Report on the water supplies of the various villages and hamlets in the Chelmsford and Maldon Rural Sanitary Districts / by John C. Thresh.

REPORT

ON THE

WATER SUPPLIES

OF THE

VARIOUS VILLAGES AND HAMLETS

IN THE

CHELMSFORD AND MALDON RURAL SANITARY DISTRICTS.

BY

JOHN C. THRESH, D. Sc., F.I.C., M.B.

ETC.,

MEDICAL OFFICER OF HEALTH.

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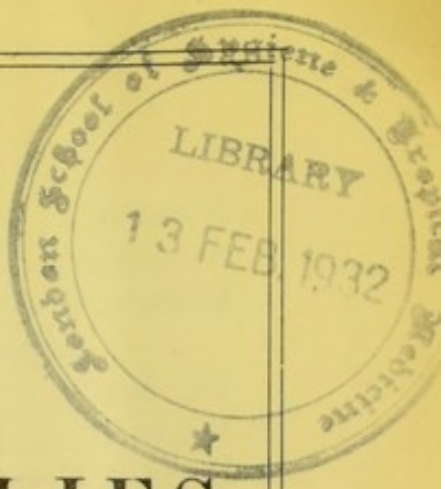

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INDEX OF PARISHES.

ERRATA.

Page 12. Line 6 from bottom, for "Gravel" read "Sand."

Page 16. Woodham Ferris. There are two overflowing Artesian Wells on Mr. Pertwee's Farms.

Page 26. Line 9 from bottom, for "Warner's" read "Wheeler's."

„ Line 4 from bottom, for "pump" read "two pumps."

INTRODUCTORY OBSERVATIONS.

Object of Investigation

THIS Report embodies the results of an investigation made during the past year into the character and quality of the waters supplying the various parishes in the Chelmsford and Maldon Rural Sanitary Districts, and includes details of the analyses of over four hundred samples of water. Its object was to ascertain, if possible, whether there was any connection between the mortality rates and the quality of the water supplies. The enquiry is beset with difficulties, since many other factors of equal, if not of greater, importance, as affecting the health of the community, cannot possibly be eliminated. The chief of these probably are, the character of the soil, the degree of elevation, and the facilities for drainage. The whole of the district under consideration lies upon the London clay, but in many cases this is capped with a greater or less thickness of Bagshot sand or gravel or with still more recent deposits of boulder clay, sand, brick earth, gravel, &c. Where the clay comes to the surface the cottages are damp and the atmosphere more humid than where the clay is covered with permeable deposits. Stiff loams and clay are better conductors of heat than sand and gravel, hence the surface temperature of the latter, other things being equal, is higher than that of the former, or in other words, the clay is colder as well as moister. On the other hand, polluting matters cannot penetrate a clay soil, and there are no variations in the level of the ground water, nor is there any noxious ground air to diffuse into the atmosphere or be drawn into the dwellings.

Speaking generally also, the more elevated tracts in the district are capped with gravel, whilst in the lower lying portions the clay is exposed or merely covered with a more or less heavy loam or with alluvial deposit. This, by affecting the relative humidity, tends also to accentuate the difference due merely to the elevation.

Another difficulty with which such an investigation is attended arises from the fact that in many of our more extensive parishes water is fairly abundant and wholesome in some parts, whilst in others the inhabitants derive their supplies from ponds or ditches. Then again the

character of the water, as well as the quality, is probably not without its effect, but as observations over very extended areas have not enabled any very definite conclusions to be drawn, the influence of such variations cannot be very marked here.

Sources of the Water supply

In the district under consideration water is derived from the undermentioned sources:—

1. Rain (*a*) Collected from the roofs of houses and stored in tubs or tanks.
   (*b*) Collected in ponds.
2. Brooks and ditches. Such water consists of surface water intermixed with water from land springs.
3. Springs. Land springs exclusively. They are found along the line of junction of the permeable gravel and sands with the impermeable London clay at points where the exposure is favourable.
4. Shallow Wells. These are sunk in the drift gravels or Bagshot beds overlying the London clay or in some few cases into the clay itself where beds of sand are known to occur.
5. Deep Wells. These are sunk or bored through the London clay to the water-bearing sands beneath.

Parishes: how supplied

No parish is supplied exclusively with water from any one of these sources, but the villages may be divided into four groups according as they are chiefly supplied with water—

(*a*) From rain water tanks, ponds, brooks, or ditches.

(*b*) From shallow wells.

(*c*) From springs.

(*d*) From deep wells.

(*a*) includes Althorne, Mayland, and Tolleshunt Knights.

(*b*) includes Asheldham, Bradwell, Broomfield, Burnham, Buttsbury, Cricksea, Danbury, Dengie, Good Easter, Galleywood, East and West Hanningfield, Highwood, Langford, St. Lawrence, Pleshey, Sandon, Southminster, Stock, Tillingham, Tollesbury, Tolleshunt D'Arcy and Magna, Wickham Bishops, Woodham Ferris, Woodham Mortimer, and Writtle.

(*c*) includes Great and Little Baddow, Boreham, Great and Little Braxted, Chignals, Fryerning, Hazeleigh, South Hanningfield, Ingatestone, Great and Little Leighs, Margaretting, Roxwell, Springfield, Tothams, Ulting, Great and Little Walthams, Widford, and Woodham Walter.

(*d*) includes North Fambridge, Goldhanger, Heybridge, Latchingdon, Mundon, Cold Norton, Purleigh, Rettendon, Runwell, Steeple, and Stow Maries.

Relation of Death rate to Water supply

Estimated population of each group and Mean Death Rate (10 years, 1881-90) from all causes, from Typhoid Fever, Diarrhœa, etc., per 1,000 persons living.

Group.	Estimated population	Mean Death Rate from all causes.	From Typhoid and Diarrhœa.	From seven principal Zymotic Diseases.	From Phthisis.	Of Children under five years.
a.	950	17·7	·63	1·68	1·15	3·99
b.	18,400	14·7	·44	1·49	1·45	3·99
c.	16,300	15·4	·33	1·38	1·25	4·13
d.	6,150	14·9	·41	1·24	1·26	4·06

In group (*a*) the population is too small to allow of much importance being attached to the Death Rates, and all that can be definitely said with reference to the others is that Typhoid Fever and Diarrhœa have been the cause proportionately of one-third more deaths in the parishes using shallow well waters than in those using spring waters chiefly. Children under five years of age do not seem to be appreciably affected by either the character or quality of the water used, the mortality rate throughout being remarkably uniform.

My predecessor (Dr. Downes) gave great attention to the water supplies, and in his report upon the Maldon District (1887) says that the various sources of supply may be roughly estimated thus:—

Maldon

1.	Ponds used probably by	5	per cent. of	the population.
2.	Streams „	3	„	„
3.	Rainwater Tanks	1	„	„
4.	Springs	15	„	„
5.	Wells in gravel above L. Clay	58	„	„
6.	Artesian Wells through L. Clay 300—400 feet deep.	18	„	„

I do not find any similar calculation for the Chelmsford District, but the following will probably be near the truth.

Chelmsford

1.	Ponds	4	per cent	of the population.
2.	Streams	3	„	„
3.	Rainwater Tanks	1	„	„
4.	Springs	50	„	„
5.	Wells, Shallow	38	„	„
6.	Artesian Wells	4	„	„

Rain water tanks and ponds

Rain water tanks and ponds are open to the gravest objections. Some of the filthiest waters I have examined were from rain water tanks (*vide* Chelmsford, Nos. 124, Maldon, No. 12 and 163), and I regard this as the most unsatisfactory mode of cottage supply. Filth of both vegetable and animal origin is washed into the tank from the roof and there undergoes putrefaction, the resulting solution being merely an infusion of bird droppings and decayed vegetable matter. Where "separators" are used, the water filtered through sand, and the cisterns and filters kept clean, such a source of supply may be permissible, but unfortunately experience proves that in cottages none of these things are attended to. Pond water as a rule is much less impure, and the polluting matter is frequently only of vegetable origin. Too often, however, such ponds collect water from manured fields, or they are used for drinking places for cattle also. (Analyses, Chelmsford Nos. 7, 158, 166, are of waters used by cattle only).

Brooks and ditches

The same remarks apply and with almost equal force to water derived from brooks. The character of some of the brook waters found in districts on the London clay is shewn by analysis No. 126 (Chelmsford). This water contains a large quantity of Sulphate of Magnesium, yet for nine or ten months of the year it is the chief supply to a number of cottages. When the brook is dry in summer, then the rain water butts and tanks are resorted to. Such waters generally cause diarrhœa amongst families who have just moved into the neighbourhood, but in a very short time the system seems to accommodate itself to the change, and the water ceases to produce any apparent effect.

Springs

Springs abound in the more undulating portions of the district, but are very rare or entirely absent elsewhere. Reference to the Analyses (Chelmsford 16, 17, 29, 37, 51, 62, 68, 71, 91, 92, 95, 100, 128, 150, 167, 174, 204; Maldon 103, 106, 147, 150, 153, 177, 185, 186, and many others) shews that as a rule they contain but little unoxidised organic matter, and much less mineral matter than the shallow well waters, but the majority of them

are very hard and not a few contain a somewhat considerable amount of Magnesium Salts. Where springs occur, the water is always preferred to that from any other source, and in many cases carts are regularly employed to fetch it for use as drinking water. The water from several springs is carted distances of two or even three miles, especially in summer time, when the ponds and shallow wells are becoming dry.

Shallow Wells

Water from the shallow wells varies to an extraordinary degree both in character and in quality. Not only do they differ amongst themselves, but water from the same well taken at different times shews marked variations. Thus, analyses Nos. 86-89 (Chelmsford) are of samples taken from the same well at intervals extending over six months. The solids varied from 32-45 grains per gallon and the hardness from 12·5 to 26 degrees, whilst the pollution by organic matter varied to as great an extent. The wells in the Drift gravels as a rule are harder and contain much more saline matter (especially Magnesium Salts) than the waters from the Bagshot beds. The totals solids vary from 30 to 200 (or even more) grains per gallon, and nearly all are excessively hard on account of the quantity of lime and magnesia salts held in solution. Save where the total solids are very excessive the water derived from shallow wells in the gravels and sands is almost exclusively used in those localities where the London clay is capped by these later deposits. The rain falling on such permeable beds sinks down until arrested in its course by the clay beneath. Where underground cesspools and bumbies abound the ground water necessarily becomes polluted by the soakage therefrom, hence in many of our villages all the wells show signs of more or less serious pollution. The danger arising from such a condition of things is well known to all who take an interest in sanitary matters, but it is very difficult to impress the fact upon the minds of the average inhabitant of our villages. Only an epidemic of Typhoid Fever will, as a rule, cause them to admit that there is anything wrong with the water, then whilst the panic last they are willing to allow money to be spent in obtaining a better supply. At other times it is generally useless to argue that prevention is better than cure. Several large villages are supplied almost exclusively by shallow well waters, most of which are exceedingly impure, but the death rates in these villages are not uniformly high. Probably the three villages using the most impure waters are Southminster, Tolleshunt D'Arcy, and Tollesbury. The

waters correspond closely in quality as well as in character. The following statistics demonstrate the utter futility of attempting to trace the connection between the Death Rates and the Water Supply. The numbers given are the means for the ten years 1881-90:—

	Mean Death Rate.	Death Rate from Typhoid and Diarrhœa.	Death Rate from seven Zymotic Diseases.
Southminster ...	16·4	·4	1·1
Tolleshunt D'Arcy	14·1	·0	1·3
Tollesbury ...	12·9	·55	1·5

Tollesbury, with the lowest death rate, had the highest mortality rate from Typhoid Fever and Diarrhœa, and from the seven principal Zymotic Diseases. In Tolleshunt D'Arcy, where the water is excessively polluted, there has not been a single death from either Typhoid Fever or Diarrhœa during the past ten years. In fairness to Southminster it must also be added that a fatal case of Typhoid Fever which occurred there this summer and is included in this return, was undoubtedly imported. Notwithstanding the care taken to prevent the pollution of the ground water, two other cases have since occurred in the village, and if a better supply be not obtained ere long there may be a serious epidemic. In 1879 a case of Typhoid was imported into Tollesbury and resulted in an outbreak, which caused many deaths.

In Burnham, which now has a public supply, Diarrhœa and Typhoid were very prevalent before the construction of the water works, 17 deaths having occurred from these causes in the preceding seven years. Only two such deaths have been recorded in the three years which have since elapsed.

Apart from the production of Diarrhœa and the dissemination of Typhoid, an impure water may be and probably is the cause of a good deal of ill-health and of suffering which we are not able definitely to trace to it. I quite agree with Dr. Salter,* who ascribes the excessive prevalence of certain forms of indigestion and stomach derangements in portions of his district to the supply of polluted water.

Deep Wells

In several parts of the district under consideration water is only to be obtained by collecting rain from the roofs or in ponds or by sinking wells through the London clay. In the south and east such wells are most numerous. Nearly all are private property, having been bored to

* *Vide* page 42.

supply the farms and labourers' cottages; a few only belong to the Rural Sanitary Authority. During the last three years a series of wells have been bored by the Great Eastern Railway Company to supply the stations on the Southend and Maldon branch lines.

In the section on Economic Geology in "Whittaker's Geology of London" much interesting information is given with reference to the waters from the sands and chalk beneath the London clay. He discusses the cause of the great similarity in the waters obtained from the tertiary sands and from the chalk beneath them, but offers no decided opinion as to the cause nor as to the source of the salts so characteristic of these waters. In S.E. Essex the similarity in composition of the waters derived from the sands immediately beneath the clay and from the chalk is very marked. Both are exceedingly soft and contain large quantity of chlorides. In the following table the Chlorine, Hardness, Alkalinity, and Total Solids are given from analyses of waters made by me during the past year. Most of the well sections are given in "Whittaker's Geology of London," and the page upon which such reference can be found is also stated. Southend is beyond the boundary of my district, but as we have no wells bored into the chalk they are included here for purposes of comparison.

Reference in Whittaker's Geology.	Stratum from which water is derived.	Total Solids.	Grains per Gallon. Alkalinity.	Hardness.	Chlorine.	Southend Water Co.'s Wells
Vol. 2	Chalk	66·	19·7	2·5	19·3	Eastwood
„ pp. 30.	„	73·	18·7	2·5	23·5	Prittlewell
„ „ 34.	„	66·5	18·5	3·	23·2	Southend
„ „ 29.	Reading or Old-haven Beds	93·	19·5	7·	28·	Fambridge, N. Railway
„ „ 21. (?)	„	97·	26·5	3·5	26·	„ Public Well
	„	91·	26·5	5·	26·4	„ Clarke's „
„ „ 17.	Reading Beds	81·	23·5	2·	22·9	C. Norton Stat.
		92·	26·5	3·	23·	PurleighPub.W.
		98·	25·	2·5	33·4	Heybridge Hall
„ „ 26.	Reading Beds?	87·	27·5	4·	24·8	Maldon P. Sup.
„ „ 31.	„ ?	64·	24·5	2·5	25·	R'tndn, Clarke's
„ „ 32.	„ ?	80·	22·	3·	23·6	Battles B. Stat.
		81·	26·	3·	28·	Latchd'n, Jollifs
		89·	26·5	3·5	26·	Mundon Public

In many instances where the hardness has much exceeded three degrees there has been other evidence to prove that

surface water was gaining access to the well. As I intend to discuss the composition of these waters more fully elsewhere, I need here only draw attention to Analyses Nos. 154-6 (Maldon) as shewing the great change which is sometimes found to take place in the composition of waters from the deep wells during the first few months of their being used.* When the well at Cold Norton Station was first bored the water was very hard (19 degrees), and had a disagreeable taste. The amount of Chlorine, which at that time was much below the normal, gradually increased, and at the same time the hardness diminished. The water now presents nothing abnormal.

Aperient waters

In certain districts there is a risk in making these deep wells of finding water so charged with Magnesium Salts as to be unusable. There are several wells around Latchingdon of this description. Thus, the well at the Althorne Railway Station yields a water containing 271 grains of solid matter per gallon. At Latchingdon the water from Hitch's well was originally good, but, the supply not being abundant, the tube was "shelled" and the boring deepened a few feet. The supply was improved in quantity, but the water is now so loaded with Sulphate of Magnesia that it is useless for domestic purposes. It is, in fact, a mineral water, and might be bottled and sold as a mild aperient.

Drawing upon capital

Several deep wells which formerly yielded an abundance of water, at the present time only furnish a limited supply, and in others which once overflowed the water does not now rise to the surface. Dr. Downes, writing to me in reference to these deep wells, says:—"I have told the Essex people that they are drawing upon capital in regard to their wells drawing from the lower tertiaries. I think so, because—1, The gathering surface at the outcrop is small and to the north steeply graded. 2, The number of bored wells has greatly increased. 3, The level of the water is falling.

Quality

These deep well waters are (when protected from surface pollution) of exceptional purity, and seem to be well adapted for all domestic purposes. Unfortunately, in districts where pure water has to be obtained at so great an expense, there are always numbers of cottages far from the wells, and rather than fetch the water such a distance the inhabitants will use any other which is available regardless of its purity.

* Other deep wells are Chelmsford Nos. 18, 104, 110, 116, 117, 123, and 125; Maldon 1, 5, 9, 13, 94, 99, 100, 151, 154, 160, 164, 165, 166, and 169.

Quantity of water used.

The amount of water used per head per diem in the villages is often astonishingly small. Few town dwellers have any conception how far a single bucketful of water can be made to go. In Burnham, where the water is laid on to many houses and to stand pipes in the street, and where hand-flushed w.c.'s have almost entirely superseded the privies, the amount of water used daily does not reach 5 gallons per head.

Interpretation of analyses.

In the tables of analyses I have indicated in the last column my opinion as to the quality of each water examined. The conclusions arrived at and there expressed have not been formed merely from the analytical results, but from these and the consideration of the various sources of supply, the surroundings of the wells, springs, dipping places, &c. To classify such waters satisfactorily is an impossibility, but an artificial distinction into the following groups may be of service:—(1), Good; (2), Usable; (3), Unsafe; (4), Polluted, *i.e.*, polluted to such an extent as to be in my opinion dangerous to health. The proportions of each class in the Chelmsford and Maldon Districts are given below:—

	Chelmsford.	Maldon.
Good	42· per cent.	28· per cent.
Usable ...	14· „	17· „
Unsafe ...	18· „	22· „
Dangerously polluted	26· „	33· „

Too much reliance cannot be placed upon these figures, but there is no doubt that the villages in the Chelmsford District as a whole are much better supplied with water than the Maldon parishes. Good water is laid on to stand pipes in the street or to the houses in the following villages in the Chelmsford Rural Sanitary District:—Springfield, Great Baddow, Ingatestone, Great Waltham, and Little Waltham. In the Maldon Rural Sanitary District a similar supply is afforded in Burnham and Heybridge only, and in the latter place the water belongs to a private firm.

As will be seen from the text of the report, the question of providing better supplies for several of the villages is under consideration, and in all probability some of the schemes for this purpose will be carried out during the present year.

The chief difficulty arises in connection with the supplies to single cottages or small groups of cottages lying at a distance from the villages. In many instances good water

is not obtainable at a reasonable cost, and the question may soon be raised whether such cottages are fit for human habitation.

With reference to the analyses very little need be said. The nitrates were determined by the Copper-Zinc couple process, the nitrites by the Hydriodic Acid and Starch reaction as described by me in a paper read at the Pharmaceutical Conference last year and published in the Year Book. The free oxygen was estimated by a process which I described at a meeting of the Chemical Society in January last, and is contained in the Journal for March, 1890. The amount of free oxygen was ascertained in about 180 different waters, but as the information so obtained rarely proved of any value I ceased making the determinations. Pure waters from the sands and chalk beneath the London clay contain very little free oxygen. On the other hand, good waters from shallow wells are usually well oxygenated, while the impure waters are not. Pond waters, unless very impure, usually contain a large quantity of free oxygen, and in fact are often super-saturated. Water No. 190 (Chelmsford) is an example. It was taken from a pond, the bottom of which was covered with luxuriant vegetation, and bubbles of the gas were constantly rising to the surface. A second sample from the same pond also exhibited a high degree of super-saturation. The alkalinity of each water is expressed in units, which correspond to one grain of carbonate of lime per gallon. In the absence of carbonate of lime or magnesia, as in most of the deep well waters, each unit of alkalinity corresponds to 1·06 grains of carbonate of soda.

Many of the waters were also examined microscopically, and plate cultivations were made for a Bacteriological examination. Probably in one instance only did the results modify the conclusion previously arrived at by a chemical examination.

In the report which follows, a brief description of each parish and of its water supply is recorded. The mean death rate and Zymotic death rate are also given, and on the opposite page (usually) the analyses of typical samples of the water used by the inhabitants.

J. C. T.

CHELMSFORD,

February 10th, 1891.

ANALYSES OF WATERS

SUPPLYING THE

VARIOUS VILLAGES AND HAMLETS

IN THE

CHELMSFORD

RURAL SANITARY DISTRICT.

WIDFORD.

A small parish. Population, 300.* (Census, 1881).

Half the village is in Chelmsford parish. All the houses in the village are connected with the Chelmsford sewers, and most of them have hand flushed water closets. Water also is supplied from the Chelmsford mains. As a result of a house to house inspection made early in the year, many of the cottages have been put into a better state of repair, and some are being re-built.

Mean Zymotic Death Rate, 1881-90	3·6
„ Death Rate, all causes	17·3

WRITTLE.

Population (1881), 2,412, including Highwood. Area, 8,325 acres.

The Soil is various, clay and loam ; Subsoil, chiefly clay.

The houses in the village surround a large green. The old highway drains do duty as sewers. No system of flushing or proper system of ventilation. The outfall is into a ditch (which is often offensive) discharging into the River Wid. There are about 20 w.cs. There are many pail closets emptied by a public scavenger. The lower part of the village is supplied with excellent water from a stand pipe belonging to the Writtle Brewery Company. The higher part is supplied by a public pump, and the water, notwithstanding the proximity of its source to the churchyard and to the old barrel drains, is of good quality. There are several private pumps.

Oxney Green is an extension of the village to the west. There are about 80 houses, some of which are connected with the village sewers. Water is derived from numerous private wells and from a public pump. A charge of 1s. per quarter is made by the Rural Sanitary Authority on the cottages using this water.

There are many houses in outlying portions of the parish depending entirely upon ponds as a water supply.

*Unless otherwise stated the population is that given by the last Census. Where any appreciable change has taken place the fact is stated.

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hard. ness.	C'pper Lead or Iron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxyged.	
	Widford—															
1	Chelmsford Town Sup.	C and C ...	48·	Nil. ...	0	·55	14·3	22·	15·	0	·02	.01	·0	·48	...	Good
	Writtle—															
2	Public Pump... ...	„ ...	35·	„	0	·51	2·5	13·5	19·	0	·01	·03	·0	·8	n d	„
3	Pipe from Brewery ...	„ ...	33·	„	0	·62	2·3	13·5	19·	0	·01	·03	·0	·8	n d	„
4	Shakstone Farm ...	Yellowish ...	81·	Ft. Brown...	0	·51	11·	30·	n d	0	·12	·12	·7	2·1	2·6	Well to be examined
5	„ (after cleansing of well)...	C and C ...	89·	Nil. ...	0	·6	13·7	36·8	38·mg	0	·04	·04	·0	·8	2·8	Good
6	Montp'lierFarmSpring	„ ...	49·	Ft. Brown...	0	·17	4·	22·	n d	0	·02	·03	·0	1·2	5·5	„
7	„ Pond ...	Very Turbid ...	76·	Charred ...	s trace	·69	13·6	28·	10·	0	16·	4·8	·4	28·4	2·1	Sewage
8	Infants' School ...	C and C ...	84·	Nil. ...	0	·66	2·6	15·5	30·5	0	·02	·04	·0	·2	6·2	Good
9	The Warren	„ ...	29·	„	0	·73	1·8	16·	16·	0	·04	·01	·04	·6	7·6	„
10	Milbanks	C but Yellowish	n d	n d... ...	0	·89	n d	n d	n d	n d	·08	·28	·0	2·9	2·9	Well to be examined
11	Writtle Park	C and C ...	19·	Ft. Brown...	0	·79	2·1	1·5	6·5	0	·01	·02	·0	·5	7·4	Good
12	„ Bailiff's house	„ ...	41·	Nil. ...	0	·30	5·4	1·	7·5	0	·01	·06	·0	·4	5·	„
13	Cemetery	Yellow &Turbid	40·	„	n d	·4	1·7	8·	17·mg	0	·04	·08	·0	3·3	9·5	Bad
14	„ 3 days later	„ „	n d	„	n d	n d	n d	n d	n d	0	·04	·36	3·4	14·9	n d	Bad
15	Old Moor Hall Pump...	„ „	54·	Charred ...	n d	·2	6·5	31·	24·mg	0	1·10	·60	·0	11·0	1·7	„
16	„ Spring (No. 1)	C and C ...	34·	„	0	·25	3·3	18·	16·mg	0	·02	·07	·0	·9	7·6	Good
17	„ „ (No. 2)	Turbid ...	27·	Slight Char.	0	1·1	2·1	15·	16·mg	0	·00	·08	·0	1·4	n d	Usable
	Oxney Green—															
18	Chain Pump... ...	C and C ...	70·	Fused ...	0	·58	17·	22·	12·	0	·40	·02	·0	1·2	7·6	Good
19	Well	„ ...	42·	Nil. ...	n d	·8	3·3	11·	16·	0	·03	·06	·0	·7	6·6	„
20	Lawes' Cottages ...	Faint Yel.,Clear	81·	Char. ...	n d	1·9	7·1	17·5	21·mg	0	·05	·24	·0	2·9	5·6	Bad
21	Hitch's „	Very Faint Yel.	48·	Nil. ...	n d	·8	2·5	15·5	18·	0	·08	·07	·0	1·0	5·9	Good

C and C, Clear and Colourless. n d, not determined. Mg, much hardness due to Magnesia.

HIGHWOOD.

Population, 665. Area, 3,400 acres.

Soil chiefly loam. A patch of gravel and sand at Writtle Park. No village. Houses in small groups.

Cook's Mill Green.—About 40 houses, most of them with gardens. Water from shallow wells. A public pump. Water good.

Chicken Row.—Seven very old cottages with piggeries in front and a large pond behind from which water is taken for domestic use. Pail closets. An attempt is being made to obtain a better supply of water by sinking a well.

Love's Green.—About 20 straggling cottages with gardens. Water chiefly derived from ditches and ponds.

Radley Green.—About a dozen houses supplied with water from private wells.

Writtle (including Highwood).

Mean Death Rate from Zymotic Diseases, 1881-90 ...	1·75
„ all causes	15·0

ROXWELL.

Population, 814. Area, 4,782 acres.

Soil, brick earth and loam.

The village consists of a street of about 30 houses, a few of which are connected with the highway drain. Pails and privies with cesspools. There is a spring of good water rising near the churchyard and carried by a pipe into the street. There are a few shallow wells.

At Boyton Cross are some 30 or 40 houses without drainage and badly off for water. They are mostly supplied by the pump at the Village Inn, yielding water of very doubtful quality.

No public scavenging. The well at Hills Farm is sunk 60 ft., then bored a few feet. The section is given in Whittaker's Geology of London, vol. 2, fol. 32.

Mean Death Rate from Zymotic Diseases, 1881-90 ...	1·3
„ all causes	13·1

THE CHIGNALS.

Chignal St. James. Population, 224. Area, 908 acres.
„ Smealey. „ 134. „ 476 „

There is no village. The houses are very scattered. They are supplied with water from springs, wells, and brooks.

The spring and well waters are mostly good. One group of cottages is dependent upon a ditch or pond, the water of which is very polluted. A well was sunk near in order that the water might filter into it, but this did not improve it in quality, in fact when I first visited the place the well water stunk abominably, and now the well is dry, so that the pond is still the only source of supply.

Mean Death Rate from Zymotic Diseases, 1881-90 ...	·6
„ all causes	15·4

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxygen.	
	Highwood—															
22	Board School... ...	F. Yel. & Turbid	27·	B. Char. ...	f. t.	·69	1·7	8·	14·	t iron	·12	·08	trace	3·2	...	Impure
23	„ ..	Very Turbid ...	32·	Nil. ...	0	n d	3·2	11·5	12·5	0	·04	·06	·09	·9	4·8	Good when filtered
24	Vicarage	C and C ...	70·	„ ...	n d	n d	5·6	20·5	22·mg	0	·02	·05	·0	·5	4·2	„
25	Chicken Row Pond ...	Very Yel.& Tur.	28·	Charred ...	0	·55	1·3	14·5	21·	0	·08	·88	·0	6·	...	Much vegetable matter
26	Barrow's Cottage ...	Yellow& Turbid	175·	„	0	·26	22·	45·	60·mg	0	1·25	·52	·0	5·5	...	Much polluted
27	Cooks Mill Green P.P.	Faintly Turbid	46·	Nil. ...	0	·28	1·7	19·5	24·	0	·01	·03	·0	·0	·7	Good
	Roxwell—															
28	Hill's Farm	C and C ...	75·	Nil. ...	0	1·10	12·8	20·5	33·	0	·01	06	·0	1·5	7·6	Usable
29	Public Supply in vill.	„	35·	„ ...	0	·85	1·5	20·5	26·	0	·01	·02	·0	·6	9·2	Good
30	School Well (closed)	Yellow& Turbid	116·	Charred ...	0	·5	15·	n d	n d	0	·80	·24	·04	3·9	n d	Bad
31	Tye Hall	Faintly T. & Y.	148·	„	n d	2·15	12·8	21·	43·mg	...	abt1·	·24	4·5	12·2	...	„
	Boyton Cross—															
32	Cottage nr. Brickyard	C and C ..	50·	Nil. ...	0	·23	2·8	19·	30·	0	·00	·03	.0	·40	6·2	Good
33	Cross Keys Pump ...	Faintly Y. & T.	67·	Charred ...	0	·26	6·5	25·	34·	0	·12	·08	.04	1·77	n d	Suspicious Well & surroundings to be exam.
34	Stream nr. Bateman's Cottages	Faintly Turbid	n d	n d ...	n d	·24	2·2	20·5	28·	0	·04	·10	·0	2·28	n d	Usable
	The Chignals—															
35	Marriage's Cottages P.	C and C ...	67·	Nil. ...	0	n d	5·5	17·5	28·	0	·02	·08	·0	1·1	·46	Good
36	Pondsupplying several cottages [Church	T., putrid odour	n d	Charred ...	n d	n d	4·3	18·	n d	0	·25	·30	·0	8·0	·9	Bad
37	Spring near St. James	Very Ft. Yel....	32·	Nil. ...	0	·25	2·2	22·5	17·	0	·04	·03	·0	·4	n d	Good
38	Wakelin's Pump ...	Very Yellow ...	44·	Charred ...	trace	·03	3·6	25·5	28·mg	0	·04	·09	·04	1·2	n d	Suspicious
39	Sewell's „ ...	Turbid ..	31·	„	„	·20	2·3	15·	19·mg	0	·16	·20	·0	3·6	n d	Bad

MASHBURY.

Population, 142. Area, 815 acres.

Soil, heavy loam; Subsoil, clay.

There is no village. Houses very scattered. There is one public pump, furnishing a fairly good water. Many houses are supplied with water from the brook.

Mean Death Rate from Zymotic Diseases, 1881-90 ...	2·1
„ all causes	18·3

GOOD EASTER.

Population, 520. Area, 2,082 acres.

Soil, clay and marl; Subsoil, clay.

The village consists of about 25 houses, without drains or sewers, and many without gardens. No public scavenger. At the "Tye" there are about the same number of houses. Many of the cottages are very old, and bumbies and cesspits abound. Ditches run close behind some of the houses. There are two public pumps, one in the village and the other at Tye-green. A few private wells. Water is found at a depth of about 40 ft. The supply at the village pump fails every summer, and I have suggested that the well should be deepened. Some of the outlying cottages have no proper water supply, and the people have either to fetch it from a considerable distance or use pond or ditch water.

Mean Death Rate from Zymotic Diseases, 1881-90	·6
„ all causes	15·5

LITTLE LEIGHS.

Population, 125. Area, 1,080 acres.

Soil, mixed; Subsoil, clay and gravel.

Scattered houses. No village. The Dog's Head spring yields an abundant supply of good water, supplying many cottages.

Mean Death Rate from Zymotic Diseases, 1881-90... ...	3·2
„ all causes	21·6

GREAT LEIGHS.

Population, 753. Area, 3,125 acres.

Subsoil, clay and gravel.

No real village. Houses very scattered. Supplied with water by springs and shallow wells; mostly of good quality. Here and there is found a cottage or group of cottages dependent upon ponds for their water supply.

CHATLEY HAMLET consists of 40 or 50 wretched Cottages at the side of the Braintree High Road supplied with water from several private wells. The principal pump is at the Dog and Partridge; a small charge per quarter is made by the tenant for privilege of using the water therefrom.

Mean Death Rate from Zymotic Diseases, 1881-90	2·8
„ all causes	17·1

PLESHEY.

Population, 302, Area, 730 acres.

Soil, chalky clay, with flints and chalk fossils; Subsoil, loam.

The village consists of a straggling street of about 30 houses. A few houses with pail closets. There is an old road drain, but none of the houses are connected therewith. No public scavenger.

Water supply; a public pump and a few shallow wells. The public pump fails in summer; the inhabitants are then allowed to take a certain amount of water from the School well. All the waters are very hard, and none of exceptional purity.

In the outlying portions of the parish, ditch water is used. A well is being sunk at Bank End to supply the cottages there, which at present are dependent upon a dipping place fed by a ditch often fouled by cattle.

Mean Death Rate from Zymotic Diseases, 1881-90	1·7
„ all causes	18·6

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxygen.	
	Mashbury—															
40	Public Pump	Ft. Col. & Turb.	35·	Nil. ...	0	·16	1·6	23·5	24·5	0	·12	·02	·0	·60	7·6	Good
	Good Easter—															
41	Tye Green Pump ...	C and C ...	41·	Nil. ...	0	·55	4·3	22·	24·	0	·10	·02	·0	·60	1·6	Good
42	Clay Pit	Yellowish ...	29·	Charred ...	0	·23	1·7	21·	22·	0	·03	·48	·0	3·1	6·8	Muchvegetableimpurity
43	Atridges	Brown & Turb.	31·	„ ...	0	·22	1·9	21·5	24·	t iron	·01	·05	·0	8·	n d	Good
44	Evarards	Y.&.T.fœtid odr	35·	Ft. Char. ...	0	·7	3·5	27·	20·	0	·48	·08	·0	1·7	n d	Bad
45	P.P. opposite Star Inn	Faintly Turbid	101·	Nil. ...	0	1·05	11·4	15·	36·mg	0	·02	·03	·0	·66	n d	Usable
	Pleshey—															
46	May's Pump	C and C ...	52·	Char. ...	0	·58	4.8	23·5	21·	0	·00	·10	·0	2·0	6·2	Good
47	South's „	„ ...	88·	Ft. Char. ...	0	·82	19·5	25·	25·	0	·08	·10	·0	2·0	2·7	Usable
48	Public „	„ ...	87·	Blk. „ ...	0	·82	13·5	32·	26·	0	·05	·08	...	1·75	10·7	„
49	Brewster's Garden ...	Turbid & Yellow	37·	Char. ...	0	·55	1·1	22·5	28·	...	·36	·40	·0	1·9	7 6	Bad
50	Quilter's Field ...	„	36·	„ ...	0	·25	1·0	22·	26·	...	·12	·12	·005	2·1	4·	Doubtful
	Little Leighs—															
51	Spring near Church...	Clear	25·	Ft. Char. ...	0	·10	1·1	14·	15·	0	·02	·09	·0	·83	n d	Good
	Great Leighs—															
52	Nr. Holland's Cottage Well...	Clear, &c. ...	32·	Ft. Char. ...	0	1·05	2·15	10·25	16·	0	·04	·07	·0	·63		Usable
53	Chatley, Dog and Partridge	C and C ...	35·	„ ...		·64	2·1	19·5	23·	0	·02	·05	·0	·39		Good
54	Dine's Farm	Turb. & Reddish	91·	„ ...		1·80	11·8	19·5	43·		·02	·11	·0	2·92		Unsafe

SPRINGFIELD.

Population, 2,528. Area, 2,898 acres.

Soil, gravel chiefly; Subsoil, clay.

The populous portion of the parish is really a suburb of Chelmsford, and is connected with the Chelmsford system. The sewers are flushed automatically by several tanks, and ventilated by shafts carried up by the sides of the houses, etc. Nearly all the cottages have long hopper closets, hand flushed. A suggestion made by me to the Rural Sanitary Authority that a scavenger be appointed to remove house refuse periodically was rejected by the Parochial Committee.

Public water supply from the tower on Baddow Road.* Water laid on the larger houses and to hydrants at the rear of the cottages. Very few private wells in the populous area. In two houses so supplied there have been cases of typhoid fever this year. Beyond the water main area the houses are chiefly supplied by private wells. There is one public pump at Halfway Houses yielding a fairly good water.

Mean Death Rate from Zymotic Diseases, 1881-90 ...	·9
„ all causes	15·1

BOREHAM.

Population, 992. Area, 3,801 acres.

Subsoil, gravel and clay.

The village is very straggling. A few houses are connected with the highway drains. In one of the largest houses a case of typhoid recently occurred, but this was not due to the water supply, but to defective drainage. The water closet was found to be connected with a cesspool, which was in direct communication with a room in the basement.

There is a public pump by the side of the main road yielding a very good water. Water from a spring near the churchyard is piped into the street. This water is also very good. There is a similar arrangement to supply a group of houses on the main road, and the water is of fair quality. Many houses are supplied by private wells. There appears to be an abundance of good water in almost all parts of the parish.

Mean Death Rate from Zymotic Diseases, 1881-90 ...	1.0
„ all causes	13·3

*For analysis *vide* Baddow.

SANDON.

Population, 466. Area, 2301 acres.

Village, small. No sewers. Subsoil, clay.

The village pump is in Hall Lane, and yields a very pure water, but the supply during summer is insufficient. There is a spring of good water near, and it is proposed to convey this into a tank in the village, and erect a second pump; and also to carry it further to supply two or three farms which at present are dependent upon wells yielding only a limited quantity of water and that of inferior quality.

There are groups of houses here without any proper water supply, water being obtained from roadside dipping places. In summer these are dry, and water has to be fetched from a distance.

Howe Green is a small Hamlet of about 12 cottages, depending entirely upon a roadside pond for its supply of water. The water is loaded with vegetable impurity, and a suggestion made by me for effecting the filtration of the water into a tank was not acted upon as the owner of the property had supplied each of the cottages with a small filter. Other groups of cottages towards the outskirts of the parish are badly supplied with water.

Butts Green. There are a number of scattered cottages here depending entirely upon ponds. The nearest Spring of good water is a mile distant. Some time ago (about 20 years) a pipe was laid from a Spring to the Green, but for some reason the water failed to reach there and the pump has been removed. The pond water is very impure, and diarrhœa is very prevalent here in summer.

Mean Death Rate from Zymotic Diseases, 1881-90	2·3
, all causes	16·3

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	Copper Lead or Iron	Free Ammonia	Organic ditto	Nitrates Nitrogen.	Oxygen used.	Free Oxygen.	
	Springfield—															
55	The Mount	C and C ...	46·	Nil. ...	0	·98	2·5	18·5	20·	0	·00	·04	·02	·5	6·5	Good
56	Prospect Terrace ...	Turbid & Yellow	45·	Ft. Char. ...	0	·66	3·7	4·	13·	0	·70	·07	·0	1·6	5·8	Unsafe
57	Near Pease Hall ...	Faint Yellow...	46·	Charred ...	m t	1·2	3·	9·	14·	0	·04	·18	·0	1·6	4·3	Well to be examined and cleaned
58	Bedfords	Yellowish ...	71·	Nil. ...	n d	1·65	6·3	10·5	18·mg	0	·02	·12	·0	2·2	n d	Unsafe
59	P.P.nr Halfway Houses	C and C ...	36·	„ ...	n d	1·1	2·4	12·5	19·mg	0	·01	·04	·0	1·8	n d	Good
60	Springfield Hall ..	Very Faint Yel.	68·	Slight Char.	n d	·6	6·7	11·	16·mg	0	·04	·12	·0	1·5	n d	Usable
61	Navigation Terrace ...	„	51·	„	nil.	·85	4·1	14·5	33·	0	·01	·14	·0	1·79	n d	Unsafe
	Boreham—															
62	P. Spring nr. Vicarage	C and C ...	21·	Nil. ...	nil.	·48	2·5	10·5	10·5	0	·00	·02	·0	·50	6·9	Good
63	Myhills	„ ...	125·	Ft. Char. ...	„	1·50	12·5	29·5	31·mg	0	·00	·09	·0	1·7	3·6	Doubtful
64	Boat Ho. Dipping Place	F. Yel. & Turb.	35·	Nil. ...	„	·4	1·8	17·5	16·	0	·08	·04	·0	1·3	11·8	Good
65	Public Pump	C and C ...	30·	Very faint	„	·65	2·3	12·	16·	0	·02	·03	·0	·38	n d	„
66	Springop. Col. T. Tyrells	Faintly Turbid	29·	Nil. ...	0	·90	1·9	14·5	15·	0	·08	·06	·0	·53	n d	„
	Sandon—															
67	May's Farm Pump ...	Clear	74·	Charred ...	0	·91	14·5	16·	25·	0	·48	·12	·0	1·7	3·	Polluted
68	„ Spring... ...	C and C ...	32·	Nil. ...	0	·40	2·8	7·5	16·	0	·00	·04	·0	·3	11·9	Good
69	Rectory Pump ...	„ ...	56·	Charred ...	0	1·16	7·	6·	16·	0	·05	·08	·0	1·6	5·3	Well to be examined
70	Village „ ...	„ ...	22·	Nil. ...	0	·40	1·5	4·	12·	0	·00	·01	·0	·0	6·6	Good
71	Spring near ditto ..	Faintly Turbid	27·	Ft. Char. ...	0	·82	2·8	5·	15·	0	·00	·06	·0	·5	5·6	„
72	Belcher's Farm ...	„ „ and slightly Yel.	120·	Nil. ...	...	...	3·9	27·5	30·	0	·03	·11	·0	1·76	n d	Doubtful
73	Dipping Place ...	„ „ ...		n d ...	...	...	...	...	...	...	·05	·09	·0	1·	9·3	„
74	Pond, Butt's Green ...	B. & Flocculent	38·	Char. ..	...	...	2·3	10·	11·	...	·20	·48	·00	12·2	...	Bad
75	Gt. Gibcrack (Bored W)	Yellow & Turbid	252·	„ ...	n d	·08	62·	15·5	30·mg	0	·20	·16	·00	2·03	...	„
76	Lt. „ (Shallow W)	C and C ...	15·	„ ...	n d	·10	1·5	2·	4·	0	·03	·05	·00	·57	...	Good

GREAT BADDOW.

Population, 2,055. Area, 3,900 acres.

Soil, gravelly; Subsoil, gravel.

A wealthy suburb of Chelmsford. Village compact. Sewered in 1880 and connected with Chelmsford system. The sewers are flushed automatically at several points. Several manholes having been closed, shaft ventilators have been erected in their place. The cottages have long hopper, hand flushed closets. No public scavenging. A spring near Chelmsford is utilised to supply this village and Springfield with water. The water is received in a covered reservoir and pumped by a gas engine into a tank on a tower on the Baddow Road. The service is constant. The water is of excellent quality.

Galleywood.—Population, 735. Area, 2,403 acres.

A portion of Great Baddow parish. The village, if such it can be called, is situated on an elevated tract of ground around a large common. The Hill is capped with bagshot pebble beds Houses very scattered, and deriving their water supply from numerous shallow wells. The water is not of good quality, and samples taken at different times from the same well vary considerably in composition.

Great Baddow (including Galleywood).

Mean Death Rate from Zymotic Diseases, 1881-90	1·1
„ all causes	15·7

LITTLE BADDOW.

Population 541. Area, 2,756 acres.

Soil light and gravelly; Subsoil, gravel.

There is no village, the houses being very scattered. Springs abound in the parish, and many of them are utilized to supply the cottages. There are very few wells or pumps. Most of the springs yield water of excellent quality, but the dipping places are not always properly protected, and frogs and decaying vegetable matter are allowed to get in.

Mean Death Rate from Zymotic Diseases, 1881-90	·9
„ all causes	13·1

SOUTH HANNINGFIELD.

Population, 234. Area, 1,526 acres.

Soil, stiff loam (a patch of gravel to the south); Subsoil, clay.

A small group of houses constitutes the village. No drainage. There is at least one good spring in the parish, which is piped into the yard of the Windmill public-house, and supplies all the village. A few large houses have to depend upon rain water stored in tanks. Many cottages use brook and pond

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used	Free Oxygen.	
	Gt. Baddow—															
77	Public Supply ...	C and C ...	16·	Nil. ...	0	·85	1·8	2·5	6·	0	·00	·05	·0	·2	n d	Good
78	Lakes, Baddow Road	Clear	16·	Charred ...	1 trace	·89	1·8	3·	7·5	0	·10	·04	·0	2·4	9·6	Suspicious
79	Dip. Pl.,Rettendon Rd.	Slightly Turbid	25·	Slight Char.	0	·40	3·4	11.	11·	0	·04	·14	·0	1·7	11·9	Usable [purity
80	Pond, Howe Green ...	Very Turbid ...	39·	Black „	0	·09	7·8	14·	11·	0	·00	·64	·0	9·6	14·8	Much vegetable im-
81	Cottage in Village ...	Clear	n d	n d ..	n d	2·31	4·	5·	17·	0	·00	·06	·0	1·2	5·7	Much oxidized sewage
82	Albert Terrace ...	F. Yel. & Turb.	58·	Nil. ...	0	1·25	6·9	2·5	15·	0	·09	·07	·0	·5	4·7	Usable
83	Finch's Pump ...	Clear	29·	„ ...	0	·60	3·	1·5	7·	0	·01	·04	·0	·1	7·7	Good
84	Dip.Pl.,GingerbreadH.	Slightly Turbid	26·	Slight Char.	0	·13	2·6	11·5	11·5	0	·06	·16	·0	2·0	14·9	Unsafe
85	Mill House	Faint Yellow...	45·	„	0	·40	4·2	17·5	19·mg	...	·12	·08	·0	2·2	5·4	Suspicious
	Galleywood—															
86	Francis	Turbid ...	45·	Black Char.	0	·82	4·8	8·	15·5	0	·20	·40	trace	4·2	·3	Bad
87	„	„ ...	33·	Ft. Char. ...	0	·60	2·9	8·5	12·5	0	·12	·14	·2	1·8	7·2	„
88	„	„ ...	32·	„	0	·80	2·8	13·	26·	0	·16	·12	·50	3·2	5·1	„
89	„	„ ...	36·	„	0	·20	3·2	11·5	13·5	0	·40	·16	·50	2·6	n d	„
9	Jacksons	Faint Yellow...	113·	Charred ...	0	2·24	29·	22·5	28·	0	·08	·18	·0	3·0	2·2	„
	Lt. Baddow—															
91	National School D. P.	F. Yell. & Turb.	30·	Ft. Char. ...	...	1·1	2·6	1·0	9·	...	·01	·16	·0	1·32	..	Usable
92	Post Office D. P. ...	„	25·	„	...	·5	2·5	·5	4·5	...	·01	·06	·01	1·34	...	„

water. Some of the farms cart water from a considerable distance. There are two public dipping places, neither of them yielding very good water.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... ·9
„ all causes ... ... 11·5

WEST HANNINGFIELD.

Population, 430. Area, 2,818 acres.

Soil, stiff loam; Subsoil, clay.

Village very small. No sewers. Water derived from a spring in a meadow some distance away. Quality not unexceptionable. A well at the Compasses public-house contains over an ounce of saline matter per gallon, chiefly magnesium sulphate. Outside the village water is difficult to obtain, and is sometimes carted miles. Roadside brooks or ditches and ponds in many cases are the only available sources of supply. There is no public pump.

Mean Death Rate from Zymotic Diseases, 1881-90 ... 1·2
„ all causes ... ... 14·2

EAST HANNINGFIELD.

Population, 404. Area, 2,446 acres.

Soil, stiff loam; Subsoil, clay.

The village is small; cottages arranged round a green. Very badly off for water. Most of the cottages are supplied from a private pump belonging to Mr. Clark, and the quantity is limited. There is no public pump.

At the Rectory a well has been sunk at a very considerable expense, and the water is raised by a pumping engine (by horse power) into a tank at the top of the house, but it is not fit for domestic purposes.

Ditch and pond water alone is available in many parts of the parish.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... 2·5
„ all causes ... ... 17·2

RETTENDON.

Population, 720. Area, 3,932 acres.

Soil, heavy loam ; Subsoil, clay.

Straggling cottages and farms, except at Battles Bridge, on the north bank of the Crouch, where there is a small village. No sewers. Only pond and rain water available in many instances. There are several deep bored wells belonging to private owners, and these supply many of the cottages for a small quarterly rent. The water is derived from the greensand beneath the London clay which here is from 350 to 400 feet thick. Sections of three of these wells are given in Whittaker's Geology of London II. 31. The wells at the lowest level overflow.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... 1·0
„ all causes ... ... 14·7

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxygen.	
	W. Hanningfield															
93	Brook nr French's Cot.	Turbid & Yellow	n d	n d ...	n d	n d	2·6	10·	11·0	n d	·08	60	n d	10·2	n d	Bad
94	Compasses P. H. ...	Faintly Yellow	496·	Nil. ..	0	·95	62·	19·	100· with s. mag.	loaded	·01	·24	·0	2·47	...	Not fit for domestic purposes
95	D. P. near Church ...	„ & Turbid	58·	„ ...	0	·65	6·4	18·5	21·mg	0	·07	·12	·0	·80	...	Usable
96	Church House Pump	F. Turbid & Yel.	130·	„ ...	0	...	10·4	31·5	36·	0	·04	·26	·0	2·40	...	Well to be examined
97	Hilliard's Farm ..	„	50·	Ft. Char. ..	0	·60	5·3	22·	21·	0	·01	04	·02	·96	...	Good
	S. Hanningfield															
98	Plough & Sail P. D. P.	Faintly Turbid	52·	Ft. Char. ...	0	1·1	4·9	14·	18·5 mg	0	·07	·14	·02	1·46	...	Unsafe
99	Another P. D. P. ...	„	19·	Char. ...	0	...	1·2	·75	5·	0	·06	·32	·0	1·19	...	Much vegetable matter
100	Windmill P.Ho. Spring	C and C ...	19·	Ft. Char. ...	0	·95	1·6	·75	4·5	0	·02	·02	·0	·80	...	Good
	E. Hanningfield															
101	Rectory Pump ...	Yellow & Turbid	40·	Char. much	n d	·35	4·3	23·	16·	0	2·90	·88	·05	8·	n d	Bad
102	Clarke's „ ...	C and C ...	35·	Ft. Char. ...	n d	·15	2·6	21·	17·	0	·08	·04	·00	·34	n d	Good
	Rettendon—															
103	Pond supplying 2 cot.	Yellow Tint ...	26·	Black Char.	0	n d	3·3	10·	9·5	0	·01	·44	·0	9·4	11·9	Much vegetable matter
104	Mott's Farm (Bored W)	C and C ...	80·	Fused ...	0	·10	27·	25·	8·	0	·24	·04	·0	·8	n d	Good (contains a little
105	Clark's Pump „ ...	„ ...	64·	„ ..	0	·03	25·	24·5	2·4	0	·60	·02	·0	·6	3·5	„ [surface water
106	Bell's Farm „ ...	Faint & Turb...	n d	n d ...	n d	·05	24·9	21·	4·5	0	·04	·02	·0	·78	n d	„
107	Haye's „ ...	Yellow & Turbid	93·	Charred ...	0	1·3	12·4	27·5	18·mg	0	·10	·80	·04	7·2	n d	Contains much impure surface water
	Battles Bridge—															
108	Ry. (Bored Well) ...	C and C ...	80·	Nil. ...	0	·05	23·6	22·	3·	0	·00	·01	·0	·8	...	Good
109	Pitt's „ ...	„ ...	76·	„ ...	0	·16	23·	23·5	5·5	0	·44	·00	·004	1·0	...	„ [water
110	Malting	„ ...	75·	„	0	·08	23·	22·5	6·	0	·40	·10	·008	1·8	...	Contains a little surface

WOODHAM FERRIS.

Population, 673. Area, 4,481 acres.

Soil and subsoil, clay.

The village is on the southern slope of a hill, and many of the houses are drained into the old highway drain, which ends in a ditch some distance from the village. The public pump is at the top of the village, and is often dry in summer. The water is not of very good quality. A dipping place has been made just below the churchyard, where water is more plentiful, but the water closely resembles that from the pump. There are several artesian wells in the lower portions of the parish. One at Mr. Pertwee's farm overflows. At the Railway Station a bored well has been sunk. The water is derived from the sands underlying the London clay, which here is 309 feet in thickness. Near Danbury there is a public roadside pump yielding fairly good water. Bicknacre Hamlet is supplied entirely from a pond fed by a pipe from a roadside ditch. Many houses use the water from old clay pits, and this is often seriously polluted either by cattle or decaying vegetable matter.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... 2·2

" all causes ... ... 15·5

RUNWELL.

Population, 393. Area, 2,059 acres.

Soil, loam ; Subsoil, clay.

No drainage. Water supply deficient. The village, which is small, depends upon the bored well in the Rectory grounds. There are several other bored wells in the parish. There are a number of cottages in Coal Lane and Chalk Lane using rain or brook water. Both fail in summer, and water has to be fetched from a considerable distance. A sample of water taken from a rain water tank at a cottage in which a case of typhoid fever occurred proved to be an infusion of decaying leaves and bird droppings. Several attempts have been made to obtain water, but as yet without success. I have suggested that the brook water should be filtered into a large tank and that a pump be placed at the road side. The brook is fed by a spring, and if the cottagers are prevented from draining into it the water would probably be improved in quality. The water, however, is excessively hard and not well adapted for domestic use, but apparently it is the best obtainable.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... 2·4

" all causes ... ... 12·

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxygen.	
	Woodham Ferris															
111	Public Pump	Faintly Turbid	110·	Ft. Char. ...	0	1·38	13·4	...	30·	0	·025	·16	·0	1·1	8·7	Usable. Well to be cleaned
112	Public Dipping Place	„	94·	„ ...	n d	1·92	11·7	14·	24·	0	·01	·12	·0	1·2	3·4	„
113	Edwin's Hall	„	96·	Black Char.	n d	·58	13·7	26·	n d	0	·005	·12	·3	2·6	6·8	„
114	Pond, "The Wants"...	Deep Yel.colour Fusty odour	42·	„	0	·05	9·6	21·	10·	0	·12	·76	·0	7·	3·9	Very impure
115	„ near Brook Ho.	Ditto	22·	„	0	·03	4·4	12·5	9·	0	·04	·64	·0	6·7	7·8	„
116	Pearle's Farm Art. W.	C. and C. ...	76·	Nil. ...	0	·06	22·2	29·	3·5	0	·25	·01	·0	·7	n d	Good
117	Railway Station, „ ...	Faintly Turbid	103·	„ ..	...	·09	21·9	23·5	12·mg	0	·02	·01	·02	1·0	...	„
	Bicnacre—															
118	Public P. near Danbury	C and C [Turb	16·	Nil. ...	n d	·25	2·2	2·4	7·	0	·04	·03	·0	1·2	n d	Good
119	Pond supplying Hamlet	Very Y. & slight	21·	Charred ...	0	·075	2·7	9·	11·	0	n d	n d	n d	ovr4·	...	Bad
120	Pump at Hutley's Farm	Very Yellow ...	196·	Ruddyfum's	n d	2·8	21·1	21·	27·mg	0	·00	·24	·10	2·9	n d	Unfit for domestic use
121	Trial Boring	Very T. (filter'd for analysis)	210·	Charred ...	0	·33	19·8	9·	33·mg	0	·04	·16	·0	2·2	n d	„ „
122	„	„	26·	Nil. ...	...	..	5·6	...	...	0	·05	·12	...	...	...	Well to be sunk deeper and another sample taken.
	Runwell—															
123	Pease and Langford...	C and C ...	74·	V. F. Char.	0	·036	22·5	23·	4·5	0	·44	·015	·00	1·04	n d	Good
124	Chalk Lane (rain water tank)	Very Y. & Turb. Odour vile	360·	Charred ...	n d	·15	15·	n d	28·	0	·80	·90	·15	8·1	n d	Very impure
125	Rectory Well (Bored)	C and C ...	83·	Nil. ...	0	·11	23·	24·	6·	0	·52	·01	·00	·52	n d	Good
126	Brook, Chalk Lane ...	Turbid & Yellow	181·	Char. ...	0	·15	7·6	23·	42·mg	0	·10	·16	·0	2·8	...	Not fit for domestic use
127	Pond „ ...	„	41·	„ ...	0	·60	2·	11·5	20·	0	·64	·96	·05	8·6	...	Sewage

DANBURY.

Population, 978. Area, 2,950 acres.

Soil light and gravelly; Subsoil gravel.

The village stands upon the highest ground in the county.

No sewers or public scavenging.

There are numerous wells in the village. Early this year a number of cases of "sore throat" occurred, and were attributed to the water used. Most of the sufferers were children of families using a particular well water, which proved to be highly polluted. The owner of the property made several attempts to obtain good water by trial sinkings, but all were abortive. This led to an investigation of the whole village supply, and it was found that most of the wells shewed signs of pollution, and that many failed in summer. As there is a remarkably strong spring of pure water on the Common, I suggested that this should be utilized for supplying the village. A scheme for forcing the water by means of a ram to a tower, and for distributing it to stand pipes in various parts of the parish, has been approved by the Rural Sanitary Authority, and application has been made to the Local Government Board for sanction to borrow the money necessary to carry it out.

Runsell End. A small hamlet about half a mile from Danbury village. When the public supply of water for Danbury was proposed the inhabitants of Runsell Green (or End) asked that the water should be piped down there. It has been decided to do so.

Buell Spring, on the Common, is somewhat difficult of access and far from any possible source of contamination. It is noted for its constant flow and the purity of its water. In summer, when the wells around fail, the water from here is carried or carted long distances. In the driest part of last summer the flow averaged 31 gallons per minute.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... ·8

" all causes ... ... 13·

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxygen.	
	Danbury—															
128	Buell Spring	C and C	17·	Nil.	0	·76	2·1	2·	5·	0	·02	·02	·0	·7	9·	Very good
129	Spring nr Bk Boy P.H.	„	24·	„	0	·70	2·4	2·	6·6	0	·00	·04	·0	·2	n d	„
130	Bull Inn	Yellow tint	45·	Black Char.	0	2·05	4·	5·5	11·	0	·00	·20	·05	4·6	1·3	Bad
131	Post Office	Turbid & Yellow	83·	„	1 trace	1·25	12·6	13·	15·	0	·04	·42	·05	10·7	3·1	„
132	Griffin Inn	Faint Yellow	79·	Char.	0	1·9	11·5	6·5	14·	0	·01	·18	·00	2·	7·6	Unsafe
133	Blacksmiths	„	34·	„	m trace	·76	3·2	2·	10·	0	·01	·10	·0	2·1	3·4	Suspicious
134	Dennis' Pump	„	30·	Nil.	„	·76	3·1	4·	9·5	0	·01	·14	·0	1·7	6·7	„
135	Bakers' „	Bright, Yello'ish	106·	Brown Char.	1 trace	1·2	7·5	n d	28·	0	·94	·28	trace	4·	4·9	Polluted
136	Trial Bore near Bakers	C and C	16·	Black Char.	m trace	·19	·6	2·5	7·	0	·01	·12	·0	1·3	5·8	Yield was very small
137	„ „	Yellow tint	92·	„ „	„	3·4	12·9	6·	21·5	0	5·2	·48	·5	8·	4·2	Sewage
138	Kerridge's Pump	„	96·	„ „	„	1·5	14·	8·	28·	0	·01	·30	·0	3·5	2·9	Bad
139	Tagris' „	„	55·	„ „	?	·13	4·6	9·	13·	0	·02	·28	·0	3·2	4·3	Doubtful
140	Cottage „	„	15·	„ „	0	·48	1·9	2·5	7·	0	·01	·20	·0	2·6	6·	„
141	School Yard	„	16·	Charred	s trace	·09	1·4	n d	n d	n d	·02	·16	·0	4·8	n d	Supply limited, Unsafe
142	Public Pump	„	46·	„	l trace	2·	3·4	6·5	13·5	0	·02	·20	·0	2·9	2·8	Unsafe
143	Rectory „	„	22·	„	trace	1·1	2·1	12·	13·5	0	·02	·19	·0	2·9	2·8	„
144	Pierces „	„	69·	„	„	2·7	8·2	5·5	12·	0	·02	·20	·0	2·6	5·5	„
	Runsell Green—															
145	Well near Beer House	Yellow & Turbid	96·	S. Char.	0	1·65	9·6	9·5	22·mg	0	·01	·10	·0	1·9	7·1	Unsafe
146	Well at Beer House	Clear, Faint Yel.	43·	„	trace	·41	4·5	17·	15·5	0	·02	·05	·0	2·1	3·4	Usable
147	Public Pump	C and C	19·	„	0	·41	2·1	2·	15·	0	·00	·10	·0	2·1	3·	„
148	Dipping Place	Turbid	45·	„	0	·77	4·4	6·5	18·	0	·06	·28	·0	4·2	5·6	Bad
140	„ „ (later)	„	43·	„	...	...	4·3	4·5	11·	0	·10	·32	·0	2·6	3·2	„

STOCK AND BUTTSBURY.

A considerable portion of the village of Stock is in Buttsbury Parish.

Population of Stock in 1881	... ...	614
„ Buttsbury „	... ...	452
Total	... ...	1,066

In all probability the population is slightly less at the present time. The village is fairly compact and stands on an eminence, consisting of a cap of Bagshot sand and pebble beds resting on the London clay. There is no general system of sewerage. Many houses are drained into the highway drains, and as nuisances have arisen from the road gullies these have just been reset and trapped. I recommended recently that the village should be properly sewered, but at a public meeting of the ratepayers it was declared to be unnecessary at present. There are two outfalls to the present drains; both empty into a ditch below the Rectory. There are several w.c.'s in the better houses and a few pail closets. Numerous cesspools pollute the ground water in the village. There is no public scavenging. There are three public pumps in the village, one yielding water which is very impure. The well on the village green yields water of doubtful purity; the Jubilee pump furnishes a much better water. The supply has not been known to fail. Some of the private wells yield highly polluted water. One or two groups of cottages in these parishes are dependent upon ponds for their water supply.

Mean Death Rate from Zymotic Diseases, 1881-90	... ...	1·1
„ all causes	... ...	16·3

MARGARETTING.

Population (1881), 556. Soil, chiefly loam, but beds of sand and gravel occur; Subsoil, clay.

The village consists of one long straggling street. Most of the houses are drained into an old road drain which discharges into a ditch This drain receives the overflow from a large pond and so is flushed by the rain, but a man is paid for flushing it every three months. No public scavenging. Privies, mostly with cesspools. Some stand over ditches.

There is one public pump by the roadside, furnishing an abundant supply of very good water. The water is derived from a spring in the park, which is piped to the resorvoir under the pump. There are a few shallow wells in the village and other parts of the parish, but in some cases water has to be carried a long distance. At the Tye the public draw well has been closed, the water being loaded with Magnesia Salts, yet a supply of this character from a private well furnishes some of the cottages with drinking water. Most of the others use pond water. The wells are 40-60 ft. deep.

Mean Death Rate from Zymotic Diseases, 1881-90	...	·8
„ all causes	... ...	17·5

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Ammonia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxyged.	
	Stock & Buttsbury—															
150	Spring at Buttsbury .	Clear Yel. tint	83·	Nil. ...	0	·47	11·8	27·	40·	...	·00	·14	·0	·40	6·2	Good
151	Well at Cot. nr. King's	Faintly Turbid	n d	Slightchar'd	nd	1·84	n d	n d	...	...	·02	·32	·0	4·	...	Bad
152	Whites Farm [Head	Yellow Tint ...	78·	Charred ...	f trace	·6	13·5	24·5	21·mg	0	·00	·16	·0	3·9	1·8	Suspicious
153	Gt. Blunts	C and C ...	...	...	...	·5	11·6	...	...	...	·00	·08	·0	1·8	...	Good
154	Goat's Wood Spring...	Faint Yellow...	15·	Char. ...	0	·2	3·2	2·5	4·8	...	·04	·06	·0	1·	...	,,
155	Potash Lane ,, ..	C and C ...	18·	Ft. ,, ...	0	·25	1·3	6·	9·	...	·01	·06	·0	1·7	...	,,
156	Hunt's Farm	,, ...	...	...	...	2·9	...	10·5	15·	0	·08	·20	·02	2·4	...	Polluted
157	Pump behind new Cot.	Very Yel. & T.	...	...	...	·8	4·2	n d	n d	t iron	lod'd	n d	·0	6·1	...	Very bad
158	Pond nr. Slough Ho.	Fusty odour ...	...	...	...	...	...	...	...	...	lod'd	...	trace	6·	...	,,
159	Pump at Slough Ho.	Faint Yellow...	139·	Char. ...	trace	2·1	29·8	31·	40·mg	0	·01	·20	·02	2·69	...	Polluted
160	P. Pump near Smithy	Reddish tint ...	70·	Charred ...	0	2·1	10·7	11·	14·	0	·02	·20	·0	2·65	...	,,
161	,, on Green ...	Faintly Turbid	47·	,, ...	0	1·10	5·2	6·	12·	0	·01	·14	·0	2·28	...	Usable
162	Jubilee Pump... ...	Very ,,	49·	,, ...	0	1·15	5·3	1·	14·	0	·02	·04	·0	·47	...	Good
163	Wright's, Stock Road	C and C ...	56·	S. ,, ...	0	1·8	11·2	2·	12·	0	·01	·07	·0	·85	...	,,
	Margaretting—															
164	Hall Pump	Slightly Turbid	29·	Nil. ...	0	·29	2·2	11·	16·	0	·20	·02	·0	·8	5·8	Good
165	,, Well	Clear	28·	,, ...	0	·30	2·3	10·	16·	0	·01	·05	·0	·8	13·3	,,
166	Steven's Farm Pond ..	Quite Thick ...	27·	Blk. Char....	0	·30	4·1	10·5	19·mg	0	1·0+	1·0+	·15	11·2	n d	Sewage
167	Public Pump	C and nly. C .	24·5	Char. ...	0	·30	2·6	14·5	17·	0	·00	·04	·0	·43	n d	Good
168	Fennel's Farm, Mar T.	F. Yel. & Turbid	230·	Nil. ...	0	·55	32·8	33·5	50·mg	0	·32	·12	·10	2·7	5·2	Unfit for use [tic use
169	New Well	C and C ...	103·	Ft. Char. ...	0	n d	23·	n d	60·mg	0	·01	·07	·0	n d	...	Not adapted for domes-
170	Ivybarn Lane Brook	Very Turb. & Y.	27·	,, ...	...	·22	4·6	7·5	12·	..	·24	·16	·0	2·77	...	Polluted
171	Stevens' Farm Pump	Faintly Turbid	83·	,, ...	...	2·85	9·	28·	46·	...	·01	·08	·0	·80	...	Usable
172	Handley Green D.Well	Faintly Yellow	59·	,, ...	...	·15	5·2	32·	38·	...	·02	·12	·0	1·23	...	Good

INGATESTONE AND FRYERNING.

The main portion of the town of Ingatestone is in Fryerning Parish.

Population of Ingatestone in 1881	... ...	926
„ Fryerning „	... ...	704
Total		... 1,630

Estimated population of both parishes in 1890 — 1,700. Subsoil, a stiff loam, save in portions of Fryerning, where the Subsoil—London clay—is capped with the Bagshot pebble beds.

Ingatestone town has a public water supply. The water from a spring or springs in Fryerning is collected in reservoirs, where it is treated with a small amount of Spence's Aluminoferric (2 to 4 grains per gallon), and filtered through flannel, to remove the slight turbidity due to clayey matter in suspension. The tanks or reservoirs are in duplicate, so that the water in one is settling, whilst that in the other is being drawn off. The water reaches the town by gravitation. There are a few wells in the town still in use, but several have been condemned during the year. The water furnished by the public supply, although sometimes slightly turbid, is of good quality and very soft. The supply is intermittent. Many of the well waters are excessively hard. *Vide* Analyses. There are three public pumps, one at Beggars Hill, one at Mill Green, and the third near Fryerning Church. The private wells in Fryerning village are 30 to 60 ft. deep. The scattered cottages at Mill Green are badly off for water.

Ingatestone is sewered, and most of the houses have water-closets, those attached to the cottages being hand flushed. The sewage flows by gravitation into a tank in which most of the solid matter is deposited, and the supernatant liquid is used to irrigate a small farm of nine acres belonging to the Rural Sanitary Authority, but rented by a farmer. The sludge is carted on to the farm at intervals. The system has been in vogue four years, and as yet has given no cause for dissatisfaction, though the land is rather heavy for the purpose.

During the past 10 years the death rates from Zymotic diseases, and from all causes, have been as under:—

Mean Death Rate from Zymotic Diseases, 1881-90 ...	... 2·1
„ all causes	... 18·6

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxygen.	
	Ingatestone & Fryerning—															
173	Ingatestone Hall ...	C and C ...	22·	Nil. ...	0	·16	1·4	6·	11·	0	·00	·02	·0	·4	7·3	Very good
174	P. Supply, unfiltered	Turbid & Yellow	19·	V. F. Char.	0	·09	2·6	4·5	n d	n d	·04	·08	·0	·9	7·6	Good
175	„ filtered ...	Faintly Turbid	16·	Nil. ..	0	·09	2·3	4·5	4·5	n d	·02	·10	·0	·9	8·3	„
176	Dr. Hodson's Pump ...	Faint Yel. tint	123·	Char. ...	0	·27	15·	39·5	36·mg	0	·56	·16	·0	1·9	n d	Polluted
177	St. Leonard's Lodge...	Faintly Turbid	25·	Nil. ...	n d	·9	3·6	15·	15·	t iron	·04	·05	·0	·2	n d	Good
178	Riley's, Truelove Lane	„ & Yel.	130·	Ft. Char. ...	n d	2·4	24·5	1·25	14·	0	·02	·12	·0	1·1	n d	Much oxidized animal matter
179	Wilson's „	Turbid & Yellow	58·	Char. ..	n d	·2	8·4	20·5	16·	0	·04	·18	·0	2·55	n d	Unsafe
180	Avenue Terrace ...	Faintly Yellow	62·	„ ...	v m t	·6	9·8	23·5	18·	0	·02	·24	·0	1·5	n d	„
181	Powell's Pump ...	„	128.	Nil. ...	0	·6	7·9	19·5	34·	0	·01	·10	·0	1·3	n d	Not adapted for domestic purposes
182	Wells and Sheds Farm	C and nly. C ...	55·	Ft. Char. ...	0	1·9	6·	19·5	26·mg	0	·01	·06	·07	1·2	n d	Much oxidized sewage
183	Woodham's Farm ...	„	13·	„ ...	0	·49	n d	n d	n d	0	·48	·08	·15	1·	3·5	Good
184	Fryerning P. P. ...	Faintly Turbid	18·	Char. ...	...	1·05	4·9	1·	9·5	...	·01	·06	·0	·91	...	„
185	Mill Green „ ...	C and C ...	31·	Ft. Char. ...	...	1·52	4·6	2·	12·	...	·01	·03	·0	·66	...	„
186	Beggars Hill „ ...	Faintly T. & Y.	16·	„ ...	...	·11	1·4	3·5	7·	...	·02	·10	·0	·73	...	„
187	Keeper's Cot., Writtle Park Spring ...	C and C ...	28·	Nil. ...	...	·35	3·1	6·	11·5	...	01	·02	·0	·32	...	„
188	Reddendyke's Farm...	Very Yellow ...	93·	Char. ...	...	·34	11·2	26·5	30·	...	02	·24	·05	4·17	...	Unsafe. Well to be examined

GREAT WALTHAM.

Population, 2,349. Area, 7,457 acres.

Soil of mixed character; Subsoil, gravel and clay.

A portion of Little Waltham village is in Great Waltham parish. The village of Great Waltham is supplied with water from a number of stand pipes. Water is pumped by a ram from a spring near the village into a tank on a tower suitably placed, from which it passes by gravitation to the stand pipes. The supply is abundant and of good quality.

Many of the houses are connected with the highway drains, which discharge at two or three points into the brook. There are a few pail closets, but more privies with cesspools. Great Waltham is one of the largest parishes in the county, and besides the village contains several small Hamlets, Chatham Green, Littley Green, Rolfey Green, etc.

Ford End consists of about 50 cottages and a Church, etc. There is a public pump near the Church yielding a fairly pure water, and water from a spring is piped to the roadside at the other end of the Hamlet. Several private wells.

Broads Green.—About one dozen houses pay Mr. Brown 1½d. per week for two buckets of water daily from his pump.

North End.—A group of houses derive their water supply from a small pond or dipping place, very liable to pollution.

Chatham Green.—A small Hamlet supplied with water by a pump from a well sunk recently by Mr. Tufnell, who owns most of the land and cottages here.

Rolfey Green.—There are about a dozen houses here using filthy pond water. Many of the children suffer from worms.

Mean Death Rate from Zymotic Diseases, 1881-90 ... 1·8

" all causes ... ... 14·9

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.							In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxygen.	
	Gt. Waltham—															
189	Fanner's Farm Pump	C and C ...	65·	Ft. Char. ...	0	1·15	9·4	12·5	15·	0	·01	·09	·0	·80	12·5	Good
190	Rolphey Green Pond	S. Turbid ...	21·	Blk. „ ...	0	·06	1·5	14·	15·	0	·06	·28	·0	2·9	22·5 17·3	Polluted with vegetable matter
191	Peverel Farm Pump...	C and C ...	86·	Ft. „ ...	0	2·65	10·5	20·5	33·	0	·02	·06	·0	1·5	5·7	Contains much oxidized sewage
192	Hills' Farm Pump ...	„ ...	38·	Nil. ...	0	·70	2·	25·	20·	0	·01	·00	·0	·45	8·3	Very good
193	Dannatt's Farm Pump	„ ...	37·	Ft. Char. ...	0	·40	3·1	n d	20·mg	0	·01	·06	·0	·27	n d	„
194	The Cottage, Howe St.	„ ...	58·	„ ...	0	·13	7·5	20·	20·	0	·00	·04	·0	1·	3·1	Good
195	Public Supply ...	Faintly Turbid	38·	Nil. ...	0	·70	1·7	19·5	29·	0	·03	·02	·0	·35	9·6	„
196	„ when affected by iron pipes	Yellow & Turbid	31·	„ ...	0	·67	1·8	21·5	21·	t iron	1·60	·04	2·0	3·2	1·6	Nitrates being reduced to Nitrites & Ammonia
197	Hyde Road	Faintly Turbid	48·	Char. ...	0	·20	...	...	...	...	·02	·08	·0	2·	4·	Usable
198	Chatham Green Pump	C and C ...	64·5	Nil. ...	...	·40	13·	22·5	31·mg	...	·06	·04	·00	·23	...	Good
199	Littley Green Spring	„ ...	29·	„ ...	...	·25	1·9	15·	19·	...	·01	·01	·00	·36	...	„
200	„ Park Hill Ho.	„ ...	40·	„ ...	...	·11	2·1	22·	26·	...	·02	·03	·00	·66	...	„
201	North End Spring ...	Faintly T. & Y.	35·	F. C. ...	...	·10	1·4	19·5	29·	...	·08	·06	·00	·80	...	„
202	Broad Green Pump ...	C and C ...	63·	„ ...	...	·95	6·3	22·	33·	...	·02	·04	·00	·50	...	„
203	Old Lane Spring ...	„ ...	38·	„ ...	...	·40	2·	18·	22·mg	...	·04	·03	·00	·98	...	„
	Ford End—															
204	Armstrong's Spring ...	Very Turbid ...	38·	Nil. ...	n d	1·4	3·	18·5	26·	0	·02	·07	·0	·7	n d	Usable
205	Public Pump	C and C ...	55·	„ ...	n d	·4	1·4	21·	26·	0	·06	·06	·0	·9	n d	Good
206	Leech's Pond... ...	Yellow & Turbid	15·	Charred ...	n d	·2	1·9	11·5	12·	0	·08	·35	·0	3·6	n d	Polluted

BROOMFIELD

Population 855. Area 2,215 acres.

Soil, loam, gravel, and clay ; Subsoil, sand, marl, and clay.

A long straggling village without a public water supply. Most of the cottages have pail closets, the pails being periodically emptied by a public scavenger. About forty-five houses drain into an open ditch or brook. In consequence of complaints of odours arising from the grids of the highway drain, proper gulley traps have been inserted and the sewer outfall extended some yards. To properly sewer the village would entail considerable expense, and a committee recently appointed to consider the suggestion decided merely to put in the gulley traps just mentioned, and extend the outfall of the road drains further from the houses.

There are very many private wells in the village, some of which are seriously polluted. Few of them yield water of really good quality. The cottages, 8 to 10, in the "Clay Pits," use a surface water, which, as will be seen from the analysis, contains a considerable amount of organic matter, probably of vegetable origin.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... 1·6
" all causes ... ... 13·6

LITTLE WALTHAM.

Population, 580. Area, 2,227 acres

Soil of mixed character ; Subsoil, gravel and clay.

The village has no proper sewers, but the highway drains convey the slops into a ditch which empties itself into the river close by. It is well supplied with pail closets, and the pails are periodically emptied by a public scavenger. Some of the houses have w.cs. connected with cesspools. Water from a spring flows into a tank and thence to stand pipes in the village. The water is of excellent quality. All the well waters examined were of good quality.

Warner's.—There are about eight cottages here badly off for water, the only source of supply being a pond, the water of which is very impure.

Blasford Hill.—A number of houses on the road side between the village of Broomfield and Little Waltham. Water from private pumps. Many cottages supplied from the pump at the Malting, which yields a fairly good water.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... 1·4
" all causes ... ... 18·2

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxygen.	
	Lt. Waltham—															
207	Blue Posts Pump ...	C and C ...	45·	Ft. Char. ...	0	·84	5·6	14·5	15·	0	·00	·04	·0	1·3	10·6	Good
208	Back Road	Ft. Y. & Turbid	32·	Nil. ...	0	·15	1·3	10·	14·4	n d	·09	·06	·05	·6	9·1	„
209	Public Supply ...	C and C ...	33·	„ ...	0	·85	1·55	13·5	16·5	0	·01	·05	·0	·40	n d	„
210	Blasford Hill Pump ..	Ft. col. & Turb.	49·	Ft. Char. ...	0	·85	3·7	10·5	15·	0	·02	·09	·0	1·08	n d	„
	Broomfield—															
211	Ayletts	C and C ...	43·	Ft. Char. ...	0	·22	2·4	26·5	19·	0	·01	·06	·0	1·	6·3	Good
212	Cottage near	Yellowish ...	56·	Char. ...	0	·45	4·6	21·	24·	0	·02	·20	·0	5·3	1·2	Vegetable contamination
213	Coffee Tavern Well ...	„ ...	135·	Brown Char.	0	7·2	8·3	8·	40·mg	0	·04	·48	·0	3·2	5·2	Very impure
214	„ 3 months later	„ ...	137·	Nil. ...	0	3·6	9·	n d	22·	0	·04	·32	·11	3·4	n d	„
215	Marriage's Pump ...	Faint Yellow..	50·	S. Char. ...	trace	1·1	3·1	n d	16·	0	·01	·10	·0	·84	n d	Usable
216	Parsonage Farm ...	Clear	38·	Ft. Char. ...	0	·58	3·	24·	28·	0	·005	·07	·0	1·4	1·8	Good
217	Cottage opp. Church...	Faint Yel. & T.	47·	„ ...	v s t	1·1	3·8	n d	16·	0	·04	·12	·0	1·8	n d	„
218	Clay Pits	Yellow & Turbid	24·	Char. ...	n d	·02	2·1	10·5	12·5	...	·04	·26	·0	3·43	...	Polluted
219	Parsonage Green ...	C and C ...	45·	Ft. Char. ...	n d	·25	4·	25·	26·5 m	g 0	·04	·04	·02	·73	...	Good
220	Crozier's Yard ...	Nly. Colourless	110·	„ ...	n d	2·38	8·6	8·5	32·mg	0	·01	·12	·0	1·44	...	Unsafe

ANALYSES OF WATERS

SUPPLYING THE

VARIOUS VILLAGES AND HAMLETS

IN THE

MALDON

RURAL SANITARY DISTRICT.

CRICKSEA.

Population, 147. Area, 958 acres.

Soil and Subsoil, stiff clay.

The village consists of a small group of houses near the church. Water is obtained from the public pump at Ostend, a small hamlet in Burnham Parish. It was at one time proposed to extend the Burnham Water Mains to Ostend, but the expense was prohibitive.

Mean Death Rate from Zymotic Diseases, 1881-90 ...	2·7
„ all causes	14·3

MAYLAND.

Population, 246. Area, 2,066 acres.

Soil, heavy loam ; Subsoil, clay.

No village. No public water supply. Only water available in most cases is rain, collected from roofs and in ponds. A few cottages obtain water from the Althorne pump. One or two farms have bored wells.

Mean Death Rate from Zymotic Diseases, 1881-90 ...	1·6
„ all causes	10·9

ALTHORNE.

Population, 319 in 1881, but probably not more than 270 at the present time. Area, 2,485 acres, 757 of which is water. Soil, strong loam and clay ; Subsoil, stiff clay.

There are two groups of houses, one on an eminence, "Higher Althorne," the other at the foot of the hill, "Lower Althorne." Both places are very badly off for water, ponds being the chief source of supply. There is one well in Lower Althorne, its depth is about 100ft. The water contains a considerable amount of magnesia, and the supply is limited. There are several bored wells in the parish, but the water is so loaded with saline matter as to be useless, and the pumps have been allowed to get out of repair. At the east end of the parish there is a small bed of sand in which good water is found, and the Rural Sanitary Authority have fixed a pump here, but it is too far from the populous portions of the parish to be of much service. It is used more by the inhabitants of Mayland Parish. During the past year a filter bed, with tank and pump, have been fixed near the Vicarage to filter water from a pond close by. At the Railway Station ($\frac{3}{4}$ of a mile from the Vicarage) a deep well has been bored, but the water is so brackish as to be scarcely usable.

Mean Death Rate from Zymotic Diseases, 1881-90	1·6
„ all causes	21·6

STEEPLE.

Population, 527. Area, 2,947 acres.

Soil and Subsoil, clay.

The village consists of one long street of straggling cottages. The sole water supply is a bored well belonging to the Rural Sanitary Authority. The water shews signs of surface contamination. I am recommending the authority to have the well opened and examined. At a distance from this pump, pond or rain water is occasionally used. Two or three farms have deep bored wells supplying the farms and few cottages around.

Only one group of about a dozen cottages is sewered. Until recently the privies were close to the cottages, but garden plots having been obtained behind, they have now been removed to a safe distance.

Mean Death Rate from Zymotic Diseases, 1881-90	1·7
„ all causes	15·7

LATCHINGDON.

Population, 549. Area, 4,216 acres.

Soil and Subsoil, strong clay.

The village consists of one long street and is badly supplied with water. There are several bored wells in the parish, but some of them yield water loaded with Sulphate of Magnesia, and totally unfit for domestic use. Others shew signs of pollution with surface water. Nix's pump (bored well) supplies most of the village. The well has been opened and repaired since the water was last examined, and doubtless it is now of better quality. The Rural Sanitary Authority has decided to sink a well here, as there was a water famine during the past summer. Ponds are not common ; where they occur the water is often used for domestic purposes.

There is no system of drainage. Slops are thrown on to the ground at the rear of cottages, and the water finds its way into a marsh ditch, discharging into the river. The privies are close to the cottages through want of ground at the rear. The Rural Sanitary Authority is trying to obtain ground at the back to allot to the cottages.

Mean Death Rate from Zymotic Diseases, 1881-90... ...	1.5
„ all causes	15·1

MUNDON.

Population, 320. Area, 3,101 acres.

Soil and Subsoil, clay.

A scattered village supplied chiefly with water from a bored well belonging to a private owner.* Unlike the water from similar wells at Latchingdon and Althorne, it contains no appreciable trace of Magnesia, and is admirably adapted for domestic purposes. There are two or three other bored wells in the parish from which the cottages near are supplied.

Mean Death Rate from Zymotic Diseases, 1881-90	1·0
„ all causes	16·6

* In the Tables this is erroneously described as a public pump.

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxygen.	
	Steeple—															
1	P. P. (Bored Well) ...	F. Yel. & Turb.	98·	Ft. Char. ...	...	·25	35·	25·	6·5	0	·60	·12	·18	1·26	...	Contains a little surface water
	Latchingdon—															
2	Nix's Pump B. W. ...	Slightly Turbid	86·	Fused ...	0	·28	27·	n d	n d	0	·22	·06	·0	2·8	3·9	Usable
3	Jollip's „	C and C ...	81·	Fused & F.C.	0	·08	28·	26·	3·	0	·28	·03	·0	1·4	3·7	Good
4	Ram's „	Turbid & Yellow	39·	Brown Char.	m t	·33	7·6	17·	11·	0	·04	·40	·0	7·5	6·1	Polluted
5	Hitch's „	Little sediment	582·	Fused ...	m t	2·88	71·	34·5	load'd with mg. salts	0	·04	·32	·8	6·2	4·5	A mineral water
	Althorne—															
6	Moat	Very T., ft. odr.	n d	Charred m.	n d	·23	3·	n d	n d	0	·04	·62	·0	11·	10·8	Bad
7	Rector's Pond ...	Faintly Turbid	31·	„	0	n d	2·6	n d	n d	0	·04	·50	·16	7·	9·7	„
8	Black Lion	„ ...	110·	Slight Char.	?	·58	28·4	24·5	much	m 0	·10	·06	·0	2·4	9·3	Usable
9	Railway Bored Well ..	C and C ...	271·	Ft. Brown...	0	·23	32·	11·	25·mg	0	·01	·06	·0	1·8	5·4	
10	Pump near Lodge ...	„ ...	49·	„	0	·35	11·1	6·	n d	0	·02	·08	·0	1·3	n d	Good
	Cricksea—															
11	P. P. (Ostend) ...	Yellow & Turbid	46·	Charred ...	...	·46	25·4	15·	11·mg	...	·02	·12	·0	2·3	...	Usable
	Mayland—															
12	Rainwater tank at Sch.	Faintly Y. & T.	142·	Ft. Char. ...	...	1·5	22·8	13·	32·mg	...	·03	·16	·0	3·1	...	Doubtful
	Mundon—															
13	Public Pump... ...	C and C ...	89·	Nil. ...	0	·06	26·	26·5	3·5	...	·20	·03	·02	·71	n d	Good

BURNHAM-ON-CROUCH.

Population, 2,130 (probably 2,300 now.) Area, 5,523 acres, much of which is marsh land. Soil, a light loam ; Subsoil gravel.

The village or town lies on the north bank of the Crouch, which here is about three quarters of a mile in width.

In 1887 the Rural Sanitary Authority constructed water works for the supply of the town. The water is pumped from a well into a tower and supplies a number of stand pipes in the town. The water is now being laid on to a considerable number of houses. The supply is intermittent. The water is admirably adapted for all domestic purposes.

There is a complete system of sewerage, and, with the exception of about 1 doz. houses, all are connected therewith and have water closets. The closets are outdoor and in nearly every case hand flushed. The sewage, after passing through tanks to deposit the suspended matter, is discharged through the sea wall into the river, a little distance below the town. The sewers are flushed automatically.

Prior to the establishing of the water works, Diarrhœa had for years been a fruitful source of mortality in Burnham. Since then only one such death has been recorded. From 1882-7 there were 13 deaths from Diarrhœa and four from Typhoid Fever; from 1888-90 there has only been one death from Diarrhœa and one from Typhoid.

During the year 1888, when the Railway was being constructed, a large number of navvies resided in the parish, and there was a considerable increase in the number of deaths registered, in part caused by the introduction of Diphtheria, which in 1888-9 caused 15 deaths. This year not a single case has been reported, and we may reasonably hope that the town will again enjoy that complete immunity from the disease which had continued for so many years.

Mean Death Rate from Zymotic Diseases, 1881-90 ...	2·2
„ all causes	14·9

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosophates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hard. ness.	C'pper Lead orIron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxyged.	
	Burnham—															
14	Town Supply... ..	C and C ...	31·	Nil. ...	0	·60	3·5	8·	14·	0	·005	·05	·0	1·4	n d	Good
15	Steele's	„ ...	45·	„ ...	0	·98	5·	11·	18·	0	·06	·05	·1	·9	n d	„
16	„ Inn [vedere rd	„ ...	49·	„ ...	0	·59	4·6	11·	16·	0	·005	·04	·0	1·	n d	„
17	Spooner & Davis, Bel-	Clear	74·	Charred ...	0	1·16	6·5	14·	21·	0	·01	·21	·0	2·4	n d	Suspicious
18	J. Richmond's ..	„ ...	81·	„	v. f. t.	·84	10·5	17·5	29·	0	·11	·11	trace	1·3	n d	„
19	P. „ Quay ..	Faintly Y. & T.	111·	„	„	·66	21·9	21·5	36·	0	·64	·12	„	1·8	n d	Bad
20	Bell's Pump	„ ...	131·	Nil. ...	v. l. t.	2·31	14·5	18·	50·	0	·03	·19	·0	2·	n d	„
21	C. Auger's	„ ...	79·	Ft. Brown...	v. f. t.	·27	5·9	17·5	36·	0	·32	·13	trace	1·8	n d	„
22	Silver Lane	C and C ...	43·	Nil. ...	0	·68	3·9	n d	22·5	0	·01	·07	·0	·53	6·6	Good
23	D. Hawkins'	Yellow tint ...	107·	Ft. Brown...	l. trace	1·38	13·6	14·5	35·	0	·48	·14	·03	1·7	2·1	Bad
24	Ship Lane	„ ...	139·	Yellow tint	0	1·73	15·	20·5	52·	0	·02	·14	·0	2·4	7·2	„
25	Ambrose	„ ..	117·	Brown „	0	1·91	11·7	21·	48·	0	·01	·20	·66	2·6	6·3	„
26	Barracks	„ ...	80·	„	0	·69	7·8	11·5	35·	0	·03	·12	·0	2·7	2·8	Suspicious
27	M. A. Auger	„ ...	117·	„	s. trace	·69	15·	21·5	40·	0	·02	·12	·0	1·9	4·1	„
28	Smith's Exors. ...	„ ...	110·	Char. ...	„	1·16	12·2	13·5	48·	0	1·6	·56	·0	3·3	1·8	Bad
29	Middleton	„ ..	105·	„ ...	l. trace	1·02	14·7	17·	30·	0	1·16	·40	·02	4·25	6·5	„
30	C. Lamb	„ ...	145·	„ ...	v. l. t.	2·42	18·	16·	32·	0	·80	·30	·0	4·6	3·7	„
31	Perry's	„ ...	77·	B. Char. ...	0	·73	12·2	n d	25·	0	·02	·09	·0	1·	5·9	Good
32	Dilliway's	„ ...	61·	F. „ ...	0	1·64	8·5	12·	17·	0	·02	·10	·06	·7	5·2	Unsafe
33	Providence	Clear, Yellowish	95·	Nil. ..	0	3·04	9·2	16·	28·	0	·20	·10	·0	1·8	9·2	Bad
34	Ship Lane	„ ...	130·	B. Char. ...	?	2·87	22·5	16·	24·	0	1·00	·18	·09	1·9	2·8	„
35	King's Arms	„ ...	140·	„	?	2·31	17·7	19·5	23·	0	·32	·18	·01	3·	2·	„
36	White Hart	„ ..	115·	„	...	1·45	26·	30·	30·	0	1·40	·10	·07	1·9	2·5	„
37	High Street	„ ..	19·	„	m trace	·69	3·4	4·5	7·	0	·01	·06	·0	1·5	6·6	Good
38	Prior's Cottage ...	, ...	98·	Char. ...	„	1·65	15·6	16·	20·	0	2·00	·32	·0	6·5	n d	Bad
39	Harris's	Turbid & Yellow	103·	B. „	trace	2·76	16·6	27·5	36·	0	·05	·06	·0	1·8	2·8	Not fit for domestic use
40	Newman's	C and C ...	77·	„	0	1.38	8·	21·	26·	0	·90	·10	·15	2·2	1·	„ „

SOUTHMINSTER.

Population, 1,311. Area—Land, 6,315 acres; Water, 1,385.

The following is an extract from a special report on the water supply of Southminster, presented to the Rural Sanitary Authority in December of this year:—

"The greater portion of the inhabitants reside in the village, which is fairly compact. Most of it stands on a patch of sand and gravel overlying the London clay, and the water supply is derived from shallow wells sunk in this gravel. The subsoil has become saturated with filth, which has percolated from the cesspools, drains, manure spread on gardens, &c., as is shown by the analyses of the samples of water taken from the wells. At the outskirts of the village the water improves considerably in quality, and in some places is very abundant. One part of the village stands on a stiff loam, and has to be supplied with water from the village pump. The same applies to very many of the farms.

"There are now three public pumps. One was recently erected in Cripplegate, and yields a fairly good water, in quantity about sufficient to supply the few cottages around; a second is in North-street, and yields water which is not sufficiently pure for domestic purposes. At the beginning of this year I reported that this water was bad, and the well was opened, cleaned out, domed over, and well puddled outside with clay. The quality of the water was somewhat improved thereby, but even now it is not good. The third pump is the principal one; it is at Priestwell Head, near the Railway Station. This yields a good water, which is fetched in butts long distances to supply farms and for sale in the village and outskirts.

"In my report for the year 1889, I stated that the operations of the Railway Company had seriously affected the supply from this latter well, and that there was every probability of there being a partial failure in the ensuing summer. I also suggested the advisability of attempting to obtain some other supply and of rendering it available for the whole village. In consequence of representations made to your committee by the guardians of the parish and others, the matter was allowed to stand over. My surmise, which was founded upon the reports of your

surveyor and my own observations, however, proved correct. Early in the summer it was found that the supply was becoming inadequate, and an attempt was made to increase it by enlarging the reservoir to the pump. Still the supply is insufficient, and an arrangement is now being made for a temporary supply from the Railway Company's tank, to be paid for at the rate of 1s. per 1,000 gallons.

"The number of the wells in the village has been counted by the Surveyor. He found 90 in all, but of these 15 are not used for domestic purposes, and seven others (still used, I am told) were condemned by my predecessor, Dr. Downes. I have examined 25 samples taken from as many different wells, and find 17 of them so polluted that I shall be obliged to ask you to take the necessary proceedings to have the wells closed and to compel the owners to obtain a wholesome supply, unless the proposed waterworks are proceeded with forthwith. The other eight samples are impure, but I cannot condemn them until a better supply is rendered available, when I shall unhesitatingly do so. Your inspector is collecting samples from other wells in the village, but it is absolutely certain, from the nature of the soil in which the wells are sunk, that all must be more or less polluted. Were the village wells to yield good water there is still a considerable number of houses which have to be supplied by water purchased from a man who carts it round and retails it at three pails a penny. This is a most unsatisfactory arrangement, and engenders filthy habits, which are certainly not conducive to health."

Since the date of this report about 20 other waters have been analysed, all of which were more or less impure.

Three brick barrel sewers convey the sewage of the village to as many different outfalls. There are a number of w.cs. connected. Until recently there were no flushing arrangements or ventilation, but both defects are now being remedied. The house connections are probably in many cases defective.

Mean Death Rate from Zymotic Diseases, 1881-90	1·1
,, all causes	16·4

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxygen.	
	Southminster—															
41	Priesthead P. P. ...	C and C ...	33·	Ft. Char. ...	...	1·20	2·6	3·5	13·	...	·03	·04	·01	1·09	...	Good
42	P. Pump near Street	Yellow & Turbid	28·	Charred ...	trace	·40	1·8	8·	10·5	0	·24	·12	·05	1·8	4·9	Bad
43	P. P., Cripplegate ...	Clear & Bright	64·	Nil. ...	0	·92	2·4	7·	6·8	0	·02	·06	·0	none	7·6	Good
44	English's Pump ...		n d	n d ...	n d	1·11	12·6	17·	11·	0	·03	·48	l t	3·6	n d	Bad
45	P. Pump near ...	Faint Brown ...	34·	Charred ...	trace	1·16	1·5	4·	18·5	0	·02	·30	·0	2 8	n d	,,
46	Gibbon's Pump ...	Faint Yellow...	55·	,,	,,	·99	4·3	16·	19·	0	·05	·14	·13	2·3	3·7	Suspicious
47	Bishop's Cottage ...	Yellow & Turbid	...	,,	,,	·80	4·2	30·	36·	0	·01	·40	·13	6·	4·3	Bad
48	Steele's Pump ...	Clear & Bright	69·	Slight Char.	0	1·98	6·3	12·5	17·	0	·24	·10	·019	1·9	3·5	Polluted
49	Bishop's New Cottage	Turbid & Yellow	51·	Charred ...	0	·81	4·8	27·	21·	0	·24	·16	·25	2·8	2·6	Bad
50	Queen's Road... ...	Clear	38·	Ft. Char. ...	0	1·61	4·2	13·	15·	0	·02	·08	·0	1·6	9·3	Usable
51	Caidge's Farm ...	C and C ...	22·	,, ...	n d	·10	1·4	9·	7·5	0	·03	·09	·0	1·1	n d	Good
52	The Limes	Faintly Turbid	118·	Nil. ...	m trace	4·6	14·2	13·	22·mg	0	·02	·20	·0	2·4	4·3	Bad
53	Hedgley's Pump ...	Faintly Yellow	62·	Charred ...	n d	1·1	4·6	25·	15·mg	0	·04	·20	·01	2·7	n d	,,
54	Railway Tank ...	C and C ...	53·	Nil. ...	0	·7	4·4	4·5	11·	0	·01	·07	·0	·46	n d	Good
55	Braybrook's	Faintly Yellow	148·	,, ...	0	2·4	13·4	4·	36·	0	·02	·18	·0	1·4	n d	Suspicious
56	G. Coombes'	Yellow Tint ...	100·	,, ...	0	1·5	11·8	20·	32·mg	0	·01	·24	·0	2·3	n d	,,
57	Thompson's	Very Yellow ...	103·	,, ...	n d	1·5	17·	15·	23·mg	0	·06	·28	·0	3·4	n d	Bad
58	Spells'	,, ...	122·	,, ...	n d	1·8	14·	22·	22 mg	0	·03	·32	·0	2 86	n d	,,
59	Cant's	Yel. & Ft Turb.	135·	,, ...	n d	1·5	21·2	24·5	26·mg	0	·05	·18	·02	2·	n d	Suspicious
60	Preston's	Clear but Yel.	116·	Ft. Brown...	n d	2·1	14·8	15·	22·mg	0	1.ab	·20	·70	2·7	n d	Bad
61	Summers'	,, ,,	170·	Nil. ...	n d	4·5	17·2	18·	38·mg	0	·94	·24	·0	2·3	n d	,,

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Am'nia	Organic ditto.	Nitr's Nitrogen.	Oxygen used.	Free Oxygen.	
	SOUTHMINSTER—CONTINUED															
62	Proposed sup., Railway	C and C ...	31·	Ft. Char. ...	0	·30	4·	4·5	8·	0	·00	·12	·0	1·3	n d	Good
63	Luckin Smith's ...	Very Yellow ...	144·	Charred ...	?	2·8	22·2	22·5	27·mg	0	·80	·48	·06	6·7	n d	Bad
64	Pro. sup., Gravel Pits	Ft. Yel. & Turb.	34·	,, ...	?	·45	7·6	14·5	19·	0	·80	·10	·01	1·9	n d	Suspicious
65	Hurrell's, near Church	C and C ...	69·	Ft. Char. ...	?	3·2	4·4	11·	27·5	0	·02	·12	·00	2·	n d	Very suspicious
66	Winterbottom's ...	Y. & Flocculent	92·	,, ...	?	2·4	7·2	15·5	36·	0	·01	·22	·0	2·7	n d	Bad
67	Carter's	Faint Yellow..	172·	,, ...	1 trace	3·5	31·	19·	9·mg	0	·09	·28	·0	3·	n d	,,
68	Bishop's Public House, Hall Road	,, ...	96·	Charred ...	0	1·5	13·5	18·5	23·	0	·12	·20	·0	1·9	n d	Suspicious
69	Clarke's	,, ..	72·	,, ...	0	1·55	9·4	27·5	25·	0	·02	·18	·0	2·6	n d	,,
70	Harvey's	Yellow tint ...	79·	,, ...	0	1·5	10·6	17·5	26·5	0	·68	·24	·20	3·9	n d	Bad
71	Hurrell's Cottages ...	Faint Yellow...	112·	Nil. ...	0	4·5	14·	18·	36·	0	·48	·20	·25	3·3	n d	,,
72	Spell's, Burnham Road	,, ...	46·	Ft. Char. ...	0	·55	5·8	12·	11·5	0	·02	·15	·0	1·24	...	Suspicious
73	Pipe ,, ...	Quite Y. & Ft. T.	51·	,,	0	·50	5·	5·	14·	0	·08	·20	·0	4·1	...	,,
74	C. Hurrell, North St...	Faint Yellow...	138·	,,	0	·85	20·5	21·5	34·mg	0	·60	·18	·01	2·24	...	Bad
75	School House... ...	,, ..	118·	,,	0	1·20	11·9	11·	30·mg	0	·06	·16	·0	1·15	...	Suspicious
76	Dunn, North Street ...	,, ..	118·	,,	0	1·15	15·6	21·	28·mg	0	·13	·15	·01	1·65	...	,,
77	Hazelton & Quincy ...	,, ...	115·	,,	0	1·60	13·2	15·5	31.mg	0	·05	·14	·10	1·53	...	,,
78	Borsey, Burnham Road	Yellow tint ...	175·	,,	0	·45	17·4	19·5	38·mg	0	·02	·24	·08	4·82	...	,,
79	Pipe's	Very Yellow ...	106·	,,	0	3·3	7·4	10·5	28·mg	0	·01	·22	·0	3·97	...	Bad
80	Harvey's	Ft. ,, ...	186·	,,	0	3·5	56·8	25·	38·mg	0	1.ab	·36	·0	3·27	...	,,
81	Totham's	,, ...	90·	,,	0	2·1	9·6	12·	30·mg	0	·32	·12	0	3·02	...	,,

BRADWELL.

Population, 999. Area, 5,012 acres of land, and about the same amount of foreshore and water.

Soil, a rich loam; Subsoil, clay. The village is on a promontory at the mouth of the Blackwater. Water is fairly abundant and derived from the public and numerous private pumps. The wells are shallow, and nearly all show signs of pollution, some of them to a serious extent. The public pump at the end of the village yields a very good water. From its position Bradwell should be one of the healthiest parishes in our district; that it is not, is probably due to the general use of such polluted water.

The village is partially sewered. There are two outfalls, one near the Cemetery, and the other in the Allotments.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... 1·3
" all causes ... ... 14·6

TILLINGHAM.

Population, 1,012. Area of land, 4,646 acres, with nearly as much water and foreshore. Soil, various; Subsoil, gravel and loam.

The village is very compact and lies about two miles from the sea. It is supplied with water by two public pumps and a number of shallow wells. The public pumps yield a good supply of excellent water. There is a third public pump yielding a polluted water, which is only used for flushing the sewers.

For two or three months every summer to economise the water, the public pumps are kept locked during the middle of day. At such times water raised from a brook, by means of a pump, furnishes most of the water used in the outlying portions of the parish.

The village is sewered, and there are a few w.c.'s connected. The sewage is conveyed to a small plot of land and utilized for irrigation. The sewers are flushed periodically by tanks with automatic syphons.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... ·9
" all causes ... ... 15·2

ST. LAWRENCE.

Population, 212. Area, 2,004 acres of land and 471 water. Soil and Subsoil, loam. Houses very scattered. Water from shallow wells or from ditches.

ASHELDHAM.

Population, 167. Area, 2,398 acres, of which 700 is water. Soil, loam and gravel; Subsoil gravel.

The village, if such it can be called, consists of a small group of cottages. Water is obtained from a roadside pump, belonging to the Rural Sanitary Authority, and is of excellent quality. There are many scattered houses dependent upon a brook or ponds for water.

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxygen.	
	Bradwell—															
82	Public Pump	C and C ...	53·	Charred ...	n d	·65	5·6	14·	13·5	0	·02	·08	·00	1·6	...	Good
83	Beacon Cob	„ ...	102·	Black Char.	m t	·23	18·5	29·5	28·5	0	·02	·22	·0	3·	6·7	Suspicious
84	Orpland „	Faint Yellow...	85·	„ ...	n d	1·2	10·7	20·5	28·	0	·05	·22	·0	2·2	...	Unsafe
85	Jay's „	Very Yellow ...	222·	Brown Char.	n d	6·9	29·8	26·	30·	0	·36	·30	·20	3·1	...	Bad
86	Turner's Pump ...	„ ...	145·	Charred ...	n d	4·5	19·4	26·	28·mg	0	·80	·50	1·3	4·1	...	„
87	„ (later date)	„ ...	145·	„ ...	n d	2·1	19·	26·	28·mg	0	lod'd	·32	imqy	8·	...	„
88	King's Head	Yellow and C...	142·	„ ...	loaded	3·6	19·4	18·5	17·	0	lod'd	·50	·09	4·+	...	„
89	National School ...	Ft. Yellow ...	80·	Brown Char.	0	3·2	8·5	20·	29·	0	·01	·14	·00	1·9	...	Unsafe
90	Caidge Road	QuiteYel.&Ft.T	111·	Charred ...	0	5·5	13·1	23·	28·mg	0	·03	·24	·0	2·5	...	Bad
	Asheldham—															
91	Public Pump	C and C ...	14·	Nil. ...	0	·45	1·5	1·2	5·	0	·00	·02	·0	·13	...	Good
	Dengie—															
92	Landwick	Yellow ...	54·	Char. ...	m t	1·73	9·	15·	14·5	0	·00	·18	·0	2·6	7·	Suspicious
93	Rectory	Ft. Yellow ...	34·	Ft. „ ...	0	·70	3·2	8·	10·	0	·02	·12	·0	1·34	n d	Usable
94	Bridgewick	C and C ...	114·	Nil. ...	...	·05	47·	23·5	3·	0	·84	·04	·0	1·35	...	Good
	Tillingham—															
95	Marshes, Reynold's ...	C and C ...	...	...	...	·075	2·5	n d	n d	0	·01	·11	·0	1·8	n d	Good
96	„ Nunn's ...	„ ...	...	...	...	·80	9·4	11·	24·mg	0	·02	·08	·0	·9	n d	„
97	P. P. in Street ...	„ ..	24·5	Nil. ...	0	·25	3·8	9·	15·5	0	·02	·06	·0	·81	n d	„
98	P. P. in Vicarage Lane	„ ...	12·5	Ft. Char. ...	0	·03	2·1	4·5	5·	0	·01	·08	·0	·56	n d	„

DENGIE.

Population, 300. Area, 2,316 acres of land and water.

There is a considerable amount of marsh land. Soil, loamy; Subsoil, in the marshes sea deposit, in the uplands gravel and loam. There is a small village, but no public pump. Water is obtained from shallow wells chiefly, but there are a few bored wells in the parish.

Asheldham, Dengie, and St. Lawrence:—

Mean Death Rate from Zymotic Diseases, 1881-90 ...	.4
„ all causes	10.0*

TOLLESHUNT KNIGHTS.

Population, 404. Area, 2,101 acres.

Soil and subsoil, clay. No village. At Tiptree Heath water is obtained from springs and shallow wells, but the greater portion of the parish is badly off for water, the only sources of supply being ponds and the brook. Some time ago it was suggested that the water from a spring at Tiptree should be piped to some convenient spot to serve as a public supply, but the scheme met with so much opposition locally that it was abandoned.

Mean Death Rate from Zymotic Diseases, 1881-90 ...	1·8
„ all causes	18·9

TOLLESHUNT MAGNA (Beckingham).

Population, 405. Area, 2,270 acres.

Soil, various; Subsoil, loam and gravel. There are two public roadside dipping places, and near the Hall there is an excellent spring. A few of the houses have private wells and pumps. Some of the cottages have rain water tanks.

Mean Death Rate from Zymotic Diseases, 1881-90 ...	1·5
„ all causes	14·0

GOLDHANGER.

Population, 524. Area, 2,125 acres.

The Soil is light; Subsoil, gravel.

The village is fairly compact, and is supplied with water exclusively by a bored well in the centre of the village belonging to the Rural Sanitary Authority. The deep well water is undoubtedly mixed with a certain proportion of surface water, and it is probably desirable that the well should be opened and examined. There are several shallow wells in the village, but the water is only used for slopping. At the Rectory a bored well yields a good supply of excellent water. There is no system of sewerage.

Mean Zymotic Death Rate, 1881-90	1·7
„ Death Rate, all causes	15·6

* The population of these parishes is probably less now than in 1881. If so the Death Rate will be proportionately higher.

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Ammonia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxygen.	
	Goldhanger—															
99	P. Pump (Bored Well)	F. Yel.& Turbid	106·	Ft. Char. ...	0	·66	37·5	24·5	13·	0	1·00	·04	·0	2·1	2·8	Contaminated with sur-
100	Rectory Pump „	C and C ...	120·	Nil. ...	0	·035	46·4	24·5	6·	0	1·20	·02	·0	·49	n d	Good [face water
	Tolles. Knights—															
101	Hall Cottage (Tank in Pond)	Very Turbid ...	43	Charred ...	0	·06	4·8	5·5	8·5	0	·16	·68	·01	6·	n d	Polluted
102	Brook	Ft. Yel. & Turb.	48·	Very ft. „...	0	·35	6·2	5·5	8·5	0	·60	·03	·02	1·81	n d	„
103	Tiptree Hall	C and C ...	23·	„ ...	0	·34	2·3	1·	6·5	0	·02	·03	·0	·24	n d	Good
104	Arnold's, Tiptree ...	„ ...	43·	Ft. „ ...	0	·83	5·3	1·5	15·	t lead	1·20	·11	·0	·87	n d	Polluted
	Tolles. Major—															
105	Old Times Pump ...	Ft. Yel. & Turb.	89·	Brown ...	...	2·7	12·2	7·5	19·	...	·03	·16	·0	2·79	...	Polluted
106	Old Hall Spring ...	C and C ...	24·	Nil. ...	...	·70	2·5	2·5	15·mg	...	·02	·09	·0	·34	...	Good
107	Public Dipping Place	Faintly Turbid	35·	Charred ...	...	·41	5·9	6·5	11·	...	·16	·11	·03	·93	...	Requires cleaning

TOLLESHUNT D'ARCY.

Population, 823. Area, 3,498 acres, 380 of which is water.

Soil, various; Subsoil, loam and gravel.

The village is fairly compact. Water is abundant and supplied by numerous private wells. There is no public pump. In consequence of an outbreak of Diphtheria, I made in the summer a special report to the Rural Sanitary Authority on the sanitary condition of this village, including as a matter of course the character of its water supply. I pointed out that portions of the village were without sewers, that the present sewers discharged into ditches close to the village, that the huge cesspools attached to nearly every house were all defective, that from all these causes polluting matter was reaching the soil and passing into the wells.

All the waters near the centre of the village, proved to be exceedingly impure. The further the source from this point the better the water. As a result of my examination I recommended, (1) That a public supply of water should be obtained, (2) That the present sewer outfall be extended and the sewerage of the village completed, (3) That all deep cesspools be abolished. It has been decided to carry out all these suggestions, trial borings are being made for water, plans for the extension and improvement of the sewerage system have been approved, and pail closets are being substituted for the old cesspool privies.

Notwithstanding the character of the drinking water, there has not been a death in the parish from Diarrhœa for the past 20 years, and no death from Typhoid for the last 10 years at least. These wells are all liable to specific pollution, and at any time Typhoid fever may be introduced and possibly cause such an epidemic as occurred at Tollesbury in 1879, resulting in many deaths. Dr. Salter informs me that certain forms of indigestion and stomach derangements are excessively prevalent in both D'Arcy and Tollesbury, and he attributes this to the character of the water used.

Mean Death Rate from Zymotic Diseases, 1881-90 ... 1·3
" all causes ... ... 14·1

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Iguition.	Phosophates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead orIron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used	Free Oxygen.	
	Tolles. D'Arcy—															
108	Well, Wager's ...	Clear	113·	Brown Char.	0	1·53	13·4	17·5	n d	0	·48	·24	·04	4·	n d	Bad
109	School	C and C ...	75·	Nil. ...	0	1·16	10·1	20·	14·	0	·00	·06	·0	·6	6·	Good
110	Seebrook's	Yellow tint ...	61·	„ ...	0	1·10	7·8	12·	12·	0	1·20	·08	·0	1·5	2·5	Suspicious
111	Porter's	„ ..	127·	„ ...	0	3·00	16·3	22·	28·mg	0	2·ab	·36	·0	4·75	3·3	Bad
112	Limus Brook	C and C ...	34·	Charred ...	0	·95	4·4	6·	9·	0	·02	·12	·0	1·1	3·	Good
113	Lavender's	Yellow tint ...	122·	Nil. ...	m trace	2·60	14·9	22·	22·mg	0	2·60	·24	·0	1·8	2·4	Bad
114	Segerton's	„	92·	Charred ...	trace	1·67	12·	24·	16·mg	0	·10	·60	1·7	2·8	3·	„
115	Dr. Salter's	C and C ...	54·	Nil. ...	m trace	1·2	14·	12·	13·mg	0	·01	·11	·0	·7	2·8	Usable
116	Rudrums	Fn. Yellow ..	137·	„ ...	0	4·	18·9	25·5	32·mg	0	1·08	·28	·05	2·6	3·1	Bad
117	Red Lion	Clear	54·	„ ...	trace	1·1	6·7	11·5	11·5	0	·02	·10	·02	1·2	2·7	Usable
118	Blaxall's	Ft. Yellow ...	108·	Char. ...	trace	3·1	15·7	24·5	26·	0	2·40	·28	·00	2·5	3·	Bad
119	Clay Pit	C and C ...	27·	Ft. „ ..	0	1·1	2·	3·9	7·5	0	·06	·20	·03	1·3	...	Suspicious
120	„	Ft. Yellow ...	23·	Black „ ...	0	·40	2·2	7·5	7·5	0	·06	·22	·00	3·	6·6	„
121	Hall	Very Yellow ...	54·	„ ...	n d	·7	5·3	20·5	20·	0	·00	·14	·00	3·1	2·2	Usable
122	Vicarage Garden ...	„ ...	62·	„ ...	n d	1·2	5·6	18·5	24·	0	·04	·28	·00	7·1	n d	Bad
123	„ Kitchen ...	Ft. Yellow ...	73·	Ft. „ ...	n d	2·3	8·8	8·	23·5	0	1·00	·28	·01	2·6	n d	„
124	Causes' Pump ..	Yellow tint ...	90·	Nil. ...	n d	2·4	9·2	11·	10·mg	0	·16	·18	1·6	4·3	5·6	Unsafe
125	Hudson's „ ...	„ ..	98·	Char. ...	n d	1·6	18·	20·	26·	0	·20	·18	·0	2·4	6·5	„
126	Queen's Head ...	VeryFt.Col.& T.	88·	Nil. ...	n d	2·4	10·8	14·	29·	0	·24	·08	·0	1·2	4·	„
127	Salter's House ...	Ft. Yellow ..	141·	„ ...	n d	4·5	19·3	8·	36 mg	0	·80	·24	·0	2·65	n d	Bad
128	Wager's, Church St. ...	„ ..	67·	Brown Char.	n d	1·8	9·8	13·	25·	0	·02	·17	·01	2·4	5·	Suspicious
129	Trial Sinking ...	„ & Turbid	24·	„ ...	0	1·7	2·1	11·	17·	0	·05	·06	·0	1·14	...	Good
130	Spring Terrace ...		42·	Nil. ...	0	·73	6·1	6·	15·	0	·09	·10	·15	·8	3·4	„
131	„ Farm	C and C ...	21·	„ ...	0	·49	2·	4·5	12·	0	·06	·10	·0	·7	5·9	„

TOLLESBURY.

Population in 1881, 1,435, probably now nearly 1,500. Area of land, 5,991 acres, much of which is "saltings." The soil is various; Subsoil, loam and gravel. A large fishing village near the mouth of the Blackwater.

Water is abundant and derived from numerous shallow wells. There are three public pumps. Of 15 samples of water examined not one could be said to be really above suspicion. The nearer the centre of the village, the worse the water becomes, and the remarks made with reference to the pollution of the D'Arcy waters apply with almost equal force here. The cesspools are being slowly abolished and pails substituted, but the ground in the village is thoroughly sewage sodden. There are numerous wells the water from which is used for slopping purposes only. I have not included any of these in my investigation, their unfitness for drinking purposes being acknowledged. One of the best waters was yielded by a well at the Coast Guard Station, yet this had been condemned by the Government Officials, and the Coast Guard Cottagers are supplied with rain water carefully collected and stored in iron tanks. An *epidemic of Typhoid fever prevailed here in 1879, causing many deaths, and was traced to the pollution of the wells. Many of the wells were condemned, and to prevent further pollution of the soil the village was sewered and a large number of cesspools filled in. If a supply of pure water could be obtained for this village and for Tolleshunt D'Arcy it would prove a great boon to the district.

The pail closets are emptied periodically by a Scavenger. Most of the village is Sewered. During the last five years some 50 new cottages have been erected, which are not connected with the sewers. Plans have been adopted for sewering this new part of the village and also for extending the present sewer outfall down to the sea. There are very few water closets in the village.

Mean Death Rate from Zymotic Diseases, 1881-90	1·5
„ all causes	12·9

* The disease was introduced into the village by a sailor who was suffering from Typhoid.

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxygen.	
	Tollesbury—															
132	Draw Well	Yellowish & T.	70·	Brown Char.	0	1·22	5·1	7·	17·	0	·15	·12	·75	4·4	6·7	Usable
133	Street P. P.	Nearly C and C	119·	Ft. „ ...	0	5·2	17·3	9·7	31·mg	0	·01	·16	·03	2·8	4·2	Unsafe
134	P. P., D'Arcy Road ...	Ft. Y. & Turb.	35·	Char. ...	0	·45	4·1	16·5	24·	0	·02	·16	·0	1·8	...	Usable
135	„ ...	Very Turbid ...	53·	„ ...	trace	·35	5·3	8·5	20·5	0	·12	·20	·02	2·6	...	„
136	Levitt's	C and C ...	49·	Yellowish ...	0	·12	5·5	14·	16·	0	·02	·24	·08	1·7	5·2	„
137	Lewis	„ ...	125·	„ ...	0	2·89	21·	9 5	25·	0	·26	·20	·17	2·2	6·7	Bad
138	National School ...	Yellowish ...	...	...	...	2 5	22·	16·	...	0	·16	·14	·0	2 9	...	Unsafe
139	Pettican's	Yel.& slightly T.	145·	Brown Char.	n d	3·3	18·5	6·3	27·	0	·18	·25	·0	3·4	7·1	Bad
140	Bibby's	Yellow& Turbid	67·	Nil. ...	l trace	1·7	5·9	10 5	30·mg	0	·02	·24	·0	2·7	8·8	„
141	Wilkinson	Ft. Yellow ...	51·	Slight Char.	l trace	·4	7·5	15·5	24·mg	0	·01	·14	·15	2·6	2·	Unsafe
142	Coastguard	„ ...	62·	„ ...	0	·7	7·9	11·	24·mg	0	02	·16	·0	1·2	...	Usable
143	Post Office	Quite Yellow..	132·	Char. ...	loaded	1·2	18·5	16·	31·5	0	·04	·20	·0	3·7	3·3	Unsafe
144	Walford's	Ft. Yellow ...	110·	„ ...	?	1·1	12·1	4·	32·	0	·08	·24	·01	3·	...	„
145	Banyard's	Yellow ...	118·	Ft. „ ...	loaded	2·7	13·1	7·5	36·	0	·09	·36	·0	3·8	...	„
146	Fisher's	„ ...	79·	Nil. ...	trace	3·4	10·8	16 5	26·mg	0	·08	·12	·00	2·1	...	„

WOODHAM WALTER.

Population, 523. Area, 2,421 acres.

Surface, undulating; Soil, mixed; Subsoil, gravel and clay.

Village fairly compact, but without drainage. Privies with underground cesspools or over ditches, Water supply from springs which abound in the parish. The spring near the Bell Inn is most used. Brook and well waters are also used.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... ·4
„ all causes ... ... 14·5

HAZELEIGH AND WOODHAM MORTIMER.

Hazeleigh ... population ... 122. Area, 973 acres.
Woodham Mortimer „ 332. „ 1,380 „

Soil, gravel in patches, but chiefly clay; Subsoil, clay; Surface, undulating; No village. The gravel pits here supply nearly all the Dengie Hundred.

The chief water supply is the "Conduit," at Woodham Mortimer, which carries water from a spring in the fields to a dipping place at the roadside. Water is fetched in butts from here to supply distant parts of the parishes. Rather than fetch water from such a distance, many people obtain from the brook. Here and there water is obtainable by sinking shallow wells, but most of this district is really without any water supply, nor is such obtainable either by boring or otherwise, at a reasonable cost. At Hazeleigh, on the Fambridge-road, there is a bored well at Jenkins supplying the farm and houses around.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... ·9
„ all causes ... ... 13·2

COLD NORTON.

Population, 185. Area, 1,691 acres.

Soil and Subsoil, strong clay.

The village consists of a number of straggling cottages along the road side. Until recently water had to be obtained from the adjoining parish of Stow Maries or from ponds. The Great Eastern Railway Company have opened a station here, and a well has been bored to supply the *employés*. An arrangement has been made by the Rural Sanitary Authority whereby the inhabitants of a dozen cottages nearest the station can avail themselves of the water from this source. At Marsh Barn Farm, near Fambridge, a bored well, the pump of which stands by the roadside, supplies many of the residents in this and the adjoining parishes. No system of drainage.

Mean Death Rate from Zymotic Diseases, 1881-90... ... Nil.
„ all causes ... ... 16·2

NORTH FAMBRIDGE.

Population, 142. Area, 1,248 acres.

A considerable portion of the parish consists of Marshes. The Soil and Subsoil are strong clay.

Houses much scattered. There is a bored well near the Ferry, belonging to the Rural Sanitary Authority. This has recently been repaired, and yields a very good water. There is a similar well at the Railway Station. The bored well at Marsh Farm, referred to in Cold Norton, and owned by Mr. Clarke, is used more than either of the others. Water from here is carted long distances. All the waters are of very similar character.

Mean Death Rate from Zymotic Diceases, 1881-90 ... ... Nil.
" all causes ... ... 13·4

PURLEIGH.

Population, 822. Area, 5,713 acres.

Soil and Subsoil, stiff loam.

The village is situated on an eminence, and is supplied with water almost exclusively by the public pump. The well is 300 ft. deep and yields a fair supply of tolerably good water. A man carts the water from here to various portions of the parish, retailing it at 3 buckets a 1d. There are one or two bored wells in the parish. No system of drainage.

Rudley or Radley Green is about a mile from the pump, from which the water has to be carted or carried. Unfortunately in summer the Carter finds more remunerative employment for his horse, and the hamlet suffers great inconvenience. Filthy pond waters are resorted to, and during the past summer two or three cases of Typhoid Fever occurred here, most probably from this cause.

Cock Clarks, another Hamlet, is supplied by ponds, and shallow wells.

Howe Green. About a dozen houses. Nearest water supply the Public Pump at Purleigh, half a mile away.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... ·4
" all causes ... ... 13·9

STOW MARIES.

Population, 248. Area, 2,452 (?) acres.

Soil and Subsoil, strong clay.

Village of straggling cottages, supplied with water exclusively from a bored well, belonging to the Rural Sanitary Authority. Farmers in some instances send their butts, nearly two miles for water from this pump. The water is much harder than is usually yielded by wells of this character in the district. No system of drainage.

Mean Death Rate from Zymotic Diseases, 1881-90... ... 1·6
" all causes ... ... 21·8

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxygen.	
	W. Walter—															
147	The Woodlands ...	C and C ...	19·	Ft. Char. ...	s trace	·80	1·8	5·5	7·5	0	·00	·06	·0	·0	8·2	Good
148	Bell Inn	„ ...	11·	Nil. ...	...	·40	1·7	1·7	6·5	0	·01	·03	·0	·55	...	„
149	Brook	Turbid ...	18·	Ft. Char. ...	...	·30	2·2	5·	10·	0	·04	·12	·0	2·2	...	Unsafe
150	Pipe nr. Grays (Land S)	„ ...	10·	„	..	·35	2·2	n d	n d	0	·06	·14	·0	1·3	...	„
	Hazeleigh—															
151	Jenkins	C and C ...	83·	Nil. ...	...	·03	25·6	28·	6·	...	·90	·015	·0	1·07	...	Good
	W. Mortimer—															
152	Dipping Place ...	Turbid ...	25·	Black Char.	0	·31	3·	5·5	10·	..	·08	·10	·0	3·1	10·1	Usable
153	Conduit	C and C ...	14·	Nil. ...	...	·20	2·3	3·	8·	0	·07	·05	·01	·6	...	Good
	Cold Norton—															
154	Railway Bored Well...	Turb. & Ft. Yel.	130·	Blk. Char....	0	·40	14·	13·	19·	0	1·00	·32	l t	9·2	n d	Unfit for use
155	„ „ ...	„	91·	F.B., then fu.	0	·34	22·5	20·5	6·5	...	·48	·05	·73	1·7	9·9	Still doubtful
156	„ „ ...	C and C ...	81·	Nil. ...	0	·075	22·9	23·5	2·	0	·01	·015	·0	·52	...	Good
	N. Fambridge—															
157	Railway Bored Well...	„ ...	93·	„	0	·16	28·	19·5	7·	...	·00	·01	·0	·6	7·	„
158	Clarke's Pump ...	„ ...	97·	Ft. Char. ...	0	·05	26·	26·5	3·5	0	·20	·03	·02	·71	...	„
159	Public Pump	„ ...	91·	„ ...	0	·125	26·4	26·5	5·	0	·01	·04	·00	·71	...	„
	Stow Maries—															
160	Public Pump	Faint Yellow...	87·	„ ...	0	·045	22 8	26·5	10·5	0	·10	·01	·04	·75	...	„
	Purleigh—															
161	Pond, Cock Clarke's...	F. Yel. & Turb.	34·	Char. ...	0	·16	7·7	15·	11·	...	·02	·44	·05	4·6	10·	Polluted
162	School Pump... ...	Faintly Turbid	51·	Blk. „ ..	0	·82	6·5	2·5	10·	...	·01	·20	·0	2·6	6·3	Unsafe
163	Rectory Cottage ...	D. B., T. & offen.	420·	V. B. Char.	0	4·	64·	7 5	50·6 m	g...	2·ab	1·5ab	1·6	16·	5·7	Bad
164	Round Bush B. W. ...	Faint colour ...	103·	Char. ...		1·7	29·3	27·5	6·5	...	·10	·12	·02	1·9	n d	Contains a little surface [water
165	Public Pump	C and C ...	92·	Nil. ...	...	·06	23·	26·5	3·	...	·00	·02	·00	·60	...	Good

HEYBRIDGE.

Population, 1,677. Area, 2,136 acres.

Soil, a light loam; Subsoil, gravel. The whole parish is very flat.

The village lies on the north bank of the Blackwater. A great proportion of the inhabitants are employed at Bentall's Agricultural Implement Works. The village is drained by a number of short sewers with outfalls into the Creek. Privies, many with underground cesspools, others placed over the river and discharging directly into it, but the majority have small receptacles above ground, which are emptied periodically at short intervals.

Nearly the whole village is supplied with water from a bored well at the Works. The water from the well is laid on to several stand pipes. There are several other bored wells here, and many shallow wells with pumps.

A number of scattered houses at Broad Street Green are supplied by shallow wells. As some of these a short time ago were found to be polluted, Sir Claude de Crespigny has allowed the people to fetch the water from the pump supplying his cottages. This now shews signs of becoming contaminated.

Mean Death Rate from Zymotic Diseases, 1881-90 .. ... 1·5
" all causes ... ... 14·4

LAGNFORD.

Population, 231. Area, 1,076 acres.

Soil light; Subsoil, gravel and loam. The whole parish is very flat.

Village very small. No sewers. Privies with cesspools or with small brick receptacles. *Water supply:* Chiefly from two public pumps, one opposite the Schools, the other near the Hall. One pump has been erected this year in consequence of my reporting that the dipping place at the spring allowed surface water to get in, and that the water was often fouled by the dirty vessels. The cottages at a distance from these pumps use ditch water.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... ·4
" all causes ... ... 9·1

ULTING.

Population, 163. Area, 1,162 acres.

On the north bank of the Chelmer. There is no village. Soil, light, gravelly; Subsoil, gravel. Water from springs chiefly. The principal one is in a field near the Church.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... Nil.
" all causes ... ... 17·1

WICKHAM BISHOP.

Population, 535. Area, 1,534 acres.

Position elevated, the straggling cottages constituting the village standing on one of the highest hills in Essex. Soil, light; Subsoil, gravel and sand. No drainage. Privies with underground cesspools. Water from private pumps and roadside dipping places. The principal supply is from a public dipping place built over a spring near the schools.

Some portions of the parish are badly supplied with water, and an application is being made by the Rural Sanitary Authority to the County Council to allow a disused well on their estate to be used by the inhabitants around, providing the water proves to be of good quality. The estate was originally purchased for the erection of a County Asylum, but after spending a large sum of money in making a deep well it was found that a sufficient supply of water could not be obtained, and the site was then abandoned.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... 2·4*
„ all causes ... ... 16·4

THE BRAXTEDS.

Great Braxted, population, 373. Area, 2,631 acres.
Little Braxted, „ 110. „ 563 „

District very undulating and elevated. Soil, gravel and loam; Subsoil, gravel and marl. No village. Largest group of houses is at Bung Row, Great Braxted, and there is a public pump here. Near the School, Little Braxted, a tank intercepts the water from a spring which rises in a wood about half a mile away, and supplies the cottages for some distance around.

Both parishes may be said to be fairly well supplied with water.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... 1·0
„ all causes .. .. 13·9

THE TOTHAMS.

Great Totham, population, 750. Area, 5,863 acres.
Little Totham, „ 293. „ 1,283 „

Soil, light; Subsoil, chiefly gravel and loam. District undulating, the highest point, Beacon Hill, being 284 ft. above sea level. Villages small and straggling. No sewers. Privies with underground cesspools.

Water supply—Great Totham. Chiefly from public pump near Schools, several private pumps. Many prefer to use the brook water rather than fetch from the public pump.

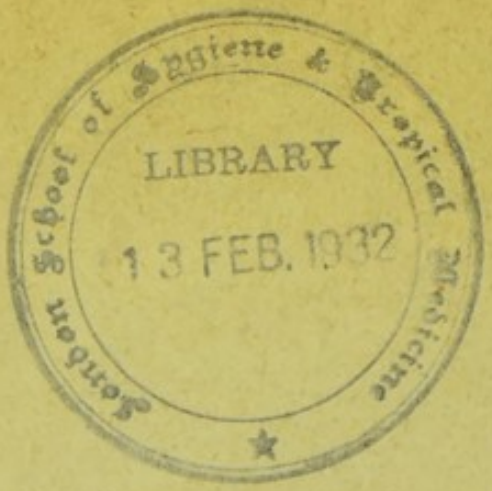
Little Totham. The village is supplied with a capital spring, the outlying houses by shallow wells or brooks. The spring water is piped to the roadside.

Mean Death Rate from Zymotic Diseases, 1881-90 ... ... 1·4
„ all causes ... ... 15·4

* Almost entirely due to an epidemic of Diphtheria in 1881.

SAMPLES OF WATER—CONTINUED.

No.	Source of Sample.	Physical Characters.	Results in grains per gallon.								In parts per million.					Remarks.
			Total Solids	Result of Ignition.	Phosphates.	Nitric Nitrogen.	Chlorine.	Alkalinity.	Hardness.	C'pper Lead or Iron	Free Am'nia	Organic ditto	Nitr's Nitrogen.	Oxygen used.	Free Oxygen.	
	Heybridge—															[known to be getting in
166	Bentall's Ho. Bored W	C and C ...	103·	Fused ...	0	·09	35·	20·5	6·	0	·88	·08	·0	1·4	4·	A little surface water
167	Bentall's Works „	„ ...	100·	„ ...	0	·06	36·5	24·	6·5	0	·60	·01	·006	1·	5·5	Good
168	H. Basin Artesian „	„ ...	102·	„ ...	0	·08	30·	26·5	5·5	0	·49	·01	·0	·8	2·5	„
169	Heybridge Hall B. „	F. Yell. & Turb.	98·	Nil. ...	0	·30	33·4	25·	2·5	0	1·ab	·01	·00	·56	n d	„
170	Chaplin's	Clear	125·	Black Char.	0	4·55	13·2	15·	44·	0	·02	·22	·07	1·7	3·8	Unsafe
171	New House	C and C ...	25·	Nil. ...	n d	·6	2·8	5·	14·5	0	·02	·06	·0	1·4	n d	Good
172	Broad Street Green ...	F. Yel. & Turbid	87·	„	0	1·3	13·9	8·5	21·m g	0	·10	·15	·25	2·8	n d	Unsafe
173	Sir C. de C.'s Cottage	„	97·	Char. ...	...	1·45	12·3	27·	27·	0	·01	·17	·00	2·69	...	Well to be examined
	Langford—															
174	P. P. near School ...	„	32·	Char. ..	0	·7	2·3	13·5	9·m g	0	·04	·10	·0	1·4	4·2	Good
175	P. P. near Hall ...	„	26·	Ft. Char. ...	...	·6	2·4	4·5	12.	0	.06	·06	·0	1·11	...	„
	Ulting—															
176	Roadside Well ...	C and C ..	24·	Ft. Brown...	0	·41	2·2	1·5	7·5	0	·02	·14	·0	1·85	5·7	Usable
177	Near Church	Faintly Turbid	25·	Nil. ...	...	·96	2·5	6·5	11·	0	·08	·14	·0	·71	...	„
	W. Bishops—															
178	Vicarage Farm ...	C and C ...	84·	Char. much	trace	·89	19·9	26·	40·	0	·08	·32	trace	4·58	3·5	Polluted
179	Public Well	Turbid ...	25·	Ft. Char. ...	0	·89	3·1	3·	11·	0	·04	·09	·0	1·8	5·2	Usable
180	„ (at later date)	Faintly Turbid	22·	Nil. ...	0	1·10	2·7	1·	5·5	0	·08	·08	·03	·52	n d	„
181	New House	C and C ...	17·	„	0	·4	1·9	1·5	9·	0	·01	·06	·01	1·1	n d	Good
182	**G. Braxted** P P....	„ „	23·	„	0	·6	3·6	2·5	9·5	0	·04	·16	·00	1·2	n d	Usable
183	**L. Braxted** P. P....	„ „	18·	Ft. Char. ...	0	·85	1·7	1·	4·5	0	·02	·09	·0	·47	n d	Good
184	**L. Totham** New Ho	Faintly Turbid	46·	B. Char. ...	0	·43	2·3	9·5	23·	0	·02	·09	trace	3·2	9·2	Usable
185	„ Public Spring	C and C ...	26·	Ft. Char. ...	s trace	1·00	2·8	7·5	10·5	0	·01	·05	·0	·35	n d	Good
186	„ ditto ...	Turbid ...	17·	Char. ...	0	·30	2·	3·5	7·	0	·07	·12	·0	2·7	10·8	Usable
187	**G. Totham** Brook	Very Turbid ...	31·	„ ...	0	·89	2·5	6·	13·	0	·03	·09	trace	2·96	11·1	Unsafe
188	P. P. near Schools ...	C and C ...	17·	Ft. Char. ...	...	·52	1·5	1·	5·	0	·18	·04	·01	·61	...	Good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