. A large quantity of sewage and filth accumulated there, and ultimately flowed into the brook running by the side of the causeway, which was thus rendered very offensive." A committee was appointed to inspect and report, "as to the most effective mode of remedying these nuisances." That ditch ran into the river.

2690. What steps were taken to remedy that state of things ?—The ditches were cleaned out: that was the only thing which was practicable under the circumstances.

2691. (*Chairman.*) And then you had a new start, the same thing repeating itself?—Yes. On the 17th of September, 1864, "it was proposed by Mr. J. L. Glasscock and seconded by Mr. Hawke, that steps be taken to cleanse the bed of the river from Rye Street, opposite Mr. Odams' house, as far as South Mill Lock." On a show of hands there were three votes for and three against the proposal.

2692. What is the general character of the complaints; have they generally reference to the foul state of the river and the bad sanitary state of some part of the town ?—They are principally as to local nuisances.

2693. In all cases they refer to some sort of local nuisance ?—Yes. The old river at the mill tail is a very shallow stream, and several sewers are discharged there, and when there is a very short supply of water no doubt a nuisance occasionally arises there.

2694. As you have no power as a highway board to initiate proper works for the future prevention of that kind of thing, you are simply doing that which will require to be done over and over again. I assume that if your board complied with any of the requisitions, or set themselves to work to remedy the nuisance, it would be as bad as ever in a few months? —No doubt, and it would require removal again.

2695. It is a sort of up-hill work which will never end ?—No doubt, so long as the sewers discharge there, there will be an accumulation.

2696. (*Professor Way.*) I suppose that small nuisances leading to complaints are not discussed and entered in your book ?—Just so.

2697. Your book merely refers to matters of importance ?—Yes, which are brought before the board. No doubt a great many of the small nuisances are obviated by the inspector.

2698. Then the general tenor of the book which is before you will be of the nature of important nuisances, and I suppose principally regarding the state of the river ?—Nuisances which the inspector did not feel himself competent to grapple with without instruction from the board.

2699. (*Mr. Harrison.*) Without going specially into each case, will you mark the number of cases which you have taken out to bring before this Commission since the last date which you have mentioned?—I have not gone carefully through them. There was another proposal for dredging the bed of the river in October 1864. Steps at that time, I believe, were taken to remove accumulations. It is only in certain parts of this river that those accumulations form.

2700. From that time to the present have the complaints been numerous?—No; several of these cases are a further consideration of the same complaint. I do not think that since that time there have been more than three complaints made to the board as to the state of the river.

2701. (*Chairman.*) May we take it that your highway board has done all that they could within their legal powers?—I think that they have strained their powers.

2702. What number of members generally attend?—Six.

2703. How are they appointed commissioners; is there a qualification?—It is an annual appointment and they must be householders.

2704. Are they elected?—Yes; on the 25th of March.

2705. Are they elected by voting papers in the same way as the board of guardians are elected?—No, they are nominated in vestry.

The witness then retired

#### **Mr JAMES ODAMS (Bishop Stortford) examined**

2706. (*The chairman*) How many years have you known Bishop Stortford?—About 27.

2707. Do you reside in it or near it? I reside in the parish.

2708. Are you a member of highway board?—I am not

2709. Has there been any reason why you should not have been so; have you not chosen to act or have the electors not chosen to appoint you/ they have not chosen to appoint me. I think that perhaps had I put myself forward I might have been appointed, but my business occupations take me so much away from the town, that I could not very well devote the time to it.

2710. Have you noticed the state of the river during the period that you have lived in Bishop Stortford? I have.

2711. Is its present condition better or worse than when you first knew it, as regards foulness?—I think that in the summer and autumn months the state of the river is decidedly worse, and must be of necessity worse than it was some few years ago, when I first knew it.

2712. I assume that there has been an increase of population in the valley?—There has not been a very great increase of population in the valley that I am aware of.

2713. What has occurred to cause the river to be in a worse condition than it was formerly?—The increase of sewage matter thrown into it from the drainage of houses into the stream.

2714. In former periods, I suppose, houses were not drained, and the filth lay around them, or in cesspools, but now they are drained and the drains end in the river?—Yes.

2715. And that has caused the extra pollution of the river?—No doubt of it.

2716. What is the character of the land below on either or both banks of the river?—It varies; there is some very good rich alluvial soil, and there is gravel very near.

2717. Is there any land upon which the sewage of the town could be beneficially applied?—I have no doubt that sewage may be beneficially applied to almost any description of land.

2718. Are there any parts of the town with which you are acquainted where there are nuisances existing such as at Providence Terrace ?—I know Providence Terrace.

2719. Is there any cause of nuisance from that terrace ?—Occasionally in the summer months. As I have walked from the town to my house, I have noticed an unpleasant odour from the drain which runs across the road to the river at that spot; and the drainage is from the Providence Row Cottages.

2720. What is that drain made of ?—I believe that it is a wooden trough drain.

2721. How many houses constitute Providence Terrace ?—Eleven.

2722. Does the sewage generally in the vicinity of the river, above and below, get into it in one way or another from houses and villages and places along the river ?—I think so, from the whole valley of the Stort, but it does not do so immediately, it percolates through; but I have no doubt that it gets into the river.

2723. Have you taken any part in the movement for the adoption of the Local Government Act ?—Not any active part.

2724. Have you considered the question as to whether it would be beneficial or otherwise ?—Yes; I decidedly thought that it would be beneficial, rather than that we should be under the superintendence of a board of guardians who reside some distance from the town.

2725. Are you a ratepayer in Bishop Stortford ?— I am.

2726. Then if any money is expended and if any rates are levied you will have to pay your share ?— Unquestionably.

2727. And I suppose that you have not the slightest desire that there should be any unnecessary rating ?— Certainly not.

2728. Have you seen at any time land under sewage irrigation ?—Yes.

2729. Where ?—I have seen the Craigentinnie meadows at Edinburgh; I have seen the Carlisle works, and I have seen a portion of the Croydon works.

2730. I suppose that at the Craigentinnie meadows you saw Italian rye-grass being grown ?—I do not know that I saw Italian rye-grass. I saw a very coarse description of grass, but it was not the true description of Italian rye-grass.

2731. And at Carlisle you saw certain meadows irrigated, and cattle and sheep grazing ?—Yes.

2732. What did you think of the grass there ?—The grass was very coarse. I believe that it answered the purpose as far as the grazier who hired the land was concerned; but I think that the odour arising from the works was rather objectionable at Carlisle.

2733. Do you think that it was the odour from the sewage or from the proprietor's patent carbolic acid? —It was from a combination of the two, I should think.

2734. The person there professes to use carbolic acid to disinfect the sewage ?—Yes.

2735. Have you ever been upon the ground after the sewage has been applied; have you smelt anything disagreeable after the application ?—I have not been there immediately after the application, and therefore I have not smelt it. I am told that the inhabitants of Portobello at the present time are very much complaining of the nuisance from the irrigated meadows in the neighbourhood of Leith.

2736. That is near Edinburgh ?—Yes.

2737. {*Mr. Harrison.*} When you were there did you go over the irrigated meadows ?—I went over the irrigated meadows near to Leith. Not those running to Portobello. There are two portions of irrigated land. I went over the irrigated land near to Leith. I saw the proprietor, Mr. Scurwin, who has been farming there for many years, and on that morning he had let one acre of his land for £27. 10s, and I was very forcibly struck with the enormous rental.

2738. {*Professor Way.*} Was that the rental of the grass ?—Yes.

2739. That is to say, that the person to whom he let it had to take it away ?—Yes.

2740. (*Chairman.*) That would be a Scotch acre, which is about one fourth larger than ours ?—Yes.

2741. (*Mr. Harrison.*) Did you perceive the condition of the ditches on those irrigated meadows? —Yes, I noticed the ditches. Plots of land intersected the ditches, so that the sewage was put on upon every alternate day, or whenever they thought proper to put it on.

2742. When you visited the property, did you observe any of these ditches with stagnant sewage in them?—No.

2743. Did you perceive any smell when you visited the land ?—None at all.

2744. If you had visited the meadows below towards Portobello you would have noticed many ditches which are large, and in which the sewage is allowed to stagnate, and I am satisfied, from inspection, that the nuisance from those irrigated meadows chiefly arises from the stagnant sewage ?—I did not visit those meadows.

2745. (*Chairman.*) When you visited Carlisle do you think that you had anything more offensive than you have in an ordinary farmyard ?—Decidedly so.

2746. When were you there ?—I think that it was three or four years ago.

2747. The proprietor professes to make no stink at all except in his patent carbolic acid ?—I believe that he does not.

2748. (*Mr. Harrison.*) When I was there I was particularly struck with the decided absence of smell. Whether the operation was a beneficial one or otherwise in other respects I will not speak so decidedly upon, but so far as the degree of odour from the works went, I thought that the absence of it was carried to a very great extent ?—I certainly perceived a disagreeable smell.

2749. (*Chairman.*) When were you at Croydon ?— It was three years ago. They had not carried out the plan in perfection there.

2750. Was it at Croydon or South Norwood that you saw the irrigated land ?—It was at Croydon.

2751. (*Professor Way.*) I suppose that the power of the soil to deodorize sewage has its limits, and that you may put on so much sewage that the soil has not power to deodorize it all ?—I of course bow to your superior judgment; but I should think that some soils would absorb almost any amount of sewage, but of course there must be a quantity running away.

2752. Supposing that the quantity of sewage put on at Edinburgh was more than in proportion to the area of land devoted to it, would not what I suggest be the case ?—Yes.

2753. Possibly it is not necessary to repeat at other places what is done at Edinburgh, where comparatively few acres of land take the sewage of a very large population, and therefore that would not be any guide. We are accustomed to say that Edinburgh shows what can be done, but that it is far from a place to be imitated?—Quite so.

2754. And that the evils of the sewage application there need not be necessarily repeated in any other place, and that therefore it is possible to deal with sewage in other places without any such evils, and that it is done ?—Yes.

2755. The case of Edinburgh is one for the enemies of sewage irrigation, and not for its friends ?—I think that it has a great many friends there in consequence of its success.

2756. (*Chairman.*) Do you know that one element of the dissatisfaction of the people in the neighbourhood of those meadows is that the proprietor is an Englishman ?—I was not aware of that.

2757. The most searching examinations and inquiries have been made in the neighbourhood of those meadows by constituted authorities; for instance, there are some large barracks there ?—Yes.

2758. And examinations were made by the War Office authorities, and the result was that it was found that the troops in those barracks had better health than in any other barracks in Scotland, consequently the accusation that the sewage caused ill health fell to the ground. I know that to be the case, because I was a member of that War Office Committee ?—It is very satisfactory to hear that statement.

2759. (*Professor Way.*) Supposing that it is made incumbent upon this town of Bishop Stortford to divert its sewage from the river Stort, and so from the river generally, which plan would your experience (having seen these places) dictate to you, the plan of precipitation of the sewage or the plan of direct application to the land?—The plan of direct application to the land decidedly. I think that you had a statement in the evidence given by Mr. Hunt this morning, who told you that the effluvia from the precipitation at Hertford is very noxious, and that therefore the water of the stream must be polluted again.

2760. Have you ever seen the precipitating works?—No.

2761. Would you be surprised to learn that it costs the people of Luton between £400 and £500 a year for precipitation?—And when the precipitate is thrown down it is not worth carting away.

2762. (*Mr. Harrison.*) They get something by it?—I should think that it is very trifling.

2763. (*Professor Way.*) At any rate they are at the expense of £500 a year over and above what they get?—Yes.

2764. (*Chairman.*) Anything which you precipitate out of washed sewage is of course of secondary importance for agricultural purposes?—Yes: there is so little of fertilizing power left after the liquid has been removed, and in a commercial point of view it is a great loss to attempt to precipitate it.

2765. At Luton they get about seven tons a day of solid matter, taking six days in the week, which comes to an enormous weight of material, and that is principally road grit. They get nearly weight for weight out of the filter beds, but they put it upon the roads to make the roads, in the shape of stone?—I think that we should be a good deal troubled by that here. I think that there are many people here who have a prescriptive right to drain into the river. If I understand the drainage of Stortford aright, the new drains are only enlarged old ones.

2766. Is there any further information which you can give us?—I think not.

The witness withdrew

#### **Mr JOHN POOLE DAVIS (Bishop Stortford) examined**

2767. (*Chairman.*) You are surveyor of the Stort navigation?—I am.

2768. For what length is the river Stort navigable?—13½ miles.

2769. Where does it commence, and where does it end?—The springs which form the source of the river commence about five miles above Bishop Stortford, in the neighbourhood of Elsenham.

2770. And it is navigable to what point on the Lee?—It forms a small stream till it gets to Stortford. It is navigable from Stortford to a place called Field's Weir, near Rye House, on the Lee.

2771. The navigation begins at Stortford?—Yes.

2772. What number of locks have you in that length?—Fifteen.

2773. What is their fall?—They average about six feet. The whole fall is about 90 feet.

2774. What tonnage can you get up that navigation?—In ordinary times we carry from 45 to 50 tons. It depends upon the supply of water.

2775. Have you any idea what tonnage goes up and down in a year?—Up and down our tonnage reaches nearly 60,000 tons.

2776. Is your navigation a separate navigation from the Lee?—Yes, it is a separate property. The Lee is a trust, and the Stort is private property owned by individuals.

2777. Is it a company?—It is a firm.

2778. Consisting of how many?—There are five persons in the firm.

2779. Is it under Act of Parliament ?—The firm who have it now foreclosed a mortgage which they had upon it, so that they got it for a small sum, which is no criterion of the value of the property.

2780. How long have they had it in their possession ?—About 12 or 13 years.

2781. Do you know what the amount of the mortgage was ?—£40,000

2782. For what length of time has the Stort been navigable ?—It was commenced in 1766 and was opened in 1769.

2783. Do you know who was the engineer who formed the navigation; was it Smeaton ?—No. I have not his name at this moment.

2784. Do you know whether Smeaton ever reported upon it ?—I do not know. I have only been connected with it for ten years. He may have done so in the earlier part of it.

2785. In what condition is the navigation now as regards its locks and permanent works; are they in a pretty good condition ?—They are in a very fair condition.

2786. Have you spent much money upon it recently ?—A great deal of money has been spent upon it in the last 10 or 12 years. This is a plan of the drainage of Bishop Stortford (*producing the same*). A great part of the drainage runs into the river before you come to the navigable part.

2787. You have been connected with the navigation for ten years ?—Yes.

2788. Is the pollution any greater now than it was when you first knew it ?—Yes, considerably greater.

2789. At what points?—We have had two new drains made into the navigation during that time. One of those drains carries all the drainage from the union, and another drain brings the drainage from New Town, and they have added very considerably to the quantity brought into the river.

2790. As surveyor to the owners of the navigation, have you any power to stop drains being put in ?— We have no power which we can act upon. The power is very ill defined. We have on all occasions protested against drains being put in, and we have been in communication with the East London Water Works Company to try whether they would aid us in mitigating the evil, but they felt a difficulty in doing so, their Acts are not sufficient.

2791. What is the date of your oldest Act ?—We have only one Act, and it is the 6th of George the Third, chapter 78; it was passed about the year 1765.

2792. Have you any dredge boats on the navigable part of the river ?—Yes, two.

2793. What do you do with the material which you dredge ?—We generally get rid of it to the farmers, some of them take it and spread it on their land, and find it very beneficial, and others dislike it.

2794. It breeds weeds I suppose ? -If you lay it in a heap it will breed weeds just as farmyard manure will, but not if you break it up.

2795. Have you any fish in the navigable portion of the river ?—Yes, we have a very great many fish.

2796. Is the river affected by floods to any extent? —We have many floods, our highest floods rise from two to three feet, and they now go off very quickly; there is a system of drainage everywhere; they are more rapid than they used to be, and we get rid of them sooner.

2797. When a flood is at its height does it stop the navigation ?—Yes, it stops it for a time.

2798. What distance on either side of the navigable portion of the river belongs to the proprietors of the navigation; do the towing path and the line of water alone belong to them, or have they any further right? —Generally our right only consists of the towing path, 14 feet from the edge of the river; we have much land belonging to the property.

2799. You have separate land belonging to the property ?—Yes.

2800. Do you claim to have the right of soil of the bed of the river ?—No ; we can deepen and scour.

2801. Does it belong to the landowners ?—It is supposed to belong to the landowners and the millowners, and so on.

2802. Do the mills belong to the proprietors of the navigation ?—No, they existed before the navigation was made, so that the water was always dammed up.

2803. Can they interfere with your navigation; can they pull the water down when you want it ?—Yes, and they interfere with us a great deal. We constantly have differences with them about their lowering the water so as to obstruct the navigation.

2804. Does that lead to lawsuits ?—We have not been to law, we generally settle those matters amicably.

2805. If you can?—If we can.

2806. Your experience is that you are getting the river fouler than used to be the case ?—Yes, in the neighbourhood of Bishop Stortford.

2807. In summer is it sufficiently foul in hot and dry weather to create an offensive smell ?—Yes, very offensive.

2808. Do the boatmen ever complain of it ?—Yes, all of them ; it is very offensive.

2809. Is it offensive when you are dredging it ?— Yes, in the neighbourhood of Bishop Stortford. In the very hot weather the sewage rises to the surface, and floats down the river.

2810. It ferments, and comes up in bubbles, and forms a scum on the surface ?—Yes, we find that to be the case seven or eight miles down the river, before it is lost.

2811. Are you troubled at all with floating carcasses of dogs and cats which are thrown in to be drowned? — Yes.

2812. Does the navigable portion of the river flood the valley on either side during floods ?—Yes, the water overflows the valley on each side.

2813. Do your locks, tending to pond up the river water, flood any portion of the valley ?—No, above the locks we have floodgates.

2814. At what height do you keep the water as compared with the adjoining land in the flattest parts of the valleys; have you not sometimes your water nearly up to the grass surface ?—We regulate our water by the height to which the mills originally dammed up the water, the overshot fixed at that time formed the head of the water mark. Our rights to the water are limited, the mills having a prior right.

2815. Do the men who navigate the river use the water for cooking and cleansing ?—They do in the lower parts of the river, but not in the neighbourhood of Bishop Stortford. Besides those at Bishop Stortford there are three drains into the river at Sawbridgeworth.

2816. Have you any list of the mills which there are upon the stream connected with your navigation? — Yes.

2817. Do you remember what their nominal power is, and what they do ?—I do not, they are continually altering their power; we know the fall, and so on.

2818. Is the entire fall made available at one point or another all the way down, as far as your navigation goes ?—No, we have 15 locks and only 11 mills.

2819. Then you could establish four more mills ?— Yes, but we would much rather do away with those which exist than establish any more.

2820. (*Mr. Harrison.*) Have those four mills been purchased by the Canal Company ?—No. In making the canal the length of water could be more cheaply dammed up by having additional locks.

2821. (*Chairman.*) Is the navigation fed by any considerable springs during its length which is navigable?—Yes, we have springs coming in all directions; there are very considerable springs about six miles down.

2822. Have you much more water coming down the river than is absolutely required for navigation purposes, and flowing to waste?—Yes, we have a good deal more than is required for navigation purposes. The mills are working constantly as long as they can go, very often night and day, and in addition to the water which they use, we pass through from 800 to 1,000 barges each way in a year.

2823. And each barge takes its lock full of water?—Yes.

2824. And one lock full of water goes through the entire navigation?—Yes.

2825. Have you any side ponds to save the water?—No. We should be very glad to have them to save the water, but the works have been made in an economical manner.

2826. Have you any double locks?—No.

2827. If your trade increased you would consider them desirable?—Our trade has increased very considerably, but the increase has not been sufficient, to cause us to make double locks yet.

2828. Have you felt the effect of railway competition?—For some years after the railway was opened the traffic upon the canal very much decreased, after that it took a turn, and in the last 11 years it has been increasing every year.

2829. What do you principally carry upon the navigation?—We carry corn, building materials, coals, and flour. We carry manure free of toll for the benefit of the farmers and landowners.

2830. Are you obliged to do that by your Act?—Yes. We also carry a great deal of artificial manure, such as oilcake and sundries.

2831. (*Professor Way.*) Do you carry timber?—Yes, a great deal of timber.

2832. (*Chairman.*) And malt?—Yes. We carry nearly 600,000 sacks of flour and corn in a year.

2833. What is your tonnage rate per mile?—We have no barges of our own. We only charge a toll upon the barges as they pass, and our average toll is about 9*d.* a ton.

2834. Is that for the entire navigation?—That is for the entire Stort navigation, and the river-Lee trustees charge a further toll to London.

2835. Does that toll apply to boats, whether they traverse only a portion of the navigation or the whole of it?—No; the rates are proportioned according to the distance.

2836. Is your lock where you regulate the toll near the junction with the Lee?—Yes, it is the second lock from the Lee.

2837. What draught of water have you throughout the navigation?—About three feet six is the average depth.

2838. What are the dimensions of your locks?—They vary in length. They vary from about 104 feet to 90 feet, and they are 13 feet 6 wide.

2839. Then the barges, I suppose, are 13 feet barges?—The barges are about 78 feet long, and about 13 feet 1 inch wide.

2840. Are any of them worked by steam power?—No; they are worked by horse power.

2841. You say that your proprietors have no barges of their own?—They have not any.

2842. Have you ever tried steam upon the river?—No. We have hired steam dredging machines.

2843. But you have not had steam barges for towing purposes?—No.

2844. Have you seen any of the steam barges upon the Aire and Calder navigation?—No. I have seen them upon the Lee and upon the Thames.

2845. What is the ordinary width of your river?—It does not average much more than 35 feet. It is rather narrow for anything of that sort. There is no doubt that that is a very economical way of working barges, if you have room.

2846. At what velocity are the barges generally taken ?—About two miles an hour.

2347. If you propelled one of your laden barges at the rate of four miles an hour, I suppose that it would give a great scour to the river?—Yes, it would injure the banks.

2848. And in some instances, I suppose, it would ground the boats—it would throw the water out of the river ?—Yes. We have an advantage over the railway company in carrying malt, which is the great staple of this neighbourhood, because malt is a thing which, by friction, decreases in quantity. There is a saving of about 1½ per cent, in carrying malt by water.

2849. That is to say, the motion in loading and unloading and the jarring friction upon the railway would cause malt to weigh less by 1½ per cent, than in carrying it quietly by a barge ?—Yes. Many of our malhouses are upon the banks of the river, and the malt is sent to the breweries on the banks of the Thames, so that a sack of malt has only to be lifted into a barge, and it remains quiet till it is taken out in London.

2850. Do you bring many coals up ?—No; our trade in coals decreases as the railways get into the coal districts, but we have a certain trade still. Sometimes when freights are low we get more coals, and so on. Of course they come from the Pool. They are all the north country seaborne coal.

2851. Do you think that any plan might be devised for purifying this water more than it is purified at present without injuring the navigation ?— My opinion is, that if the sewage of the towns upon its banks were not allowed to flow into the river there would be nothing to complain of. There is no hope for the river in any other way.

2852. It is the sewage which causes the mischief? —Yes, particularly the sewage of Bishop Stortford.

2853. How many bankmen have you upon that length of river ?—We have about eight lockmen, but then we have a number of labourers.

2854. They keep the towing path in order ?—Yes. The number varies.

2855. They move about ?—Yes.

2856. What do you repair the surface of the towing path with; do you at all form the surface upon which the horses travel with gravel and broken stone? —Yes. We use unscreened gravel just as it comes from the pit.

2857. Do you get any gravel from the bed of the river ?—Yes, occasionally, but it never binds; it is always loose.

2858. Because it is washed ?—Yes.

2859. It has not sufficient loam in it to bind it ? - No

2860. Have any proprietors upon the river a right to dredge or to take material out of the river for their own purposes?—We always take out what we like.

2861. But do any of the owners of property do so? —No. No one else has claimed that right for many years, but our Act of Parliament does not say that we have any right to the bed of the river except for scouring and deepening.

2862. It only gives you a right to the navigation? —Yes.

2863. (*Mr. Harrison.*) We may take the locks to be about 100 feet long and 13 feet wide in round numbers, and the fall of the locks to average about six feet ?—Yes.

2864. That would be in round numbers pretty nearly 50,000 gallons each lock full ?— Yes, we average them at about 50,000 gallons.

2865. For a lockful of water, what do you pay the miller?—By the Act of Parliament we pay him *6d.* For this he is required to open the lock on payment of *3d.* for a lockfull of water, and *3d.* is paid him for opening the lock itself.

2866. You have said that he gets *5d.*, and that you have a penny for passing the barges ?—Originally by the Act they took *3d.* for a lockfull of water, and *3d.* for opening it. By long usage they have got into the habit of taking the whole *6d.*, and finding it more easy to take it by means of our lockmen than to send their

own men to take the toll, they have adopted the plan of allowing the lockmen a penny in the 6d. for collecting this amount, so that they only get 10d. out of the shilling, but still they get 4d. more than the Act intended that they should get, unless they opened the locks.

2867. But in effect they get 5d. for each lockfull of water?— Yes.

2868. And for a barge going the length of your canal you have to pay 5d. at each of the fifteen locks? — One mill does not charge at all, there is 5s. each way paid.

2869. And the millowner gets 60 pence? — Yes; he gets the whole amount, and the terms which he makes with the lockmen whom he appoints for collecting the money are a private arrangement.

2870. You pay 1d. for 10,000 gallons of water?— Yes, a penny and a fraction, but according to the Act the payment should be only 3d. for 50,000 gallons.

2871. Have you the power of taking all the water, supposing that the traffic, increased to such an extent as that you required it?—Yes.

2872. Could you by paying that rate per lockfull divert the whole of the water from the mill premises of the valley?—There is no doubt we could. The miller is bound to open the lock when a barge arrives there, under a penalty of £20, and no limit is placed to the number of barges, so that I apprehend that we could take the whole of the water if it were necessary.

2873. Making a payment to the millowner?—Yes, 3d. per each lock.

2874. (*Professor Way.*) In case you come to loggerheads with the millers you could not keep running the barges up and down?—No. A court of equity would no doubt prevent that.

2875. (*Mr. Harrison.*) For getting a boat down and back again, you pay 2d. per 10,000 gallons?—One and one fifth of a penny each way.

2876. You mentioned that a number of these sewers (*pointing to the map*) had been put in of late years? — Two of them.

2877. You heard Mr. Odams mention just now, that he claimed for the inhabitants of Bishop Stortford some vested rights, do you think that they would have any vested right in these new sewers?—I should say that they would have a vested right in the old sewers, but not in the new ones, and therefore when the new sewers have been put in we have protested against them.

2878. Besides these new sewers which are put into the river, is there not a considerable scour washed down from the soil into the basin of the river?—A great deal is washed away from the banks; the banks are continually wasting, so that a great deal of soil gets in in that way.

2879. Have you any account of the number of tons, much you have dredged out in past years, has it been an increasing quantity of late years?—The firm who now own the navigation have only had possession of it for about 12 years which is hardly long enough for comparison. It depends very much upon the season; if we have a rainy season, we take very little out; if we have a dry season, we are obliged to take a great deal out.

2879a. That would rather point to its being to a great extent the sewage matter which you have to get out, is that so?—We always find that there is an accumulation at the mouth of the sewers, and we find that at Bishops Stortford it fills up much more than at any other part of the river.

2880. (*Professor Way.*) You have mentioned that there is a decrease in the quantity of the malt by carrying it by railway?—Yes, in the measurement by the bushel.

2881. That does not mean by weight?—The lost particles of malt diminish the weight.

2882. Do not they remain in the bag?—Yes, but they are not used in making beer.

2883. Does the malt sell for less money?—Yes.

2884. Practically you know that that is the case?—I have been so informed by maltsters in a large way of business. Some maltsters make the difference the amount of the rent of the malthouse, and others say that it is about 1£ per cent. The ordinary load of one of our barges is 600 sacks of pale malt, or 800 sacks of

brown malt. The loss in this quantity if carried by railway would be nine sacks of pale or 12 sacks of brown malt, when the malt passed the meters in London.

2885. From what does it arise?—It is from the carting of it into the station, and the shaking of it in the train, and its being carted again.

2886. *{Chairman.}* You have been asked with regard to the quantity of the dredgings which you have taken out of the river; has the same amount of power been used within the last two or three years, between the town of Stortford, and the South Mill as has been used in previous years; have you used the same exertions to cleanse the river between those places recently as you have hitherto done?—We keep an account of the quantity taken out of the river, but it is very difficult to answer a question of that kind in a general way. If you asked me the difference between the quantity taken out in 1855 and the quantity taken out in 1865, I could, perhaps, state it from my books.

2887. But you can state whether your expenditure between Stortford and South Mill in the last three years has been as great as, or greater, than it was previously?—I should say that in the last three years we have not taken out so large a quantity as usual.

2888. But you have been understood to say, that the sewage of Stortford has very much increased?—The town has had it under consideration on several occasions lately to clean the river in the neighbourhood of the town itself, and on one or two occasions I believe it has been ordered to be done, but has been postponed, and that has rather hampered us in our arrangements; besides which, as the town has insisted upon putting drains in against our protest, we have felt it desirable not to do work which we should do under other circumstances.

*{Mr. Miller.}* Mr. Davis will bear in mind that the highway board have requested applications to be made to the navigation company as proprietors to assist them, which applications they have resisted from time to time.

*{Witness.}* We protest against these new drains, and they keep insisting upon putting them in, and then they ask for £100 from us to take the deposit out of the river again.

2889. *{Chairman.}* We have this broad fact, that the sewage gets into the river, it causes a nuisance, it occasions a deposit, and the river people have more or less to take it out?—Yes.

The witness withdrew.

**Mr. WILLIAM ROBERT HAWKES (Bishop Stortford) examined.**

2890. *{Chairman.}* You are a maltster and brewer? —Yes, and a wine and spirit merchant.

2891. Where is your brewery situated?—In Water Lane, Bishop Stortford. It is sometimes called Back Lane.

2892. What quantity do you brew?—From 8,000 to 10,000 quarters.

2893. Where do you obtain the water for brewing? —From an artesian well on the premises.

2894. Does that artesian well go into chalk?— Yes, ultimately into chalk.

2895. Of what depth is it?—210 or 220 feet.

2896. Is it truly artesian, does the water rise above the surface?—It is not truly artesian.

2897. It is a bore hole with a well on the top of it?—I should think so; it was made many years ago, before I was connected with it, and therefore that is a question which I cannot answer, but I understand that in a well which is strictly artesian the water flows to the surface, and over the surface from the orifice.

2898. What volume of water per day do you pump from your well?—I cannot answer that question. When we are refrigerating, for instance, probably three barrels a minute would pass through.

2899. How many gallons are there to a barrel?— Thirty-six.

2900. (*Professor Way.*) That is for the surface refrigeration?—By passing cold water.

2901. By pipes?—Yes.

2902. (*Chairman.*) Is the water good water for your purposes?—The water is hard, but there is a difference of opinion, which has been expressed here today, amongst brewers and others, as to whether hard or soft water is better or worse.

2903. Does not it rather more depend upon what you want to brew; whether you want to brew dark coloured ale or light coloured ale?—I have no doubt that soft water would extract more colouring matter than hard water.

2904. Is not the Burton water hard?—I suppose so.

2905. What number of men do you employ upon the premises?—From 30 to 40 of all grades.

2906. Have you privies?—There are two privies; they adjoin.

2907. Where does the refuse from the privies go?—Into the river.

2908. Have you many horses?—Yes.

2909. Does the drainage of the stables go into the river?—No, I should think as a rule not; some of it undoubtedly does.

2910. Where does the waste water from cleansing the utensils and barrels go?—It goes entirely into the river, but you know what the nature of that cleansing is.

2911. Do you cleanse a great many of the barrels by steam jet?—No.

2912. Is not that process used as a cleanser and sweetener?—Yes; we use it in some cases, but as a rule we do not make use of that apparatus.

2913. Have you formed any views of your own as to what should be done with the river to purify it?—I can scarcely say that I have. No doubt, from the refinements of modern civilization, which have resulted in the watercloset system, the river is worse than it was from more of the excrement getting into it; but what is going to be done with the river I cannot say, and I have not gone a great deal into that question.

2914. Do you carry principally upon the river or upon the rail?—We principally carry by means of our own horses and waggons.

2915. You do not export?—No, not to any extent.

2916. (*Mr. Harrison.*) In pumping the water from your well, is the quantity which it delivers from the bore holes such that your pump does not much alter the level of the service?—That is a question which I cannot answer; it is all covered in.

(*Mr. Nash.*) When it was first done we could not lower the spring by applying three different appliances; there were hand pumps.

2917. (*Mr. Harrison, to the Witness.*) At what height below the surface of the ground did the water stand in the ground when the spring was first tapped?—When the well was made it was dug down into the chalk, and a seven inch cylinder was let down, and when they cut off the smaller cylinder the water flowed into the larger cylinder which we call the well. When the pumps were applied to it, we could not reduce the head at all, it was an immense quantity of water.

2918. What height was it?—It was about 20 feet below the surface, but that is not very much from the level of the river.

2919. (*Chairman.*) What was the size of the borehole by which the water came up from the chalk?—About nine inches, but I am not sure about that.

2920. You are sure that it comes from the chalk?—Yes; I should think that it is about 150 feet in the chalk.

2921. (*Mr. Harrison.*) Do you know the level at which the water stands in that well at the present day, as compared with what it stood at after the completion of the works?—No, we have had no opportunity of judging of that.

2922. (*Chairman.*) For anything which you know, I suppose that it is at the same level as when you first started it?—Yes, as far as we can judge.

2923. (*Mr. Harrison.*) The information which we have had to-day would go to show that it probably might stand at a lower level than it did?—Possibly it may.

2924. (*Professor Way.*) At what depth were your pumps put?—I do not recollect now, but we have never had anything like a deficiency of water since we have had that well.

The witness withdrew.

**Mr. GEORGE PERRY (Bishop Stortford) examined,**

2925. (*Mr. Harrison.*) You are the manager of the gasworks in Bishop Stortford?—Yes.

2926. How long have you been so?—About 24 years.

2927. How long have the gasworks been established?—Since 1835. They have been twice enlarged during my supervision. They are situated at the south end of the town on the banks of the river Stort. I should think that the site is about one third of an acre.

2928. Is there any refuse from the gasworks which passes into the river?—None whatever; we have not a single drain at this time communicating with the river, neither have we had a foul water drain communicating with the river in the last nine years. I had it nine years ago, but in consequence of the frequent complaints of persons living on the banks using the river, and other persons, I cut it off, since that time I have evaporated the foul water under the ashpans.

2929. So that now you can positively state that no foul matter passes into the river from your works?—None whatever, except what is occasioned by the ordinary rainfall washing our premises. It is impossible to keep the yards and places exempt from ammonia, and when there is a rainfall a small quantity of the surface water will find its way down into the river. If we turned the ammoniacal liquor into the river and had a disposition to conceal it we could not do so, because it would be patent to everybody who passed by us. If the waste was turned into the river it would render the water from the works opaque all the way down to South Mill. If you take a tumbler of clear water and only take a straw and dip it into ammonia and put it into the water it will become opaque.

2930. All the products of your gasworks are now so valuable that there is an abundant demand for them, and you dispose of them?—We find it rather an expensive thing for us to store the ammoniacal liquor. We, of course, store our tar as much as we can. A great deal of it is used for rough buildings and agricultural buildings.

2931. (*Professor Way.*) And for boats?—Yes, some of it for boats, but the great bulk of it is taken away for making creosote and other articles in London.

2932. (*Mr. Harrison.*) When it is used on boats, is it not mixed with pitch?—I think that it is rather mixed with Stockholm tar.

2933. Would it be liable to defile the water?—Whenever the vessel passes up and down the river it breaks out in a few illuminated particles on the top of it, and that is the result.

2934. Then you think that any person observing that kind of thing upon the river might mistake it as coming from your works, whereas it possibly comes from a barge?—Yes.

2935. (*Chairman.*) What number of retorts have you now?—21 at work.

2936. What is your make of gas?—About 6,000,000 cubic feet in a year.

2937. What weight of coal do you use?—About 600 tons.

2938. At what price is gas selling here ?—5s. per 1,000 cubic feet.

2939. For private consumption ?—Yes.

2940. And are the lamps by agreement? — Yes, £3. 6s. 8d. a year each, the company supplying the lamp and keeping it in order, and lighting it and putting it out.

2941. And do you supply the post ?—Yes. That I believe is a cheaper rate than gas is supplied at under similar conditions in any town in England, or in any town in this part of the county.

2942. The gasworks belong to a company? - Yes.

2943. (*Professor Way.*) That is 5s. a head upon the population for that quantity of gas ?—Possibly so.

2944. (*Chairman.*) I assume that gas is used very largely in the malthouses ?—No, it is only used for the purpose of lighting.

2945. (*Mr. Harrison.*) From what quarter do you get the coal ?—From Newcastle.

2946. How is it brought ?—By the navigation.

2947. It is brought to London and up the canal ?— Yes.

2948. What is the price of coal now as compared with what it was when you first were manager of the gas works?—I do not think that we are paying as much for it now as we did by 4s

2949. Do you give the railway company credit for that reduction ?—I do not know; I think that the price was reduced before the railway came into operation.

2950. What is the price now per ton ?—About 16s. 6- in the river. I refer to the price in London.

2951. What is the price of coal now in Bishop Stortford as compared with what it was when you first became manager of the gasworks ?— I do not recollect what it was. but my impression is that it is not more than 4s. less.

2952. (*Professor Way.*) You have been manager of the gasworks for 24 years ?—Yes.

2953. At what time did you begin to preserve the tar; you I suppose, threw the tar into the river at one time?—It never found its way there unless it was once by accident; it has been most carefully preserved. I myself have sold a barrel of tar for 12s. 6d.

2954. What does a barrel weigh ?—It contains about 28 gallons.

2955. We hear that a ton is worth about £1. in the north ?—I have sold three gallons of it for 1d.

2956. In other rivers the tar was thrown into the river, after an Act was passed to prevent it ?—I should think not, because it was of such great value.

2957. But possibly you had a consumption for it; did you at any time throw it in ?—We never did.

2958. (*Chairman.*) Had you a sale for it when you were first connected with the works ?—Yes. I think that there is evidence from the gas company's books which will show that the tar has been sold for 12\*. 6d. a barrel.

2959. What do you get per ton for your coke here? —We sell it by the chaldron, 12s. a chaldron.

2960. Have you a ready sale for all that you make? —Yes, a very fair sale.

2961. Do you use most of it for your own purposes? —We use fully one third of it.

2962. Then you have two thirds for sale ?—Yes.

2963. What dividend is your company paying ?— We have paid 7½ per cent, for the last three years.

2964. (*Professor Way.*) Do you get any of your coal by rail ?—No, except in one instance.

2965. Do you think that you could get it cheaper if you contracted to get it by rail ?—I am not aware of it.

2966. *{Chairman.}* The canal company puts your coals alongside your yard, you have a wharf alongside the side of the river ?—Yes, our works are better adapted for the reception of coal by water than in any other way.

2967. Is there anything farther which you wish to add ?—Nothing, except that I hope that every publicity will be given to my declaration, and I almost wish that I was allowed to make it upon oath because I have been so strongly suspected and charged with foul practices upon the river. I take this opportunity of publicly declaring that we have not a single drain flowing into the river, and that for the last two months there has not been a single surface drain from our works flowing into the river, but for nine years our foul drain has been most effectually cut off.

*{Mr. Miller.}* We have an instance in our minute book of the highway board where we had to draw attention to a nuisance from a ditch from the overflow at the gasworks and which was of a most abominable character, and there is always found in the neighbourhood of the gasworks a great nuisance. I do not know how the gas company get rid of their nuisance, whether it is by absorption or by fire from the ashpits, but we all know, living in that district, that we are very much annoyed.

*{Witness.}* When the foul lime from our works, which is strongly impregnated with sulphur, has accumulated in consequence of not being removed, a heavy rain produces a smell.

2968. *{Professor Way.}* Then you acknowledge that there is a smell, whether by your act or not ?— Yes.

2969. Is it possible to make arrangements for that lime to be taken away, and if not bought for you to take it away ?—We should not then go to the expense of it.

2970. *{Chairman.}* Cannot you purify it ?—No, I do not like the oxide of iron.

2971. Have you never tried it ?—No; the late Mr. Gripper, who was a large shareholder in the Hertford gasworks, where they had adapted their gasworks for oxide of iron, recommended me not to do it.

2972. But is his opinion to be put in opposition to the opinion of the managers of the great gasworks in London, all of whom use oxide of iron ?—I have had communication with the City of London Gasworks, and there I think they use dry lime.

2973. They are all altering it into the oxide of iron ?—I do not like it.

2974. Have you any children brought into your purifying house when they are suffering from croop or whooping cough ?—I have only had one instance of it. A lady brought children down there about two years ago; she paid but one visit to us; she wished to be there when the purifier was opened. I did not go into the place myself, but I think it was too strong for them ; they never repeated the visit.

2795. *{Mr. Harrison.}* Was that visit of any use? —I did not hear the result.

The witness withdrew.

The Commission then adjourned to London and later to Hertford where on 19<sup>th</sup> December 1866.....

Mr. JOHN MARCHANT, jun. (Hertford), examined

4329. *{Chairman.}* Are you clerk to the River Lee Trust, ?—I am.

4330. Will you kindly explain to the Commission what the statutory powers of the Trust are ?—Yes. I have drawn out a short statement, a sort of historical statement of the constitution and powers of the Trust, which I will refer to, and then hand in.

*{The witness subsequently handed in a Paper, which will be found printed at the end of his evidence.}*

The navigation of the river Lee is managed and governed by a public Trust, incorporated by the name of "The Trustees of the River Lee." They derive their powers from various Acts of Parliament, the earliest of which were passed in the reign of Henry 6th. The first Act, cap. 5, was passed in the third year of his reign, 1424, and the second, cap. 9, in the ninth year of the same reign 1430. Those two statutes empowered the Chancellor for the time being to issue Commissions for the purpose of clearing, scouring, and amending the

river "Ley," which in both of them is stated to be "une des grandes rivières" of England. Then I would pass on to the year when the river was rendered navigable.

4331. (*Mr. Harrison.*) Between what points?—In those Acts no points are defined, but in subsequent Acts the navigation is defined from point to point. In the 13th year of the reign of Queen Elizabeth the river appears to have been rendered navigable, and the constitution of the River Lee Trust may be said to have been first established in that reign. In the 13th year of Elizabeth, 1570, an Act was passed, cap. 18, "for the bringing of the river of Lee to the "north side of the city of London." By this Act the Lord Mayor, commonalty, and citizens of London and their successors were authorized to bring the said river of Lee from the town of Ware to the north side of the city of London; and by section 4 it was enacted, "That the said Lord Mayor, commonalty, and citizens shall have the whole jurisdiction, conservice, rule, and government, as well as the said new cut river and ground of each side, as also the royalty of the fish and fishing of the same, and the profits of the said ground, soil, and water to them and their successors for ever." Power was also given by this Act for the punishment of offenders and persons breaking the rules and orders provided for the preservation and maintenance of the said river.

4332. (*Chairman.*) Was the section you have just read enacted for the purposes of the navigation, or for water supply, or both?—For the navigation only.

4333. The navigation and the fishing?—Yes.

4334. (*Mr. Harrison.*) Was power given to them to dredge the river and sell the ballast?—Yes. Then certain trustees were mentioned in that Act and appointed. I then come to an Act passed in the 12th year of the reign of George II., cap. 32, 1739, and certain trustees were added to the corporation.

4335. Had they a joint interest with the corporation?—Yes, they were local individuals. I may mention that there were to be "16 commissioners," who were to act with the corporation, "viz., four of the city of London, and four of each of the shires of Essex, Middlesex, and Hertford, having lands, tenements, or hereditaments of the clear yearly value of 40 marks, and not being London traders." The power given to them was, to "treat, agree, and compound for the scouring, cleansing, repairing, and keeping of the said river Lee." In 1739 an Act was passed, the 12th George 2nd, cap. 32, "For ascertaining, preserving, and improving the navigation of the river Lee from the "town of Hertford to the town of Ware, in the county of Hertford; and for preserving and improving the said river from the said town of Ware to the new cut or river made by the mayor, commonalty, and citizens of London; and for enabling the governor and company of the New River the better to supply the cities of London and Westminster, and the liberties and suburbs thereof, with "good and wholesome water." That is the first mention of a supply of water from the Lee. By this Act the course of the river was defined, and certain persons therein named were appointed for the putting in execution the powers and trusts by them reposed, by virtue of and in pursuance of that Act, for the purposes therein expressed. I may here mention that the body of Trustees consists of the following *ex officio* members; the Lord Mayor, aldermen, and recorder of the city of London for the time being; the knights of the shire for the county of Middlesex, the members of parliament for the city of Westminster, the knights of the shire for the counties of Essex and Hertford, the members of parliament for the boroughs of Colchester and Hertford; the mayor of Hertford for the time being, and noblemen and gentlemen from time to time elected from the counties of Hertford, Essex, and Middlesex. The governor, deputy-governor, and treasurer of the New River Company for the time being are also *ex-officio* members of the trust.

4336. Does that constitution of the body of Trustees continue to this day?—It does. I then come to another Act which was passed in 1766, in the seventh year of the reign of George the 3rd, cap. 51, for improving the navigation of the river Lee from the town of Hertford to the river Thames; and for extending the said navigation to the floodgates belonging to the Town Mill in the said town of Hertford: that is the extreme limit of the navigation as at present constructed. By this Act the trustees appointed by the 12th George 2nd, cap. 32, together with several other noblemen and gentlemen therein named, were appointed "trustees for the making, extending, improving, and maintaining the navigation of the said river Lee from the floodgates belonging to the Town Mill, in the town of Hertford, to the river Thames, and for putting this Act in execution:" and they were empowered to cleanse, scour, deepen, enlarge, or straighten the channel of the river Lee, and to make and maintain the new cuts therein described, and to build the bridges and works therein mentioned. That was the first period of canalizing the river Lee. By this Act the navigation was declared to be a free navigation for all the King's liege people, subject to the payment of such rates and duties which were thereby authorized to be levied. Then I come to another Act passed in 1779, the 19th

George 3rd, cap. 58, which was an Act to authorize the raising of certain additional tolls which are mentioned there. Then in the year 1805 an Act was passed, 45th George 3rd, cap. 69, for the better preservation and further improvement of the navigation, defining certain heights of water and giving power to the Trustees to make byelaws for regulating the lading of barges. It was also provided that no craft should carry more than 40 tons of freight. That provision has since been repealed, and now there is no limit to the tonnage that may be carried; it sometimes exceeds 80 and 90 tons. The next Act was passed in the 13th and 14th years of the reign of Queen Victoria, cap. 109, called "The Lee Navigation Improvement Act, 1850." The principal objects of this Act were to enable the Trustees further to improve the navigation and dispose of the surplus water. The Trustees were incorporated by the name of "The Trustees of the River Lee," and were empowered to purchase and hold, and sell, demise, and dispose of lands for the purposes of that and the therein recited Acts.

4337. What was the meaning of disposing of the surplus water?—That we may dispose of the water to companies and to individuals for a water supply. I may state here that there is a subsequent Act which vests the surplus water in two companies, namely, the New River Company and the East London Water Company.

4338. Is there any provision under that head of "disposing of the surplus water" for passing the water freely off the land?—No, that Act enables the Trustees to raise funds.

4339. In the Acts which you have mentioned up to the present moment there is no power given to raise money?—Yes; I think there is. Money has been borrowed: there was power to buy land in the Act of the seventh of George III., cap. 51, section 5. The Trustees were empowered to treat and agree with the owners and proprietors of land and property, and they were enabled to pay for that land and property either by way of purchase in a gross sum or by annual payments, and certain annual payments are still made by the trust,

4340. How was the money to be obtained?—The money to be raised was by annuities. The Trustees were enabled to create annuities for the purpose of raising money. Annuities were raised and have since been paid off. In 1850 the Trustees were empowered to raise on mortgage upon the security of the tolls and property of the trust £230,000. Those borrowing powers have been exercised to a certain extent, and the money has been laid out in the improvement of the navigation and renewal of the works.

4341. (*Chairman.*) Is that the most recent Act under the powers of which you are now working?—Yes. There is an Act which has been passed since, the Act of 1855, which transferred the surplus water of the Lee to the two companies, but our own maintenance and working, are under the Act of 1850.

4342. (*Chairman.*) The money which has been raised and expended has been raised and expended under the powers of the first of those Acts which you have named?—Yes.

4343. The debt, whatever it may be, is secured by arrangement under that special Act?—Yes. Then I come to the Act of 1855, the 18th and 19th of Victoria, cap. 196.

4344. Is that the most recent Act?—Yes. This is called "The River Lee Water Act, 1855." By this Act the surplus water of the Lee over and above the quantity required for the purposes of navigation was vested in those two water companies respectively, subject nevertheless to such rights as might not then belong to the Trustees. The daily quantities of water reserved to the Trustees for navigation purposes and not subject to any control by the water companies are as follows: first, they may pass through their locks from the highest point at which the water companies or either of them take their supply down to and including the first lock above Fielde's Weir (called "The Upper Reach") not exceeding in any 24 hours 576,000 cubic feet per diem.

4345. The companies referred to there being, I assume, the two water companies you have mentioned?—Yes, the New River Company and the East London Water Company. Secondly, they may pass from the first lock above Fielde's Weir exclusive down to and including Waltham Town Lock (called the Middle Reach), not exceeding in any 24 hours 720,000 cubic feet. Thirdly, they may pass from Waltham Town Lock exclusive down to and including Old Ford Lock (called the Lower Reach), not exceeding in any 24 hours 864,000 cubic feet. All water below Tottenham Mill not required by the two water companies at their drawing stations is reserved to the Trustees for navigation purposes. By that same Act the two water companies are strictly forbidden without the consent of the Trustees, at any time to draw from the river so as to reduce the water in any pond of the navigation below the customary head level of that pond.

4346. (*Mr. Harrison.*) That limits your navigation ?—Yes, it does, but I believe that limit has never been attained. Below Tottenham Mill the whole of the water belongs to the River Lee Trust. The priorities of rights to take the water of the river Lee are very clearly defined by this Act and are as follows: first, the right of the Trustees to the upper, middle and lower daily quantities, and such further quantity as shall be necessary to maintain the water of the navigation on a level with the head levels aforesaid ; secondly, the right of the New River Company to take 2,500 cubic feet a minute; thirdly, the right of the East London Waterworks Company to take 2,500 cubic feet a minute; fourthly, the right of each company to take, *pari passu*, 500 cubic feet a minute ; fifthly, the right of each company, after notice, to take, *pari passu*, any additional quantity; sixthly, the right of the Trustees to surplus water below Tottenham Mill.

4347. You have the first claim upon the water up to the limits you have mentioned ?—Quite so.

4348. The companies have power to take 2,500 cubic feet per minute at the same time ?—Yes.

4349. If there is a surplus beyond what you require and they require, they can each divide it in equal proportions ?—Yes.

4350. To any extent that that surplus may be ?— Yes.

4351. Below Tottenham you have the entire control of the remaining water, whatever it may be ?—Yes, that is so. These Acts which I have cited give the whole jurisdiction, conservancy, and government of the river to the Trustees of the river Lee, and they give them a priority of right to the quantity of water necessary for navigation purposes. That exhausts the constitution and statutory powers of the trust.

4352. (*Chairman.*) What are your executive powers as a trust ?—We meet monthly and dispose of all the business which comes before the Trustees ; the meetings are, in fact, general meetings; that is to say, all the Trustees receive notice; they are not committee meetings, but we deal with all questions affecting the navigation other than those of nuisance; that is to say, we have not power to deal with nuisances under the Acts.

4353. Where do the meetings take place ?—At Hertford during part of the year, and in London during the session of Parliament.

4354. Are the Trustees a paid body ?—No, unpaid.

4355. Is there any allowance made for travelling expenses ?—None whatever.

4356. Each member of the trust travels to and from each place at his own proper charges ?—Quite so.

4357. Do those meetings take place essentially for the purpose of regulating the navigation traffic and business of the river ?—Yes, and to receive communications from traders and parties using the navigation.

4358. What is the present debt of the Trustees ?— £174,287

4359. You have power to borrow to what amount? — £230,000

4360. You have not borrowed to the maximum that you are authorized by the recent Act to borrow ?— Not by a sum of £55,713

4361. Then the money is borrowed, I suppose, from any individuals who choose to lend it ?—Yes.

4362. Have the Trustees borrowed any of it from the Exchequer Loan Commissioners ?—No.

4363. Is there any authority in the Act to enable the Exchequer Loan Commissioners to lend money to the Trustees ?—I think not.

4364. Upon what terms have you been enabled to borrow that money as to interest, and what is the period allowed for repayment ?—At 4½ and 5 per cent., upon terms varying from three to seven years.

4365. You have borrowing powers, and I assume reborrowing powers ?—Quite so.

4366. You can pay off and reborrow to replace the money ?—Yes.

4367. Are you bound by the terms of the Act to repay that money, or may it remain a permanent debt? — We are not bound to repay it.

4368. You are not bound, when money is borrowed by the trust for water supply and other purposes, by Act of Parliament to repay it either in 30 or 50 years? —There is no limit in this case.

4369. It is borrowed upon the security of the tolls? —Yes. and other property of the trust.

4370. In the event of railway competition, or any other form of competition, or any alteration in trade, diverting traffic from the river, and reducing the income of the trust, is there any outside security to the lenders of the money ?—We possess land and mills, and annuities, secured by Act of Parliament from the water companies.

4371. You have an income from the water companies ?—Yes.

4372. I believe the amount was mentioned by your engineer ?—Yes, £3,500 I might mention just to qualify your observation, that in 15 years, from tolls alone, we have doubled our income during the period of railway competition, we have annuities secured by the Act, and we have mill property and land; a valuation of that has been made within a recent period, and it is a very large sum indeed; that is over and above the tolls.

4373. You have a profitable trade now, and one that has for many years back been growing ?—Yes; this year we shall realize £1,000 upon the river more than at any other period.

4374. I may ask you, perhaps, whether your traffic manager will attend to give evidence ?—He will.

4375. He will, perhaps, put in the tonnage earned upon the Lee, showing the rate of increase, and also the income derived from that tonnage ?—Yes, he will.

4376. Have the Trustees power to increase the rate of charge over and above what is at present paid, supposing that they resolved to do so, to meet their engagements ?—Yes, they can considerably increase it.

4377. At the present time you do not charge the maximum rate that you are empowered to charge ?— No ; take, for example, these four items, coals, malt, flour, and sundries. Coals may be charged 2s. 2¼d. per ton, whereas we charge 6d.; malt may be charged 2s. 1¼d., whereas we charge 1s. ; flour may be charged 1s. 8¼d., whereas we charge 1s.; sundries may be charged 1s. 9¼d., whereas we charge from 1s. 3d. to 1s. 2d. We lower our tolls from time to time as the exigencies of trade or our finances admit.

4378. (*Professor Way.*) As a matter of policy ?— Yes.

4379. (*Chairman.*) You are able now to offer good security for any money you may wish to borrow to improve your works ?—We think so, and with a very considerable margin.

4380. In the event of your continuing to earn a surplus would the Trustees be authorized to pay off any of the mortgage bonds, or would they, instead of that, reduce the rate of tolls ?—They have power to do either; they have power legally to pay off the bonds, because some of the debentures are overpaid; some parties prefer the security, and they allow them to remain. The Trustees would probably consider whether it was desirable to pay off some of their debt, or to lower the tolls for the public. As long as the trade remained in an increasing condition I presume they would pay off the mortgages in preference to lowering the tolls.

4381. In the event of the day coming when the trade of the district was found to be so profitable that they could wipe off their mortgage debt altogether, and have the whole income available, except for the payment of the salaries of their officers, does the Act point out any arrangement that might be made ?—The navigation would become a free one absolutely.

4382. The tolls would then be reduced to a minimum to provide for the payment of the salaries and so forth? —Yes, there must be some revenue for that purpose, for maintenance and for repairs, but that might be met probably by the payments made by the water companies or by rentals.

4383. Can you explain to the Commission the special circumstances under which this town has been sewered and drained ; has it been done by the river Lee Trustees or entirely by the New River Company ?—Entirely by the New River Company, and for their own purposes; it was done under a special Act of Parliament obtained by them.

4384. Have the Trustees of the Lee been at all troubled by pollutions caused in the course of the navigation ?—Yes.

4385. Have they ample legal powers to deal with parties who cause nuisances ?—They have no legal powers other than the common law rights which individuals possess in such cases ; they have no statutory powers to deal with nuisances. There is one section in our Act which enables them to inflict penalties upon parties who maliciously cast refuse into the river, building refuse and so on. The words are, "if any person shall wilfully throw any gravel, ballast, stones, rubbish, or dirt" *{reading from the Act to the words}* "not exceeding three months."

4386. What clause do you refer to?—The 109th clause of the 7th George 3rd, chapter 51.

4387. Would the word "intent" in that clause so qualify the intent and meaning of that clause as to render it inoperative ?—Perfectly so ; I consider that that word "intent" entirely prevents the clause being operative.

4388. If you were to summon a man, would you not have great difficulty in proving what he "intended" to do ?—It would be utterly impossible to prove it.

4389. That clause requires amendment, does it not? —Yes; I have never heard of an attempt yet being made to put it in force.

4390. *{Mr. Harrison.}* So far as the clause goes, would not the word " dirt" include sewage ?—Yes, I think it might; but then it must be proved that there was a wilful intention on the part of the offender to obstruct and injure the navigation.

4391. *{Chairman.}* If the framers of the clause had been satisfied with saying that proof of having thrown solid refuse into the river should be sufficient, do you think you could have put the Act in force ?—Yes.

4392. But when it puts upon you the onus of proving a man's intention it takes away the whole sting of the clause ?—It does; the Trustees have very much regretted that they had not the power which the

Thames Conservancy are able to exercise. I understand that they have carried those powers into operation—the powers given to them by the last Act of 1854; indeed I know they have, because I have supplied them with evidence, which has enabled them to obtain a conviction.

4393. Might I ask you whether the Trustees have discussed recently the advisability of obtaining additional legal powers similar to those which are embodied in the Conservancy Act of last session for the river Thames ?—They have in reference to that and many other objects, and it is thought desirable to obtain powers for the same purpose. The Thames Conservancy, since the passing of their Act of 1864, have taken proceedings in six cases, in which they have obtained convictions under the three-mile clause.

4394. What cases were those ?—One was the case of H. Tallerman, who was fined £5; a man of the name of Stevens was fined £5. ; another of the name of Crossley was fined £5 ; in the case of Denton and Jutson the case was dismissed on their agreeing to alter their pipes; in the case of Batley and Butler the case was dismissed on their agreeing to alter their pipes; the case of Messrs. Abbott was adjourned till the following Friday to ascertain the result of a wall that was in course of erection. These were cases of nuisances on the Limehouse cut, the refuse being discharged into the river Lee.

4395. Was it solid refuse that was thrown in ?—It was refuse from their manufactories, liquids and solids together.

4396. The proceedings in those cases were taken under the Act that was obtained in 1864?—Yes.

4397. Are you acquainted with the clauses generally in the Act passed in the last session for the future government of the Thames ?—I have read it.

4398. It gives to the conservators, after notice, power to remove weirs, to take possession of locks, to remove or lower mill dams, and absolutely to prevent the sewage of any town or place from being thrown into the river ?—It does.

4399. *{Mr. Harrison.}* Did the cases to which you have referred come under your notice as having a joint interest in Bow Creek with the Thames Conservancy ?—Yes, they were our complaints in point of fact. We brought the matters before the conservancy, our officers were directed to give evidence, and convictions were in that way obtained, I think, in all the six cases; they all occurred in our district.

4400. Have they taken any action out of your district that you know of, or do they do so only when a matter is seriously forced upon their attention ?—I am not aware.

*(Mr. Beardmore.)* I may be allowed perhaps to say that the Thames Conservators are constantly prosecuting offending parties; not a week passes without that being done.

*(The witness.)* I might mention other cases of nuisance. One or two of these cases we took before the police magistrates ourselves, and in the case of Tallerman we failed because we had not the power which the Thames Conservancy enjoy.

4401. *(Chairman.)* Is that the general character of the nuisances you have to complain of, polluting the waters of the navigation?—Yes; beginning with Ware, and down to the effluence of the Manifold ditch which conducts the water from the sewage works at Hertford, I think I may say that the water is extremely pure, that is to say, I am not speaking chemically, but to all appearance and taste. When we get below Ware lock the first real nuisance commences at the point where the outfall of the sewage water from Hertford takes place, that is the water which is brought there and which has passed through the deodorizing works at Hertford which were constructed by the New River Company.

4402. Do you know sufficient of the character of that effluent water to be able to say whether it has ceased to be the cause of nuisance, and therefore unobjectionable?—I think it is neither one nor the other, but I will say this, that it is most undoubtedly to the interest of the navigation that the water should be kept pure; that is necessary for the navigation. There must be a certain amount of solid deposit if you get filthy water, and therefore it will affect our navigation. In course of time it will silt up the bed of the river, and it does do so. We have, in consequence, to spend large sums of money in dredging out the sewage mud which accumulates in the river.

4403. Are you chemist enough to know that no disinfecting process or any treatment of that kind does anything but remove the solids; it does not touch the salts of sewage which are incorporated chemically with the water?—I do not know that of my own knowledge, but that is what I hear.

4404. *(Mr Harrison)* After undergoing the process of clarification adopted by the New River Company is there any deposit in your navigation from the effluent water from the deodorizing works?— There is certainly an accumulation, whether it is a deposit of solid sewage which has floated down, or sewage in solution, I do not know, but I have observed that there is an accumulation of a black substance occasionally. In passing there you may see floating on the surface what appears to be at first sight floating sewage; it appears like nightsoil, but if you examine it you will find what it is; it is simply a confervoid growth which has risen from the bottom, and which has grown up from the presence of the sewage water. The sewage water seems to have fertilized the bed of the river. I have examined some of these collections and found that they were vegetable, not sewage. I suppose it is nature's method of clarifying the water.

4405. Is the water that is discharged from the works in appearance clear as it passes along and before it reaches the navigation?—I have seen it perfectly clear, and I have seen it also looking somewhat peaty, as though it had passed over peat of a brown colour; I cannot say that at all times, for instance, in hot weather, it is perfectly clear.

4406. Notwithstanding it appears to be quite clear as it passes from the works, when it reaches the navigation there is a deposit of some kind which gives rise to the results you have mentioned?—Yes, there is certainly a discolouration.

4407. After it mixes with the water of the navigation?—Undoubtedly; and I have been told by parties who have complained, that there is absolutely a smell and a great nuisance. We have received complaints from the Ware local board of health upon the subject.

4408. *(Chairman.)* The smell would probably come from two causes; first, the heat of the weather, and, secondly, the length of time during which the sewage has stagnated in the sewers before it got into the open air?—No doubt; we then come within 300 or 500 yards of the main sewer of the town of Ware, which is as abominable as it can possibly be; no attempt is made at deodorization, or any process which shall render it innocuous.

4409. It comes down as it is delivered from the town, does it?—Yes.

4410. Have you given them any notice upon the subject?—We have complained, but I may say that there is a little counter irritation in this case. They send us a complaint as to the Hertford sewage, and then we refer them to the nuisance they create.

4411. *{Professor Way.}* I suppose you have no doubt that the measures taken at Hertford to precipitate the sewage place the river in a better position than it is at Ware ?—Yes, certainly.

4412. At Hertford the evil is greatly mitigated ?— Yes, the work is done there as well as one could think it possible to do it by the process which they adopt.

4413. *{Mr. Harrison.}* Is any bank formed in the navigation below the point where the Ware sewage is discharged?—Yes, I believe there is one accumulated, and we shall have to incur expense in clearing it away.

4414. Is that an obstruction to the navigation ?—It will become such.

4415. Cannot you under your Act proceed against the authorities of Ware on that account?—At that point there is a stream which enters the river, and it flows very rapidly there from the Town Mill of Ware, and the rapidity with which the water comes down clears away the bank, or the accumulations which are continually growing there; now and then there must be large accumulations in the river, but they are distributed over a large area.

4416. You would probably find it difficult to bring the matter home to the authorities of Ware ?—Yes.

4417. *[Professor Way.]* And perhaps you could not do so until the evil had been the cause of some damage?—No.

*{Mr. Beardmore.}* I may mention that the river also, besides the millstream, has very large floods constantly coming down, and the mud gets washed away into the general stream; there is a very large amount of mud in the river generally, but not at that point.

4418. *{Chairman to the witness.}* Have you looked with any care at the recent Conservancy Act for the Thames ?—Not with any very great care, but I have read it through.

4419. I suppose, if a complaint was made before any properly constituted tribunal that the river Thames was polluted by the river Lee, you could not deny it?—Unquestionably not; our great complaint is that pollution does find its way down our channel, but we have not sufficient power to prevent it.

4420. You might say that you do your best to prevent it, but you must at the same time confess you were guilty of passing the foul water into the Thames ?—The fact is that our funds are not applicable to the purpose of preventing it. By their prescriptive rights, the parties have been empowered to discharge, and from time immemorial discharges have taken place at different points of the river, and the law will not reach them in its present state unless they cause a nuisance.

4421. I suppose you are aware that if any person suffers from a nuisance caused by pollution from sewage, and he can prove that he suffers from it, the person who causes the nuisance can be indicted ?— Quite so.

4422. We have been informed that it is by no means a simple process to obtain an injunction to restrain parties from causing a nuisance ?—It is a very expensive and tedious proceeding.

4423. And when you have obtained an injunction you are sometimes no better off than before ?—That is frequently the case.

4424. You may be suffering in the river Lee from town sewage, and if you obtain an injunction you may be no better off than you were before ?—An injunction may be only partial in its operation, for instance, you might proceed against a board, having certain limits to its jurisdiction, and not extending over the whole area of the nuisance, and you would have to multiply your legal proceedings with very doubtful success.

4425. Are you aware that the river Lee Trustees are not alone liable to these almost futile proceedings, but that the authorities of towns and private individuals stand in the same position ?—Quite so.

4426. Suits may be multiplied without any beneficial results being attained ?—Yes.

4427. Have you considered the question of the future conservancy of the river Lee, and what form it might take in connexion with your trust ?—I have thought a good deal about it but I do not know whether I ought to express an opinion in the presence of the chairman, who is prepared to speak upon that subject.

4428. Will you then, as far as you can, enumerate the nuisances which exist between Ware and the point at which the East London Water Company take their water ?—At Ware there are a great number of privies

and drains which lie immediately over the river and which are discharged immediately into it ;in a space of only about 200 yards there are a great number, about which we have complained, but we found that the Local Board of Health were not disposed to act in the matter.

4429. If you summoned those parties before the justices I suppose their advocate would say that they had a prescriptive right?—Yes, and that is the difficulty we have to contend with. The next bad nuisance is at Tottenham; I think there is nothing between Ware and Tottenham of any importance. There is a small amount of drainage from the towns and villages.

4430. (*Mr. Harrison.*) Is the sewage of Hoddesdon carried into the river ?—Yes, it is partially.

4431. Between Ware and the point from which the East London Water Company take their water are there any streams or tributaries from which any polluted water is passed into the Lee ?—Yes, there is the Stort, and I believe the whole of that is turned into the river Lee.

4432. Do you find in the navigation that the water of the Stort brings down much polluted matter ?—It is not observable, and it is not in the form of solids; then there is Waltham Abbey.

4433. (*Chairman.*) Have you any legal power-over the navigation of the river Stort ?—None whatever.

4434. You have no legal authority to pass along that stream to inspect it and see what they are doing? —No, except as one of the public might, not in any official capacity.

4435. That stream is not under your supervision? —No.

4436. The owners have an independent engineer and an independent board, and I believe it is private property ?—I believe so. After we leave Waltham Abbey we reach Enfield lock.

4437. Is there any discharge of sewage at Waltham Abbey which is objectionable ?—Yes, it is very bad there.

4438. Then you get to Enfield lock ?—Yes.

4439. Is the sewage from Waltham Abbey let into the Lee above the point at which the East London Water Company takes its water ?—Yes.

4440. So that any foul matter that comes in there necessarily forms part of the water taken by the East London Water Company ? — Certainly. The next place is Enfield lock ; the outfall works are in that neighbourhood, and the drainage from that district finds its way into the Lee.

4441. Is there any treatment of the sewage matter by filtration before it gets into the river ?—I think not, it is all in the natural state.

4442. Is it above or below the point at which the East London Water Company takes its supply ?— Above ; then we come below the point of the supply to the East London Water Company below Tottenham lock. There we had first an intercepting drain or outfall, and that was constructed by the East London Water Company in pursuance of an Act that was passed in 1852.

4443. To which I believe you assented ?—Yes, we were assenting parties, and for this reason: the sewage before that had found its way into the river Lee, through open ditches and several outfalls that there were into the Lee, in a worse form altogether than that in which it presents itself now. Those ditches were intercepted to enable the East London Water Company to take their supply wholly above Tottenham lock as pure as they could get it, and they passed the intercepted sewage down at the tail of Tottenham lock. I might say that it is not so bad as many I have spoken of, as the sewage is conveyed for some miles in an open drain, and absorption, evaporation, and oxidation have been going on, so that when it arrives at the Lee it is not always very polluting in its character. In hot weather it is so certainly.

4444 (*Mr. Harrison.*) The whole drainage of the land adjoining is intercepted as well as the sewage, is it not ?—Yes.

4445. So that the sewage is diluted to a considerable extent?—Yes. .

4446. I believe there are some tributaries as well? —Yes, at that point there is a considerable silting up of the bed of the navigation by the effluent water and the matters in solution.

4447. If the sewage matter running down the cut becomes comparatively harmless when it gets to the bottom, what is the effect upon the inhabitants of the district through which it runs?—They complain very much of it. I do not know that there is a very manifest effect produced, but there must be something. Then about a quarter of a mile below the intercepting outfall comes the whole drainage of Tottenham, Wood Green, and West Green.

4448. At Tottenham they profess to disinfect the sewage?—They attempt to do it, but the result, I believe, is utter failure.

4449. Do you think that the process is less effectual than that pursued at Hertford?—Certainly; because the Hertford arrangement is adequate to the volume of the sewage, whereas at Tottenham it is totally inadequate.

4450. You think that they do not take out the amount which they might?—Certainly; not a tenth part of it.

4451. Have you given them any notice that you should interfere with them?—We have filed an information against them in chancery.

4452. There are several places besides the lunatic asylum at Colney Hatch, all of which tend to pollute the Lee at and about Tottenham?—Yes.

4453. I believe that the Tottenham board have either threatened or commenced proceedings against certain parties above them?—Yes, they have attempted to do so. I believe last year they filed a bill against the Hornsey board, but there there is nobody to make amenable; that board is not an enduring body; it is not a corporation.

4454. (*Professor Way.*) The works at Tottenham, I believe, were made 12 years ago?—Yes; rather more.

4455. Has the population of Tottenham increased since that time?—Yes, very largely, but the works have not been increased.

4456. Do you think that that is the cause of their inadequacy?—Yes, I believe that the works have been, although in operation, decreased; that is to say, certain tanks that were in operation originally have been abandoned.

4457. I believe there were certain elevated tanks into which the sewage was lifted, and I think those have been abandoned?—Yes. As I understand the process, it involved the use of those tanks to enable them to deal with a larger volume of sewage than they now deal with.

(*Mr. Beardmore.*) They also had filter-beds in a yard, which have all been filled up.

4458. (*To the witness.*) Was it at the suit of the Trustees of the river Lee that the interim injunction was granted?—Yes; and it was to restrain the authorities of Tottenham from bringing the sewage of Wood Green and West Green into the Lee. The injunction says that they shall not increase the evil until the healing of the cause.

4459. Was it in consequence of that, that they made cesspools in Wood Green?—I do not know; but I might mention that on the occasion of the last survey of the river, (there is an annual visit paid by the Trustees of the river to inspect the works,) we went to the deodorizing works, and we there saw the pollution passing into the river at Tottenham, below the lock, and the nuisance was then excessive, the sewage was perfectly black and abominable. That was after the institution of our suit.

4460. Have you any control over the drainage of the adjoining lands on either side of the river Lee?—No.

4461. Or any responsibility—for example, if any flooding takes place are you liable for the damage done?—I presume that if damage arose from the want of repairs and the inefficient working of the navigation there probably might be some liability, supposing that the banks were not kept up and made sufficiently strong,

4462. (*Mr. Harrison.*) Are there any water-marks on your navigation to which you are limited as to the height at which the water is to be kept?—There are marks up to which we are entitled to keep the water for the purposes of the navigation as against other parties, but we are not limited as to any outlay that may be necessary for the preservation of our works; we have proper side weir exits for the water. Then I come to the state of the river from Old Ford to the Thames, which is the tidal portion of the navigation, and that is

rendered very pestiferous during hot weather owing to the discharge of impurities from various manufactories and works on the banks of the river there.

4463. Have the Trustees any control over those works either to prevent their establishment or to regulate them when established?—Not unless they interfere with our banks, or they require lay-byes or works and convenience; we have no power if they keep themselves at a distance from our undertaking. We find that they generally come to our banks, and then make application for an agreement for lay-byes or for a supply of water to their engines; then they come under our control in some respects.

4464. Have applications been recently made to you for leave to make wharves for the accommodation of the traffic on the banks of the river in the navigable parts?—Yes, one was made very recently at Ponder's End; large jute works are being erected there.

4465. So that they should be enabled to have their barges come alongside and discharge their loads at the wharves?—Yes, and the agreement is in course of completion. In every case when we enter into an agreement of that kind we invariably insert clauses to restrain parties from casting any pollution into the river; we make that a *sine qua non*, and we will not grant them the facilities they require unless they undertake to exclude all sewage and drainage from the navigation.

4466. Have you made any arrangement with any of the boards of health or other authorities, either of London or any of the adjoining parishes in the tidal portions of the river, to prevent sewage passing in?—No.

4467. Is it not the fact that a considerable amount of sewage has been passed in from the London district to the western side?—Yes.

4468. Have you any sewage passing in from any of the areas on the eastern side; I believe there is no sewer?—I think not. Not in the Limehouse Cut, but there is the West Ham sewage which is discharged beyond the Bow Creek entrance. There are two entrances to the river Lee navigation, one *via* Bow Creek to Blackwall, and the other from Bromley to Limehouse, near the church, and up the canal which was constructed under the powers of an Act of Parliament.

4469. That, I think, brings you down to the Thames?—Yes. We then come within the district of the Metropolitan Board at Old Ford, and there are outfalls, what they call storm water outlets. Three or four years ago, I think in 1863, the discharge from those outlets was so enormous that the Trustees were compelled to take proceedings, and they filed an information and bill against the Board and they obtained an injunction and £820 in respect of the damage done to the navigation, and the costs of the suit.

4470. The metropolitan board allowed their sewers to discharge at their overflows as you conceived improperly?—Quite so, and the court justified our view of the question.

4471. I assume that having made overflows at those points they would have power to admit the flood water under certain conditions?—Undoubtedly. The injunction that was obtained is permanent, and since then they have constructed their main outlet works at Barking, so that we do not now anticipate such an influx under any conditions as we had then.

4472. Did the nuisance take place previously to the time when they commenced their outlet works at Barking?—Yes.

4473. They had made a temporary outlet then?—Yes.

4474. {*Professor Way.*} Have they not an overflow at Bow Lane?—I think not.

4475. Does Bow Common drain into the Lee?—No.

4476. You know that there are all sorts of disgusting trades carried on there?—It is a nuisance district.

4477. Does it drain into any stream which drains into the Lee?—I would rather that Mr. Beardmore answered that.

{*Mr. Beardmore.*} It was the ancient Tower Hamlets sewer up to about the 13th of August last. It flowed under the river Lee by a pipe, but there was a storm overflow under Bow Common bridge, which I think is what you refer to; if heavy floods of rain came it flowed over into the Lee, but only on those occasions. On or about the 13th of August the metropolitan board commenced pumping temporarily at Abbey Mills from

the low-level sewer, and since that date I believe the bulk of the sewage of that sewer has been turned into the low-level sewer, not because it happened to run into the Lee, where it overreached it, but it ran down into Limekiln Dock, and created an abominable nuisance at Limekiln Dock ; that nuisance is very much mitigated.

4478. *{Mr. Harrison.}* When was that abominable nuisance which you speak of?—Up to August it had always prevailed.

4479. You know that of your own knowledge ?— Yes. Perhaps I may explain that the nuisance of the Tower Hamlets sewer at Limekiln Dock was very much mitigated when the northern high-level sewer was carried to Barking in the summer of 1863, but the sewage has flowed ever since up to very recently, when it was diverted under the circumstances which I have mentioned, and it is now pumped by temporary engines into the high-level sewer, and so to Barking.

4480. *{Professor Way.}* The Penstock Station was the point which I meant.

( *Witness.*) The storm outlets of which I have been speaking are connected with that Penstock Station, and I may say that the repetition of that nuisance is possible, according to the construction of their works.

4481. Because they have a permanent outfall ?— Yes.

4482. It could only, I believe, be possible in a very heavy storm ?— I believe that to be so because the gates are set at a very great height.

*{Mr. Beardmore.}* Up to August the low part of the Hackney brook came by gates which are shut down. The arrangements are very complicated; it is hardly possible to explain them or to understand them without a plan and section.

( *Witness.*) We have recently had occasion to complain of what we thought was the inflow of a quantity of sewage from those outlets; there was no diminution in their flow at Barking Creek on the day of which we complained. The outlets are probably a quarter of a mile off, that is to say, the entrance into the Lee is a quarter of a mile from Penstock, and their theory is, that this quarter of a mile must from time to time have accumulated animals and refuse, and that when there was a flood of rain in London it ran over the gates, and simply pushed out the impurities which had flowed up these channels by the action of the wind. If that be the case there must be some preventive means ; there must be a grating or something of that kind placed at the mouths to prevent its occurring again. The rust shows that the gates have never been touched for two or three years.

4483. *{Mr. Harrison.}* Is the mill property and the land which the navigation Trustees possess a security for the money which you have borrowed ?—Certainly, we consider so.

4484. Are you aware that upon the Thames, the Thames Commissioners had land to the value of about £10,000 which was not considered security for the bondholders ? —I conceive that their bond must have been in a different form. We certainly understand that the whole undertaking is a security for the monies advanced. We have actual power to buy, hold, and dispose of lands.

4485. In the case of the Thames the Commissioners at any rate actually possessed land valued at about £10,000, which they said was not available for the payment of the bondholders. Your debentures appear to be terminable at short dates ?—At periods of three, five, or seven years.

4486. Is that provided for in your Act of Parliament, or is it an arrangement of your own ?—It is an arrangement of our own. We are not limited at all as to time.

4487. You might have the money for an unlimited period of time as the bondholders determined ?— Quite so, for a shorter or a longer period as circumstances might admit. I am reminded that we have been a corporate body since 1850, under seal, and as such corporation we are able to hold lands and to dispose of them, but the Commissioners of the Thames were never in that position, so that we are superior to that body in that respect as well as in the other respects which I have mentioned.

4488. The money which is annually paid by the water companies to your Trustees is on account of powers given for the abstraction of the water from the river Lee ?—Yes.

4489. Besides that have they net power to call upon you to execute works, they paying for them ?—They have, for the better storage of the water.

4490. Have they exercised that power ?—In one instance ; the New River Company called upon us last year to reconstruct the Hertford lock. The reason was that they drew down the water frequently, as we proved by gaugings, considerably below the navigable head; they did so from time to time. We made complaints to them and threatened them with proceedings because our barges ran aground and did not get over the sill at Hertford lock. Then they said, "Well, in order to prevent your having any cause "for complaint we will ask you to rebuild your lock "and to place the sill at a lower level ;" and that has been done, and we have had no further complaint from the traders on the navigation;

4491. You have benefited the navigation and you have improved the construction ?—Yes, and they have kept up their water very much better since the lock has been lowered than they did previously.

4492. Shall we obtain from your manager information as to the advantage which the navigation is, not only to Hertford but to the whole district through which it passes, or have you any observations to make upon that head ?—My own impression is a very strong one, that the navigation is very essential to the towns through which it passes as a highway. I moreover think that the navigation should be maintained in a sanitary point of view, because the form of a river well maintained and in good repair, the river being full and deep, must be better for the health of the districts than a river neglected and simply running as a channel for the passage of water. Barges passing to and fro causing a change of the water from pond to pond, locking every hour, I fancy, must be more beneficial than a river neglected.

4493. Does the navigation afford greater facilities for manufactories upon its banks than can be given by any railway ?—Certainly. There are manufactories on the banks which have no other mode of carriage.

4494. Barges upon a navigation can stop at any point ?—Yes.

4495. It is not so easy for the trucks to do so upon a railway ?—Just so. There are a number of public wharves upon our navigation, and if they were abandoned it would be a very serious loss to the neighbourhood.

4496. *{Chairman.}* Do you charge a toll for carrying manure ?—No.

4497. Then I presume that that is an advantage to the landowners and the farmers ?—Quite so. Agricultural manure is not charged for, and that alone must be an immense advantage to the Londoners who purchase an enormous quantity.

4498. *(Mr. Harrison.)* Is artificial manure free ?— Yes. If you will allow me to refer to the clause in the Act which exempts those articles you will see what is included. It is the seventh of George III., chapter 51, section 81, "Provided always, that no tonnage rates or duties shall be due, paid, or demanded for any boat, barge, lighter, or other vessel carrying only oil-cakes, malt dust, pigeon dung, or manure of any kind whatsoever on the said river or the said new cuts or canals or any of them, or any part thereof."

4499. So that the agriculturists on each side of the river throughout the whole length of the navigation have a beneficial interest in the maintenance of the navigation ?—Unquestionably. There is a very large brickfield at Ware which has no other means of carriage except the road.

4500. *(Chairman.)* What is your present income and what rate of increase has taken place ?—That, I think, will be best manifested by the traffic return, which will show it year by year.

4501. Is there anything further which you would wish to name to the Commission ?—I think not, except that I will complete my list of Acts.

The witness withdrew.

APPENDIX NO. 1,

to EVIDENCE of JOHN MARCHANT, jun., Esq., Clerk to the River Lee Trust.

Statement (referred to supra, Question 4330) of Matters relating to the River Lee Navigation.

*Constitution and Statutory Powers of the River Lee Trust.*

The navigation of the river Lee is managed and governed by a public trust, incorporated by the name of "The Trustees of the River Lee."

They derive their powers from various Acts of Parliament, the earliest of which were passed in the reign of Henry VI., one (cap. 5.) in the third year of his reign, (1424); and the other (cap. 9.) in the ninth year of the same reign (1430).

These two statutes empowered the Chancellor for the time being, to issue commissions for the purpose of clearing, scouring, and amending the river "Ley," which in both of them is stated to be "une des grandes rivières" of England.

The river appears to have been rendered navigable in the reign of Queen Elizabeth, and the constitution of the River Lee Trust, may be said to have been first established in that reign.

In the thirteenth year of Elizabeth (1570), an Act was passed (cap. 18.) "For the bringing of the river of Lee, to the north side of the city of London." By this Act the Lord Mayor, Commonality and Citizens of London, and their successors, were authorized to bring the said river of Lee from the town of Ware to the north side of the city of London, and by section 4. it was enacted, "That the said Lord Mayor, Commonalty and Citizens, shall have the whole jurisdiction, conservice, rule, and government as well of the said New Cut River and ground of each side, as also the royalty of the fish and fishing of the same, and the profits of the said ground, soil, and water to them and their successors for ever." Power was also given by this Act for the punishment of offenders and persons breaking the rules and orders provided for the preservation and maintenance of the said river.

The Lord Chancellor or Lord Keeper of the Great Seal of England was empowered to appoint and authorize by commission under the Great Seal of England, sixteen Commissioners, (namely four of the city of London, and four of each of the shires of Essex, Middlesex, and Hertford, having lands, tenements, or hereditaments of the clear yearly value of forty marks, and not being London traders,) who should have full power to treat, agree, and compound for the scouring, cleansing, repairing, and keeping of the said river Lee.

The navigation between the towns of Hertford and Ware was at this period under the control of the corporation of Hertford, but certain disputes arose between that body and the inhabitants of Ware and the New River Company as to the jurisdiction of those bodies, and in consequence of these

disputes an Act was passed in the twelfth year of the reign of George II., cap. 32. (1739.) "For ascertaining, preserving and improving the navigation of the river Lee from the town of Hertford to the town of Ware in the county of Hertford; and for preserving and improving the said river from the said town of Ware to the New Cut or River made by the Mayor, Commonalty and Citizens of London; and for enabling the governor and company of the New River the better to supply the cities of London and Westminster, and the liberties and suburbs thereof, with good and wholesome water."

By this Act the course of the river was defined, and certain persons therein named were appointed for the putting in execution the powers and trusts by them reposed by virtue of and in pursuance of that Act for the purposes therein expressed.

In the seventh year of the reign of George III., cap. 51. (1766) another Act was passed, "For improving the navigation of the river Lee from the town of Hertford to the river Thames; and for extending the said navigation to the flood gates belonging to the town mill in the said town of Hertford."

By this Act the trustees appointed by the 12th George II., cap. 32., together with several other noblemen and gentlemen therein named were appointed, "Trustees- for the making, extending, improving, and maintaining the navigation of the said river Lee, from the flood gates belonging to the town mill in the town of Hertford to the river Thames, and for putting this Act in execution ; and they were empowered to cleanse, scour, deepen, enlarge, or straighten the channel of the river Lee, and to make and maintain the new cuts therein described, and to build the bridges and works therein mentioned. (Section 1.)

By this Act the navigation was declared to be a free navigation for all the King's liege people, subject to the payment of such rates and duties which were thereby authorized to be levied.

The main source of revenue of the trust is provided by this Act which defines the tolls to be taken upon the navigation in respect of the commodities conveyed upon it.

The trustees were authorized by the 19th George III., cap. 58. to raise certain additional tolls therein described.

Another Act was passed in the 45th year of the reign of George III. (cap. 69), for the better preservation and further improvement of the navigation, defining certain heights of water, and giving power to the trustees to make byelaws for regulating the lading of barges.

It was also provided that no craft should carry more than 40 tons of freight, but this provision has since been repealed by the Act next to be referred to.

The next Act was passed in the 13th and 14th years of the the reign of Queen Victoria (cap. .109), called "The Lee Navigation Improvement Act, 1850." The principal objects of this Act were to enable the trustees further to improve the navigation, and to dispose of the surplus water.

The trustees were incorporated by the name of "The Trustees of the River Lee," and were empowered to purchase and hold, and sell, demise, and dispose of lands for the purposes of that and the therein recited Acts.

In 1855 arrangements for the supply of water to the New River and East London Waterworks Company were confirmed by the Act of 18 & 19 Victoria, cap. 196. "The River Lee Water Act, 1855."

By this Act the surplus water of the Lee, over and above the quantity required for the purposes of navigation, was vested in "those two companies respectively, subject nevertheless to such rights as might not then belong to the "trustees."

The daily quantities of water reserved to the trustees for navigation purposes, and not subject to any control by the companies, are as follows :—

First. They may pass through their locks from the highest point at which the companies or either of them take their supply, down to and including the first lock above Feilde's weir (called "The Upper Reach "), not exceeding in any 24 hours 576,000 cubic feet.

Secondly. They may pass from the first lock above Feilde's weir exclusive down to and including Waltham town lock (called the Middle Reach), not exceeding in any 24 hours 720,000 cubic feet.

Thirdly. They may pass from Waltham town lock exclusive down to and including Old Ford lock (called the Lower Reach), not exceeding in any 24 hours 864,000 cubic feet.

All water below Tottenham mill, not required by the two companies at their drawing stations, is reserved to the trustees for navigation purposes.

The two companies are strictly forbidden, without the consent of the trustees, at any time to draw from the river so as to reduce the water in any pond of the navigation below the customary head level of that pond.

The priorities of rights to take the water of the river Lee are very clearly defined by this Act, and are as follows:—

First. The right of the trustees to the upper middle and lower daily quantities, and such further quantity as shall be necessary to maintain the water of the navigation on a level with the head levels aforesaid.

Secondly. The right of the New River Company to take 2,500 cubic feet a minute.

Thirdly. The right of the East London Waterworks Company to take 2,500 cubic feet a minute.

Fourthly. The right of each company to take *pari passu* 500 cubic feet a minute.

Fifthly. The right of each company, after notice, to take *pari passu* any additional quantity.

Sixthly. The right of the trustees to surplus water below Tottenham mill.

The body of trustees consists of the following *ex-officio* members, viz :-The Lord Mayor, Aldermen, and Recorder of the city of London for the time being; the Knights of the Shire for the county of Middlesex, the

Members of Parliament for the city of Westminster, the Knights of the Shire for the counties of Essex and Hertford, the Members of Parliament for the boroughs of Colchester and Hertford; the Mayor of Hertford for the time being; and noblemen and gentlemen from time to time elected from the counties of Hertford, Essex, and Middlesex.

The governor, deputy-governor, and treasurer of the New River Company for the time being are also *ex-officio* members of the trust.

The trustees have, in execution of their powers, made new cuts and straightened the course of the navigation; they have removed locks and other obstructions; they have replaced old wooden locks with new brick and stone structures; and have otherwise expended very large sums in maintaining and improving the navigation between Hertford and London.

By the foregoing Acts the whole jurisdiction, conservice, government, and maintenance of the navigation of the river Lee has been for three centuries and is now vested in the trustees appointed under those statutes.

The trust has been regarded as one of great public importance, having for its sole object the public benefit and advantage.

*Nuisances on the Navigation.*

Commencing at Hertford there are but few cases of drainage into the river Lee, the town being sewered by the New River Company in order to purify the source of their supply below Hertford lock, the first on the navigation.

The sewers constructed by that company intercept the drainage of the town, and convey it to deodorizing works about a mile down the valley towards Ware. The sewage water after being dealt with at the works is conveyed down an open channel into the river Lee below Ware lock, about two miles south of Hertford, and just above the town of Ware.

The discharge from this channel, called the "Manifold ditch," is not generally offensive, but in the summer months during the prevalence of hot weather it is said to be so.

Communications upon the subject have passed occasionally between the Ware local board of health and the trustees of the river Lee, but the local board have the power in their own hands to deal with the nuisance if it be one.

Within 500 yards of the Manifold ditch and discharging into the same pond of water is the outlet of the main sewer of the town of Ware, under the control and management of the local board of health. The sewage flows into the navigation in large volumes, and without any attempt being made to deodorize or purify it. A trap door is fixed at the mouth of the sewer, opening outwards by the action of the sewage.

This Ware sewer is undoubtedly a great nuisance to the navigation, and the neighbourhood of the outfall, and is one which calls for interference.

Another sewer flows into the navigation under Ware bridge, and takes the drainage of Amwell End. There is no attempt to purify the discharge of this drain.

In addition to the above, there are many privies and drains discharging into the river at Ware.

There is no sewer falling into the river at Stanstead, but there are privies and drains which should be done away with.

There is no further serious drainage into the navigation below Ware until we reach Tottenham.

The East London Waterworks Company take their supply of water from the river above Tottenham lock.

In about the year 1853, that company constructed an intercepting drain or sewer, to intercept and divert the drainage and sewerage water from Enfield, Ponder's End, and Upper and Lower Edmonton, and part of Tottenham.

Previously this drainage found its way into the navigation through open and circuitous ditches, discharging into the river above Tottenham lock. The intercepting drain was made under the powers of the East London Waterworks Act, 1852, 15 & 16 Vict., cap. 164, (sec. 81).

It has its outfall into the Lee a few yards below Tottenham lock.

When this intercepting drain was constructed the discharge from it was comparatively innocuous, but the increase of population in the districts draining into it has caused a corresponding increase in the volume of discharge which is at times offensive. Large quantities of sewage, mud, and sand are also deposited in the bed of the Lee from the drain.

About a quarter of a mile down the river below the East London drain is an intolerable nuisance, caused by the discharge through an iron pipe into the navigation of the sewage of Tottenham, Wood Green, and West Green by the Tottenham local board of health. In hot weather the water in the neighbourhood of and for some distance below the outfall is black with filth, and the smell is most offensive.

The navigation is also injuriously interfered with by the deposit of mud along its bed.

The trustees of the river Lee have found this nuisance so intolerable that they have been compelled to file an information and bill of complaint in the Court of Chancery. An order has been obtained and is still in force, restraining the Tottenham board from making any further connexions with houses and drains until the hearing of the cause, which will be argued during next term.

The state of the river from Old Ford to the Thames, which is the tidal portion of the navigation, is rendered very pestiferous during hot weather, owing to the discharge of impurities from various manufactories on the banks of the river there.

The Limehouse Cut is at times little better than a reeking sewer.

The trustees have endeavoured to prevent the increase of the nuisances there, but owing to the want of statutory and summary powers have only been very partially successful.

The Metropolitan Board of Works have constructed large storm-water outlets from their works at Old Ford, and in the year 1863, the discharge from these outlets was so enormous that the trustees were compelled to file an information and bill in Chancery, the result of which was a decree by the court, restraining that body from continuing the discharge, and directing the payment by them of £820 in respect of the damage to the navigation by the deposit of the solid sewage in its bed, together with the costs of suit.

The mode of construction of the Metropolitan works is such as to render the repetition of this nuisance possible.

The trustees endeavoured to deal with the cases in the Limehouse Cut, but could get no relief for want of summary powers. On applying to the Thames Conservancy, who have jurisdiction over three miles of the river for nuisance purposes, that body attacked some of the cases, and obtained convictions on the evidence supplied by the officers of the trust.

This part of the river will be relieved of the drainage now discharged into it on the completion of the Metropolitan low-level sewers, which will intercept the drains of that locality.

#### *Financial Position of the Trust.*

The trust derives its income from the tolls levied upon commodities carried upon the river; from certain annual payments for water supplied to the New River and East London Water Companies: and from the rentals of mills and other properties belonging to the trustees.

The whole revenue of the trust, from whatever source arising, is vested in the trustees, to be applied in paying the several annual payments directed to be made by the 7th Geo. III., c. 51; in paying interest upon money raised under their borrowing powers; and in improving and maintaining the navigation.

The trustees are empowered to raise the sum of £230,000 upon the credit of the trust, so that their borrowing powers are unexhausted by the sum of £55,713

The progress of the traffic may be understood from the following statement, which shows that the income from tolls has nearly doubled itself within the last 15 years, viz.:—

The estimated annual receipts are as follows:—

Tolls - - - - -	£11,611
Water rents - - - - -	3,500
Rentals of mills and other property - - - - -	1,401
Sundries, including ballast - - - - -	700
	<hr/>
	£17,212
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HERTFORD

Mr. J. Mac  
chant, jun

19 Dec. 188

The estimated annual payments are as follows:—

Salaries - - - - -	£1,300
Pensions - - - - -	430
Lock-keepers' and collectors' wages - - - - -	1,345
Maintenance and repairs, including ma- terials - - - - -	3,500
Mills and weirs - - - - -	800
Land rents - - - - -	180
Rent and taxes - - - - -	600
Insurances - - - - -	15
Printing, stationery, and advertising - - - - -	165
Office disbursements - - - - -	160
Sundries - - - - -	97
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Expenditure for maintenance - - - - -	8,592
Interest on borrowed money, viz.:—	
Debenture loan - - - - -	7,173
Other loans - - - - -	1,250
	<hr/>
	8,423
	<hr/> <hr/>
	£17,015
	<hr/> <hr/>

The amount raised on debentures under the borrowing powers of the trust is 149,287*l.*, viz., 58,412*l.* bearing interest at 4½ per cent., and 90,875*l.* at 5 per cent. In addition, the bankers have advanced 23,000*l.*, and the London Life Assurance Association the balance of a loan of 20,000*l.*, 2,000*l.*

Capital,  
2,800 = 4½  
4,345 = 5  
7,173.

The capital raised, therefore, stands thus:—

Debenture loan - - - - -	£149,287
Loan from bankers - - - - -	23,000
Ditto London Life Association - - - - -	2,000
	<hr/>
	£174,287
	<hr/> <hr/>

The trustees are empowered to raise the sum of £230,000 upon the credit of the trust, so that their borrowing powers are unexhausted by the sum of £55,713.

The progress of the traffic may be understood from the Progress of following statement, which shows that the income from tolls has nearly doubled itself within the last 15 years, viz.:—

Tolls received in	1851	5,798
	1852	6,266
	1853	7,852
	1854	7,482
	1855	8,010
	1856	8,647
	1857	8,670
	1858	8,104
	1859	8,444
	1860	8,929
	1861	9,202
	1862	10,526
	1863	10,290
	1864	10,057
	1865	10,431

APPENDIX NO. 2 to EVIDENCE of JOHN MARCHANT, Jun., Esq., Clerk to the River Lee Trust.

Copy of Notice to remove Nuisances given by the direction  
of the River Lee Trustees.

HERTFORD, *August* 1864.

SIR,

At the annual inspection of the river Lee on the 2nd inst., the Trustees observed that considerable nuisance was occasioned to the navigation by the drainage from your into the River.

It is the imperative duty of the Trustees to preserve the river from contamination; I am therefore instructed to request that you will accept this as a notice to remove the cause of complaint from your premises without delay.

The next meeting of the Trustees will be held on Saturday, the 20th instant, by which time they hope to hear from you that you are taking active measures to comply with their requisition.

Your obedient servant,

JNO. MARCHANT,

APPENDIX NO. 3 to EVIDENCE of JOHN MARCHANT, jun., Esq., Clerk to River Lee Trust,

(referred to *infra*, Question 4829).

ABSTRACT of the RECEIPTS and PAYMENTS of the Trustees of the River Lee, for the Year ending

31st December 1866.

RECEIPTS.			PAYMENTS.		
	Ordinary.	Extraordinary.		Ordinary.	Extraordinary.
	£ s. d.	£ s. d.		£ s. d.	£ s. d.
Tolls - - - - -	11,581	5 0	Interest - - - - -	8,558	11 11
Water rents - - - - -	3,441	13 4	Salaries - - - - -	1,353	15 0
Sundry rents - - - - -	1,060	11 10	Pensions - - - - -	423	10 0
Loans, namely:—			Lock-keepers' and collectors' wages - - - - -	1,352	13 0
Upon debentures - - - - -	£14,500	0 0	Maintenance and repairs of locks, weirs, works, plant, and dredging - - - - -	1,501	4 6
Less debentures paid off - - - - -	6,944	11 10	Materials for ditto - - - - -	250	2 11
			Reconstruction of Limehouse lock - - - - -		3,115 8 4
Sundries - - - - -	412	2 7	Payments on account of ditto, viz.:—		
Ballast sold - - - - -	298	4 4	Materials - - - - -	£3,294	0 4
Repayments for sundry works - - - - -	169	18 0	Limehouse board of works - - - - -	440	2 2
Received from the New River Company on account of the reconstruction of Hertford lock - - - - -			Gas - - - - -	32	8 5
Purchase of property - - - - -			Compensation to tenants - - - - -	165	10 0
			Watching - - - - -	38	7 4
			Munday—Supervision of works - - - - -	196	5 0
			Rent of warehouse - - - - -	52	0 0
					4,218 13 3
			Reconstruction of Hertford lock - - - - -		1,889 10 1
			Mills and weirs - - - - -	784	11 8
			Land rents - - - - -	158	17 7
			Rents, rates, taxes, &c. - - - - -	639	2 10½
			Insurances - - - - -	1	1 0
			Printing, stationery, and advertising - - - - -	93	2 8
			Office disbursements - - - - -	113	15 0½
			Sundries - - - - -	82	7 5
			Stamps on debentures - - - - -		17 8 3
			Commission on loans - - - - -		122 0 0
			Purchase of property - - - - -		94 10 0
			Law expenses - - - - -		115 18 2
			Parliamentary expenses - - - - -		536 0 9
			Engineers' ditto - - - - -		251 7 0
			Ballast paid for - - - - -	78	7 0
					15,391 2 5
					10,864 18 7
					15,391 2 5
			Balance of banker's cash, 1866 - - - - -	1,757	8 9
			Ditto, office cash - - - - -	41	1 8
					26,256 1 0
					1,798 10 5
					£28,054 11 5

At the annual general meeting of the trustees of the River Lee, held at the London Tavern, Bishopgate Street, in the city of London, on Wednesday, the 6th day of February 1867, the above abstract was submitted to, and settled and passed by, the trustees assembled at such meeting.

(Signed), GASCOYNE SALISBURY, Chairman.

STATEMENT of TRAFFIC upon the RIVER LEE NAVIGATION during the last 21 Years, from 1846 to 1866.						COMPARATIVE STATEMENT OF TRAFFIC.		
Year.	Tons.	Tolls.	Year.	Tons.	Tolls.		Tons charged.	Tons.
		£			£			
1846	287,327	8,349	1857	274,741	8,670	Tons carried and tolls collected in the year 1866	393,788	11,581
1847	313,304	8,455	1858	254,269	8,104			
1848	287,166	8,349	1859	280,353	8,444	Average per annum of tons carried and tolls collected in 15 years, 1846 to 1860, inclusive	262,305	7,974
1849	287,520	8,511	1860	275,667	8,929			
1850	265,158	7,844	1861	300,900	9,202			
1851	212,633	5,798	1862	355,519	10,526			
1852	206,213	6,266	1863	320,850	10,290			
1853	228,072	7,852	1864	351,038	10,057			
1854	216,930	7,482	1865	349,760	10,431			
1855	257,886	8,010	1866	393,788	11,581	Increase above the average in 1866	131,483	3,607
1856	287,337	8,647						

APPENDIX NO. 4 to EVIDENCE of JOHN MARCHANT, jun., Esq., Clerk to the River Lee Trust  
referred to infra, Question 4829).

Statement of Balances on "Ordinary" or Revenue Accounts for 10 years, from 1856 to 1865 inclusive, as shown by the foregoing Abstracts :—

Surplus.		Deficiency.
1856. Receipts, 11,472 10 2		
„ Payments, 11,640 3 11		
1857. Receipts, <u>12,525 4 5</u>	-	- 167 13 9
„ Payments, <u>11,503 16 10</u>	1,021 7 7	
1858. Receipts, <u>11,743 12 8</u>	-	-
„ Payments, <u>11,757 15 2</u>	-	- 14 2 6
1859. Receipts, <u>12,934 3 7</u>	-	-
„ Payments, <u>12,271 9 0</u>	662 14 7	
1860. Receipts, <u>13,204 0 9</u>	-	-
„ Payments, <u>13,497 12 10</u>	-	- 293 12 1
1861. Receipts, <u>14,362 17 8</u>	-	-
„ Payments, <u>13,134 2 9</u>	1,228 14 11	
1862. Receipts, 15,289 12 11		
„ Payments, <u>14,149 16 9</u>	1,139 17 2	
1863. Receipts, <u>14,568 11 4</u>	-	-
„ Payments, <u>14,522 18 11</u>	45 12 5	
1864. Receipts, <u>14,855 17 0</u>	-	-
„ Payments, <u>15,848 4 6</u>	-	- 99
1865. Receipts, <u>16,064 1 1</u>	-	-
„ Payments, <u>15,497 4 5</u>	566 16 8	
	<u>£ 4,665 3 4</u>	<u>1,46</u>
Surplus upon the operations } of 10 years - - - - }	-	- 3,19
		<u>£ 1,265</u>

The MARQUIS OF SALISBURY examined.

4502. (*Chairman.*) I believe that your lordship is chairman of the River Lee Trust?—I am.

4503. How many years have you acted as chairman of that trust?—I think about 15.

4504. Will your lordship please to describe the character of the trust; it is I believe an unpaid trust?—Entirely.

4505. You pay your officers?—We pay our officers, but the trustees have no remuneration whatever.

4506. They meet at stated periods?—We generally meet once a month, and at additional times if requisite. We pass our accounts in London once a year, and generally we have the benefit of the attendance of some members of the corporation, and on other occasions they also come, it is principally when we meet in London during the session of Parliament.

4507. What number of trustees is required to make a quorum for business?—I think three, but we cannot sign any cheque without five.

4508. Is there at any time any difficulty in getting a quorum to do the business of the trust?—None. I do not recollect an instance of it.

4509. The gentlemen who are nominated you find quite willing to pay that attention to the duties which is necessary for carrying on the business of the trust?—Quite so.

4510. I presume that your lordship is well acquainted with the character of the district through which the river passes?—I may say that I am entirely acquainted with the river Lee. I do not say that I am well acquainted with all the tributaries, but I am entirely acquainted with the river Lee from Luton down to Bow Creek.

4511. Is the river Lee almost becoming what one might term a necessity to the district?—An absolute necessity.

4512. What amount of traffic in tonnage is now carried on the river Lee?—I have it from 1851 to 1865, for periods of three years at a time. The tonnage from 1851 to 1853 was 215,639 tons; the tolls were £6,638. There has been a regular increase in the tonnage. From 1863 to 1865 it was 340,547 tons, and the tolls were £10,259. The tolls in this year have been increased most prodigiously. I am not quite sure that I can state them correct, as the accounts are not made up; £11,073, has been received up to the 15th of December, which is more than we received in the previous three years.

His Lordship delivered in the following table:

**RIVER LEE NAVIGATION.—AVERAGE STATEMENT of  
Tons carried, and Tolls collected per Annum, taken  
from Periods of Three Years during the last Fifteen Years.**

Years.	Tons.	Tolls.
1851 to 1853	215,639	£6,638
1854 to 1856	254,051	8,046
1857 to 1859	269,784	8,408
1860 to 1862	310,625	9,552
1863 to 1865	340,547	10,259
Tolls received to 15th December 1866-	-	11,073

4513. Any scheme which seriously affected the navigation of the river Lee would, I assume, perhaps in a greater proportion affect the value of property on both its banks?—Most certainly. Very much indeed.

4514. May we consider that the property situated in proximity to the Lee, on both its banks, may be said to exceed the navigation in value and consequently in interest if affected by anything done upon the river?—It

would depend upon how far you carried it; but certainly the land is daily rising very much in value all along on both sides.

4515. There are towns situated upon the banks of the Lee and its tributaries ?—There are. I am not acquainted with the Stort.

4516. Has the population in the valley of the Lee been increasing of late years ?—Very much.

4517. Then, of course, the trade of the district would increase with the population ?—Certainly.

4518. I suppose that the navigation upon the Lee is convenient, as it takes the goods more immediately to the premises of persons situate on either bank than any other mode of conveyance yet established can accomplish ?—More so certainly, and to a greater extent; but I apprehend also that the carriage of goods on the Lee is very much cheaper than that on the railroads.

4519. We have heard that the river Lee trustees carry the manure without charge. I need scarcely ask the question whether any railway company gives the same facility ?—Certainly not.

4520. Then it would be depriving the adjoining landowners of a sort of property into the possession of which they have come, if anything interfered with that arrangement ?—I should certainly think so.

4521. Can your lordship give us a statement of the weight of manure which has been carried for any fixed periods ?—I can. In 1858 there were 22,000 tons, and in 1863 there were 109,000 tons. In consequence of the cattle plague there was a great falling off in 1864 and 1865, because we ordered no manure to go down the banks. I rather took upon myself to order no manure to go down the banks during the cattle plague.

His lordship delivered in the following tables:

RIVER LEE NAVIGATION.

STATEMENT of TRAFFIC to and from the various Points during Eight Years—1858 to 1865 inclusive.

	1858.		1859.		1860.		1861.		1862.		1863.		1864.		1865.	
	Tons.	Tolls.	Tons.	Tolls.	Tons.	Tolls.	Tons.	Tolls.	Tons.	Tolls.	Tons.	Tolls.	Tons.	Tolls.	Tons.	Tolls.
Linthouse Cut	60,439½	1,164 17 11	67,808½	1,374 5 10	97,515	1,733 4 2	109,790	1,802 2 8	106,484	1,765 1 1	102,291	1,838 2 6	112,848	2,041 3 8	100,528	1,828 10 2
Duckett's Canal	1,635½	29 7 4½	4,378½	84 12 10	2,729½	52 19 8	5,201	93 9 4	11,817½	222 11 5	10,988½	183 12 8½	28,426	449 3 0½	203,46½	484 1 10
Homerton and Lee Bridge.	9,884½	266 19 3	8,223½	202 13 10	9,373½	201 4 1½	13,590½	293 17 8	13,702	415 1 6½	18,105	487 1 5½	30,794	730 6 5	42,849½	898 12 8
Tottenham and Peckham's End.	12,273½	342 16 10½	8,671½	241 4 7½	12,344½	340 18 0½	14,707½	408 3 4½	56,143½	1,121 11 6½	17,960½	671 19 7	20,131½	531 8 0	21,499½	558 2 1
Enfield Lock and Waltham.	22,294½	919 10 7½	22,587½	932 12 6½	24,128½	1,004 8 1½	25,782	1,144 17 0½	23,278	1,204 2 4½	21,181½	1,073 18 5½	19,827	945 3 4½	19,673	907 3 2½
Chestnut and Hoddesdon.	6,070½	252 11 3	7,013½	260 18 9½	5,678½	205 17 7	6,655½	246 7 5	7,508½	282 2 4½	7,883½	274 2 6½	9,192½	249 10 2½	7,196	241 15 8
River Stort	43,407½	2,037 0 2½	43,499½	1,950 1 3½	40,621	1,838 0 11	40,456½	1,817 12 4½	42,743½	1,907 19 2½	46,489½	2,076 15 7½	44,937	2,038 3 1½	47,361½	2,168 11 9½
Rye and Stansstead.	5,529½	145 3 3	3,183½	130 17 2	4,986½	149 1 8	3,606½	161 3 0	4,404½	193 18 1	4,470½	203 4 10½	4,023	162 19 8	4,350½	190 5 7
Ware	52,545½	2,269 9 2½	56,605½	2,449 18 5	5,632½	2,419 18 10½	63,338½	2,567 3 8½	71,321	2,650 16 9½	75,422½	2,710 8 11½	63,355½	2,179 0 4½	64,333	2,354 10 11½
Hertford	16,065½	676 14 8½	18,847½	817 7 1½	21,708	963 16 11½	16,780½	668 0 4½	8,022	733 11 7	18,748½	770 15 7½	17,434	793 9 11	18,022½	799 13 11½
Total	232,907½	8,104 10 8	241,808½	8,444 12 5½	275,676½	8,929 10 1½	300,900½	9,202 12 4½	355,519½	10,526 15 11½	320,850	10,290 2 3½	331,088½	10,057 7 9	349,760½	10,431 7 11½

**RIVER LEE NAVIGATION.**  
**STATEMENT of TRAFFIC during the last Eight Years.**

Year.	Tons charged.	Tons of Manure and Spoil free.	Total Tons.	Tolls.
				£
1858	232,097	22,172	254,269	8,104
1859	241,808	38,545	280,353	8,444
1860	275,076	36,398	312,074	8,929
1861	300,900	40,967	341,867	9,202
1862	353,319	119,111	474,630	10,526
1863	321,850	109,974	430,824	10,290
1864	351,038	36,751	*387,789	10,057
1865	349,760	23,597	*373,357	10,431
Tolls received, 1st Jan. to 15th Dec. 1866			-	11,073

•The falling off in manure in the year 1864-1865 was caused by the prohibitory laws in consequence of the Cattle Plague.

4522 (*Mr. Harrison.*) In the first of those returns can your Lordship separate the weight of artificial manure from the weight of horse manure and London manure?—No.

(*Mr. Glass.*) The artificial manure is a very small proportion; guano and rape cake are the principal things; rape cake has to be certified that it is to be used for manure, and also ashes.

4523. (*Chairman to the Marquis of Salisbury.*) In speaking of carrying the manure free you mean that you permit the farmers or other persons interested, to traverse the navigation free of toll?—Exactly so; we are not carriers.

4524. You are not carriers in any sense; you have no boats of your own?—We have some for the purposes of dredging. I think that there is nothing else; we do not carry for hire but only for our own purposes.

4525. You do not enter into competition with carriers?—Not at all.

4526. You simply maintain the navigation, and levy toll upon persons using the navigation, and you regulate the traffic?—Yes.

4527. (*Mr. Harrison.*) I observe upon the railway a number of trucks between this and London laden with manure?—Yes.

(*Mr. Glass.*) The owners of that manure must pay the railway company for its carriage. When it comes down in small quantities, perhaps the land adjoins the railway and is at a distance from the navigation. Our navigation does not extend beyond Hertford, and perhaps those trucks may be going further down, to Cambridge.

(*Marquis of Salisbury.*) I, myself, have been a large carrier of manure by railway, for my own purposes, and I think that the charge to me was 3s.6d. a ton to Hatfield.

4528. What would the charge be upon the navigation for hauling?—That is a question which the traders must look to.

4529. The railway company are haulers as well as owners of the rates, so that it is quite possible that practically they merge any rates in the charge which they make for the carriage ?—Probably.

*(Mr. Glass.)* They charge about 2s. to 3s., according to the distance. It is generally done by the freighter; he pays for the manure and all; a man goes to the yards in London and gets a barge load of manure.

4530. I presume that your navigation has a beneficial effect as regards the farmers in the neighbourhood?

*(Mr. Glass.)* There is no doubt of it.

4531. *(Professor Way.)* But it is possible that in spite of rates not being levied on manure, if earned by the navigation, the cost might be quite as much or more than the carriage by railway?

*(Mr. Glass.)* It depends upon the barge owners.

4532. *(Professor Way.)* That does not give us any notion how cheaply the manure can be carried?

*(Marquis of Salisbury.)* I think that it is 14d. a ton to Hertford, that is the price of the manure altogether.

4533. The rates must be a small proportion of the carriage ?—Yes.

*(Mr. Glass.)* It is about 6d. a ton?

*(Marquis of Salisbury.)* I used to import manure down to Hertford at 14d. for 40 tons, the parties furnishing me with the manure.

4534. *(Chairman.)* I presume that the trustees have had decisions as to parties polluting the water of the navigation ?—To a very small extent.

4535. Do you consider that you have sufficient power to deal with the parties causing those pollutions ?—I think not.

4536. Do you think that it would be advisable that some additional power should be provided to prevent this state of pollution which is growing up ?—I think it very desirable indeed. The cases are rather frightful cases; there is, I think, one case of a man going up to Limehouse Cut, and dying of cholera within 48 hours; he was a bargeman from this part of the country ; but there is an universal complaint of it.

4537. Have you arrangements with the two great East of London water companies, namely, the New River Company and the East London Company, for supplying water under certain conditions ?—Yes, under an Act of Parliament of 1855.

4538. And you receive a certain rental from them? —We do.

4539. Do you consider that as trustees you have a moral obligation placed upon you to preserve the water pure for the use of the metropolis ?—We certainly should think so; we should think it very desirable to do so.

4540. And I presume that you now, as far as your means will carry you, do what you can to prevent the pollution ?—We do what we can to the full extent that we think that we have the power, or should be justified in applying the funds.

4541. But you know of your own knowledge, and also by hearsay, that impurities find their way into the river Lee, which forms a source of supply to the eastern portion of the metropolis ?—Certainly.

4542. And I daresay that you have heard this autumn that cholera has prevailed very extensively in that eastern portion of London ?—I have.

4543. Have you noticed that the Registrar General, whether rightly or wrongly, attributes the outbreak of cholera in some measure to the impure character of the water distributed by the East London Waterworks Company ?—I have seen such a report.

4544. I presume that you are aware that that water does receive the sewage of a considerable population situate above the point at which they abstract it ?— Certainly.

4545. The town of Luton is, I believe, situate near the head of the main river Lee ?—The Lee rises immediately above Luton.

4546. And a large manufacturing population at Luton passes its sewage into the waters of the Lee?—I am not quite aware of what has taken place lately, but Mr. Leigh, when he bought Luton Park, made some arrangement with the town of Luton; there was a lawsuit about it, and the water is supposed to be diverted in his park.

4547. The water at Luton is dealt with in somewhat a similar manner to the mode in which it is dealt with here, the sewage is passed into depositing tanks, and the sediment is intercepted, and the effluent water passes into the Lee and goes on. Any person who calls that a purification of sewage does not understand the chemical character of the water, because it comes in to the tank true sewage, full of a solid deposit, and it simply passes out true sewage freed from the solid deposit?—I am aware that that is the fact. I was not aware what the arrangement was.

4548. We may take it all the way down. We have yet had no evidence that there is any true utilization of sewage by applying it in irrigation to land?—No; I should think that the valley is never wide enough to allow of such utilization, even if it is good.

4549. Would the application of pumping enable you to put it in another position than that in which it would go by gravity?—I should think it very difficult, the banks are rather steep.

4550. Looking at the constitution of the River Lee Trust, is it the opinion of yourself as chairman that the trustees would take upon themselves the necessary duties if Parliament granted them the power, to prevent these pollutions through their servants?—Do you mean from Luton?

4551. Taking the whole valley of the Lee, supposing a conservancy board to be formed, would the trustees be willing that they should be constituted a conservancy board, having proper powers and proper authorities to prevent in a practical way these nuisances which now pollute the Lee and its tributaries?—My own opinion is that they would, but they must have means to do it beyond their navigation.

4552. You have now the means of arranging with the two great water companies to receive a rental for the water which they take from you, and to carry out works by arrangement and agreement with them, they paying the costs?—Yes.

4553. Assuming that Parliament thought fit to devise some machinery by which you should be required to give notices to these towns which now pollute the streams, calling upon them to show you through their engineers the way to prevent that pollution, and either to compel them to carry out the work under your supervision, or to enable you to carry it out, and to charge them with the cost, do you think that such a form of conservancy could be made to work?—I think that it could perfectly, and the more so because the members for Hertfordshire, and Essex and Middlesex, and the members for this town, and the mayor of this town, all form a part of the board *ex officio*.

4554. Do you think that the present constitution of the board is such as would justify Parliament in placing such powers as are indicated in their hands?—I think so.

4555. What is the gross number of the trust at present?—67, that is including the *ex officio* members.

4556. What is the mode of election?—The greater portion of the members are *ex officio*.

4557. By reason of their position and holding property? Yes; and the remainder are elected by our own board, notice being given that such a person will be proposed.

4558. Is there any check upon the acts of the trustees. Supposing that any trader upon the river Lee feels himself aggrieved, is there any superior board of appeal to which he can go for redress?—I think not; we generally have some of the principal traders upon the board.

4559. But is there any board of appeal if any person wishes to appeal?—I am not aware that there is any.

4560. In the event of a conservancy being established do you think that it would be advisable that any board of appeal should exist, such as the Board of Trade, or the Privy Council, or the Home Office?—I apprehend that there could be no objection to it whatever, but if I were to name the board I should say the Board of Trade or the Privy Council.

4561. If Parliament were to authorize powers of conservancy similar to those now exercised by the conservancy board of the river Thames, do you think that it would be advisable that the Government should

have the power to nominate one or more members upon the trust as they have to nominate such members upon the conservancy board of the Thames ?—I do not think that it would be desirable, because such a member must naturally be immediately the head person of the trust, and give his constant attention to it.

4562. The Government, I think, have power to nominate one or two members upon the conservancy board to act as the other members act ?—I do not think that it would answer well. I would give every facility of appeal, but I think that what you suggest would impede the action, because it would be exactly as it is in London, namely, that wherever you have a stipendiary magistrate he takes the thing into his own hands.

4563. I do not anticipate anything of that sort; you would appoint your own engineer and your own clerk, just as you appoint your servants now, and would have power to pay them ?—I do not think that the suggestion would answer.

4564. *{Professor Way.}* A member of the Admiralty board has been on the board for years ?—He very seldom attends the meeting.

4565. *{Chairman.}* In the case of the Thames such a member attends, the Admiralty being supposed to have a direct interest, but the Admiralty has no direct interest in your navigation ?—No; I do not think that is a very desirable thing.

4566. *{Professor Way.}* I presume that the object would be that in case of any point arising in which Government interference would be requisite some member of the board should be in communication with the officers of the Government; you know that at present the new conservancy of the Thames has that element ?—I was not aware of that fact; I myself do not think that it would be a desirable mode, because it would be a party matter. Where I have known it to exist it does not seem to me to work satisfactorily ; it ends in an absence from interference on the part of the other members.

4567. *{Chairman.}* Your lordship is aware that the Local Government Act has been adopted by many of the towns and parishes, and townships upon the banks of the Lee and its tributaries ?—I believe that it has.

4568. When the Local Government Act is put in force I suppose your lordship is aware that it sets up a local authority, and that there must be a chairman and members ?—Yes.

4569. As they for the most part are the sources of pollution they would be the parties with whom you would have to interfere to prevent pollution. Do you think that it would be advisable that the chairman of those local boards should sit at the conservancy board ?—Certainly not.

4570. They are the persons whom you have to keep in order, and they are not to keep you in order ?— Just so.

4571. *{Mr. Harrison.}* Would you exclude the mayor of Hertford ?—Certainly not; he is an *ex officio* member.

4572. But, I suppose, that he is at the head of the polluting system ?—He has the advantage of being approved by a magistrate. I have had put into my hand a letter which shows how little the local boards are inclined to act. This is an answer to our application to the Ware local board on account of the nuisance created by the Ware sewage: "Dear sir,—I submitted your letter of the 27th instant to the board at their last meeting, relative to the drains discharging into the river Lee near the summerhouses at Ware, and also below Ware bridge, and I am directed to inform you that the board see no reason for taking any measures for the diversion of any drains belonging to them."

4573. *{Chairman.}* With regard to the conservancy which we have been speaking about, in your opinion would this Commission be justified in making a recommendation that the trustees should be consulted by Her Majesty's Government as to the future management of the Lee, going no further than that ?—Certainly; I should think it very desirable.

4574. It has not been settled yet which department of the Government shall undertake the duty of bringing in a bill, but when a bill is brought in you think that they should communicate with your lordship and the trustees as to the form which the future conservancy should take ?—I think that it would be very desirable, and I am sure that the trustees would give their best attention to it.

4575. May we assume that the trustees would rather not have an entirely new board placed above them, and having jurisdiction over the valley and over the river Lee navigation?—I am quite certain that it could not be done, and that there would altogether cease to be an attendance.

4576. If any new conservancy board were set up there would have to be paid officers, and they would, in some degree, come into antagonism with you as managers of the river Lee for navigable purposes, but having interests also in keeping the river free from impurities?—Yes.

4577. (*Professor Way.*) I suppose that we may take it to a certain extent, that you would have less difficulty in so modifying, if necessary, your trust as to make a conservancy board than the conservancy of the Thames had, seeing that in that case there were two jurisdictions, one of which had to be abolished?—Certainly.

4578. You have nothing of the kind, you stand without any sort of supervising jurisdiction?—Entirely so.

4579. (*Mr. Harrison.*) Is it quite so; have not the New River Company and the East London Waterworks Company such an interest in the water of the river Lee and in its condition, as to purity, that they would like to be represented upon your board?—By our constitution the governor and deputy-governor of the New River Company are *ex officio* members of the trust.

4580. Is there any representation of the East London Waterworks Company upon your board?—I think not.

4581. Do you think that that would be desirable?—I think that it would be introducing a new element. We have never found that the New River Company have interfered to make the water more pure, and there would be an antagonistic principle introduced between the East London Waterworks Company and the New River Company. The New River Company have never interfered except as to the formation of a storing reservoir; they have never attended a board meeting except during that negotiation.

4582. (*Chairman.*) I suppose that this Commission may understand that the River Lee Trust would decidedly object to any interference with their existing powers in the way of diminishing or crippling those powers, but that they would be willing to be consulted as to any addition to their powers for the prevention of the nuisances which have grown up in the district?—I believe that that is quite correct.

4583. Has there been any system of drainage carried out in the valley with which your lordship is acquainted?—In my own parish, in my own park.

4584. Is there much undrained land on the margin of the Lee as far as you are acquainted with it?—I should think that all the marshes are very low, and in many portions the river is above the marshes.

4585. What is the character of the works which have been carried out in your own park?—They are very rough.

4586. Is that result beneficial?—It has completely stopped the arrival of the sewage into the river. Here is a rough plan (*producing the same*). I began the work in the first instance by sinking wells at different places, but I found that my wells answered the purpose for only two or three years. About 15 years ago I made this work (*pointing to the plan*). These are the holes which I made in the valley to intercept the sewage from the river. I have a statement of the expense, and I have the quantity of sewage; about one-third of that is earth. I have the quantity which we have got out for 1863, 1864, and 1865.

4587. (*Mr. Harrison.*) Is this for the interception of the sewage from your mansion?—It is for the sewage from the town of Hatfield. The first attempt was merely to turn it into a chalk pit, and get rid of it.

4588. (*Professor Way.*) That was happily unsuccessful?—I had reason to be satisfied with it, except that I had to sink a fresh chalk-pit every two or three years, and then I adopted this plan, which does the work perfectly in that way till it gets charged; but it is a work of several years. The solid part of the sewage is stopped by gratings, and by a man who is kept to throw it up and cover it over with mould. The liquid part goes into this chalk pit by having two holes acting as a syphon; the sewage goes down into the chalk with the water, and of course the water rises up on the other side, so that no effluvia can escape so long as the thing works.

4589. (*Chairman.*) Has your lordship's attention been at all directed to the question of utilizing the flood waters of the valley of the Lee, so as to make them available for metropolitan water supply?—There is no

difficulty at all about it. An excellent plan was introduced, and it was brought into Parliament, and no doubt would have been carried into effect, but there was a gentleman then at the head of the river Lee board who was frightened at the expense. I will read the notice which was given of that bill in 1850 for the session of 1851.

4590. Was that a notice given by the River Lee Trust?—No, by the New River Company; we were parties who were agreeing with them.

4591. You sanctioned it?—Yes, we were ostensibly the promoters.

His lordship read the notice, as follows:

#### RIVER LEE TRUST

Amendment of Acts; Extension of Powers; Enlargement of existing Works; and Construction of new Works.

Notice is hereby given, that application is intended to be made to Parliament in the ensuing session for leave to bring in a bill to enable "the trustees of the river Lee" to effect all or any of the objects hereinafter mentioned, (that is to say) to make, maintain, vary, extend, or enlarge the following works, viz., first, a reservoir on the river Lee, commencing in Hatfield Park at or near Cecil Hill in the parish of Bishop's Hatfield, and terminating by an embankment to be constructed across the valley of the Lee, near Roxford farmhouse, in the parish of Bayford, and -which reservoir and embankment will be situate in the parishes, townships, or extra-parochial places of Bishop's Hatfield, Essendon, Bayford, Hertingfordbury, and Brickendon, some or one of them; second, a reservoir adjoining the river Lee, commencing and terminating at or near Ware Mill lock in the parishes, townships, or extraparochial places of St. John's, Hertford, Ware, Little Amwell, and Great Amwell, some or one of them; third, a reservoir on the river Rib, commencing near Stondon Lordship House, otherwise Standon Lordship House, in the parish of Stondon, otherwise Standon, and terminating by an embankment to be constructed across the valley of the Rib at or near Swangles, in the parish of Thundridge, which embankment and reservoir will be situate in the parishes, townships, or extra-parochial places of Stondon, otherwise Standon, Thundridge, Ware, and Ware-side, some or one of them; fourth, a reservoir on the river Ash, commencing at or near Widford Mill in the parishes of Widford and Ware, or one of them, and terminating by an embankment across the valley of the Ash, at or near Easney Park Wood in the parishes, townships, or extra-parochial places of Widford, Ware-side, Ware, and Stanstead Abbott's, some or one of them; fifth, a tunnel, pipe-track, aqueduct, cut, or channel of communication, from the first-named reservoir near Roxford farmhouse, to the secondly above-named reservoir near the Ware Mill lock, and which said tunnel, pipe-track, aqueduct cut, or channel of communication will pass in, through, or into the parishes, townships, or extra-parochial places of Bayford, Hertingfordbury, Brickendon, Saint Andrew's, Hertford, All Saints, Hertford, St. John's Hertford, Ware, Little Amwell, and Great Amwell, some or one of them; sixth, a tunnel and conduit, cut, or channel of communication from the thirdly above-named reservoir, commencing at or near Timber Hall in the parish of Thundridge, and terminating at the fourthly above named reservoir, near Hole farm, in the parish of Ware, and which last-mentioned tunnel, conduit, cut, or channel of communication will pass in, through, or into the parishes, townships, or extra-parochial places of Thundridge and Ware, or one of them; seventh, a tunnel, pipe-track, aqueduct, cut, or channel of communication from the fourthly above-named reservoir, at or near Easney Park Wood, to extend across the valley of the river Lee, and terminating in the bed of the New River, near the village of Amwell; and which said last named tunnel, pipe-track, aqueduct, cut, or channel of communication will pass in, through, or into the parishes, townships, or extra-parochial places of Ware, Stanstead Abbott's, Great Amwell, and St. Margaret's, some or one of them; together with all other necessary cuts, sluices, pipe-tracks, channels of communication, aqueducts, embankments, tunnels, and other works for connecting the said reservoirs, tunnels, cuts, channels, and aqueducts with the river Lee and New River, both or either of them; all which said reservoirs, cuts, pipetracks, channels, aqueducts, embankments, tunnels, and works, will be made and maintained, and pass from, in, through, or into the several parishes, townships, or extra-parochial places of Bishop's Hatfield, Essendon, Bayford, Hertingfordbury, Brickendon, St. Andrew's, Hertford, All Saints, Hertford, St. John's, Hertford, Little Amwell, Stondon, otherwise Standon, Thundridge, Ware, Widford, Ware-side, Stanstead Abbott's, St. Margaret's, Little Amwell, and Great Amwell, some or one of them. Also to make and maintain all proper and necessary balance engines, gauges, tumbling bays, and other devices and works, on and near the New

River and river Lee, at and below Fielde's weir, for correctly ascertaining the flow of water, and to remove all existing balance engines, gauges, tumbling bays, and other devices and works.

And it is also intended by the said bill to take powers to alter and improve certain parts of the course of the New River, and for that purpose to make and maintain the several works herein-after mentioned in the lines and according to the levels defined upon the plans and sections herein-after referred to, that is to say:—the first of such works, consisting of cuts or channels of communication, pipe-tracks, and widenings of the said New River, and commencing at a point about 214 yards above the bridge over the New River (numbered 4) in the parish of St. John, Hertford, and terminating at the bridge over the New River in Theobald's Lane in the parish of Cheshunt. The second of such works, consisting of cuts or channels of communication, pipe-tracks, tunnel, and widenings of the said New River, and commencing at a point about 290 yards above the foot-bridge over the New River in Theobald's Park (numbered 51a) in the parish of Cheshunt, and terminating at the north-east end of the reservoirs of the governor and company of the New River brought from Shadwell and Amwell to London in the parish of Stoke Newington, otherwise Newnton; with a branch pipe-track, conduit, or channel of communication, commencing at a point above 213 yards above the bridge over the said New River (numbered 82) and terminating at a point about 100 yards below the bridge over the said New River (numbered 105) in the parish of Edmonton; and also with a branch pipetrack, cut, conduit, or channel of communication commencing at a point about 30 yards above the bridge in the Seven Sister's Road over the New River, and terminating at the eastern end of the Stoke Newington reservoir of the said governor and company in the parish of Stoke Newington, otherwise Newnton. The third of such works, consisting of cuts or channels of communication, pipe-tracks, and widenings of the river, and commencing at the south-west end of the reservoirs of the said governor and company in the parish of Stoke Newington, otherwise Newnton, and terminating at the aqueduct of the said river over the East and West India Docks and Birmingham Junction Railway in the parish of Saint Mary, Islington. Fourth, a reservoir on the New River commencing at or near Clay Hill farmhouse in the parish of Tottenham, and terminating near to the bridge over the said New River in White Hart Lane in the said parish of Tottenham. Fifth, a reservoir on the New River commencing at the bridge in the Green Lane on the New River, near to the Stoke Newington reservoirs of the said governor and company and terminating at or near to the Eel Pie House Tavern, Highbury Vale, in the parish of Hornsey. All which works will be made in or pass through, from, or into, the parishes, townships, or extra-parochial places following, or some of them (that is to say), St. John's, Hertford, Little Amwell, Great Amwell, St. Margaret's, Hoddesdon, Broxbourne, Wormley, Cheshunt, Enfield, Edmonton, Tottenham, Hornsey, Stoke Newington, otherwise Newnton, and St. Mary's, Islington; and also to make and maintain all necessary tunnels, pipe-tracks, sluices, embankments, aqueducts, cuts, or channels of communication for the convenient use and maintenance of such several works, and to remove all such existing works as may interfere therewith; and also for the purpose of improving the drainage, to alter and shorten the course of a certain common sewer on Chase-side in the parish of Enfield, in the manner and direction shown upon the plans hereinafter referred to, such alteration being intended to commence at a point in the highway from Chase-side to Enfield Church, near the bridge over the New River (marked No. 69), and to terminate by a junction with the common sewer in Enfield Street where such sewer crosses the highway aforesaid. The whole of such alteration being in the said parish of Enfield. And it is also intended to apply for powers more effectually to prevent the contamination of the river Lee and New River, or either of them, or any stream, reservoir, aqueduct, or other works connected therewith respectively.

Also to form a roadway, with all necessary bridges, approaches, and works from the bridge across the navigable cut of the river Lee, near the Hertford gasworks, to the public road leading from Bengoe to Ware Park, and which roadway will pass through or into the parishes, townships, or extra-parochial places of St. John's, Hertford, and Bengoe, or one of them.

Also to vary, divert, or stop up and relinquish the Ordnance corn millstream, otherwise Waltham Abbey millstream, and the tail and waste channels leading therefrom, by constructing an embankment across the said corn millstream, at or near the point where it diverges from the old river Lee at Edmondsey Meads in the parish of Waltham Holy Cross. Also to vary, divert, or stop up, and relinquish that branch from the river Lee forming Sewardstone Mill Head and the tail waters and waste channels leading therefrom (which last-mentioned branch diverges from the main channel of the river Lee at or near the sluice at Enfield Lock in the parish of Enfield) and that branch from the river Lee and tail waters and waste channels leading therefrom forming Chiiigford Mill head and tail (part of which said branch diverges from the river Lee at or

near Ponder's End Lock), and also forming that branch of the river Lee called Walthamstow Copper Mill head and tail, and the waste channels leading therefrom, all which streams now terminate in the river Lee at the Copper Mill stream near High Bridge in the parish of Walthamstow, and run from, in, through, or into the parishes, townships, or extraparochial places of Cheshunt, Waltham, Waltham Holy Cross, Sewardstono, Enfield, Edmonton, Chingford, Walthamstow, and Tottenham, or some or one of them; and also to form a tumbling-bay and cut from the river Leo immediately above the Stone Bridge lock to a point in the same river immediately below such lock, and to make and maintain all such embankments, sluices, and other works as may be necessary for varying, diverting, or stopping up the said streams, channels, and tumbling-bay; and also to construct all such new works as may be necessary for the convenient use and maintenance of such new reservoirs, cuts, aqueducts, and tunnels, and such diverted or improved streams, channels, tumbling bays, and other works, and to remove all such existing works as may interfere therewith; and also to abandon and discontinue using, as the channels of such streams and branches, an} portions of the existing courses or lines of the river Lee which may be rendered unnecessary by reason of the execution of the proposed new reservoirs, cuts, channels, or works, and generally to take powers to construct all such new works and remove all such existing works or other obstructions as may be necessary for effecting the objects of the proposed bill. And it is also intended by the said bill to take powers to divert into or cause to flow or proceed through or into the proposed works the waters which flow in or supply the streams, cuts, canals, reservoirs, aqueducts, or navigations herein-after mentioned, that is to say, the river Lee and the several streams, cuts, canals, reservoirs, aqueducts, and navigations connected therewith, videlicet:—The Hertford cut, Parker's cut, Hadsley's cut, Stanstead cut, the cut next below Stanstead bridge, Fielde's Weir cut, Dobb's Weir cut, Hoddesdon or Lins mill-tail, Broxbourne mill-head and tail, Carthagera cut, Waltham cut, Cheshunt mill stream, Powder mill stream, Waltham Abbey mill stream, Waltham Common Cut, Enfield Cut, Enfield Mill Stream, Edmonton Cut, Chingford mill stream, Tottenham Mill Stream, and Tottenham New Cut, Walthamstow Mill Stream, the Hackney Cut, Temple Mill Stream, Abbey Mill Stream, West Hani Waterworks Stream, City Mill Stream, Stratford Mill Streams, Pudding Mill Stream, otherwise Hunter's Mill Stream, the Three Mills Stream, the Bow Creek and the Limehouse Cut, the river Mimram, and the several streams, cuts, canals, reservoirs, and aqueducts connected therewith; the river Beane and the several streams, cuts, canals, reservoirs, and aqueducts connected therewith; the river Rib and the several streams, cuts, canals reservoirs and aqueducts connected therewith ; the New River and the several streams, cuts, canals, reservoirs, and aqueducts connected therewith; the river Ash and the several streams, cuts, canals, reservoirs, and aqueducts connected therewith; the East London Waterworks Company's cuts, canals, reservoirs and aqueducts; Sir George Duckett's Canal, otherwise the Lee Union Canal, and the streams, cuts, canals, reservoirs, aqueducts and navigations connected therewith; the Regent's Canal and the several streams, cuts, canals, reservoirs, aqueducts, and navigations connected therewith and the river Thames.

And it is also intended by the said bill to take powers to make and maintain a sewer or drain, or sewers or drains, and culverts,, sluices, and other works connected therewith, for intercepting and diverting the sewage of all sewers and drains from emptying into the rivers Lee, Beane, Mimram, Rib, Ash, and Stort, or any of them, which, sewer or drain, or sewers or drains, will commence on the north side of Cowbridge in the parish of St. Andrew, Hertford, and will be made and maintained, or will pass from, in, through, or into the parishes, townships, or extra-parochial places following or some of them (that is to say), St. Andrew's, Hertford, All Sainls, Hertford, St. John's, Hertford, Little Amwell, Ware, and Great Amwell, some or one of them, and will terminate at or near Amwell Marsh bridge in the parish of Great Amwell. And also to take power to prohibit and prevent any drain or sewer from flowing into the river Beane below Sele Mill in the parish of St. Andrew, Hertford, or into the river Lee between the Horns Mill in the liberty of Brickendon, and Amwell Marsh lock, or into any part of the New River; all which parishes, townships, or extra-parochial places herein-before mentioned are situate within the counties of Hertford, Essex, or Middlesex, some or one of them.

And it is also intended by the said bill to take powers to make lateral deviations from the lines of the said intended works to the extent and within the limits defined on the plans to be deposited as herein-after mentioned, and to purchase, lease, and otherwise acquire, compulsorily or by agreement, lands, houses, mills, and other hereditaments, corporeal or incorporeal, and to stop up, alter, or divert roads, railways, rivers, canals, cuts, aqueducts, tunnels, drains, sewers, reservoirs, and streams for the purposes of the said bill, and to extinguish any existing rights and privileges, which may interfere therewith; to provide compensation to the owners and tenants of mills in such manner as may be deemed expedient, and also to

take power to raise money for carrying out the objects and provisions of the said bill; to levy tolls, rates, duties, and water rents for or in respect of the several purposes of the said bill; to alter existing tolls, rates, duties, and water rents, and to confer, vary, or extinguish, exemptions from tolls, rates, duties, and water rents; and also to authorize the trustees to appoint committees of their number with such powers as may be deemed expedient, and to confer, vary, or extinguish all such powers, rights, and privileges, as may be necessary for carrying into execution the purposes and provisions of the existing Acts hereinafter mentioned and of the said bill.

And notice is also hereby given that duplicate plans and sections, describing the lines or situations and levels of the several intended works before mentioned, and the lands in or through which the same are to be made, maintained, varied, extended, or enlarged, together with a book of reference to such plans, containing the names of the owners or reputed owners, lessees or reputed lessees and occupiers, of all lands and houses in the line of the proposed works or within the limits of deviation as penned upon the said plans, and describing such lands and houses respectively, with a copy of this notice, as published in the "London Gazette," will, on or before the 30th day of November 1850, be deposited at each of the following places; that is to say, with the clerk of the peace for the county of Hertford at his office at St. Albans; with the clerk of the peace for the county of Essex at his office at Chelmsford; and with the clerk of the peace for the county of Middlesex at his office in Clerkenwell Sessions House; and a copy of so much of the plans, sections, and book of reference as relates to each of the several parishes before mentioned, with a copy of this notice, will, on or before the said 30th day of November, be deposited with the parish clerk of each such parish at his place of abode, or, in the case of any extra-parochial place, with the parish clerk of some parish immediately adjoining thereto at his place of abode.

And notice is further given, that it is intended by the said bill to alter or amend, or in whole or in part to repeal, the following Acts, and any Acts therein-mentioned or referred to (that is to say), 13th Elizabeth, chapter 18; 3rd James I., chapter 18; 4th James I., chapter 12; 11th George II., chapter 14; 12th George II., chapter 32; 7th George III., chapter 51; 19th George III., chapter 58; and the Local and Personal Acts, 45th George III., chapter 69; 47th George III., chapter 72; 48th George III., chapter 8; 3rd George IV., chapter 109; 10th George IV., chapter 117; and 13th and 14th Victoria, chapter 109.

Dated this 11th day of November 1850.

JOHN MARCHANT, Clerk to the Trustees, Ware.

In short, any attempt to divert the sewage without some reservoirs would be almost impossible, because with every diversion of the sewage you would lose a great quantity of water, which must be supplied in some way or other.

4591a. Then I may assume that you think that it would be necessary that any legislative powers should arm the trustees with authority to look at all points, and should enable them to devise and carry out the prevention, or assist in preventing the pollution of the river, and in providing for the increased volume of pure water which may be passed on to the metropolis?—I think so; but that I think would be a matter for a special Act of Parliament.

4592. I assume that you have heard that it has been proposed to bring in increased supplies of water to the metropolis, from North Wales by one scheme, and from Cumberland and Westmoreland by another scheme?—I have.

4593. If the river Lee itself and the waters falling into the valley of the Lea were properly dealt with, do you think that such a scheme might be more economical than going to such a distance for water for the metropolis?—£530,000 was the estimate given in the case of the bill of which I have read the notice, dated in 1850.

4594. (*Professor Way.*) That was for increasing the available supply of water, and for improving its quality?—Yes.

4595. (*Chairman, to Mr. Beardmore.*) I assume that an estimate was made of the probable income which would be yielded from the works so as to cover the expenditure?—(*Mr. Beardmore.*) I do not know whether that was gone into, because the companies dropped the scheme at an early date. We did not go into evidence before Parliament upon it. With the prospect of a very largely increased supply of water we no doubt reckoned on a large increase of revenue from the water.

4596. (*Mr. Harrison.*) Were the embankments which you proposed to make so as to form these reservoirs to be constructed in any case upon the chalk formation?—(*Marquis of Salisbury.*) I think that in most of these streams the embankments are already made by the millowners, and that they would only require a little raising.

4597. (*Professor Way.*) This proposal was made in 1850?—Yes.

4598. Has anything which you know of occurred in the interval which would cause a serious alteration in this plan, supposing the powers existed to put it into operation?—I should think not.

4599. You think that the plan would be now available?—Yes; of course the expense of the land would be increased.

(*Mr. Beardmore.*) The plan would have to be modified.

4600. That scheme was dropped from the want of means and power to carry it through?—(*Marquis of Salisbury.*) It was dropped, I think, from the want of means; there was no opposition to it.

4601. Supposing that your board of trustees were constituted a conservancy board, would the resuscitation of that plan in any form be possible and desirable?—I think that with certain modifications it would be very desirable. Of course I cannot speak to the details of a plan before Parliament.

4602. (*Chairman.*) I suppose that we may assume that the trust would watch very narrowly any scheme of that magnitude and character brought in by what one may term outside persons?—Certainly.

4603. If such a scheme were brought in by any speculators wishing to utilize, as they would term it, the waste waters of the Lee for commercial purposes you would look very earnestly at it before you permitted them to obtain parliamentary powers, if you could prevent their doing so?—I should decidedly think so.

4604. (*Mr. Harrison.*) There was one point which I think your lordship raised just now, and did not give a full explanation of; it was as to the funds which the trustees of the Lee would require in case they were formed into a conservancy board such as you recommend. You said that the funds would be a difficulty. Where do you think that the requisite funds could be obtained from?—I think that the requisite funds might be readily obtained by imposing full costs and penalties wherever a nuisance was supposed to exist.

4605. Do you expect that they would be sufficient to pay for the supervision of the valley of the Lee?—As a board of conservancy has been proposed, it would only require the supervision of the channel of the Lee which we at present perform, but I apprehend that we could not embark in litigation with boards. If we required expensive alterations we should be opposed by local authorities unless we did it at our own cost.

4606. You would require a summary means of punishing those who committed a nuisance, so as not to entail much expense?—Yes; the cost of the litigation with the metropolitan board was upwards of £1,000, our funds will not allow us to carry on proceedings of that kind.

4607. (*Chairman.*) As a board having public duties, and having no pocket interest in exercising those public duties, supposing that you were placed in a position where it was necessary to raise additional funds to carry out works of great public utility, do you think that you would be in a condition to ask the Government of the day to allow the Chancellor of the Exchequer to issue exchequer bonds at a low rate of interest, you giving the security of the navigation so as to get the money at a less rate of interest than you could get it at in the commercial market?—I rather think that there is always a condition of repayment in the advance of exchequer bonds, and generally I believe it is in 30 years; there would then be the necessity of a sinking fund, which would add very materially to our expense.

4608. If you want anything like half a million the Exchequer Loan Commissioners, without any injury to any person in the State, can lend that money in the present condition of the money market at 3½ per cent.?—Just so.

4609. If you repaid that money in 30 years the annual payment would be about £5 . 5s. per cent.?—Just so.

4610. I believe that for certain public purposes, and also for private purposes, the Exchequer Loan Commissioners have been authorized by Parliament from time to time to make loans, for instance, for land draining?—Yes.

4611. For carrying on public works in Ireland?— Yes.

4612. And recently for carrying on certain public works in Lancashire, for the relief of the distressed cotton labourers ?—I am aware of that.

4613. That money being repayable by annual instalments with interest ?—Yes.

4614. It has been considered a very great advantage in many of these places (in Lancashire, for instance, where works have been carried out) for the local authorities to get that money at 3½ per cent., and yet Government will not necessarily lose one farthing in the transaction ?—Just so; but I am not quite sure that it would not entail a loss upon the parties who would be supposed to profit by it, because the whole of the country said to be benefited by it would not have anything to do with the supposed relief.

4615. Looking at it in that view you think it better to go on as you have done and to raise any money required in the open market upon such terms as you can raise it?—I think so, and I think that it would rather tend to more economy in the management.

4616. If you have power to borrow and to reborrow it always gives you the power of rectifying your loan by the existing state of the money market? —Exactly so.

4617. If you pay off a debt which you owe to a party, which debt is at 4½ per cent., and you can borrow money at 3½ per cent, you can as a trust relieve yourselves to that extent ?—Yes, and we should feel bound to do so ; it would be a financial operation, whether it was wise or not wise.

4618. You do not borrow in perpetuity, but you borrow for a limited term ?—Yes.

4619. Having the power of repaying the money, or of borrowing to pay off the bonds which you have accepted up to that time ?—Yes.

4620. You, I suppose, accept bonds for three, five, seven, and 21 years ?—We have never gone beyond seven years.

4621. But those bonds are, I presume, renewable if agreeable to yourselves and to the parties ?—If they are allowed to run on beyond the period we put a condition that the debentures shall be realisable at six months' notice.

4622. Are those debentures easily transferable ?— Very much so.

4623. Are they taken by trustees?—{*Mr .Marchant.*} They are made available for trustees.

4624. And they can recover their money at short notice?—{*Marquis of Salisbury.*} Yes, in three, five or seven years, and afterwards at six months notice just like the case of any other mortgage.

4625. That makes it an available means of investing money, and one which many persons are very glad to have an opportunity of availing themselves of ?—Just so.

4626. And you consider that you have a secure basis for paying the interest ?—I can only say that I think so, for I am a very considerable debenture holder, but of course it is a matter of opinion. We have been in great difficulties during the last year and a half; we have had very heavy works to carry on and have had very great difficulty as regards the money, but our bankers have not hesitated to advance us mouey.

4627. {*Professor Way.*} We have been informed that you have a surplus of profits at this moment ?— Yes.

4628. Supposing that you borrowed money from the Government funds at a less interest and paid off the old debt, would not that surplus be available for the gradual liquidation of the debt ?—I think not for many years, because we have still considerable improvements to make.

4629. But you would have the means of borrowing a much larger sum at a lower interest ?—We might have, but I am not quite sure that we should judge wisely in going too largely into things at once. We should get into a great system of contracts. I certainly should not recommend it; I would rather go on quietly. We are now in very good condition except with reference to two or three locks, and the sills of those locks must be lowered to enable us to make the navigation throughout navigable for boats of 120 tons, which is supposed to be our limit. It was only available for 40 tons. We carried a little more than we were authorized to do, and we now carry commonly 80 or 90 tons.

4630. You are not in the same position as the Commissioners of the Thames, who, besides a large debt, required a large outlay of money to put the river into a proper state?—No. I daresay that we shall spend all the money which we have power to raise in necessary improvements.

4631. (*Mr. Harrison.*) Is there a large area of land in the valley of the Lee liable to be flooded?—I think that a large area of land in the valley of the Lee from Luton to Hertford may be flooded; Hertford is below Luton. From Rye House downwards there is a large tract of land which might be flooded; the valley widens out.

4632. The trustees have made certain cuts, so that in portions of the valley the navigation is in the channel of the river Lee, and in other parts there are new cuts?—Yes.

4633. Have the trustees any control over the river proper, along which the navigation does not pass?—I claim it under grant from the Crown in the old river.

4634. Then the trustees at present have no power over it?—They have abandoned the navigation. It has never come into question except as a fishing right. I pay a fee farm rent to the Crown.

4635. Do you think that it is desirable that the powers of the river Lee trustees should extend to those portions of the river as well as to the navigable parts of it?—No, I do not see that any object would be gained by it; it is not a matter of very great importance.

4636. Do you not think that if the whole river were placed under their jurisdiction they might be a useful body to carry out works to prevent the flooding of the adjoining lands?—I hardly see how it would be possible, because by the alteration of their locks the river in many places is considerably above the level of the land.

(*Mr. Marchant.*) Each reach might be drained into the reach below. There is a fall of 100 feet between this town and London.

(*Marquis of Salisbury.*) That must be by the purchase of land.

4637. Do you think that the land which is liable to be flooded below Waltham Abbey would be increased in value if steps were taken to prevent that flooding?—If it were my own land I should prefer its remaining as it is. I should prefer pasture land. A great deal of it is Lammas land.

4638. Is not a great portion of it in a wretched state, in an agricultural point of view?—No, I think that they are all very valuable meadows.

4639. Might not they be made more valuable if they were properly drained?—That is a question which I must not venture to answer. I am the proprietor of some land in the parish of South Mimms where the Mimms' wash runs through; it is a celebrated place where water runs over two or three times in the course of a week and disappears into chalk-pits, and it makes the most valuable land on the farm.

4640. In the valley of the Stort, and in the valley of the Lee itself, in passing up and down the railway. I see large areas of land covered with rushes?—That may be. I do not deny it at all.

4641. Surely that land could be improved. Is it generally considered that the flooding is an improvement to the land?—We consider so, provided that the flood does not last too long.

4642. (*Professor Way.*) Your lordship would like the benefit of the water, but you would like to have it under control?—Quite so. .

4643. It is a compulsory flooding at present?—Yes, but it seldom remains on for a month in the course of a year. I should imagine that £3 an acre is a very common sum, and that is the best test of the value of land.

4644. I suppose that a proper treatment of the district would enable you to keep the floods out, and to use them where you wished to do so?—I do not at all mean to say that the land is not capable of great improvement, but there are a great many proprietors.

4645. (*Mr. Harrison*) If it is capable of improvement, do you not think that any improvements which were made should be made as a whole throughout the entire length of the valley?—I should think it very desirable, but then you must obtain the consent of a vast number of owners, because the greater part of the

meadows are let in small portions; some are what are called cow leases, and things of that kind. There is no reason why it should not be done, but it is a great undertaking.

4646. It is undoubtedly a great undertaking, but does not your lordship think that if a trust were appointed for the whole of the river Lee it should embrace the carrying out of the works for such an improvement?—I have not the least objection to it, but I think that Parliament would hardly trust any body of men with the power compulsorily to buy up all the cow leases.

4647. I did not intend that, the point I contemplated was to carry out drainage works for the improvement of those lands, so as to prevent the flooding and to drain the whole valley of the Lee?—I am not prepared to say that it would not be very advantageous so to do, but a general drainage is one of those things which we have tried for a good many years, and we have not succeeded yet.

4648. (*Chairman.*) Of course your lordship is aware that this Commission must report to Parliament, and that we must make recommendations?— Yes.

4649. As Chairman of the Commission I only wish to say that I assume that we shall not be considered as travelling out of our way, if we take upon ourselves to recommend that the river Lee trustees be consulted as to any form of legislation for the future management of the water of the river and its navigation, and the water supply to the metropolis, and the prevention of pollution?—Certainly. It cannot be doubted that we as trustees should be very glad that it should be so.

4650. I asked the question because you might have told me that as trustees you would not trouble yourselves with the pollutions beyond indicting the parties who committed them, and would not take upon yourselves the extra amount of duty, seeing that you were an unpaid Commission, and then we should have had to have looked about and to have made some other form of recommendation?—It is the interest of the whole of this part of the country that every possible improvement should be effected, and we as the representatives of the counties and the residents are the persons who would be most interested in carrying out such improvement.

4651. (*Professor Way.*) But your duties would then be much extended; they would not be for the river but for the whole valley?—Those are matters of detail. I do not think that there would be any difficulty in it.

4652. (*Chairman.*) I suppose that before your lordship expressed any further opinion upon this question, you would say, "Let me see what your report and what your recommendations are?"— Exactly so; but I do not think that there would be any difficulty whatever in obtaining the assistance of all my co-trustees.

4653. Is there anything further which your lordship has to offer to the Commission?—I do not know that there is anything.

His lordship withdrew.

The witness withdrew.

Mr. JOHN GLASS (Enfield Lock) examined.

4730. (*Chairman.*) What are you?—I am traffic manager for the River Lee Trustees.

4731. How long have you been their traffic manager? —For the last 14 years. I have been connected with the river Lee trust for 27 years.

4732. Is the traffic upon the river a growing one?— It is very much so.

4733. Has it been a growing traffic in spite of railway competition?—It has.

4734. Have the railways at all tended to diminish the traffic on the Lee?—To some extent they have upon some articles, but it has increased upon others.

4735. In what has the traffic diminished?—Principally in coal.

4736. And in what has it increased?—In building materials, and grain and malt; grain of every description.

4737. Is that because you give better accommodation than the railway can give to take the articles nearer to the place where they are wanted, and so nearer to the place where they are to be removed from? —Yes ; and because we can do it cheaper in very large quantities.

4738. Have you any written statement which you can put in of the progressive increase of the traffic, and the income from that traffic ?—I will put in a statement for the last eight years, showing the amount of tons charged and the amount of tolls collected.

4739. This is a statement of traffic on the river Lee during the last eight years. In 1858 you carried 254,269 tons, including 22,171 tons of manure, and received £8,104 ?—Yes.

4740. And the last year, 1865, you carried 373,357 tons, including 23,896 tons of manure, and you received £10,431 ?—Yes.

4741. In 1862, which was a maximum year, I find that you carried 474,630 tons, including 119,111 tons of manure, and that you received £10,526 ?—Yes.

4742. It would appear that the excess of tonnage there had been in something which did not pay very much, for there is not a difference of £100 between the amount received in that year and the amount received in 1865 ?—Just so.

( *The Mayor.* ) That was manure.

4743. ( *To Mr. Glass.* ) And the carriage of manure was stopped after the cattle plague set in ?— Yes. In the year 1862 large buildings and works were going on in the neighbourhood of Homerton at the East London Waterworks, and that caused a great increase at that point, but this year the amount of tolls received will be considerably more than in 1862.

4744. From what will that arise ?—The general increase of traffic; there is no one particular thing; there are building materials of every description and also materials for brick making.

4745. Do you, in the course of your occupation, go much up and down the navigation ?—Constantly.

4746. In what state should you say that it is now as regards the banks, and the locks, and the waterway ?—Very good.

4747. Have you anything to do with the dredging? —Yes, a great deal; we realize a considerable profit by the dredging.

4748. Have you charge of the dredging operations? —Yes.

4749. Have you had occasion to complain of any pollutions poured into the navigation at any particular points ?—That perhaps would be a matter more for the engineer; so long as the water is sufficient to carry the barges up and down I do not interfere much about the quality of it, unless there is any obstruction in the navigation.

4750. You think that dirty water will carry coals as well as clear ?—Exactly.

4751. Has the water been at all offensive to you at any time ?—Not above Tottenham.

4752. But below Tottenham ?—Below Tottenham, very much so.

4753. That is below where the East London Waterworks Company takes its water supply ?— Yes.

4754. ( *Mr. Harrison.* ) As to the traffic upon the canal, is that traffic which you have given in distributed throughout the whole length of the canal ?— Throughout the whole length of the navigation from London to Hertford, beginning at Limehouse cut, Bromley, Old Ford, part of Homerton, Lee Bridge, Clapton., Tottenham, Edmonton, Ponder's End. Enfield lock, Waltham, Cheshunt, Broxboume, Hoddesdon, the river **Stort navigation**, Stanstead, Ware, and Hertford, and at all those places there is an abstract showing the different articles carried, ashes, breeze, chalk, sand for brick making, coals and coke, building materials, cement, stone, iron, and timber, gravel, linseed cake and oil, and linseed for making the cake, barley, and oats. Immense quantities of barley are taken up to be converted into malt. Wheat is taken up to the mills and ground, and sent back again as flour. Flour is carried both up and down; flour is brought from the mills, and foreign flour is carried up in casks. Beans, peas, tares, and every description of grain are carried. Immense quantities of malt are carried, last year there were 26,653 tons of malt carried from Ware only; that multiplied by eight would give you the number of quarters.

4755. ( *Professor Way.* ) Is that at 1s. 3d. a ton? —At *Is.* a ton.

4756. (*Mr. Harrison.*) Besides the traffic to those places which you have mentioned, do you afford accommodation for mills and wharves in between ?— Yes. The mills at Hertford keep barges (I am speaking of the flour mills), and they convey the wheat up and grind it, and send the flour again to London in a barge.

4757. Do you know of any railway of the same length with accommodation to such an extent as is afforded throughout the length of the river Lee ?— There is nothing like it I should think on any railway in England.

4758. (*Chairman.*) What is the difference between breeze and ashes ?—The ashes are the sifted material and the breeze is the coarse material.

4759. Then the breeze is just as you get it from the ashpits in London ?—It is the coarse parts sifted from the ashes; the breeze is used for burning the bricks, and the ashes are used for mixing with them, when they make them; the fine part of the ashes is mixed with clay in making the bricks, and the breeze is put into the stack to burn them.

4760. When the dustmen cart the mass from the London dustbins, what would you call it ?—The dust.

4761. When you have sifted it the one portion is called breeze and the other is called ashes ?—Yes.

4762. The fine portion is called ashes ?—Yes.

4763. And the coarse portion is called breeze ?— Yes.

4764. (*Mr. Harrison.*) Is the return which you have put in a return for a twelve month ?—Yes.

4765. (*Professor Way.*) It gives 373,000 tons for the year 1865 ?—Yes.

4766. That is in both directions, up and down ?— Yes.

4767. (*Chairman.*) Can you give us a copy of that return ?—I will do so. (*The witness subsequently furnished to the Commissioners a copy of the return, which will be found printed at the end of his evidence.*)

4768. (*Mr. Harrison.*) Do you find that manufactories are being established on the banks of the navigation in consequence of this accommodation which you can give them ?—Very much so. In the case of any new factories established in the suburbs of London the parties generally apply to the trustees of the river Lee navigation for land on which to erect the factories.

4769. How far from Bow creek up the navigation does the establishment of factories extend ?—To Ponder's End, about nine or ten miles.

4770. Therefore any interference with the navigation would not only injure the property of the navigation but would seriously injure a considerable amount of property on the bank ?—Yes ; the property established on the banks in old and new factories and warehouses and malhouses is immense ; that property is far before the property of the trustees.

4771. When you carried the manure, before the cattle plague broke out, did you find it pretty equally distributed throughout the length of the navigation? —We put all the restrictions which we possibly could upon the manure as far as the law would allow us. We prevented its being landed on the trustees property or across the towing-path, but still a certain amount was carried up which we could not prevent : it was taken up the back rivers. I am speaking of the time during the cattle plague.

4772. Generally speaking, apart from the cattle plague, you do not discourage it ?—No.

4773. Is it distributed upon the navigation right and left throughout the whole length ?—It generally begins about Ponder's End and goes all the way up to Hertford to different points, Ware and Stanstead, and many parts between the towns, where the agriculturists have land ; they bring a barge alongside and carry it at once upon their land; **that is the case up the Stort.**

4774. Then that is a very great accommodation to the neighbourhood ?—Yes; in many places they would not be able otherwise to get it upon the land at all ; it is too marshy to cart it.

4775. (*Professor Way.*) I see that last year you carried altogether 349,000 tons of the articles given, and 23,000 tons of manure besides that ?—Yes.

4776. These 23,000 tons compared with 349,000 tons of other articles, make about one-sixteenth of the whole, which goes without charge?—Yes. I was going to enumerate the different towns where factories are established on our banks. At Enfield lock there is the large gunmaking establishment, and at Waltham Abbey there is the government powder establishment; they keep barges of their own, locked up barges, in which they send their powder to their stores at Purfleet.

4777. Do they pay you any rate?—Yes, they pay for it, but they could not send their powder except by water; it would be dangerous to the public.

4778. Do they pay you an exceptional rate for it?—They pay the highest rate which we can charge, which is 1s. 1d.

4779. (*Chairman.*) Is it your duty to make yourself acquainted with the rates charged by the railway company, and to advise your principals of what rates are current in the district for the different kinds of goods?—No, we are not carriers; the railway company are carriers.

4780. Who are the persons generally who carry upon your navigations, are they carrying companies, or proprietors owning their own barges?—Most of them own their own barges; a great many in the lower part of the district are principally lightermen, who have barges of their own, and who work by the job.

4781. Lightermen are persons who may possess from one to a hundred of these lighters or barges?—Exactly so.

4782. And they navigate the Thames as well as the river Lee?—Yes.

4783. And they take up and put down cargo according to their own freightage scale?—Yes.

4784. How do you ascertain the tonnage which they carry?—By gauging; the system is the same as is in operation on all the inland canals, such as the Grand Junction canal, and the Regent's canal.

4785. Do you compel them to have a floating gauge plate, which you can read, on the stem and stern?—No, it is in a different way; we have a gauging rod which we put on the side of the barge, which shows the number of dry inches, that is to say the number of inches from the gunwale of the barge to the water's edge. First of all we have a table made, and according to the number of dry inches and decimal parts, we find the tons by the table.

4786. The boats are registered to carry according to the depth and draught, and you ascertain the draught, and accordingly register them for the tonnage?—Yes.

4787. So far as your knowledge goes, do you think that that is a pretty fair way of ascertaining the tonnage?—It is the most correct mode that can possibly be adopted.

4788. Can you get the tonnage of a 100 ton barge within 5 tons?—Within 5 lbs.

4789. (*Mr. Harrison.*) As each new boat is introduced on to your navigation, do you put it on to a lock or pound, and load it, and see what depth it draws with each additional foot?—We do not take the depth of water, but we take the dry inches, because the depth of water is liable to fraud by putting on pieces at the bottom to make it appear deeper, and it is not always in view. We first of all put on four plates; we measure the extreme length of the barge, and then take the stowage, and divide the stowage into four, and put four plates on, two on each side. We take the dry inches before we put anything into the barge, and according to the size of the barge we have regular weights, 2 cwts. each, which we put in until we have loaded her down to 60 tons, or as deep as is necessary, and then we make a table. A copy of that table is sent to all the collectors on the navigation, and by that means we get at the tonnage as correctly as anything can be got at.

4790. (*Chairman.*) If you measure by tens of tons, the intermediate space for decimals of tons you divide into decimal parts?—Yes.

4791. If it was 4 feet 3 inches and 1/10th you would know exactly what it meant, although you had not measured the tenth in the arrangement?—If we put in 8 tons we should see what the difference was, and should then divide it by 8. We find that the barges sink from 45 1/100ths to about 55 1/100ths of an inch to a ton.

4792. (*Mr. Harrison.*) I suppose that you feel the effects of competition through the haulers; if they find that they are losing their traffic by the railway company lowering their rates, they will come to you and let

you know, and ask you to reduce your rates?—Yes; it is our interest as much as possible to cooperate with the traders.

4793. (*Chairman.*) Have you anything to do with the maintenance of the banks?—That is more a question for the engineer.

4794. And for the bank manager?—Yes; I have to do with that matter, but it is under the direction of the engineer.

4795. Do you know what is the net income of the trust at present for paying dividend, after paying salaries and maintenance?—No.

4796. (*To Mr. Marchant.*) Do you know whether you have a surplus income, whether you have more than you require, or less than you require?—At the present moment I believe that we have something more of revenue than of expenditure.

4797. (*Professor Way.*) Is that after paying current works out of revenue?—No; we distinguish between ordinary and extraordinary expenditure, that is to say, revenue and capital.

4798. If you have used up your capital, how do you provide for current works except by increasing your debt?—We do not; if we required more money on capital account, we should immediately issue more debentures.

4799. (*Chairman.*) You have not gone to your limit?—We have not.

4800. (*Professor Way.*) You do not use your revenue for new works?—No.

4801. (*Chairman.*) Have you a public audit?—No; we have an auditor appointed, in fact, our deputy chairman, *ex officio* auditor.

4802. Is he appointed by your own board?—Yes,

4803. You have no external authority to which you refer the account?—None.

4804. Do you not think it advisable if you had additional power, that there should be some independent board to whom you should have to refer your audit?—I can quite conceive that if you were to extend the powers of the trust, and to raise funds by means of rating, or any other means, it would be desirable to have a public audit.

4805. That is to say, that your accounts should be submitted to an independent authority, such as the Board of Trade?—Yes.

4806. And that persons who considered that they were interested, should have the power of making an examination?—I may say, that the accounts are public to this extent, that if any person interested in the navigation desired to have a copy of our accounts, or to look at our books, we should not hesitate for a moment in letting him do so; for copies he would have to pay to the clerk the charge which is mentioned in the Act. The accounts are, therefore, public to that extent.

4807. Then you have a provision in the Act by which any person directly interested in the navigation can ask to have a copy of the accounts?—Yes.

4808. (*Professor Way.*) He could demand it, at all events, he could get an order from the Court of Chancery to see the accounts?—Certainly. We have always an annual meeting in the city of London, at which the accounts are passed, and a statement is placed before the trust.

4809. (*Chairman.*) Your trust is composed of such a variety of interests, that in fact, it amounts to a public audit, because you have so many interests involved in the constitution of the trust?—That is so, the trust is, in fact, essentially a public trust; it is a public commission, the members of that commission being chosen from the localities of the different counties and boroughs through which the river passes.

4810. (*Professor Way.*) There is nothing to prevent us from getting a statement of your receipts and disbursements for the last 10 years?—Certainly not.

4811. (*Chairman.*) Are your annual accounts published, and is a printed copy submitted to each member of the trust?—Not as a rule, but if a member asks me for a copy I gave it to him, they are not sent round as a rule.

4812. You do not necessarily publish and send round the accounts?—No. For instance, there may be *ex officio* members who have not attended the meetings for a considerable period, and we do not take the trouble to send the accounts to a gentleman who takes so little interest in the affairs of the trust, and the result of our operations; but if any member should happen to write to me for a copy of the accounts, it is sent to him immediately.

4813. (*Professor Way.*) Will you let us have a copy of your receipts and disbursements for the last 10 years?—Certainly.

4814. (*Chairman to Mr. Glass.*) Have you anything to add to your evidence?—Not that I know of, except that I wish to show that the river Lee navigation is a greatly improving navigation, and will be year by year increasing in every direction, and for this reason, namely, that London is spreading out far away, and getting towards the nearest mode of conveyance of heavy materials for building and so on. The trustees have a large quantity of land on the side of the navigation at the marshes at Homerton, in a few years that land will be all built over with large factories, which will be increasing the traffic upon the navigation. Within the last 12 or 14 years the trustees have been improving the navigation and laying out an immense sum of money in widening the locks, so as to admit barges of a larger capacity from the Thames which could not come up before, also barges which travel on the Regent's canal where the locks are wider than ours. Barges of any width which traverse the Thames are now enabled to come up to those lower points where these manufactories are likely to be established. I may add that I find that at Ware and Hertford the malting trade is gradually and progressively increasing.

4815. Have you any pleasure boats upon the river in any portion of its course?—Yes, we have a great number of pleasure boats down below Tottenham.

4816. Do they pay any rate to the trustees?—Not unless they come through the lock; some of the owners of these boats pay a small sum per annum for the privilege of keeping their boats over a certain area near the towing-path, so that they should not be interfered with by others.

4817. Have you any idea what number of pleasure boats ply upon the river in the different branches?—I should think that there are 500 or 600 pleasure boats.

4818. Seeing that you have to maintain the river, should you think it any hardship if you had the right of putting a rate of 10s. or £1 a year upon the pleasure boats?—We do that to a certain extent in the cuts, and I think that it would be a very excellent thing if we had power to do so on the old river between Tottenham and Lee Bridge, for those boats are a very great nuisance.

4819. You think that a person who could afford to keep a pleasure boat would not object to a moderate payment?—No.

4820. It might be a great advantage to you and might enable you to keep the river in a better condition?—Yes. They always pay for passing through a lock. They do not keep the pleasure boats for their own use, but they keep them for hire.

4821. In that case do you not think that it would be fair and reasonable that you should have the power of levying a rate upon them for a licence, an annual or quarterly payment?—Yes.

4822. If you made them take out a licence at 5s. a quarter or £1 a year, you would have a small income from them, and it would do them no very great harm, and it would do you some good?—Yes; we do adopt that principle in the cuts and in some places below where they wish to lay alongside our towing-path, we charge them 10s. per boat per annum, and it gives us some little control over the matter.

(*Mr. Beardmore.*) There is no doubt that many of those boats are most dangerous and there ought to be a registration of them.

4823. (*Professor Way to Mr. Glass.*) The pleasure boats are an obstruction to the navigation?— They are a very great obstruction below Tottenham. We keep them within bounds above and have a control over them, but below Tottenham, between there and Lee Bridge, they are a very great obstruction.

4824. (*Chairman.*) Have you power to license persons for fishing?—No, we have nothing to do with the fishing.

4825. Who regulates that?—It is regulated by different parties.

4826. Private owners?—Private owners.

4827. According to arrangements which have been previously entered into?—Yes.

4828. Is there anything further which you wish to add?—There is nothing that I know of.

(*Mr. Beardmore.*) The trustees own two or three fisheries which they let.

4829. (*Professor Way to Mr. Marchant.*) Is there any reason why we should not have a return of your income and expenditure. If we are to make any recommendation we must really know what funds you have at your disposal?—It is necessary for me to have authority to give that return, and the only reason why I say that it is necessary for me to have that authority is, that the Act specifies that those persons who are interested in the navigation should have copies of the accounts; if at our next meeting, which will be on the 14th of January, I can get the authority, it will I presume be sufficient for your purpose.

(*Mr. Marchant subsequently furnished to the Commissioners copies of Abstract of Accounts of River Lee Trust from 1856-66. The Abstract of Accounts for the year ending Dec. 31, 1866, will be found printed as Appendix 3 to his evidence.*)

4830. We have authority to call for all papers?— Yes.

The witness withdrew.

APPENDIX I. to the EVIDENCE of JOHN GLASS, Esq., Traffic Manager to the River Lee Trust (referred to supra, Q. 4767).

ABSTRACT of TRADE for the Year ending the 31st December 1885.

	Limehouse Cut.		Bronnley, Bow, and Old Ford.		Dredget's Canal.		Horsehoe, Lee, Biddes, and Clapton.		Zetsham, Edmonstone, and Vender's Road.		Ruffell Lock and Waltham.		Chisbush, Brentbourne, and Hoffenden.		River Stort.		Ivy and Stansland.		Ware.		Hertford.		Total.	
	Tons.	Tolls.	Tons.	Tolls.	Tons.	Tolls.	Tons.	Tolls.	Tons.	Tolls.	Tons.	Tolls.	Tons.	Tolls.	Tons.	Tolls.	Tons.	Tolls.	Tons.	Tolls.	Tons.	Tolls.	Tons.	Tolls.
Adhes and breaco-	120	£ s. d.	10,554	£ s. d.	712	£ s. d.	—	£ s. d.	—	£ s. d.	202	£ s. d.	1,098	£ s. d.	589	£ s. d.	60	£ s. d.	3,230	£ s. d.	183	£ s. d.	24,948	£ s. d.
Corks and coko	602	1 10 0	10,053	25 13 0	8,314	158 12 0	4,253	17 1 0	—	—	8,244	200 10 1	1,189	25 4 0	7,634	186 7 4	794	19 17 8	0,412	136 7 1	4,852	119 4 7	54,019	1,081 4 8
Bricks and tiles	—	—	9,010	124 6 8	5,204	7 17 4	8,754	105 14 7	1,866	25 0 6	300	3 0 0	683	11 1 0	105	2 8 8	823	2 18 8	0,231	114 10 9	73	1 14 0	21,454	398 17 10
Chalk and sand	42	0 14 0	2,102	30 10 8	—	—	13,777	311 14 6	5,287	154 12 6	121	3 0 0	433	11 6 0	64	1 12 0	61	1 10 6	501	12 19 6	—	—	22,106	313 12 8
Coarse and lime-	90	1 10 0	2,481	41 7 0	42	0 13 0	—	—	—	—	236	17 14 9	—	—	6	0 7 6	—	—	—	—	—	—	—	—
Slates	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Stone	12	0 4 0	456	6 0 0	35	1 1 8	—	—	—	—	42	2 0 0	—	—	881	14 1 0	—	—	—	—	—	—	—	—
Timber	903	10 1 0	4,104	63 8 0	284	4 17 10	1,661	22 10 10	1,461	39 0 9	639	44 12 5	1,103	5 13 6	1,832	9 3 9	30	0 10 0	107	9 17 0	279	11 10 0	3,284	99 10 11
Iron	30	0 3 4	309	1 13 4	7,481	12 17 1	1,229	30 14 0	1,229	30 14 0	372	16 3 0	—	—	471	2 7 6	1,311	0 11 6	781	38 11 0	834	41 14 6	12,371	365 10 7
Gravel and road materials	—	—	—	—	34	0 13 0	891	22 5 0	1,738	47 10 0	75	1 17 6	25	0 12 0	125	3 2 0	—	—	—	—	—	—	—	—
Lime and coke	240	4 0 0	2,447	40 12 8	444	7 8 0	—	—	—	—	681	3 8 6	5	0 5 0	3,136	156 10 0	—	—	—	—	—	—	—	—
Oil	628	10 9 4	7,662	117 15 0	104	0 10 10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Barley and oats	—	—	—	—	5	0 1 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Four and meal	—	—	—	—	82	1 17 10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Seeds, Beans, peas, and vyo	330	3 3 4	10,166	160 8 8	—	—	—	—	—	—	129	9 3 8	80	4 9 0	461	43 1 0	—	—	—	—	—	—	—	—
Male	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Boats	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Empty barges	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Scumbers	5,797	96 2 4	21,545	392 5 0	11,067	177 14 11	13,427	189 13 0	1,415	25 7 6	1,557	63 13 8	1,14 5	6 16 6	1,004	6 16 6	—	—	251	3 15 14	179	10 12 6	56,421	969 2 51
Sulphate and gunpowder	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Flints, chalk, gravel, sand, and road materials	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wharfrage	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total tons charged	8,544	103 10 4	91,084	1,074 12 10	25,346	488 1 10	42,840	508 12 8	21,460	388 2 1	19,678	407 3 7	7,186	84 13 8	47,261	2,168 11 9	4,280	100 5 7	64,238	2,254 10 11	14,024	709 13 13	840,501	10,411 7 11
Measure	408	—	10,528	—	181	—	510	—	2,251	—	868	—	1,666	—	4,736	—	—	—	—	—	—	—	—	—
Total	9,112	—	101,287	—	25,527	—	4,259	—	25,711	—	20,546	—	8,852	—	52,001	—	—	—	—	—	—	—	—	—

(Signed) JNO. GLASS, Traffic Manager, R.N.T.

HERTFORD  
Mr. J. Gla  
19 Dec. 188

APPENDIX NO. 2 to the EVIDENCE of JOHN GLASS, Esq., Traffic Manager to the River Lee Trust.

*Rates of Tonnage, Table of Distances, and List of Barge Owners.*

The River Lee is navigable for craft coming from the lower part of the Thames and the river Medway at Blackwall, through Bow Creek; and from the upper part of the Thames at Limehouse through the Limehouse Cut to Bromley, Stratford, Bow, Old Ford, Homerton, Clapton, Lee Bridge, Walthamstow, Tottenham, Edmonton, Ponder's End, Enfield Lock, Waltham, Cheshunt, Wormley, Hoddesdon, Stanstead, Ware, and Hertford.

The locks are now calculated to admit barges of 90 feet in length to any point, and of the following width, viz.:—

To any point short of Old Ford lock, 20 feet wide.

To any point short of Ponder's End lock, 17 feet wide.

To any point short of Enfield lock, 15 feet wide.

To all points beyond, and the Stort, 13 feet 3 inches wide.

*Junctions with Canals and Railways.*

The navigation is connected with the Regent's Canal through the Hertford Union or Duckett's Canal at Old Ford, opening a direct communication with the Grand Junction and all canals and railways north of London.

It also joins the Stort navigation at Hoddesdon, extending to Roydon, Harlow, Sawbridgeworth, and Bishop Stortford.

In the Limehouse Cut there is a coal shoot where craft may load direct from the North London in connexion with the North Western and other lines of Railway. Also at Hertford, a capacious dock and wharf adjoining the Great Northern Railway.

The navigation is open for traffic at all times, night and day, except Sundays, when it is closed from eight o'clock in the morning until 6 in the evening.

RIVER LEE TRUST.—Rates of Tonnage.

Goods.	LONDON TRADE.					LOCAL TRADE.			
	To or from the Thames, the Regent's Canal, and the following Points, viz.:—					To or from Hertford, Ware, or the Stort, and		To or from Cheshunt, Waltham, or Enfield Lock, and	
	The Limehouse Cut only.	Junction of the Duckett's Canal, Old Ford, and Homerton.	Lee Bridge, Tottenham, Edmonton, and Ponder's End.	Enfield Lock, Waltham, and Cheshunt.	Rombarrow, River Stort, Stanstead, Ware, and Hertford.	Waltham, Cheshunt, or Enfield Lock.	Ponder's End, Edmonton, Tottenham, Lee Bridge, or Duckett's Canal.	Ponder's End, Edmonton, Tottenham, or Lee Bridge.	Homerton, Duckett's Canal, or Old Ford.
	Per Ton.	Per Ton.	Per Ton.	Per Ton.	Per Ton.	Per Ton.	Per Ton.	Per Ton.	Per Ton.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Tiles, chalk, sand, and gravel and road materials (upwards) - }	0 4	0 4	0 6	0 6	0 6	0 6	0 6	0 6	0 6
Asbes, breeze, and coke - - - }	0 3	0 4	0 6	0 6	0 6	0 6	0 6	0 6	0 6
Coals - - - - }	0 3	0 4	0 4	0 6	0 6	0 6	0 6	0 6	0 6
Grain, seeds, malt, oil, linseed cake, iron, slates, stone, timber, and flour and meal (upwards) - - }	0 4	0 4	0 6	1 0	1 0	0 7	1 0	0 6	1 0
Cement, lime, and sundries - - - }	0 4	0 4	0 6	1 1	1 3	0 7	1 3	0 6	1 1
Saltpetre and gunpowder - - - }	0 4	0 6	0 6	1 1	1 9	0 7	1 3	0 6	1 1

Bricks or spoil, to or from any point, 3d. per ton.



4833. Have you more than one mill ?—I have two mills, one on the Lynch and the other on the Lee.
4834. Of what power are those mills ?—At one mill we have a guaranteed power of 4,000 cubic feet of water per minute.
4835. Which mill is that ?—That is the one on the Lee.
4836. What is your fall there ?—5 feet.
4837. What is it at the mill on the Lynch ?—12 feet.
4838. Does the water originate with you?—It springs on our own premises.
4839. Have you found any difference in the volume of water discharged from that spring of late years ?—I have not measured it.
4840. You have not found any sensible diminution of the power of your waterwheel ?—No, I cannot say that I have.
4841. It was mentioned to us at Bishop Stortford that in many cases the water power had considerably diminished. Your mills are flour mills ?—Yes.
4842. Do you use the navigation for carrying your corn and flour ?—Yes, almost entirely.
4843. Do you find it a convenience ?—A very great convenience; the rail would be very inconvenient to me, I could not work with it.
4844. So that any interference with the navigation would be a decided disadvantage to you ?—It would make the mills comparatively worthless ; at one mill I should be three miles from the railway station.
4845. How far are you below Ware ?—We call it four miles. Charlton mill is the first mill below where the Stort enters.
4846. Do you find any nuisance arising from the waters of the Stort, or of the Lee ?—No ; our foreman at the Charlton mill cottage always uses the Lee water for drinking and cooking, and so they do at the "Fish and Eels " public-house.
4847. Without filtration ?—Without filtration. I do not think that our foreman has a filter. I drink the water myself, occasionally.
4848. Do you see much difference between the water now, and in former years, as to its purity ?—I do not think that it is quite so pure as it was; that is speaking of above me as far as it comes down to me; below it certainly is not so clear.
4849. The benefit of the navigation to yourselves would be equally felt by millers situated upon the river, and other persons, throughout its length ?—Yes, maltsters and millers, seed crushers, and every one. I consider it of very great value; in fact, it is that which makes Hertford, and Ware, and Waltham Abbey what they are.
4850. You think that the railway will not do for those towns what the navigation does ?—No, certainly not. In my own case I can get a sack of flour conveyed by the navigation for 3*d.*, if I send it to the rail I must pay 6*d.*, and I must first get it to the rail.
4851. Have you any steam power?—No, there is a steam engine put up by the New River Company to make up the quantity of water which they have to supply in dry seasons; they have to supply us with a certain quantity of water, or to forfeit £10 a day. We have to give them notice.
4852. When was that engine erected ?—I think in 1855, just after the last Act.
4853. In how many instances have you had occasion to call upon them to use it?—That has been the case most years ; it was so in last year, and the year before. I should think that it has been at work eight years out of ten.
4854. In 1864 for what length of time was it used? —I think that it was at work about two or three months.

4855. And in 1865?—About the same time. In 1864 I think that it was at work three mouths, and in 1865 two months.

4856. Of what horse power is it ?—They call it, I believe, 40-horse nominal power. The engine pumps the water. They have centrifugal pumps; we would not allow them to put it up at the mill. The New River Company were to provide a certain quantity of water by pumping or otherwise, and we said, "Provide it by pumping."

4857. You would rather have a regular steady action of the waterwheel than steam power? Yes, decidedly.

4858. (*Chairman.*) They pay 1s. every time they pump for nine pennyworth of power ?—I believe that if that engine was worked up to 45-horse power it would only do about 8-horse power of work ; they lose 10d. out of the 1s.

4859. Or more than that ?—Yes.

4860. (*Professor Way.*) Would it not seem the most reasonable way for you to take some compensation ?—We fought it out rather hard and we died hard.

4861. (*Mr. Harrison.*) What is your opinion as to the value of the navigation for the powder works, and the small-arms factory ?—I do not think that the powder works could be carried on without it. The way in which they manage is to work small boats upon the cuts, and they take the charges to the various magazines, so that it is not necessary to use a cart or a truck; there is no friction and no danger, and as soon as they have 500 barrels of powder it is sent away to Purfleet.

4862. (*Chairman.*) They can isolate themselves? —Yes.

4863. (*Professor Way.*) They were put there for the very purpose of that being the mode of transit to the depots ?—Yes.

4864. (*Mr. Harrison.*) How do you think that the present, river Lee trust works for the benefit of the public ?—I think that it worked better when there were a greater number of men of business upon it.

4865. (*Chairman.*) Is there anything to prevent your being a member of the trust ?—No, if I choose to qualify; you must have a certain amount of income derived from freehold property.

4866. (*Mr. Harrison.*) Is there any exclusion of millers from the trust ?—No, I should have qualified, but I do not quite like the way in which they manage things.

4867. Would not the best thing for you to do be to get on the board and induce them to manage better? —I very much doubt that. I am the secretary of an association which has been formed, to endeavour as much as we can to keep them in their places.

4868. (*Mr. Harrison.*) How does that association act upon them ?—I think that, for instance, in the case of the Regent's Canal Bill, which was brought forward two years ago, it acted beneficially; it stirred them up, and pushed them forward to do their duty.

4869. How is it that the men of business are not upon the board now ?—Some years ago there was a great change in the management of things. A vice chairman and a great number of county gentlemen were introduced, and it did not appear that there was that amount of attention paid to the wishes of men of business which there had been, and consequently I think that in most cases they declined to attend and others declined to become fresh members. We have no court of appeal; for instance, if I went to-morrow and said, "So-and-so is wrong," it is possible that I might be heard, and in all probability I should be heard, but in the event of my not getting any redress there would be nowhere for me to go.

4870. (*Chairman.*) Then do you think that there should be some superior board to whom you could appeal?—Yes, I think that if there were two or three commissioners before whom we could lay any case of complaint, in case we could not obtain redress from the board, it would act extremely well.

4871. Do you think that if the trust was to be extended in its operations into a conservancy board, the Government in granting that power should place some sort of check or control, or should establish a court

of appeal to which persons thinking themselves in anyway aggrieved could have recourse ?—Yes, I think that there should be a superior board.

4872. (*Professor Way.*) But I take it that you would not like the present trust in any form unless it was considerably modified by the admission of a large business element ?—I think so.

4873. (*Mr. Harrison.*) Is the Regent's Canal Company much interested in the Lee navigation ?—As a navigation I do not think that it is now, because the communication was cut off two years ago, that is to say, the communication between the Regent's canal basin and the Limehouse cut; it was cut off at the Coffey dam in consequence of their losing their bill, and having to give up property which they had held for many years, they held it for 12 years, and we got it away again.

(*Mr. Beardmore.*) A very large traffic is earned on from the Regent's canal through Duckett's canal.

4874. (*Chairman to Mr. Manser.*) Have you ever preferred a complaint which the trust has not dealt with?—I have.

4875. What was that complaint, and when ?—It is now a good many years ago ; it was with regard to the reconstruction of a weir, and its water-marks.

4876. Has it not been reconstructed to this day ?— It was reconstructed, but I did not get what I wanted. I had no appeal; the matter was not fairly gone into to say whether I was right or wrong; the thing remained in *statu quo*.

4877. The trustees had power to deal with it in their own way, and you think that they did not consult your interests ?—Yes, but I do not make a charge against them, that is not my object.

4878. (*Mr. Harrison.*) Do you admit the general statements which we have had given in evidence to-day, namely, that under the present management and since the passing of the Act in 1855, the canal has been much improved, and the locks have been made good, and the canal has been deepened so as to take barges of nearly 100 tons instead of 40, and that accommodation is given so as to encourage an increase of the traffic to a very considerable extent upon the navigation ?—I believe so in every respect. I am perfectly satisfied with it, so far as regards the actual improvement of the navigation.

4879. Therefore so far as the substantial interests of the public are concerned, the present trust appears to be working well ?—Yes, so far as the public are concerned.

4880. Would your complaint be an individual one? —I think that if they paid more attention to economy and exercised more care, and if instead of borrowing a large amount of money and raising these debentures, they endeavoured to be careful to improve the river out of income, which they might very properly do, it would be very much better.

4881. Do you think that if they had confined their attention to doing works of that kind, you would have had the benefit of the present improved navigation? —We perhaps might not have had it quite so quickly, but still it is progressive.

4882. (*Chairman.*) Within the last two years, did not a memorial proceed from the association, of which you are the acting secretary, and was it not sent to the river Lee trustees, begging them to reconstruct the Limehouse entrance, it involving an outlay of something like £15,000?—Yes, but I do not think that it was necessary that they should borrow the money, because I think that if greater economy had been practised for 10 or 12 years previously, that money would have been saved, and need not have been borrowed.

(*Mr. Marchant.*) We are, not enabled to create a surplus capital fund. If we had a large fund in hand applicable to such a purpose, as the memorialists requested of us, we should have to reduce our tolls. We must improve the river from year to year; we cannot make a fund for 20 years, which shall repay a possible expenditure 20 years hence. If any extraordinary work, such as that of the Limehouse entrance, is forced upon us by an association, or by extensions of business, we must borrow the money by the powers of the Act.

4883. I presume that the association in their application to the Lee trust, represented what the trade required, or the trust would not have been coerced into making that outlay ?—There was no coercion. When the trade represent such a matter to us we carry it out if it is needed. This memorial was a recommendation; it was not antagonistic to us at all.

4884. (*Mr. Harrison to Mr. Manser.*) Do you know the condition of the land in the valley of the Lee, below the point where your mill is?—Yes.

4885. Is it liable to be flooded much?—Yes.

4886. Is it injured or benefited by the floods?—I should think that it is not injured. I think that the water down below in the lower part of the river is so very foul, that it manures that land rather than otherwise.

4887. Does it lie for sometime upon the land?—Generally a day or two.

4888. It lies for so short a time that it does not injure the land from the water becoming stagnant?—No; the weirs for passing off the water are better than they used to be, so that the water is passed off more quickly. Those weirs I think are all under the control of the trustees. Mr. Beardmore has introduced an iron weir in place of a wooden one, so that his posts are perhaps 6 or 7 inches instead of 14, and that increases the difference in waterway.

4889. Then that is a benefit to the neighbourhood which must be carried to the credit of the trustees of the navigation?—Yes, I will give them full credit there.

(*Mr. Beardmore.*) The improved getting off of the water is due as much to the dredging as to the other works.

4890. You have deepened the reaches?—Yes.

4891. (*Chairman.*) You have increased the sectional area through which the water can pass?—Yes.

(*Mr. Manser.*) And they have raised the banks a little.

(*Mr. Beardmore.*) The sectional area in shoal places is now at least double.

4892. That would give more than double the volume of water in the same time?—Yes; the hydraulic effect as you are aware is very much larger. I should think that it is pretty nearly eight times.

4893. (*To Mr. Manser.*) Is there anything further which you wish to bring before the Commission?—Nothing, I think, except that I do hope that any recommendation which you may make may lead to some higher power being appointed to control the acts of the trustees, and to give us justice when we seek for it.

The witness withdrew.

MR THOMAS GARRATT further examined

5330. (*Chairman.*) You were examined at Bishop Stortford, and you live at Hunsdon Mills?—Yes.

5331. I understand you wish to make some corrections in your former evidence?—Yes.

5332. Upon what points do you wish now to speak?—The evidence that I gave before was upon the pollution of the Stort, but I was asked whether I had any evidence to give upon the sources of the Lee and the Mimram. I described to you then the state of the Stort, and the evidence that I omitted to give then was that which I will now supply, viz., that a great deal of sheep washing is carried on in the spring of the year, and from that cause I have known the fish to die.

5333. In which river, or at what point is this sheep washing carried on?—I think there is scarcely a single place on any stream near Hertford where sheep washing is not carried on; it is carried on at nearly every point.

5334. In what months does the sheep washing take place?—In May and June.

5335. When the sheep are washed in the streams is there something that comes from the wool that is poisonous to the fish?—Yes, on the river Mimram some years ago there used to be at a place called Kimpton Mill, about 7,000 sheep washed, and in one year we had a great many trout in the river, and I can remember that after the washing there were 13 or 14 trout picked up dead. I believe nearly every farmer dips his sheep in the autumn, and in doing that, for every score of sheep it is necessary to use from 4 lbs. to 6 lbs. of dippings with a great deal of brimstone and arsenic.

5336. What is the object of the dipping, what does it do for the wool?—It kills the ticks and poisons the insects. The sheep get lousy in the summer time, and the dipping kills the fly, and prevents the scab, or the maggot; then that is retained in the wool until the spring comes when the sheep are washed before shearing; it improves the growth of the wool but it is certainly then washed off. On the Stort I washed some sheep this last spring, and after that I saw the gudgeons and small fish quite sickly on the top of the water.

5337. Are there any other points that you wish to speak to?—I told you I think that at Welwyn and Whitwell there is scarcely a house where the privies and waterclosets are not drained into the river.

5338. And the sewage goes down with the water?—Yes, the Mimram is the clearest stream that runs into London if it is not polluted. I have lived upon it for 20 years, and I never yet saw it overflow its banks; it rises through veins of chalk, and it would be one of the finest trout streams were it not for the pollution from a tan yard at Whitwell that used to run in; the lime used to kill some of the trout.

5339. What number of barges pass Hunsdon Mill down the Stort, or what number did pass during the years 1862, 1863, 1864 and 1865?—I receive a toll for every barge that goes down the river Stort. The proprietors of the barges send me a toll of 1s. for the journey of every barge, less 2d. for collection, which makes it 10d. In 1862 there were 720; in 1863, 732; in 1864, 745; and in 1865, 757 that went the journey up and down. I believe there were about 10 or 12 more that came up from the Lee as far as Roydon, or Roydon station.

5340. What is the size of the lock above your mill?—It is 92 ft. long, the width at the bottom is 14 ft. 6, at the top 36 feet. I have always complained that there was a great waste of water on the river from there being no Commissioners; every dispute between the millers and the proprietors should be settled by the Commissioners, but some years ago the Commissioners died; they allowed them to die off, and no fresh ones were appointed, it was under the 32nd Clause of their Act that the disputes between the millers and the proprietors were to be settled by the Commissioners. I have complained several times to the Stort proprietors about the great waste of the water, for I consider that each lock takes much more water than it ought to do.

5341. Have the locks any side walls?—The Roydon Mill has, but the Hunsdon Mill is made wide at the top and tapering down. Under the Act of Parliament they are bound to compensate me for the full loss of my water. I mean through the Commissioners, but as they have allowed the Commissioners to die off, I have no resource, no claim, unless they appoint Commissioners. It was stated by one of the witnesses at Bishop Stortford that the millers were under a penalty of 20s. for refusing to comply with the navigation orders, but it is 40s. through the Commissioners as provided in the 6th George 3rd, Chapter 78, Clause 8. This is a private navigation and has nothing to do with the Lee.

5342. Have you anything further to state?—No. withdrew.

Mr. JOHN MARCHANT, jun. (Hertford), further examined.

5564. (*Chairman.*) You have some documents which you promised to furnish the Commissioners?—Yes, I produce an "Abstract of the receipts and payments of the trustees of the river Lee from the year ending 31st December 1856, and downwards to the year ending 31st December 1865. I have also appended a statement showing the result of the operations of the trust upon the revenue account, to show that the operations have been successful, and that we have not expended more than we were warranted in doing (*handing in the same*). Evidence was given at Hertford by Mr. Manser in which he seemed to reflect upon the management of the trust, and seemed to think that we ought to have in hand a large surplus to pay for any extraordinary expenditure. I show by the papers handed in that we have not overrun the expenditure. I will also put in an "Abstract of trade for the year ending 31st of December 1865, showing the amount of tolls received at different points upon the river" (*handing in the same*). I also produce the form that we adopted in the year 1864, to serve upon every person whom we found creating a nuisance in the navigation (*handing in the same*). We sent a number of these forms to different parties, but having no parliamentary power to carry them out, we found that they were insufficient.

5565. (*Professor Way.*) Will you be kind enough to state whether the trustees are changed from time to time ?—Not by rotation, a change is caused only by death, unless on the ground of non attendance for a certain period, that will disqualify.

5566. Are the members removed if they become disqualified in that way ?—In practice they seldom return to act.

5567. How often is the body really changed ?—It is difficult to say, because it is principally by death, almost entirely by death, that any change takes place.

5568. (*Chairman.*) Will it be fair to ask you whether you have formed any definite opinion, and that you wish to express, as to the constitution of the trust ?—My opinion is distinctly this, that a certain limited number of trustees, or a limited body of any kind will generally act better than a body unlimited in numbers. The points which you have elicited to day from the witnesses go quite to this opinion, that you ought not to have so large a number that a majority can come in and swamp the rest upon any question by being whipped up at a particular moment. Such a power I think ought not to exist.

5569. In your opinion would a limited and properly defined body be better fitted for active work than an unlimited and ill-defined body ?—As a general principle, I should say, yes ; but we have not found any practical difficulty with the trust, it has worked marvellously well. I believe there were days many years ago, perhaps 30 years ago, when, if certain questions were coming on, there was a whip up, and those who were interested in the questions to be decided won the day as against the judgment of those who were not so particularly interested. I have heard my father say that there were days when 50 trustees were brought to a meeting by a whip up for particular purposes, and that is certainly not a condition of things which I think is desirable.

5570. You do not think it would be right that the acting working trustees, upon whose shoulders the burden of the business usually rested, should be, if some important arrangement was about to be made, overwhelmed by the votes of trustees who were usually dormant ?—No; and if now such a thing were likely to happen, I should challenge the right of a trustee to vote, because I know that if he has absented himself for six months, he is undoubtedly disqualified.

The witness withdrew.  
Adjourned.